BBRC

Bioscience Biotechnology Research Communications

Special Issue Vol 13 Number (8) 2020
Print ISSN: 0974-6455
Online ISSN: 2321-4007
CODEN BBRCBA
www.bbrc.in
University Grants Commission (UGC)
New Delhi, India Approved Journal

Bioscience Biotechnology Research Communications
Special Issue Volume 13 Number (8) 2020

Special Issue Volume 13 Number (8) 2020

On

Advances in Dental Research

An International Peer Reviewed Open Access Journal

Published By:
Society For Science and Nature
Bhopal, Post Box 78, GPO,
462001 India

Indexed by Thomson Reuters, Now Clarivate Analytics USA

SJIF 2020=7.728
Online Content Available:
Every 3 Months at www.bbrc.in

SOCIETY FOR SCIENCE AND NATURE
SCIENCE FOR LIFE

Registered with the Registrar of Newspapers for India under Reg. No. 498/2007
Bioscience Biotechnology Research Communications
Special Issue Volume 13 No (8) 2020

ISSN 0974-6455

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EDITORIAL COMMUNICATION

The special issue of Bioscience Biotechnology Research Communications Vol 13 No (8) 2020 on "Advances in Dental Research" aims to provide an academic compilation to discuss various original research articles from clinicians, research scholars, academicians and scientific experts on different recent perspectives in the exciting field of dental research. This special issue contains 100 original articles which forms the platform for providing latest scientific knowledge on Advanced Researches in Dentistry and their applications.

Some noteworthy research contributions of the special issue are Centrally acting skeletal muscle relaxants during tooth preparation procedure; Piezoelectric surgery, ER:YAG laser and Rotary surgical burs in harvesting mandibular block grafts; Cytotoxicity of a nanoparticle incorporated root canal sealer; and Comparative evaluation of antimicrobial efficacy of calcium hydroxide mixed with different vehicles on Enterococcus faecalis, which will be very interesting to the readers.

The published research articles have been aimed to motivate the next generation researchers working in this emerging research era. The articles available in this issue will be helpful for the researchers working in these new emerging areas. Best wishes and thanks for the excellent original contributions from the undergraduates and postgraduates, research scholars and senior faculty members, from Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Chennai, India.

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Research Communications

Morphometric analysis of External Occipital Crest

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ABSTRACT

The external occipital crest is a part of the external surface of the squamous part of Occipital bone, it is otherwise called the median nuchal line. It extends from external occipital protuberance to foramen magnum. The inferior nuchal line starts laterally from the middle of crest between the posterior rim of foramen magnum and external occipital protuberance. The main aim of this study is to measure the distance of external occipital crest and position of starting point of inferior nuchal line from the posterior rim of foramen magnum and external occipital protuberance.48 unsexed human skulls were taken from the Department of Anatomy, Saveetha Dental College and hospitals and the distance along external occipital crest between. External occipital protuberance to posterior rim of foramen magnum (AC). External occipital protuberance to the inferior nuchal line (AB) and Inferior nuchal line to the posterior rim of foramen magnum (BC)

was measured using the digital Vernier caliper all data were recorded and analyzed statistically. The average mean distance of the measurements taken in 48 skulls between the external occipital protuberance to posterior rim of foramen magnum (AC) was 38.23±5.28 mm, between external occipital protuberance to the inferior nuchal line (AB) was 19.55±3.93 mm and between the inferior nuchal line to the rim of foramen magnum (BC) was 16.63 ± 2.28 mm respectively.Our research provides morphometric data of external occipital crest of occipital bone which could be a valuable for surgeons to plan for the cranial base surgeries.

KEY WORDS: OCCIPITAL BONE, EXTERNAL OCCIPITAL CREST , EXTERNAL OCCIPITAL PROTUBERANCE, INFERIOR NUCHAL LINE, POSTERIOR RIM OF FORAMEN MAGNUM.

ARTICLE INFORMATION

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Received 25th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/101

INTRODUCTION

External occipital crest is seen in the external surface of the squamous part of the occipital bone. It begins at external occipital protuberance and moves downwards to the foramen magnum. It is convex in shape and present in the middle between the summit of the bone and foramen magnum. External occipital crest is also known as median nuchal line. It provides the attachment to the nuchal ligament. Inferior nuchal line is present in the posterior surface of occipital bone it is the ridge extending laterally from either side of the middle of the external occipital protuberance and foramen magnum, curving slightly upward. Superior nuchal lines have very less chance of damage of intracranial venous penetration(Zipnick et al., 1996). Some cases the external occipital protuberance shows hyperostosis which gives horn-like curved appearance to the external occipital bone(Satyarthee, 2019). In laboratory study of CSM Medical university they have found that most of the skulls have shown exostosis from the external occipital protuberance(Singh, 2012).

The enlargement of external occipital protuberance was found in the young individuals of ancient times; this same growth is now found in CT scan of present generation youngsters (Jacques et al., 2020). Previous research was done on the occipital bone ,is helpful in the sexual dimorphism in the archaeological population(Hoover, 2017). Other research was done based on the occipital bone thickness ,which was an cadaveric ('Occipital bone thickness: Implications on occipital-cervical fusion. A cadaveric study', 2016). This study helps to know the variation between the thickness of occipital bone of male and female (Zipnick et al., 1996). Other few research was done based on the morphometric and radiologic anatomy of the occipital bone (Naderi et al., 2001).

With a rich case bank established over 3 decades we have been able to publish extensively in our domain (Abdul Wahab et al., 2017; Eapen, Baig and Avinash, 2017; Patil et al., 2017; Jain and Nazar, 2018; J et al., 2018; Marimuthu et al., 2018; Wahab et al., 2018; Abhinav et al., 2019; Ramadorai, Ravi and Narayanan, 2019; Senthil Kumar et al., 2019; Sweta, Abhinav and Ramesh, 2019). Over the past years various research done by our team was on Osteology (Choudhari and Thenmozhi, 2016) (Hafeez and Thenmozhi, 2016)(Kannan and Thenmozhi, 2016)(Keerthana and Thenmozhi, 2016) (Pratha, Ashwatha Pratha and Thenmozhi, 2016) (Nandhini et al., 2018)(Subashri and Thenmozhi, 2016), stature estimation (Krishna, Nivesh Krishna and Yuvaraj Babu, 2016), uses and ill effects of electronic gadgets (Sriram, Thenmozhi and Yuvaraj, 2015) (Thejeswar and Thenmozhi, 2015), on RNA (Johnson et al., 2020) (Sekar et al., 2019), animal studies (Seppan et al., 2018) and in few other fields (Menon and Thenmozhi, 2016)(Samuel and Thenmozhi, 2015). There is a lack of much information on the current topic of morphometric analysis of External Occipital Crest. The main aim of the study is Morphometric analysis of External Occipital Crest.

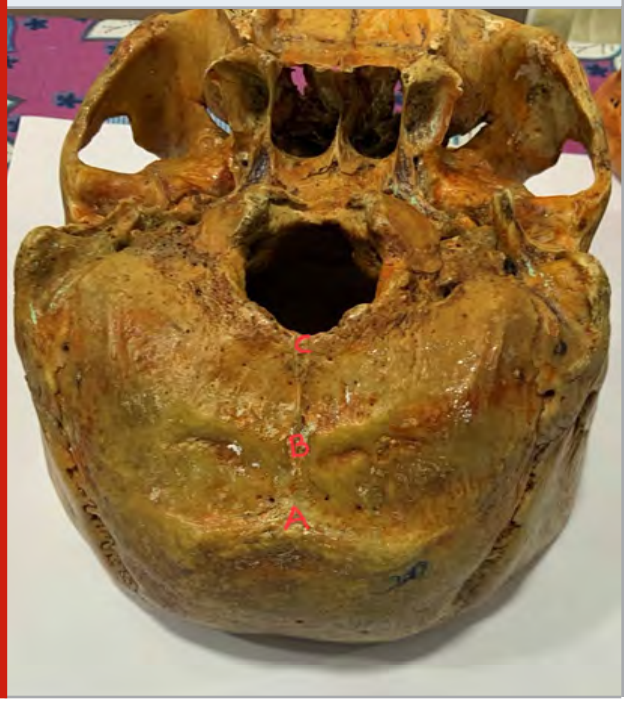
MATERIAL AND METHODS

Forty-eight unsexed dry human skulls were taken from the Department of Anatomy of Saveetha Dental College and Hospitals the distance between

1. Lower end of external occipital protuberance to posterior rim of foramen magnum.[AC]
2. External occipital protuberance to inferior nuchal line .[AB]
3. Inferior nuchal line to posterior rim of the foramen magnum .[BC]

were measured using a digital vernier caliper each skull was studied separately for the above measurements were recorded. All data were collected and analyzed statically and the mean((mm) and range(mm) were tabulated separately for understanding purposes [Table 1}.

Figure 1: Picture showing anatomical landmarks used to measure the external occipital crest, A - External occipital protuberance, B- Inferior nuchal line, C- posterior margin of Foramen Magnum



RESULTS AND DISCUSSION

The measurements from lower end of external occipital protuberance to posterior rim of foramen magnum [AC] was in the range is 25.71 to 50.53mm and its mean was measured to be 38.23±5.28 mm, The distance between the external occipital protuberance to inferior nuchal line [AB] was within range of 10.09 to 28.45 mm and the mean was 19.55±3.39 mm finally the distance between the inferior nuchal line to posterior rim of the foramen magnum [BC] was in range of 12.23 to 20.64mm and mean value is 16.63±2.28mm .from our study we found that these distance varies from individual to individual.

The external occipital protuberance for determination sex in turkish population (Gülekon and Turgut, 2003). The study found enthesophytes in the occipital protuberance in 41% of their skull (David Shahar, 2016). We are not able to find any published research done on morphometric measurement of external occipital crest, it was found to be (38.28±5.28 mm) and inferior nuchal line at a distance (19.55±3.39)mm from external occipital protuberance and (16.63±2.28)mm from the posterior border of foramen magnum. From the search of previous research articles we found articles for the surgical applications for nuchal ligament (Kadri and Al-Mefty, 2007). Pain in the external occipital protuberance due to the exostosis (Marshall, Abela and Eccles, 2015) A non metric study was done among the Korean population by using external occipital protuberance for the determination of human gender (Kim and Han, 2015). Nuchal line can be helpful for the dissecting superficial muscle and deep muscle such as muscles of the suboccipital triangle (Campero et al., 2018) , but we couldn't find any article related to the external occipital crest.

Table 1. Range and Mean distance in millimeter of various measurements

Distance between	Range in mm	Mean Distance in mm
External occipital protuberance to posterior rim of foramen magnum (AC)	25.71-50.53	38.23±5.28
External occipital protuberance to the inferior nuchal line (AB)	10.09-28.45	19.55±3.93
Inferior nuchal line to the posterior rim of foramen magnum (BC)	12.23-20.64	16.63 ± 2.28

CONCLUSION

Since most of the research have only done on the external occipital protuberance and occipital cervical fusion of the bone, but in our study we have collected the measurement data for the external occipital crest and this data would be helpful for the neurosurgeons to plan for the cranial based surgeries.

ACKNOWLEDGEMENTS

We acknowledge Department of Anatomy for allowing us to use bones from their collection for this study

Conflict of Interest: The author declares that there is no conflict of interest in the present study.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-05-10

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Factors Associated with Dental Pain in Toddlers – Using Dental Discomfort Questionnaire (DDQ)

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ABSTRACT

Dental pain is considered as one the most common symptoms associated with oral problems. It creates a great impact on the quality of life and if it gets worse, it may even affect the daily activities. In neonates and toddlers, behavioural and psychological variations are used to assess pain. The aims of this study are to evaluate the factors associated with dental pain in toddlers using DDQ. To compare dental pain and dental caries evaluated using ICDAS. To compare the frequency of dental pain and socio-economic status of parents. A cross sectional study was conducted in Saveetha Dental College Chennai, Tamilnadu. 93 children of the age group 1-4 years (toddlers) were submitted to an oral clinical examination for the evaluation of dental caries using International Caries Detection and Assessment System (ICDAS). The caregivers of the children were asked to fill a dental discomfort questionnaire along with a questionnaire addressing their socio-economic and educational status . The factors ``chewing on one side" and "reaching the cheek while chewing are the common associated factors of pain which were observed by the parents and caretakers of the children. Pain scores were higher in patients with caries involving dentin, with or without involving pulp (scores 4 and above). Families with low annual income had increased pain scores. Greater frequencies of pain were observed in families with low income and also in dental caries involving dentin with/without involving pulp.

KEY WORDS: DENTAL PAIN IN TODDLERS, TOOTH PAIN IN TODDLERS, CARIES IN TODDLERS, DENTAL DISCOMFORT QUESTIONNAIRE, PAIN ASSESSMENT IN TODDLERS.

INTRODUCTION

Dental pain is considered as one the most common symptoms associated with oral problems. It creates a great impact on the quality of life and if it gets worse, it may even affect the daily activities. (Ratnayake and Ekanayake, 2005; Moura-Leite et al., 2011; Marayza Alves Clementino et al., 2015) Pain is a subjective experience and hence self report pain measures are considered gold standard for assessment of pain. Objective assessment of pain in children is a great challenge for all healthcare workers including dentists. (Franck, Greenberg and Stevens, 2000) This is because children are unable to verbalise feelings of pain and moreover variations in children's cognitive abilities affect how they perceive, understand, remember, and report pain. (Versloot, Veerkamp and Hoogstraten, 2005; Daher, Abreu and Costa, 2015) Children gradually improve their understanding of pain (6–11 years), the cognitive sequence ends in the formal operational stage in which children (12 years and older) use sophisticated psychophysiological concepts to describe pain. These children generally understand why pain hurts and can explain its value. (Harbeck and Peterson, 1992)

ARTICLE INFORMATION

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Received 4th August 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/102

In neonates and toddlers, behavioural and psychological variations are used to assess pain. Hence parents play an important role in the assessment of pain in neonates and toddlers. (Reid et al., 1995; M. A. Clementino et al., 2015) The Dental Discomfort questionnaire (DDQ) is a tool devised to recognise pain and to assess the severity of pain in children 2-5 years of age through the reports of parents / caregivers regarding the changes in their child's behaviour. (Knowledge and Attitude of Parents Regarding Children's Primary Teeth & their Willingness for Treatment, no date; Versloot, Veerkamp and Hoogstraten, 2006; Daher et al., 2014) There are several factors associated with dental pain. In young children, the factors are less and one main factor among the several factors associated with pain is dental caries. (Slade, 2001; Ortiz et al., 2014; Ferreira-Júnior et al., 2015; Nivethithan and Raj, 2015; Schuch et al., 2015; Naziya et al., 2017) Pain caused by carious tooth can be manifested in different ways by the child – child may eat less, sleep less, sometimes may exhibit negative behaviour. In a study, post treatment of dental caries, there was a subsequent increase in the quality of life in children like eating and sleeping. (Naziya et al., 2017) A study on the effects of dental caries on the quality of life in children showed that only 48% of the children with carious lesions indicated that they had pain or discomfort, however they did manifest effects of pain by changing their eating and sleep habits. (Low, Tan and Schwartz, 1999)

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years. (Govindaraju, Jeevanandan and Subramanian, 2017a, 2017b; Panchal, Gurunathan and Shanmugaavel, 2017; Ravikumar, Jeevanandan and Subramanian, 2017; Jeevanandan and Govindaraju, 2018; Nair et al., 2018; Ravikumar et al., 2018, 2019; Ravindra et al., 2018, 2019; Subramanyam et al., 2018; Vishnu Prasad et al., 2018; Jeevanandan, Ganesh and Arthilakshmi, 2019; Ramadurai et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Veerale Panchal, Jeevanandan and Subramanian, 2019; Vignesh et al., 2019; V. Panchal, Jeevanandan and Subramanian, 2019; Samuel, Acharya and Rao, 2020). With this inspiration we planned to pursue research on the factors associated with dental pain in toddlers - using dental discomfort questionnaire (DDQ). The usage of Dental Discomfort Questionnaire aids in the assessment of dental pain in children less than 5 years and helps in understanding dental pain experience in them. The aims of this study are to evaluate the factors associated with dental pain in toddlers using DDQ. To compare dental pain and dental caries evaluated using ICDAS. To compare the frequency of dental pain and socio-economic status of parents.

MATERIAL AND METHODS

A cross sectional study was conducted in Saveetha Dental College Chennai, Tamilnadu. 93 children of the age group 1-4 years (toddlers) were submitted to an oral clinical examination for the evaluation of dental caries using International Caries Detection and Assessment System (ICDAS). The caregivers of the children were asked to fill a dental discomfort questionnaire along with a questionnaire which includes their demographic details, socio economic status and educational status of the family. Only the mother's educational status was included in the study as it has a great significance in the oral health of the child. Children with systemic health problems that required medical assistance and greater care on the part of the parents/caregivers were excluded from the study.

The questionnaire consisted of 3 parts. First part included demographic details. The second portion included the Dental Discomfort Questionnaire (DDQ) and the final portion of the questionnaire included questions assessing their socioeconomic status and educational status of the parent. The DDQ included the following questions (Figure 1)

Figure 1: Dental Discomfort Questionnaire (DDQ)

Dental Discomfort Questionnaire

How often did the child have a toothache?

a. Never
b. Sometimes
c. Often
d. I do not know

If sometimes or often , when does it occur?

a. During meals
b. During the day
c. During the night

Do you notice the toothache yourself? Yes/No

Does your child indicate the toothache to you? Yes/No

Behavioural and lifestyle changes observed : Each question is given a score based on the option selected. Final score is calculated.

0: Never 1: Sometimes 2. Often

1. Bites with molars instead of front teeth
2. Puts away something nice to eat
3. Cries during meals
4. Has problems with brushing lower teeth
5. Has problems with brushing upper teeth
6. Has earache during the day
7. Has earache at night
8. Has earache while eating
9. Has problems chewing
10. Chews on one side
11. Reaches for the cheek while eating
12. Suddenly cries at night

Final score:

RESULTS AND DISCUSSION

This study investigated factors associated with dental pain detected using DDQ. A total of 93 children (71% females and 29% males) aged 1-4 were included in the study [figure 2 and 3] . Only 6.5% of the respondents experienced tooth ache often; 54.8% of the respondents had toothache sometimes and 25.8% of the respondents never had toothache [figure 4]. 50% of the children experienced toothache during the day, 22.7% at night and 27.2% during meals [figure 5]. 35.7% parents admit that

they can't notice the toothache by themselves [figure 6]. 57.1% of the respondents say that their child indicates toothache to them [figure 7].

Figure 2: Bar graph depicting toddlers belonging to different age groups. X-axis shows the different age groups - 1 year (lavender colour), 2 years (blue colour), 3 years (green colour) and 4 years (beige colour) respectively. Y-axis shows the number of participants. Participants aged 4 years were more.

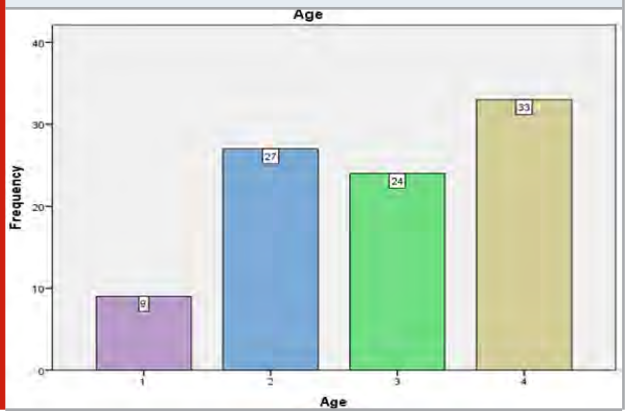


Figure 3: Bar graph depicting the gender of participants. X-axis shows gender - males (green colour) and females (blue colour). Y axis shows the number of participants. Females (71%) were more compared to males (29%).

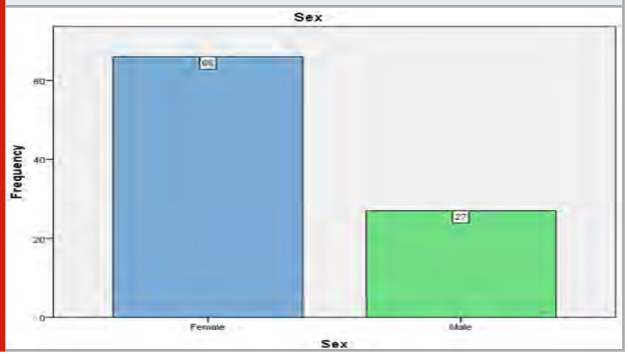


Figure 4: Pie chart depicting the frequency of toothache among the participants. 54.84% of the participants responded that their child experienced toothache "sometimes" (magenta colour), 25.81% said "never" (green colour), 6.45% said "often" (beige colour) and 12.9% said "they don't know" (blue colour).

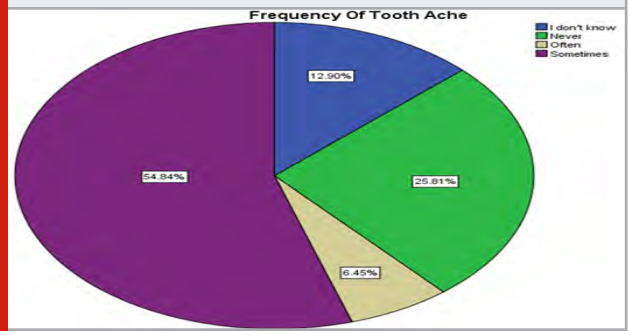


Figure 5: Pie chart depicting the onset of pain among the participants. 35.48% of the participants responded that their child experienced toothache "during the day" (green colour), 29.03% said "during meals" (blue colour), 16.13% said "during the night" (beige colour). Majority of the participants reported toothache during the day.

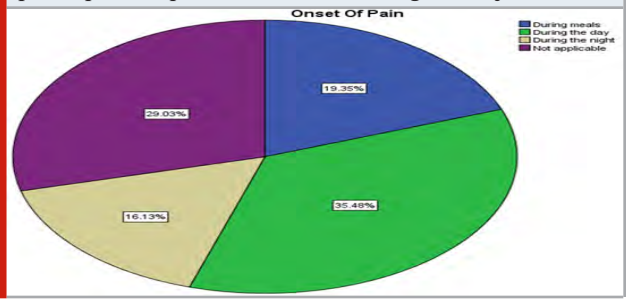


Figure 6: Pie chart depicting the signs of pain identified by the parents. 58.06% of the participants responded that they did not find any sign indicating toothache (blue colour), 32.26% said they were able to identify signs indicating toothache (beige colour).

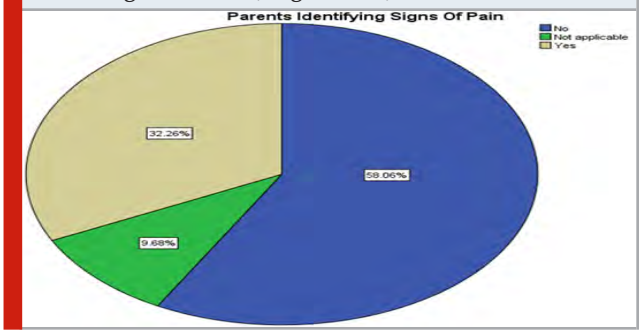
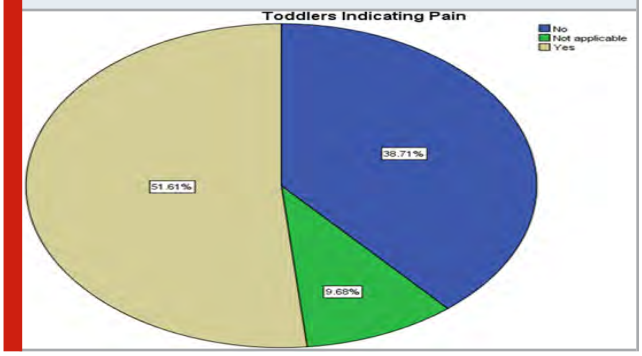


Figure 7: Pie chart depicting the frequency of toddlers indicating toothache. 51.61% of the toddlers were able to indicate pain (beige colour), 38.71% of toddlers were not able to indicate tooth pain (blue colour).



The percentage of different factors associated with pain and is expressed by the respondents is tabulated in Table 1.

From Table 1 it is evident that the factors ``chewing on one side" and "reaching the cheek while chewing are the common associated factors of pain which were observed by the parents and caretakers of the children. These

results were in contrast with the results obtained in a study done by Isabella Barbican Fernandes et.al., where the most frequent factors were "suddenly cries at night", "puts away something nice to eat" and bites with molars instead of front teeth". (Fernandes et al., 2018)

Table 1. DDQ index

Factor	Never (n%)	Sometimes (n%)	Often (n%)
Bites with molars instead of front teeth.	48.4%	45.2%	6.5%
Puts away something nice to eat	54.8%	41.9%	3.2%
Cries during meals	54.8%	45.2%	0
Has problems with brushing lower teeth	54.8%	45.2%	0
Has problems with brushing upper teeth	71%	19.4%	9.7%
Has earache during the day	74.2%	22.6%	3.2%
Has earache at night	80.6%	16.1%	3.2%
Has earache while eating	80.6%	90.4%	0
Has problems chewing	61.3%	38.7%	0
Chews on one side	35.5%	61.3%	3.2%
Reaches for cheek while eating	41.9%	58.1%	0
Suddenly cries at night	64.5%	29%	6.5%

Pain scores were higher in patients with caries involving dentin, with or without involving pulp (scores 4 and above). This is due to the exposed dentinal tubules. This is in accordance with several studies done to find the association with dental caries and dental pain. (Low, Tan and Schwartz, 1999; Thomas and Primosch, 2002) More advanced stages of dental caries have proven to restrict the daily activities of affected children [6].

Mother's age and schooling did not have any correlation with increased pain score as observed by Isabella Barbican Fernandes et.al., But socioeconomic status had an effect on the pain score. Families with low annual income had increased pain scores. This is in accordance with the study done by Isabella Barbican Fernandes et.al., (Fernandes et al., 2018) Several other studies have also proved the association between dental pain and socioeconomic factors. (Slade, 2001; Ratnayake and Ekanayake, 2005; Ferreira-Júnior et al., 2015; Schuch et al., 2015; Narayanan, 2017; Siddiqui et al., 2019)

CONCLUSION

This study investigated various factors associated with dental pain in toddlers using DDQ. These findings are of great importance to understand the determinants of pain and also to educate parents to under and identify these behavioural changes associated with pain. Many children with rampant caries remain untreated as they fail to verbally express pain. In this study, greater frequencies of dental pain was observed in children with caries involving dentin, with or without involving pulp. Also there were increased scores in children with low annual income. This study was done to educate parents to identify these factors and to seek dental help at the earliest and prevent further damage to teeth.

ACKNOWLEDGEMENTS

The authors of this study would like to express their gratitude towards everyone who facilitated and enabled us to carry out this study successfully.

Conflict of Interest: There were no conflicts of interest as declared by the authors.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-11-18

BBRC
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Knowledge, Attitude and Practice of Shade Matching Among Dental Students – A Survey Based Analysis

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ABSTRACT

This study was done to determine the knowledge, attitude and practise of shade matching techniques among dental students. Esthetics are of great importance in anterior teeth restorations. Shade selection plays an important role to achieve with a good aesthetic restoration that harmoniously blends to the natural dentition. Even though the colour may not be important to the physiological success of a dental restoration but it plays a dominant role in patient acceptance. Patients are currently demanding esthetic replacement that must match their existing dentition, and are more concerned about the shade match of their restoration rather than the quality of the restoration. This was a questionnaire based study. The study setting was a University setting. A pre-tested questionnaire with 10 questions was formulated for the collection of information. They were distributed to 100 dental students at a private dental institution and their answers were recorded. Excel Tabulation was done. SPSS was used to find out the association. In this study, all the dentists used only visual methods for shade matching. 62% of them did not find any difficulty during the process of shade matching. The second opinion from another dentist for shade matching was preferred by 68% of them while only 6% of them asked for the patient's opinion during shade matching. Natural light was mostly used for shade matching. From the present study, we can conclude that the dental students had comparatively better understanding and knowledge about the principles of tooth shade selection. Majority of them did not face any difficulties during shade matching. They had better knowledge about the effectiveness and reliability of natural light during shade matching. But the knowledge about recent advances in shade matching was very less so better training and work experience can help them to understand about the advancements and the significance of shade matching.

KEY WORDS: AESTHETICS; COLOUR; KAP SURVEY; LIGHT; SHADE MATCHING.

ARTICLE INFORMATION

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Received 5th August 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/103

INTRODUCTION

Nowadays, aesthetics has turned into an essential issue, as it appears to characterize one's character. Before, practical needs were the primary thought in dental treatment. Today, the concentration has moved towards dental aesthetics(Awinashe and Dugad, 2010). Reproducing the color of a natural tooth with artificial replacement still possesses a great challenge in modern dentistry(Vichi, Ferrari and Davidson, 2000; Azer et al., 2011). The success of restorative dentistry is principally determined based on functional and aesthetic results and is directly related to the accuracy of chair side selection(Hall, 1991; Joiner, 2004).

Esthetics are of great importance in anterior teeth restorations. Shade selection plays an important role to achieve with a good aesthetic restoration that harmoniously blends to the natural dentition. Even though the colour may not be important to the physiological success of a dental restoration but it plays a dominant role in patient acceptance. Patients are currently demanding esthetic replacement that must match their existing dentition, and are more concerned about the shade match of their restoration rather than the quality of the restoration(Hall, 1991).

So chair side selection has become a very important step in the overall treatment of the patient. Both visual and instrumental methods are used for shade selection with merits and demerits over each other. However, the visual method is still the most commonly used method due to relative simplicity and low cost(Hammad, 2003; Klemetti et al., 2006; Small, 2006).

One of the main concerns in the visual method is its highly subjective nature. Different individuals can have different shade perceptions for the same object(Hammad, 2003; Small, 2006). To achieve a good result, the four basic determinants are required. They are position,contour,texture and colour. The knowledge of the concept of colour is of great importance to achieve a good esthetics and its distribution of colour is very essential for dental shade matching(O'Brien et al., 1997). Colour combination will make the restoration look natural and attractive and also gives a good esthetic result. Color is a result of the interaction of three dimensions known as hue,chroma and value(Magne and Holz, 1996; Vanini, 1996).

Hue is denoted qualities that can be differentiated by colour words such as red,yellow,green,blue or purple. Chroma is a degree of saturation or the intensity of the hue such as light blue, dark blue and royal blue. Value describes the relative brightness of colours.(Terry, 2003). Visual colour matching is affected by many variables,such as age of the observer, his/her experience, possible colour deficiency, condition of the teeth observed and the light source(Gasparik et al., 2014; Clary et al., 2016).

Factors influencing the tooth colour may include congenital, metabolic, chemical, genetic, infectious and environmental. The shade and appearance of teeth is a heterogeneous phenomenon because many factors like opacity,translucency, light scattering, lighting conditions, gloss and the human eye and the brain influence the overall perception of the tooth colour(Joiner, 2004).

To ensure accuracy, various shade selection protocols have been devised and thorough knowledge of these protocols is important so that visual shade selections can be carried out with accuracy and precision(Okubo et al., 1998; Carsten, 2003; Dagg et al., 2004). Increasingly composite are placed in preference due to patients demands for esthetics as well as the clinical desire to do minimal preparation where possible and provide patients with bonded esthetic restoration(S et al., 2014; Sachan, Srivastava and Ranjan, 2016).

We have numerous highly cited publications on well designed clinical trials and lab studies (Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019; Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019). This has provided the right platforms for us to pursue the current study.

The aim and objective of this study was to provide information on the level of awareness among the dental students in Chennai and the current status of knowledge, attitude and practice towards shade matching.

MATERIAL AND METHODS

The study was conducted in a private dental institution in Chennai. The study setting was carried out in a University setting with approval of the Institutional review board.

Inclusion criteria and Exclusion criteria: Undergraduate third year students, final year students and Interns were included in the study. Post graduate students and dental practitioners were excluded from the study.

Data Collection: A pre-tested questionnaire with 10 questions was formulated for the collection of information. The questionnaire was simple and brief. The self made questions were developed. The questionnaire included self made questions to assess about the knowledge, practise and awareness among the dental students regarding shade matching techniques and its recent advancements. The questionnaire was shared with 100 dental students and their answers were recorded using an online surveying tool(Google Forms).

Statistical Analysis: Data was entered in Microsoft Excel sheets. The data was imported and transferred to the computer and subjected to statistical analysis using SPSS(IBM SPSS Statistics, Version 24.0, Armonk,

NY: IBM Corp]. Chi-square test was performed to find the association between the variables.The level for a statistical significance was set at p<0.05. The results were demonstrated in the form of bar graphs.

Questionnaire

1. Which method do you use for shade matching ?
   a. Visual method
   b. Digital method
2. Do you face any Difficulties during shade matching ?
   a. Yes
   b. No
3. When do you prefer doing the shade selection ?
   a. Before starting the procedure
   b. In between the procedure
4. Do you always ask for a second opinion during shade matching ?
   a. Yes
   b. No
5. Do you ask for a patient's opinion during shade matching ?
   a. Yes
   b. No
6. What type of light do you use during shade matching?
   a. Natural light
   b. Dental unit light
7. Are you aware of the shade guides?
   a. Yes
   b. No
8. What is the most common shade used in your clinical practice ?
   a. A1
   b. A2
   c. B1
   d. B2
9. Do you do the shade selection separately for different regions of the tooth surface ?
   a. Yes
   b. No
10. Are you aware of the recent advancements in shade matching ?
    a. Yes
    b. No

RESULTS AND DISCUSSION

The present study has provided information on knowledge about the principles of tooth shade selection in students with one year, two years and three years of experience. It has identified the areas where clinical training of the students need to be enhanced in relation to tooth shade selection. Figure 1 showed that all the participants of our study used only visual method for shade matching. In the study by Alruwaili.et.al, 56.8% of the participants used visual (manual) method for tooth shade selection while the remaining participants used mechanical method or the combination of both the methods(Alruwaili et al., 2018). Studies by Sambandam. et.al and Dagg.et.al also reported that the visual method was used more commonly for tooth shade selection than the instrumental method(Dagg et al., 2004; Sambandam and Ramesh, 2017). The high level of difficulty faced can be due to the fact that shade selection is done visually and the visual method has several known disadvantages and inaccuracies(Hall, 1991; Judeh and Al-Wahadni, 2009). The deficiencies can be controlled by utilizing the instrumental method which provides scientifically accurate shade reading. High tech gadgets like colorimeter and spectrophotometer are expensive and very difficult to operate in clinical setup. This is the reason for the visual method to remain as the most commonly used method for tooth shade selection worldwide(Okubo et al., 1998; Brewer, Wee and Seghi, 2004; Klemetti et al., 2006; Small, 2006).

Figure 1: Bar chart depicts the percentage distribution of the method used during shade matching. X-axis denotes the years of experience. Y-axis denotes the number of students. All the dental students used only visual methods (Blue) for shade matching.

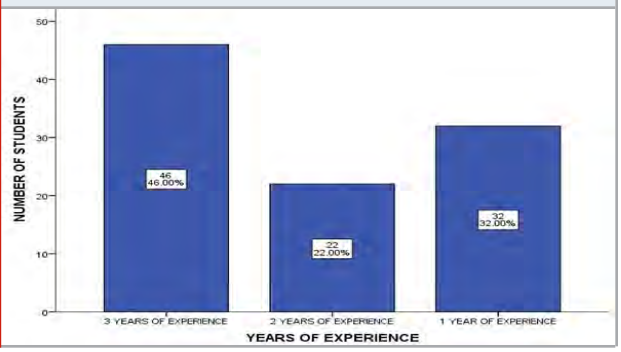
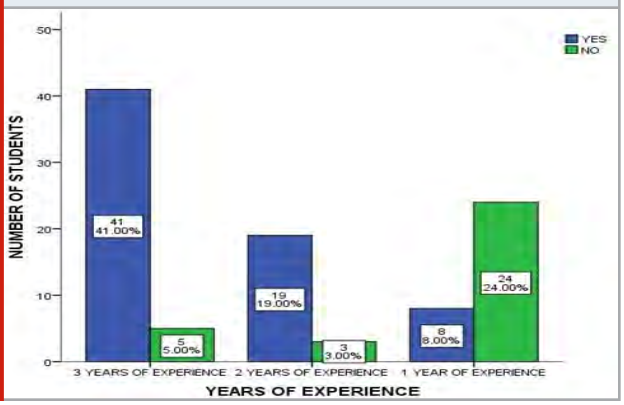


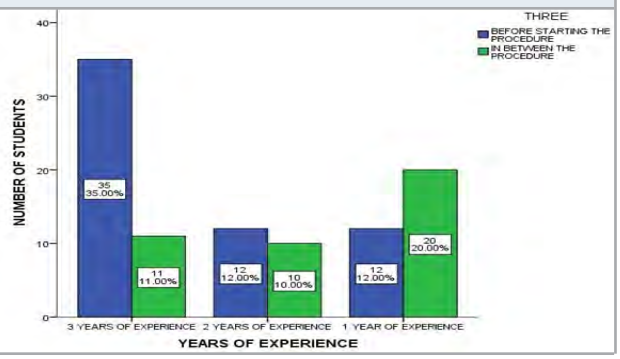
Figure 2: Bar chart depicts the association between difficulties faced during shade matching with respect to various years of experience. X-axis denotes the years of experience. Y-axis denotes the number of students. Chi-square test was done and was found to be statistically significant (Pearson chi square, p value- 0.001;(<0.05). Students with three years of experience and two years of experience did not have any difficulties during shade matching while students with one year of experience did face difficulties.



In our study, Figure 2 showed that the majority of the students with one year of experience did face many difficulties during their shade matching process while students with two years and three years of experience did not face any difficulties. In the study by Habib.et.al, majority of the respondents faced difficulty "sometimes" or " always" during the shade selection process(Habib, 2012). Even in the study by Klemetti.et.al, the majority of the participants faced difficulty during shade matching(Klemetti et al., 2006). Tooth shade selection can be regarded as a challenging procedure even for the experienced clinicians.

In our study, Figure 3 showed that more than half (57%) of the participants preferred shade matching before starting the procedure while the remaining participants preferred to do it in between the procedure. In the study by Habib.et.al, 55.4% of the participants selected the shade at the end of the procedure(Habib, 2012). In the study by Iqbal.et.al, the observers preferred to select the shade matching in the end of the procedure after all the caries removal or after wetting the tooth surface(Iqbal, Shahid and Mm, 2017). Teeth tend to dry out towards the end of a dental procedure or when a rubber dam is applied. Therefore, it has been recommended to select shades before the procedure(Passon and Lambert, 1994; Joiner, 2004).

Figure 3: Bar chart depicts the association between knowledge about the time of shade matching with respect to various years of experience. X-axis denotes the years of experience. Y-axis denotes the number of students. Chi-square test was done and was found to be statistically significant (Pearson chi square, p value- 0.003;(<0.05). Students with three years and two years of experience preferred to do shade matching before starting the procedure while students with one year of experience preferred to do it in between the procedure.



In our study, Figure 4 showed that the students with one year of experience (28%) preferred to ask for a second opinion from other dentists than the students with three years of experience(25%) during shade matching. In the study by Habib.et.al, second opinions during the shade selection process were sought either always or sometimes by most of the respondents(Habib, 2012).

Figure 4: Bar chart depicts the association between the attitude of asking for another dentist's opinion during shade matching with respect to various years of experience. X-axis denotes the years of experience. Y-axis denotes the number of students. Chi-square test was done and was found to be statistically significant (Pearson chi square, p value- 0.009;(<0.05). Students with one year of experience preferred to ask for a second opinion during shade matching more than the students with three years of experience.

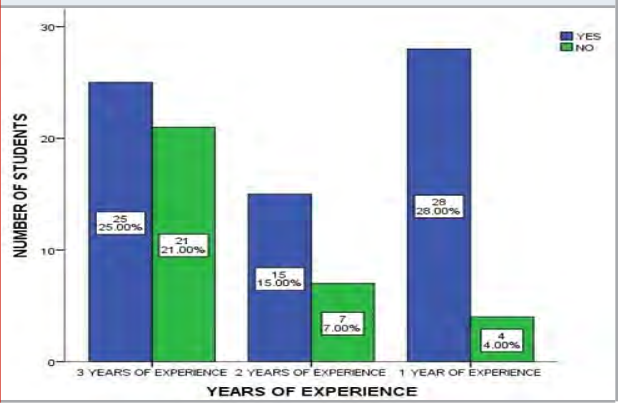
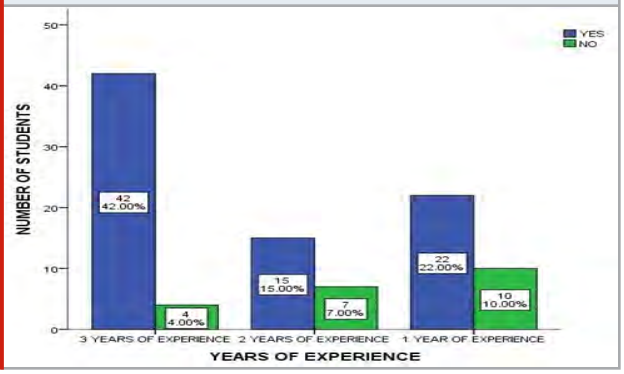


Figure 5: Bar chart depicts the association between the attitude of asking for the patient's opinion during shade matching with respect to various years of experience. X-axis denotes the years of experience. Y-axis denotes the number of students. Chi-square test was done and was found to be statistically significant (Pearson chi square, p value- 0.020;(<0.05). Majority of the students with three years of experience preferred to ask for the patient's opinion during shade matching.

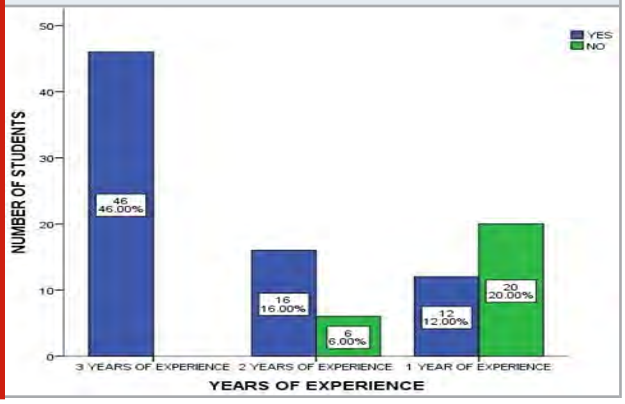


In our study, Figure 5 showed that 79% of the respondents always asked for the patient's opinion during shade matching. In the study by Sambandam.et.al, 80.7% of the respondents asked for the patient's opinion(Sambandam and Ramesh, 2017). In the study by Habib.et.al, patient's opinions were sought either always or sometimes by 90% of the respondents(Habib, 2012). Wagenaar.et.al stated that whenever an object such as a tooth is viewed for longer than 10 seconds, the colour vision capability of the eyes decreases rapidly and the perceived colour

does not remain stable(Barrett et al., 2002; Wagenaar and Smit, 2004; Wee, 2006). In order to overcome this, get a second opinion from another dentist or from the patients themselves for a better outcome.

In our study, Figure 6 showed that the natural light (74%) was the most commonly used light during shade matching. Students with two years and three years of experience found the natural light to be more reliable and effective than the dental unit light. But many students with one year of experience used dental light for shade matching. In the study by Alruwaili.et.al, dental unit light was used more than the natural light to do shade selection(Alruwaili et al., 2018). Studies by Sambandam. et.al and Habib.et.al showed similar results to our study. Natural light was used more than the other sources of light(Habib, 2012; Sambandam and Ramesh, 2017). Northern daylight is considered a standard for judging good lighting. However, in everyday dental practice we can't rely on sunlight so color-corrected fluorescent lights with CRI of 90 or above are recommended(Barna et al., 1981). The use of incandescent bulbs and dental unit lights is not recommended because of greater amount of light emittance(Wee, 2006).

Figure 6: Bar chart depicts the association between the knowledge about the type of light used during shade matching with respect to various years of experience. X-axis denotes the years of experience. Y-axis denotes the number of students. Chi-square test was done and was found to be statistically significant (Pearson chi square, p value- 0.001;(<0.05). Students with three years and two years of experience used only natural light during shade matching. Students with one year of experience were less aware about the effectiveness and reliability of natural light and they mostly used dental unit light.



In our study, Figure 7 showed that more than half (69%) the participants preferred to select the shade separately for different regions of the tooth surface. In the study by Sambandham.et.al, 66.7% of the participants preferred to determine the shades as cervical, middle and incisal thirds(Sambandam and Ramesh, 2017). Teeth are known to possess a gradation of colour from the cervical to the incisal area(Wee, 2006). According to Schwabacher. et.al and O'Brien.et.al, the cervical color is modified by scattered light from the gingiva whereas the incisal colour is often translucent and is affected by its background. Therefore, shade should be selected separately for different regions of the tooth surface(Schwabacher, Goodkind and Lua, 1994; O'Brien et al., 1997).

Figure 7: Bar chart depicts the association between awareness about shade matching separately for different regions of tooth surface with respect to various years of experience. X-axis denotes the years of experience. Y-axis denotes the number of students. Chi-square test was done and was found to be statistically significant (Pearson chi square, p value- 0.001;(<0.05). Students with three years of experience were aware about the shade matching done separately for different regions of the tooth surface more than the students with one year of experience.

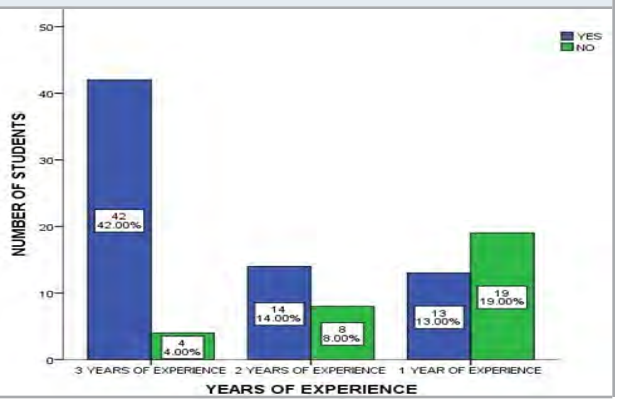
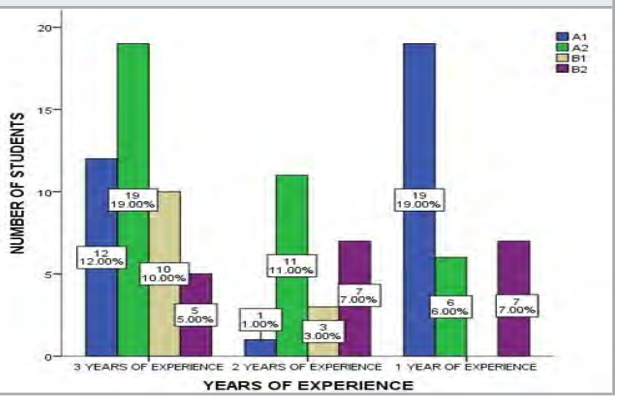


Figure 8: Bar chart depicts the association between the most commonly used shades with respect to various years of experience. X-axis denotes the years of experience. Y-axis denotes the number of students. Chi-square test was done and was found to be statistically significant (Pearson chi square, p value- 0.003;(<0.05). A2 shade was the most commonly used shade among students with two years and three years of experience but according to students with one year of experience A1 shade was the commonly used shade.



In our study, Figure 8 showed that A2 shade was the most commonly used shade among students with two years and three years of experience but according to students with one year of experience A1 shade was the commonly used shade. Even in the study by Sambandham.et.al,

A2 shade was considered as the most commonly used shade(Sambandam and Ramesh, 2017). But in the study by Alruwaili.et.al, B1 shade was commonly used in practice(Alruwaili et al., 2018). The variation in the results may be to different geographical areas and a completely different population.

Figure 9: Bar chart depicts the association between awareness about shade guides with respect to various years of experience. X-axis denotes the years of experience. Y-axis denotes the number of students. Chi-square test was done and was found to be statistically significant (Pearson chi square, p value- 0.02;(<0.05). Majority of the students were aware about the shade guides.

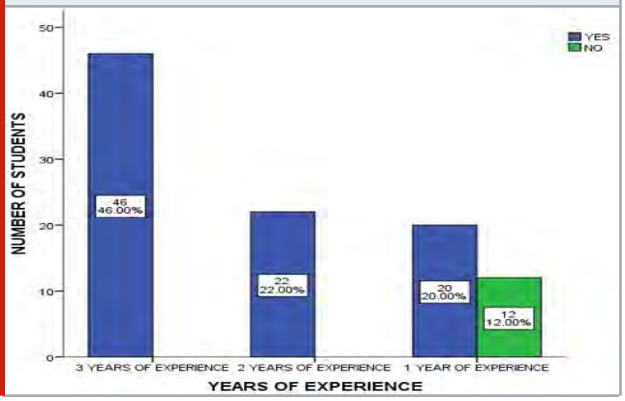
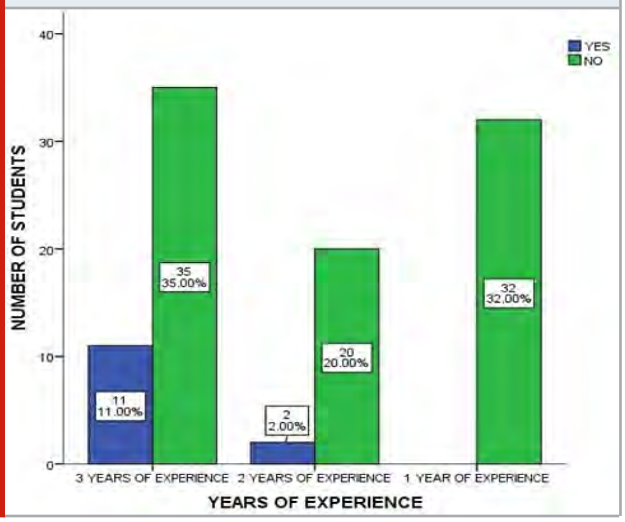


Figure 10: Bar chart depicts the association between awareness about recent advancements in shade matching with respect to various years of experience. X-axis denotes the years of experience. Y-axis denotes the number of students. Chi-square test was done and was found to be statistically not significant (Pearson chi square, p value- 0.07;(>0.05). Students with three years of experience were slightly more aware about the recent advancements than the students with one year and two years of experience.



In our study, Figure 9 and Figure 10 showed that the majority of the participants (88%) were aware about the shade guides that were used during shade matching but only 13% of them were aware about the recent advancements in shade matching techniques. In the study by Alruwaili.et.al, it was reported that 69.24% of the participants used the standard shade guide while the remaining participants used the shade guide provided by the company that manufactured those composite materials(Alruwaili et al., 2018). Shade guides have said to have some disadvantages. To avoid all those mistakes, a new shade guide Vita 3D Master has been developed using Munsell's terminology. It utilizes the colour perception concept with five levels of values and three levels of chroma and hue and has been proved to be more accurate than the other theories(Hammad, 2003; Yuan et al., 2007; Nakhaei et al., 2016). The finding from the present study adds to the consensus of the previous studies. Limitations of the study were smaller sample size so it cannot be generalised to the whole population. Further studies can be done with a larger population.

CONCLUSION

From the present study, we can conclude that the dental students had comparatively better understanding and knowledge about the principles of tooth shade selection. Majority of them did not face any difficulties during shade matching and they always preferred to do shade selection for different regions of the tooth surface separately and to get a second opinion for a better outcome. They had better knowledge about the effectiveness and reliability of natural light during shade matching. But the knowledge about recent advances in shade matching was very less so better training and work experience can help them to understand about the advancements and the significance of shade matching.

Author Contributions: All the authors have equal contributions in bringing out this research work.

ACKNOWLEDGEMENTS

The authors are thankful to Saveetha Dental College for providing permission to access the database and for giving a platform to express our knowledge.

Conflicts of Interest: The authors declare no conflicts of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-19-25

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Effectiveness of Train the Trainers Program in Improvement of Oral Health of Children in Tamilnadu – A Randomized Trial

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ABSTRACT

School years are influential stages in people's lives where lifelong substantial oral health-related behaviours, as well as beliefs and attitudes, are being developed. Children are particularly receptive during this period, and the earlier habits are established, the long-lasting, and the impact. The aim of the study is to assess the Effectiveness of Train the trainers program in improvement of oral health of children in rural Tamilnadu. In this double blinded trial, 100 schools were selected from each Tiruvallur and Kanchipuram districts by computer generated randomized sequence (CGRS). 50 schools in each district were chosen as control and the other 50 in the test group.The oral hygiene of the children was assessed with DMFT and QH plaque index (with dissolved disclosing solution) and fracture of teeth was assessed with Elli's Classification. The children were enquired regarding their diet sugar intake frequency, brushing frequency, fluoride toothpaste etc. Oral health education , brushing techniques and oral hygiene instruction were taught to Block Resource Teacher Educators (BRTE) and trainers in the test group schools alone. After that a follow up has been done after 6 months for the final data. The data was entered in Google forms and analysed in IBM SPSS software version 20.0.Student T test was used to compare the baseline data and 6 month follow up data between the 2 groups and p value was kept at <0.05 for significance. Results showed that in baseline DMF components were 1.47±0.95, 0.12±0.08 and 0.1±0.04 respectively and after the follow up, it was 1.26±0.71, 0.09±0.05 and 0.1±0.07 respectively. Likewise in primary dentition, dmf components were 1.71±0.92,0.14±0.09 and 0.019±0.02 in the baseline data and 1.2±0.8 ; 0.11±0.06 and 0.15±0.082 final data respectively. Before intervention,only 30.9% were brushing twice daily but after the intervention, 69.5% were brushing twice. Similarly 11.5% were using the proper brushing technique before the intervention but it increased to 81.2% after the intervention. The present study shows significant difference in brushing frequencies, oral hygiene status which shows the train the trainees program was successful even with limitations.

KEY WORDS: PLAQUE, ORAL HEALTH, CHILDREN, BRUSHING FREQUENCY,HEALTH EDUCATION.

ARTICLE INFORMATION

*Corresponding Author: samuelrajs.sdc@saveetha.com
Received 10th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/104

INTRODUCTION

Health is a basic human right and oral health is a significant component of general health. Although oral diseases are mostly not life - threatening, they are important public health problems. The reasons for their importance are their high prevalence, public demand, and their impact on individuals and society in terms of pain and discomfort and effect on the quality of life(Al-Haddad et al., 2013) Oral health is a prime aspect of the overall health status of an individual. Teeth and their supporting (periodontal) structures are of main importance to oral health.(Last and Wallace, 1992; Gopalakrishnan et al., 2012) Oral health care in rural areas is limited due to shortage of dental manpower, financial constraints and the lack of perceived need for dental care among rural masses. One of the most important factors to be considered when planning for the improvement in dental care facilities in rural India is the baseline data for dental diseases and the treatment needs of the population(Saravanan et al., 2008)

School years wraps a period that runs from childhood to adolescence. These are influential stages in people's lives where lifelong substantial oral health-related behaviours, as well as beliefs and attitudes, are being developed. Children are particularly receptive during this period, and the earlier habits are established, the long-lasting, and the impact.(Goel et al., 2014).Children who suffer from poor oral health are 12 times more likely to have more restricted activity days including missing schools than those who do not(Organization and Others, no date). Dental caries are a multifactorial disease and are the outcome of a multiple complex process involving factors such as diet, microorganisms, trace elements, saliva, genetic predisposition, and tooth morphology. Apart from these, many related factors such as individual, social, environmental, and cultural factors are also responsible(Doifode, Ambadekar and Lanewar, 2000; Lukacs and Largaespada, 2006; Saxena and Shashikiran, 2010; Naziya et al., 2017).

The oral health of primary school children is poor and there is a dire need to improve the oral health behavior of less privileged children from rural areas in Tamilnadu. These children may come from a background in which the parents won't be much aware of their oral health. Therefore it is ideal to teach them health education through the teachers in their school. Also the knowledge , attitude of parents and children towards oral health is much important to improve the oral health of the children and behaviour change is essential (Priya et al., 2013, 2019; Gurunathan, Moses and Arunachalam, 2018; Mk and Umadevi, 2020) It is suggested that a holistic approach to development of healthy lifestyles and creation of healthy environments is needed in schools and families to promote oral health of schoolchildren and it is proven that involving the teachers in oral health promotion has proven effective (Jürgensen, Petersen and Others, 2013; Petersen et al., 2015).

We have successfully completed numerous epidemiological studies for the betterment of our community. (Prabakar, John and Srisakthi, 2016; Kannan et al., 2017; Kumar and Preethi, 2017; Kumar, Pradeep Kumar and Vijayalakshmi, 2017; Prabakar, John, I. Arumugham, et al., 2018; Prabakar, John, I. M. Arumugham, Kumar and Sakthi, 2018; Prabakar, John, I. M. Arumugham, Kumar and Srisakthi, 2018; Vishnu Prasad et al., 2018; Harini and Leelavathi, 2019; Khatri et al., 2019; Manchery et al., 2019; Mohapatra et al., 2019; Neralla et al., 2019; Pavithra, Preethi Pavithra and Jayashri, 2019; Pratha and Prabakar, 2019; Shenoy, Salam and Varghese, 2019; Mathew et al., 2020; Samuel, Acharya and Rao, 2020). In this research we are analyzing the effectiveness of train the trainers program in improvement of oral health of children in rural Tamilnadu.

MATERIAL AND METHODS

The study was a randomized trial conducted in the Tiruvallur and Kanchipuram districts of Tamil Nadu, South India. The study period was from August 2019 to March 2020. Ethical approval was obtained from the Institutional ethical board. 100 schools were selected from each Tiruvallur and Kanchipuram districts by computer generated randomized sequence (CGRS). 50 schools in each district were taken as control group (A) and the other 50 in the test group(B). The study was a double blinded trial. Oral screening was done and a set of questions were asked to 4 random students from class 3,4,and 5 each. The demographic details, like the name and age was obtained from school records. Questions about brushing frequency, brushing technique, use of fluoridated toothpaste , frequency of parents brushing per day and number of sugared snacks they consume per day has been asked and recorded. The questions were asked in a friendly, comprehensive and in local language to the children. The oral hygiene of the children was assessed with DMFT index (1938), QH plaque index and fracture of teeth was assessed with Elli's Classification.

The set of questions asked were frequency of brushing, use of fluoridated toothpaste , the frequency and quantity of sugared snacks consumed in a day and whether they have had any previous lessons of health education. The DMFT was used to measure the number of caries, missing and filled teeth(Klein, Palmer and Knutson, 1938) . QH

plaque index was used to measure the plaque score. (Turesky, Gilmore and Glickman, 1970) The fractured teeth were recorded according to Ellis classification of fracture. After the baseline data has been recorded , oral health education , brushing techniques and oral hygiene instruction were taught to Block Resource Teacher Educators (BRTE) and trainers in the test group schools alone. This program was conducted for 3 days and one teacher from each test group school participated. Tooth brushes , toothpastes and mouthwashes were provided in the program. After that a follow up has been done after 6 months for the final data. The data was entered in Google forms and analysed in IBM SPSS software version 20.0. Descriptive statistics was done to assess the distribution of the variables. Student T test was used to compare the variables between the groups and Paired T test used to compare the variables within the group at baseline and follow up data and p value was kept at <0.05 for significance

Table 1. Comparative distribution of parameters among both groups at baseline and follow up using paired T test

Parameters	Study group			Control group		
	Baseline (mean)	Follow up (mean)	P value	Baseline	Follow up	P value
D	1.47±0.95	1.26±0.71	0.001*	1.37±0.34	1.31±0.76	0.06
M	0.12±0.08	0.09±0.05	0.09	0.83±0.05	0.71±0.04	0.08
F	0.1±0.04	0.1±0.07	0.12	0.09±0.03	0.1±0.04	0.14
d	1.71±0.92	1.2±0.8	0.04	1.51±0.63	1.34±0.02	0.08
m	0.14±0.09	0.11±0.06	0.52	0.13±0.02	0.12±0..07	0.62
f	0.19±0.02	0.15±0.82	0.33	0.21±0.06	0.19±0.07	0.56
QH Plaque index	2.31±1.23	0.7± 0.32	0.001*	2.12±1.1	1.8±0.92	0.63
No of fractured teeth	0.36±0.41	0.39±0.6	0.52	0.35±0.05	0.36±0.04	0.71
Correct Brushing frequency	1.21±0.56	1.83±0.4	0.03*	1.2±0.32	1.32±0.23	0.09
Correct Brushing technique	0.62±0.08	1.55±0.23	0.02*	0.72±0.09	0.91±0.01	0.56
No. of sugary snacks a day Less than 3	1.62±0.5	1.2±0.08	0.06	1.63±0.23	1.41±.07	0.21
More than 3	3.23±1.54	2.82±1.65	0.07	4.1±1.93	3.98±1.87	0.36
Use of Fluoridated toothpaste	0.82±0.04	1.66±0.86	0.02*	0.62±0.02	0.81±0.46	0.65
Parents brushing twice	0.22±0.05	0.61±0.05	0.07	0.27±0.06	0.53±0.04	0.09

RESULTS AND DISCUSSION

The total number of the schools studied were 200 and in each school 12 students were examined. The final sample was 2400 for the study. In each school, 4 students from class 3,4 and 5 were examined. Two girls and two boys from each class were examined to maintain uniformity. Results showed that among the study group, there was a statistically significant difference between baseline and follow up data in the D component which was distributed as 1.47±0.95 and 1.26±0.71 respectively with p value = 0.001 . Similarly there was a statistically significant difference between baseline and follow up data in the plaque level measured by QH plaque index which was distributed as 2.31±1.23 and 0.7±0.32 respectively with p value = 0.001 . There was a significant difference found between baseline and follow up data among the study group in the brushing frequency which was distributed as 1.21±0.56 and 1.83±0.4 respectively with p value = 0.03. Similarly there was a significant difference found between baseline and follow up data among the study group in the brushing technique which was distributed as 0.62±0.08 and 1.55±0.23 respectively with p value = 0.02.(table 1)

Results showed that there was a statistically significant difference between study group and control group at follow up data in the d component which was distributed as follows: 1.2±0.8 and 1.34±0.02 respectively with p value = 0.05. Similarly there was a statistically significant difference between study group and control group at follow up data in the plaque level measured using QH plaque index which was distributed as follows: 0.7±0.32 and 1.8±0.92 respectively with p value = 0.0001. There was a significant difference between study group and control group at follow up data in the brushing frequency which was distributed as follows: 1.83±0.4 and 1.32±0.23 respectively with p value = 0.001. Similarly there was a statistically significant difference between study group and control group at follow up data in the brushing technique which was distributed as follows: 1.55±0.23 and 0.97±0.01 respectively with p value =0.012.

Results showed that there was a statistically significant difference between study group and control group at follow up data in the less than 3 sugary snacks per day component which was distributed as follows:1.2±0.08 and 1.41±0.07 respectively with p value = 0.031. Similarly there was a statistically significant difference between study group and control group at follow

up data in the more than 3 sugary snacks per day component which was distributed as follows: 2.82±1.65 and 3.98±1.87 respectively with p value = 0.041. Also there was a statistically significant difference between study group and control group at follow up data in the use of fluoridated toothpaste which was distributed as follows : 1.66±0.86 and 0.81±0.46 respectively with p value =0.006(table 2).

Table 2. Distribution of different parameters in the final follow up data between both study and control groups using independent T test

Parameters	Study group	Control group	P value
D	1.26±0.71	1.31±0.76	0.06
M	0.09±0.05	0.07±0.04	0.21
F	0.1±0.07	0.1±0.04	0.13
d	1.2±0.8	1.34±0.02	0.05*
m	0.11±0.06	0.12±0..07	0.51
f	0.15±0.82	0.19±0.07	0.421
QH Plaque index	0.7± 0.32	1.8±0.92	0.0001*
No of fractured teeth	0.39±0.6	0.36±0.04	0.462
Correct Brushing frequency	1.83±0.4	1.32±0.23	0.001*
Correct Brushing technique	1.55±0.23	0.91±0.01	0.012*
No. of sugary snacks per day Less than 3	1.2±0.08	1.41±.07	0.031*
More than 3	2.82±1.65	3.98±1.87	0.041*
Use of Fluoridated toothpaste	1.66±0.86	0.81±0.46	0.006*
Parents brushing twice	0.61±0.05	0.53±0.04	0.09

Since 2000, substantial literature has emerged describing studies purporting to evaluate the effectiveness of various types and combinations of educational and behaviour-modification techniques. Studies concluded that quality of the evidence pertaining to the effectiveness of dental health education is poor (Brown, 1994; Kay and Locker, 1996) Dental health education can be delivered to individuals and groups in settings such as dental practice, schools, the workplace and day-care and residential settings for older adults. The importance of giving health education to children is that they are at an early point in their health career. Also, educating children can help us reach their families and community members. Logically, this provides a prime opportunity for influencing attitudes and behaviours at a formative stage(Habbu and Krishnappa, 2015) School children in the age group of 10– 15 years are in particular need of oral health promotion programmes because of high levels of plaque leading to gingivitis and early periodontitis(D'Cruz and Aradhya, 2013).

'Oral health education is a planned package of information, learning activities, or experiences that are intended to promote oral health' (Overton Dickinson, 2005). This level of knowledge is known to be necessary and one of the key determinants of behaviour change(Adair and Ashcroft, 2007). The cornerstone of the prevention of the two major oral diseases, dental caries and periodontal disease, is maintenance of a clean mouth or a clean tooth surface to be particular, that is, a tooth surface free from dental plaque. Well-planned and executed oral health promotion programmes could greatly accelerate the decline of the dental caries problem, periodontal problems, etc.(Harris, Garcia-Godoy and Nathe, 1999). The development of health education as a scientific discipline within dentistry has been slow. All too often action takes precedence over evaluation(D'Cruz and Aradhya, 2013).

Caries is the most prevalent dental disease both in the primary and the permanent dentition. And Schools are perhaps the best place for promoting oral health because approximately one billion children worldwide spend most of their daytime life there . Indeed, many habits of adults are formed when they are children of school age. Children are receptive, and health messages can easily be delivered to them.(Organization and Others, no date) In our present study , 30.9% of the sample population were brushing twice daily in the baseline data. But in a study by Kuppusamy et al, 17% only brushed twice(Kuppuswamy et al., 2014).

In our study , DMFT of the children were more than 1.5 which is similar in a study done by Mahesh kumar et al. The Decrease in D /d component and increase in F/f component can depict the effect of the programme (Varma et al., 2005). Similarly the oral hygiene status of the were poor in the baseline and it increased significantly in the final data. The increase in the proportion of children who brush twice a day is attributed to the constant reminder in the test group schools. Similar findings were found in the study conducted by PE Peterson among school children in Wuhan, China (Petersen et al., 2004) There was no significant change in the brushing frequency of parents. But opposite findings were found in a similar study which involved mothers .This shows the involvement of mothers in these studies are important since it is children oriented (Makvandi et al., 2015)

Use of fluoridated tooth paste also increased from baseline to final data and similar finding was observed by a study by PE Peterson et al (Petersen et al., 2004). There was no significant difference in the consumption of sugared snacks and No. of fractured teeth. The main limitation of the study is the questions were subjective in nature. The children cant remember the factors like how many sugared snacks they have or the name of the tooth paste they use. Also the study was conducted in Government school children there cant be major disparities in socio economic status and diet.

CONCLUSION

The present study shows significant difference in DMFT, brushing frequencies, oral hygiene status which shows the train the trainees program was successful even with limitations. Further research may be needed in the weak

areas of the study. children can easily taught a habit since they are young and teachers are the best way to teach them is to teach through teachers and parents. There is a need for a program by incorporating parents and teachers for better results.

ACKNOWLEDGEMENTS

Acknowledge all the staff of the department

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-26-36

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Awareness on Topical Therapeutics in Management of Oral Mucosal Lesions Among Undergraduate Dental Students in a University Setting- a Questionnaire Based Survey

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ABSTRACT

Topical medications play an important role in the management of oral lesions. Various topical medications had been extensively used as the first line of therapy in many conditions such as vesiculobullous diseases, oral infections like candidiasis, herpes simplex, potentially malignant disorders and oral mucositis. The aim of this questionnaire study is to assess the awareness of proper treatment protocol of use of topical therapeutics in management of oral mucosal lesion among undergraduate dental students in a university setting. The questionnaire based study was conducted among 100 participants. A self administered questionnaire was used. Sampling was done by convenient sampling. The study was done in a university setting. The questionnaires were distributed to the dental students who have clinical exposure including 3rd BDS, final BDS and interns .It was circulated using an online search software, google form and the response was collected through it. The collected data was ranked as good (11 - 15 correct responses), average (6 - 10 correct responses) and below average (below 5 correct responses) then it is tabulated. The data collected were stored and results were analysed by SPSS software. Out of 100, 63% of the participants were male and 37% were female . Pearson association was done between the year of study and the awareness percentage, and found to be statistically significant (Chi square value : 60.475 ; p -value = 0.00 < 0.05 which is statistically significant . Interns showed good awareness compared to the other undergraduate dental students followed by final years who had average awareness on use of topical therapeutic in management of oral mucosal lesions. Most of the third year dental students (29%) showed below averaged which emphasise a need on educational programs exclusively on topical therapeutics in management of oral mucosal lesions to be initiated from the beginning of clinical exposure for undergraduate students and educational programs on current updates of topical therapeutics is essential for undergraduates to ensure proper treatment protocol in dental practice.

KEY WORDS: TOPICAL THERAPEUTICS ; ORAL MUCOSAL LESIONS ; AWARENESS; UNDERGRADUATE DENTAL STUDENTS.

ARTICLE INFORMATION

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Received 5th August 2020 Accepted after revision 13th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/105

INTRODUCTION

Oral mucosa is a stratified squamous epithelium, acts as a barrier and protects deeper tissues from trauma, prevents the entry of bacteria and toxic substances entering into the body. Oral mucosa can be the site for both local and systemic drug delivery. Topical application of medication allows the direct action of the drug onto the oral-mucosal lesion, thus increasing its therapeutic effectiveness. Topical drug administration is one among the various routes of drug administration.(Tripathi, 2013).

Topical medications play an important role in the management of oral lesions. Various topical medications ranging from topical anesthetics to topical antineoplastics have been widely used in dentistry. Numerous oral mucosal lesions can be effectively treated by various topical therapeutic agents. Topical medications have been extensively used as the first line of therapy in many conditions such as vesiculobullous diseases, oral infections like candidiasis,oral ulcers, salivary dysfunction, herpes virus simplex, potentially malignant disorders and oral mucositis. Topical drug therapy provides targeted and more efficient drug delivery options for the local oral lesions as compared to systemic therapy. (Hearnden et al., 2012) While accessibility, lower systemic side effects, and many other advantages were associated with the usage of topical oral medications, several challenges are also faced such as taste alterations, poor penetration. Many different formulations such as mucoadhesive tablets, mucoadhesive films, patches, gels, ointments, sprays, and oral rinsed are used for local oral drug delivery.(Hughes and Ghosh, 2015).

Corticosteroids are substances that regulate many functions in our body like fat, protein and carbohydrate metabolism, regulation of the immune system and help to reduce inflammation. In dentistry, corticosteroids are used in a wide variety of conditions such as vesiculobullous ulcerative diseases. They inhibit the inflammatory reaction, redness, and edema. (González-Moles and Scully, 2005) Oral mucosal diseases are common complaints in the outpatient clinic which is caused by a variety of causes that includes local and systemic diseases, trauma, chemical causes,tobacco, and as side effects of certain medications.(Leão, Gomes and Porter, 2007) Oral lesions are usually oral conditions or oral manifestations of systemic diseases. (Field and Allan, 2003).

A study found 28.2% of American adults to have a diagnosed oral lesion with different prevalence rates. Candida mucosal lesions represented 8.7%, particularly among denture wearers and the traumatic lesions accounted for 5.7%, while herpes labialis and herpes gingivostomatitis was found among 1.6% of the adult population. (Parashar, 2011) The prevalence of oral lichen planus among adults is varied from 0.5% to 2% 4,5, while oral submucous fibrosis is uncommon disease mainly affecting the population in southeastern Asia with a prevalence of 16 per 100,000 (Eisen et al., 2005) In Saudi Arabia, the prevalence of aphthous ulcers among females was 9.8% while 11% of Saudi females had lichen planus .(Yang et al., 2018)(Ajmal et al., 2018).

Dental students should be aware about the management of oral mucosal diseases as well as the major oral diseases such as dental caries, gingivitis and periodontitis. The knowledge of dental students is expected to increase by the increase in educational level, and the dental practices are usually improved in the internship year. The aim of this questionnaire study is to assess the awareness of proper treatment protocol of use of topical therapeutics in management of oral mucosal lesion among undergraduate dental students in a university setting. Our recent research portfolio slides numerous articles in reputed journals (Santosh R. Patil et al., 2018; S. R. Patil et al., 2018; Subramaniam and Muthukrishnan, 2019; Vadivel et al., 2019; Patil et al., 2020). Based on this experience we planned to pursue the awareness of proper treatment protocol of use of topical therapeutics in management of oral mucosal lesion among undergraduate dental students in a university setting.

MATERIAL AND METHODS

The setting was an online University setting. Ethical approval was obtained from the institution's ethical committee and the ethical approval was SRB/SDC/UG-036/03. The number of people involved in this study includes a guide, two reviewers and one principal investigator. A structured self assessed online questionnaire having 15 questions on topical therapeutics for oral mucosal lesion was prepared with the aim to assess the awareness of proper treatment protocol of use of topical therapeutics in management of oral mucosal lesion among undergraduate dental students in a university setting. Sampling was done by convenient sampling.

The study was done in a university setting. Inclusion criteria of the study includes dental undergraduates students with clinical exposure such as 3rd BDS , final BDS, Interns. Exclusion criteria includes dental undergraduates students without clinical exposure such as 1st BDS and 2nd BDS. The questionnaire was validated with two reviewers who were experts in the field of oral medicine before distributing to the undergraduate dental students. The questionnaires were distributed to the dental students who have clinical exposure including 3rd BDS, final BDS and interns . It was circulated using an online search software, google form and the response was collected through it.

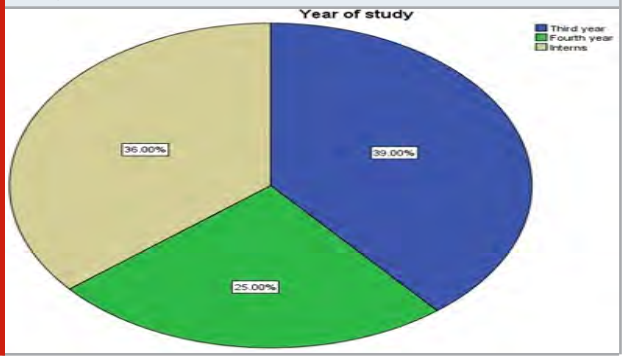
The collected data was ranked as good (11 - 15 correct responses), average (6 - 10 correct responses) and below average (below 5 correct responses) then it is tabulated. The Collected data was recorded in the Microsoft Excel 2016 and later exported to the Statistical package of Social Science for Windows Statistical analysis was done using SPSS software. (Version 20.0, SPSS Inc., Chicago, Illinois, USA). Frequency distribution of each response among undergraduate dental students such 3rd BDS, final BDS and interns was analysed . Chi-square association

using Pearson correlation was done to determine the statistical significant association between year of study and the responses for each question. Pearson correlation was done to determine the statistical significant association was done between the year of study and the awareness of topical therapeutics in management of oral mucosal lesions.

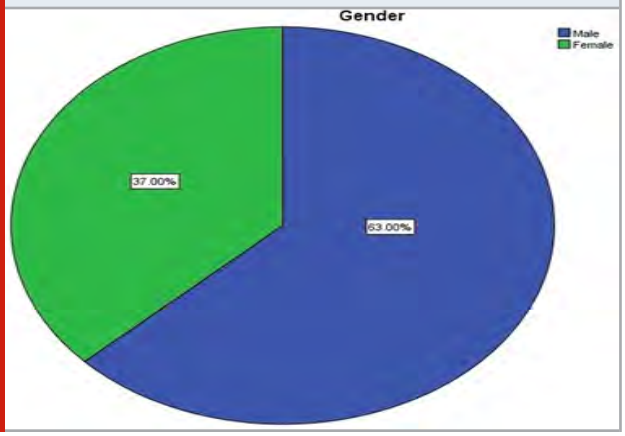
RESULTS AND DISCUSSION

This study was conducted among 100 dental students. Out of 100, 63% of the participants were male (blue) and 37% were female (green) [Graph 1]. Pie chart represents 39% of the participants were 3rd years (blue), 25% were 4th years (green), 36% were interns (beige) [Graph 2]. Pie chart represents 50% of the participants reported aphthous ulcer (green), 28% were traumatic ulcer (blue), 22% were herpetic ulcer (beige) [Graph 3]. Pie chart represents 40% of the participants reported topical steroids (beige), 39% topical antiseptic (blue), 21% topical anesthetics (green) [Graph 4]. Pie chart represents 43% of the participants reported triamcinolone acetonide oro-base 0.1% (blue), 39% amlexanox paste 5% (beige), 18% chlorhexidine gluconate gel 0.1% (green)[Graph 5].

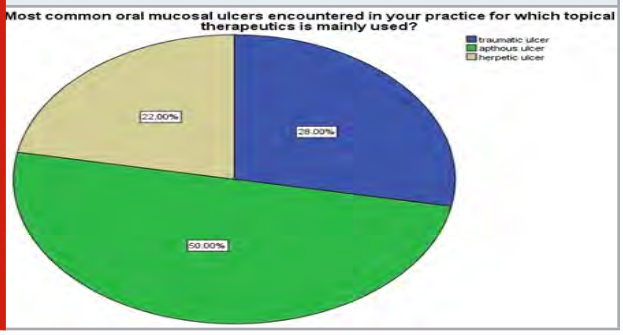
Graph 1: Pie chart showing the frequency distribution of year of study. 39% of the participants were 3rd years (blue), 25% were 4th years (green), 36% were interns (beige).



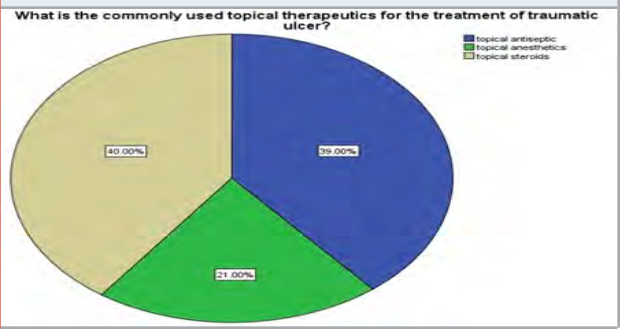
Graph 2: Pie chart showing the frequency distribution of gender. 63% of the participants were male and 37% were female



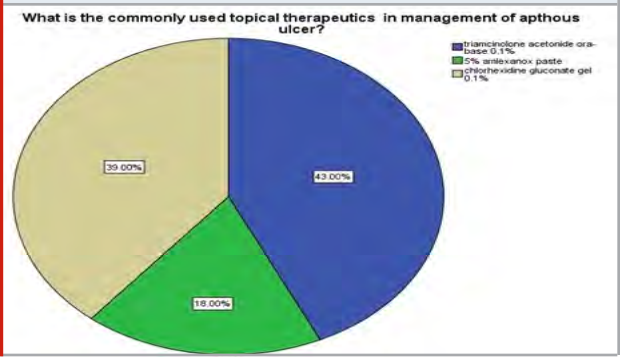
Graph 3: Pie chart showing the responses to the question: "Most common oral mucosal ulcers encountered in your practice for which topical therapeutics is mainly used"? 50% of the participants were reported aphthous ulcer (green), 28% were traumatic ulcer (blue), 22% were herpetic ulcer (beige).



Graph 4: Pie chart showing the responses to the question: "What is the commonly used topical therapeutic for the treatment of traumatic ulcer"? 40% of the participants reported topical steroids (beige), 39% topical antiseptic (blue), 21% topical anesthetics (green).



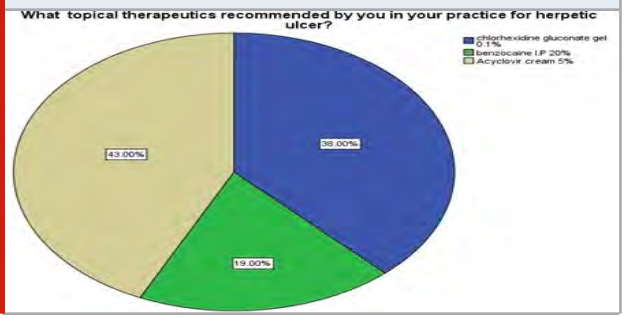
Graph 5: Pie chart showing the responses to the question: " What is the commonly used topical therapeutic in management of aphthous ulcer"? 43% of the participants reported triamcinolone acetonide oro-base 0.1% (blue), 39% amlexanox paste 5% (beige), 18% chlorhexidine gluconate gel 0.1% (green).



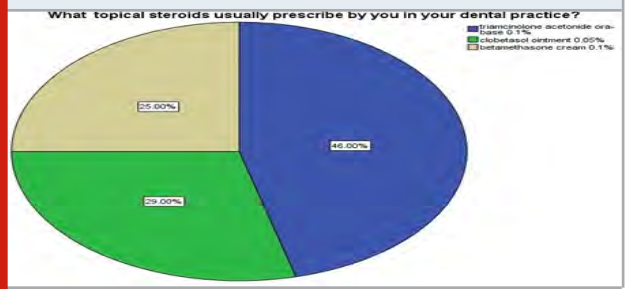
Pie chart represents 43% of the participants reported acyclovir cream 5% (beige), 19% benzocaine I.P 20% (green), 38% chlorhexidine gluconate gel 0.1% (blue) [Graph 6]. Pie chart represents 46% of the participants reported triamcinolone acetonide oro-base 0.1%

(blue), 29% clobetasol ointment 0.05% (green), 25% betamethasone cream 0.1% (beige) [Graph 7]. Pie chart represents 49% of the participants reported clotrimazole mouth paint 1% (beige), 30% nystatin cream (blue), 21% ketoconazole (green) [Graph 8]. Pie chart represents 42% of the participants reported triamcinolone acetonide oro-base 0.1% (beige), 35% diphenhydramine hydrochloride (blue), 23% dicyclomine hydrochloride (green)[Graph 9]. Pie chart represents 41% of the participants reported hydroxy methyl cellulose (blue), 40% cevimeline (green) , 19% natural sialogogues (beige) [Graph 10].

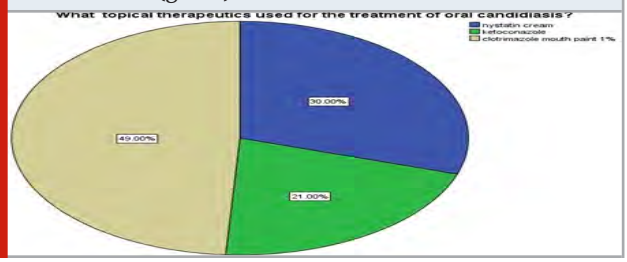
Graph 6: Pie chart showing the responses to the question: "What topical therapeutics recommended by you in your practice for herpetic ulcer"? 43% of the participants reported acyclovir cream 5% (beige), 19% benzocaine I.P 20% (green), 38% chlorhexidine gluconate gel 0.1% (blue).



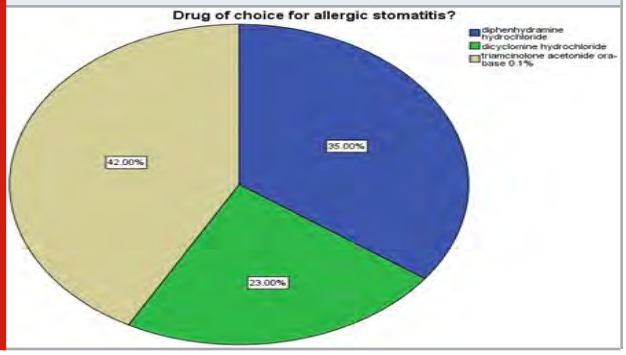
Graph 7: Pie chart showing the responses to the question: "What topical steroids usually prescribed by you in your dental practice"? 46% of the participants reported triamcinolone acetonide oro-base 0.1% (blue), 29% clobetasol ointment 0.05% (green), 25% betamethasone cream 0.1% (beige).



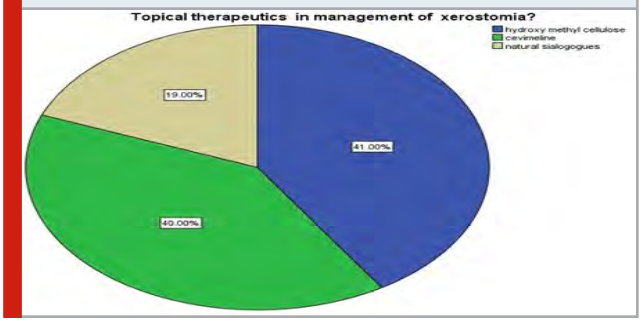
Graph 8: Pie chart showing the responses to the question: "What topical therapeutic used for the treatment of oral candidiasis"? 49% of the participants reported clotrimazole mouth paint 1% (beige), 30% nystatin cream (blue), 21% ketoconazole (green).



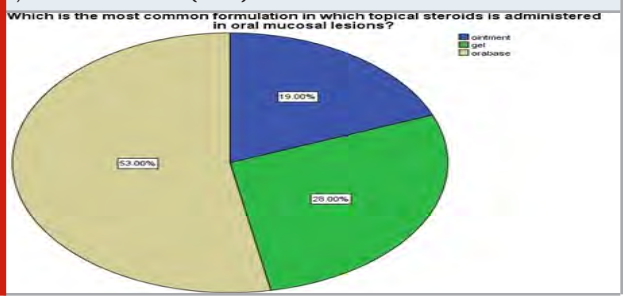
Graph 9: Pie chart showing the responses to the question: "Drug of choice for allergic stomatitis"? 42% of the participants reported triamcinolone acetonide oro-base 0.1% (beige), 35% diphenhydramine hydrochloride (blue), 23% dicyclomine hydrochloride (green).



Graph 10: Pie chart showing the responses to the question: "Topical therapeutic in management of xerostomia"? 41% of the participants reported hydroxy methyl cellulose (blue), 40% cevimeline (green) , 19% natural sialogogues (beige).



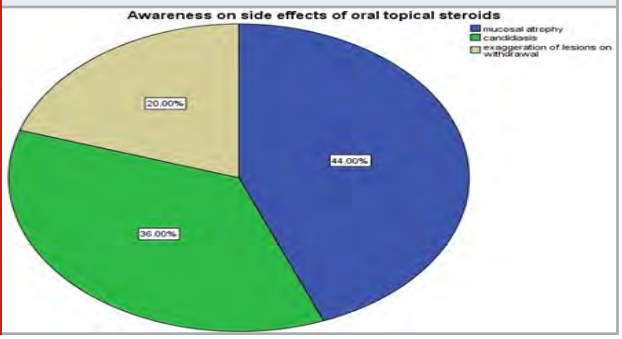
Graph 11: Pie chart showing the responses to the question: "Which is the most common formulation in which topical steroids is administered in oral mucosal lesions"? 53% of the participants reported orabase (beige), 28% gel (green) , 19% Ointment (blue).



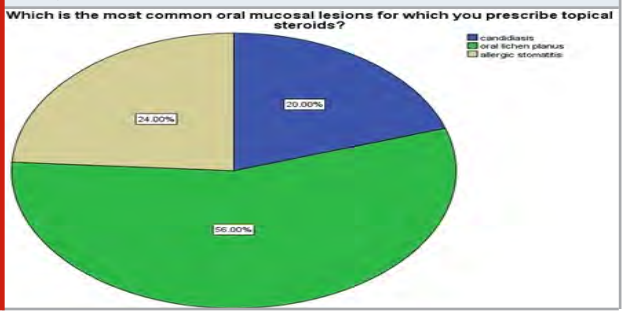
Pie chart represents 53% of the participants reported orabase (beige), 28% gel (green), 19% Ointment (blue) [Graph 11]. Pie chart represents 44% of the participants reported mucosal atrophy (blue), 36% candidiasis (green), 20% exaggeration of lesions on withdrawal (beige) [Graph 12]. Pie chart represents 56% of the participants reported oral lichen planus (green), 24% allergic stomatitis (beige), 20% candidiasis (blue) [Graph 13]. Pie chart represents 44% of the participants reported

Triamcinolone acetate 0.1% (beige), 29% fluocinonide 0.1% (blue) , 27% hydrocortisone butyrate 0.1% (green) [Graph 14]. Pie chart represents 56% of the participants reported hexidine mouth rinse (beige), 25% tantrum mouthrinse (green), 19% betadine mouth rinse (blue) [Graph 15]. Pie chart represents 44% of the participants reported hyaluronidase (blue), 34% dexamethasone and hyaluronidase (beige), 22% placentrex (green) [Graph 16]. Pie chart represents 41% of the participants reported lycopene (blue), 40% retinoids (green), 19% beta carotene (beige) [Graph 17].

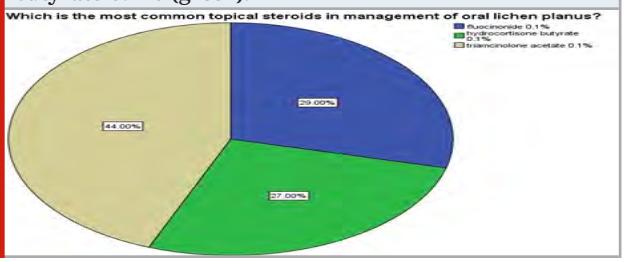
Graph 12: Pie chart showing the responses to the question: "Awareness on side effects of oral topical steroids "? 44% of the participants reported mucosal atrophy (blue), 36% candidiasis (green) , 20% exaggeration of lesions on withdrawal (beige).



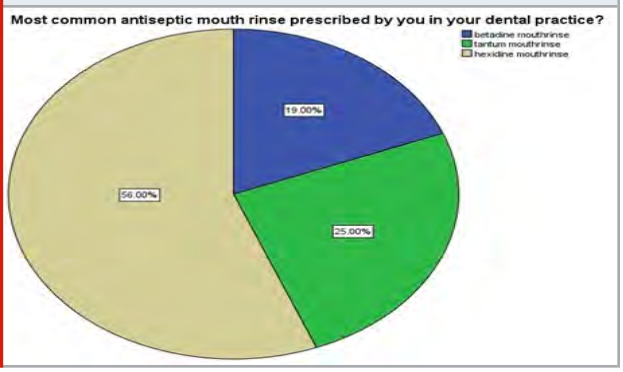
Graph 13: Pie chart showing the responses to the question: "Which is the most common oral mucosal lesion for which you prescribe topical steroids"? 56% of the participants reported oral lichen planus (green), 24% allergic stomatitis (beige) , 20% candidiasis (blue).



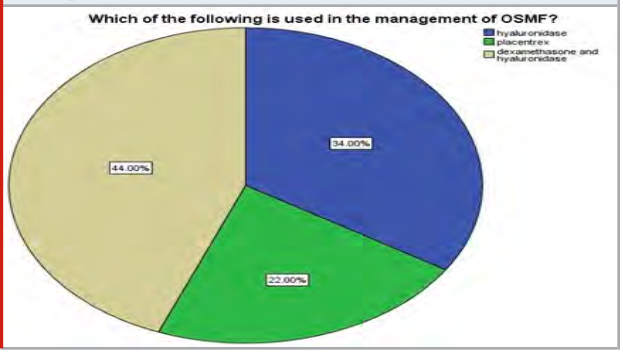
Graph 14: Pie chart showing the responses to the question: "Which one is the most common topical steroids in management of oral lichen planus"? 44% of the participants reported Triamcinolone acetate 0.1% (beige), 29% fluocinonide 0.1% (blue) , 27% hydrocorticosone butyrate 0.1% (green).



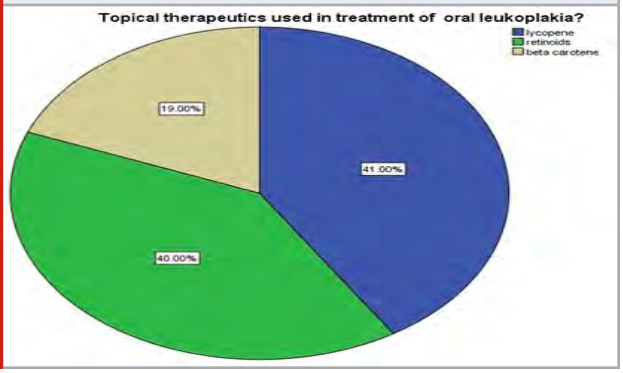
Graph 15: Pie chart showing the responses to the question: "Most common antiseptic mouth rinse prescribed by you in your dental practice"? 56% of the participants reported hexidine mouth rinse (beige), 25% tantrum mouthrinse (green) , 19% betadine mouth rinse (blue).



Graph 16: Pie chart showing the responses to the question: "Which of the following is used in the management of OSMF"? 44% of the participants reported hyaluronidase (blue), 34% dexamethasone and hyaluronidase (beige) , 22% placentrex (green).



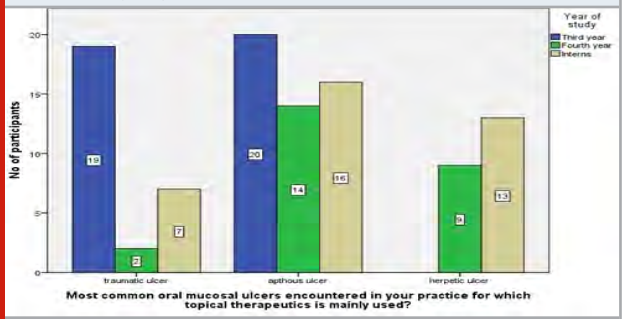
Graph 17: Pie chart showing the responses to the question: "Topical therapeutic used in treatment of oral leukoplakia?" 41% of the participants reported lycopene (blue), 40% retinoids (green) , 19% beta carotene (beige).



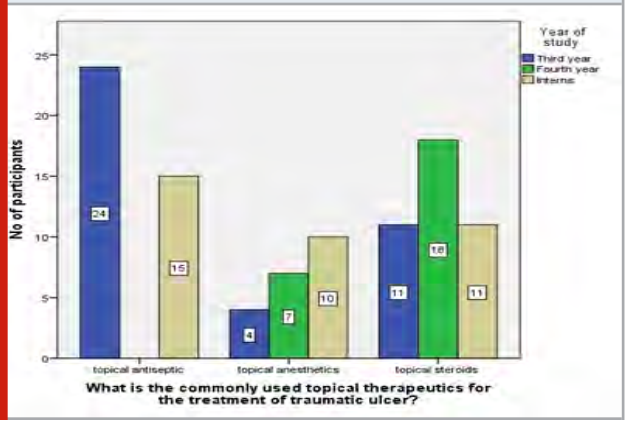
Majority of respondents reported that aphthous ulcers were more common ulcers encountered in their practice for which topical therapeutics is mainly used (Pearson chi square;p -value = 0.00 < 0.05 which is statistically significant)[Graph 18]. Majority of respondents reported

that topical antiseptics were commonly used topical therapeutic for the treatment of traumatic ulcers .(Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant)[Graph 19]. Majority of respondents reported that triamcinolone acetonide ora-base 0.1% were commonly used topical therapeutic in management of aphthous ulcer. (Pearson chi square ; p -value = 0.049 < 0.05 which is statistically significant)[Graph 20]. Majority of respondents reported that acyclovir cream were the topical therapeutics recommended by you in your practice for herpetic ulcer. (Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant) [Graph 21].

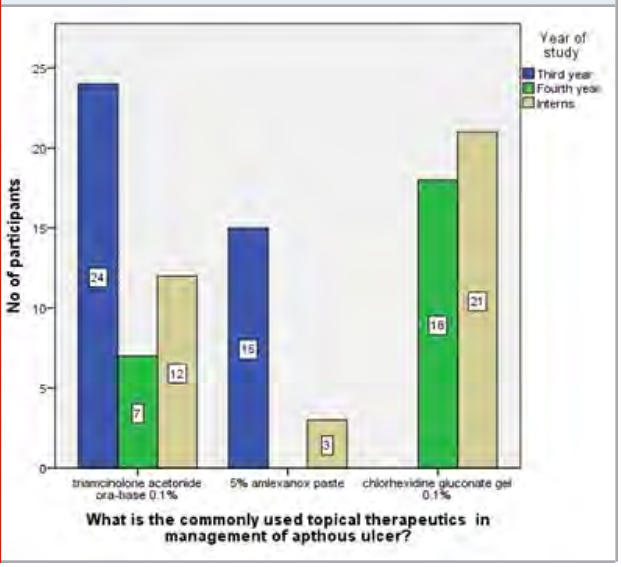
Graph 18: Bar graph showing comparison of responses based on year of study to the question, " Most common oral mucosal ulcers encountered in your practice for which topical therapeutics is mainly used?" X axis represents the questions and Y axis represents the number of participants .Majority of respondents reported that aphthous ulcer were more common ulcer encountered in their practice for which topical therapeutics is mainly used(Pearson chi square value- 24.972 ; p -value = 0.00 < 0.05 which is statistically significant).



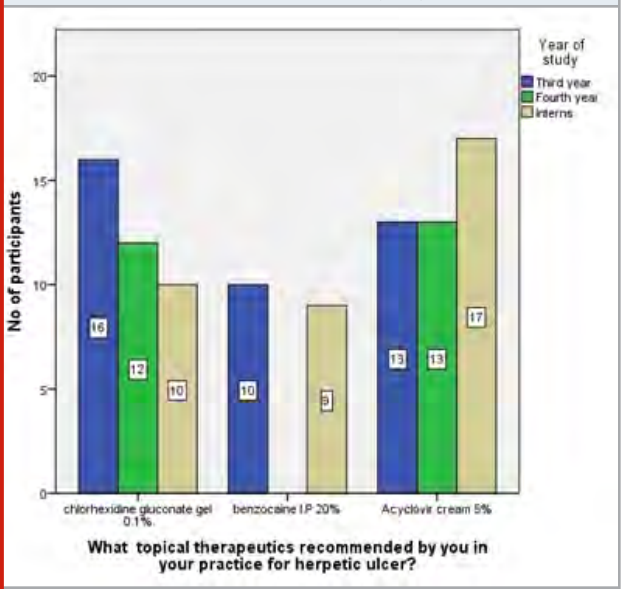
Graph 19: Bar graph showing comparison of responses based on year of study to the question, " What is the commonly used topical therapeutic for the treatment of traumatic ulcer?" X axis represents the questions and Y axis represents the number of participants. Majority of respondents reported that topical antiseptics were commonly used topical therapeutic for the treatment of traumatic ulcer .(Pearson chi square value - 26.969 ; p -value = 0.00 < 0.05 which is statistically significant).



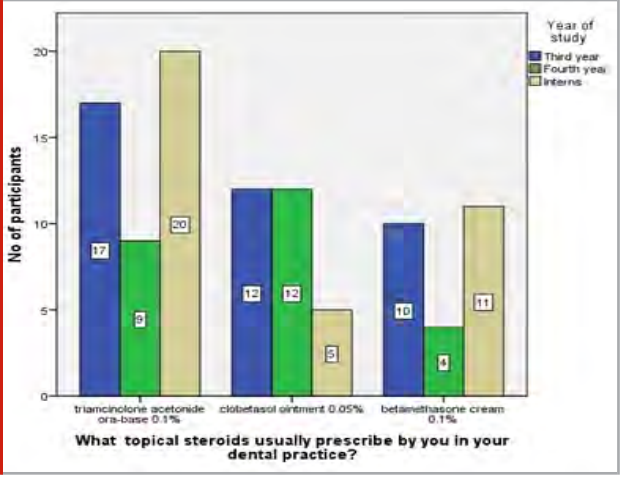
Graph 20: Bar graph showing comparison of responses based on year of study to the question, " What is the commonly used topical therapeutic in management of aphthous ulcer?" X axis represents the questions and Y axis represents the number of participants. Majority of respondents reported that triamcinolone acetonide ora-base 0.1% were commonly used topical therapeutic in management of aphthous ulcer. (Pearson chi square value - 36.567 ; p -value = 0.00 < 0.05 which is statistically significant).



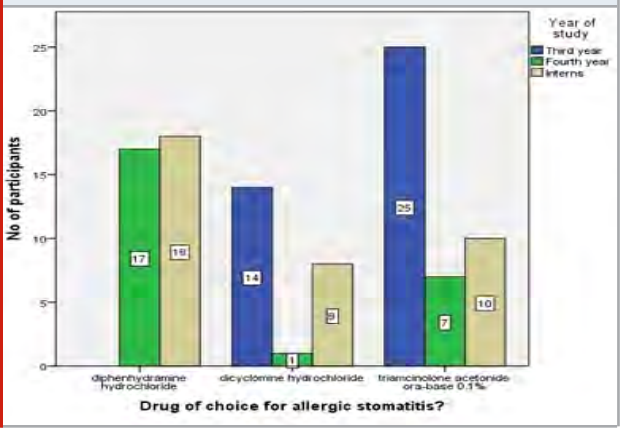
Graph 21: Bar graph showing comparison of responses based on year of study to the question, " What topical therapeutics recommended by you in your practice for herpetic ulcer?" X axis represents the questions and Y axis represents the number of participants .Majority of respondents reported that acyclovir cream were the topical therapeutics recommended by you in your practice for herpetic ulcer. (Pearson chi square value - 9.547 ; p -value = 0.049 < 0.05 which is statistically significant).



Graph 22: Bar graph showing comparison of responses based on year of study to the question, " What topical steroids usually prescribed by you in your dental practice?" X axis represents the questions and Y axis represents the number of participants. Majority of respondents reported that triamcinolone acetonide Orabase 0.1% were the topical steroids usually prescribed by them in their dental practice(Pearson chi square value - 8.557 ; p -value = 0.073 > 0.05 which is statistically not significant).

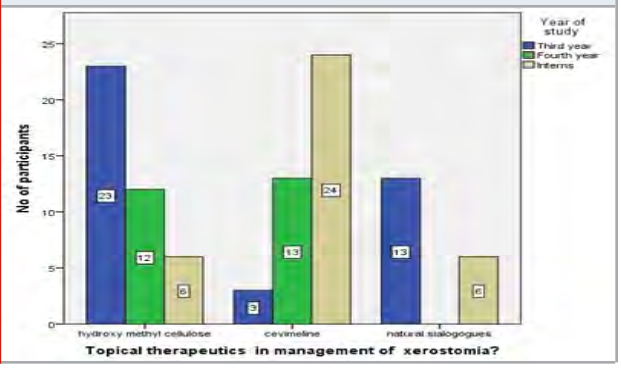


Graph 23: Bar graph showing comparison of responses based on year of study to the question, " Drug of choice for allergic stomatitis?" X axis represents the questions and Y axis represents the number of participants .Majority of respondents reported that triamcinolone acetonide orabase 0.1% were the drug of choice for allergic stomatitis. (Pearson chi square value - 37.934 ; p -value = 0.00 < 0.05 which is statistically significant).

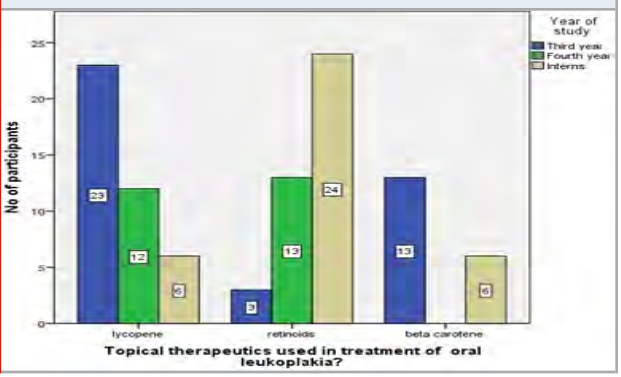


Majority of respondents reported that triamcinolone acetonide Orabase 0.1% were the topical steroids usually prescribed by them in their dental practice(Pearson chi square ; p -value = 0.073 > 0.05 which is statistically not significant)[Graph 22]. Majority of respondents reported that triamcinolone acetonide orabase 0.1% were the drug of choice for allergic stomatitis.(Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant)[Graph 23]. Majority of respondents reported that cevimeline was the topical therapeutic in management of xerostomia. (Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant) [Graph 24]. Majority of respondents reported that retinoids were the topical therapeutic used in treatment of oral leukoplakia (Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant)[Graph 25].

Graph 24: Bar graph showing comparison of responses based on year of study to the question, " Topical therapeutic in management of xerostomia?" X axis represents the questions and Y axis represents the number of participants. Majority of respondents reported that cevimeline was the topical therapeutic in management of xerostomia. (Pearson chi square value - 35.118 ; p -value = 0.00 < 0.05 which is statistically significant).



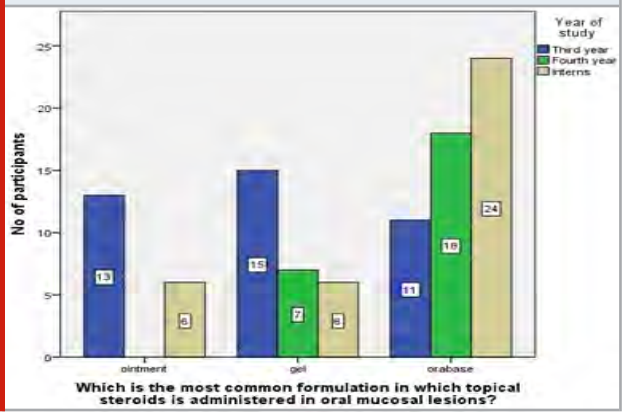
Graph 25: Bar graph showing comparison of responses based on year of study to the question, " Topical therapeutic used in treatment of oral leukoplakia?" X axis represents the questions and Y axis represents the number of participants Majority of respondents reported that retinoids were the topical therapeutic used in treatment of oral leukoplakia (Pearson chi square value - 35.118 ; p -value = 0.00 < 0.05 which is statistically significant).



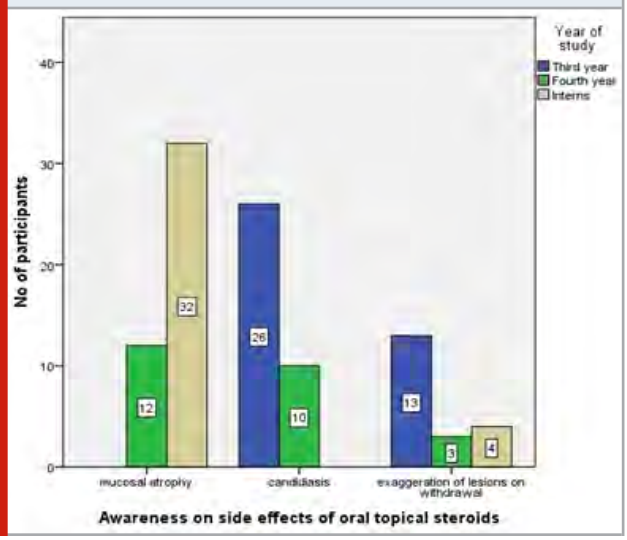
Majority of respondents reported that ora base was the most common formulation in which topical steroids are administered in oral mucosal lesions (Pearson chi square ; p -value = 0.001 < 0.05 which is statistically significant)[Graph 26]. Majority of respondents reported that mucosal therapy were the side effects of oral topical steroids.(Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant) [Graph 27].Majority of respondents reported that oral lichen planus was the most common oral mucosal lesion for which they

prescribe topical steroids (Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant)[Graph 28]. Majority of respondents reported that triamcinolone acetate 0.1% were the common topical steroids in management of oral lichen planus.(Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant)[Graph 29].

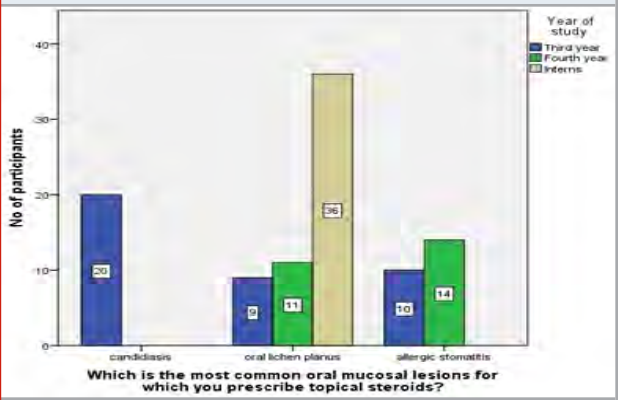
Graph 26: Bar graph showing comparison of responses based on year of study to the question, " Which is the most common formulation in which topical steroids is administered in oral mucosal lesions?" X axis represents the questions and Y axis represents the number of participants .Majority of respondents reported that ora base was the most common formulation in which topical steroids is administered in oral mucosal lesions (Pearson chi square value - 19.741 ; p -value = 0.001 < 0.05 which is statistically significant).



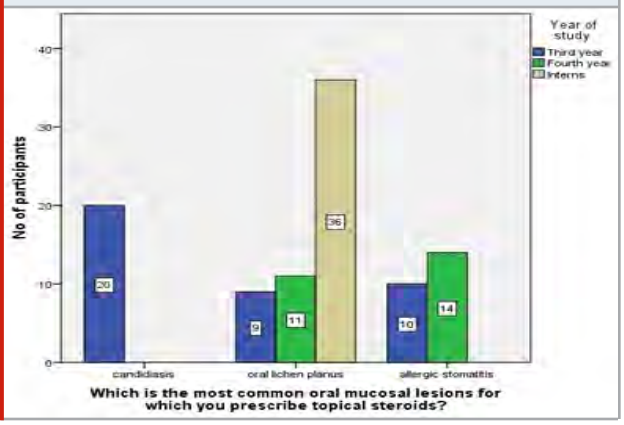
Graph 27: Bar graph showing comparison of responses based on year of study to the question, " Awareness on side effects of oral topical steroids?" X axis represents the questions and Y axis represents the number of participants . Majority of respondents reported that mucosal therapy were the side effects of oral topical steroids.(Pearson chi square value - 66.686 ; p -value = 0.00 < 0.05 which is statistically significant).



Graph 28: Bar graph showing comparison of responses based on year of study to the question, " Which is the most common oral mucosal lesion for which you prescribe topical steroids?" X axis represents the questions and Y axis represents the number of participants .Majority of respondents reported that oral lichen planus was the most common oral mucosal lesion for which they prescribe topical steroids (Pearson chi square value - 71.270 ; p -value = 0.00 < 0.05 which is statistically significant).



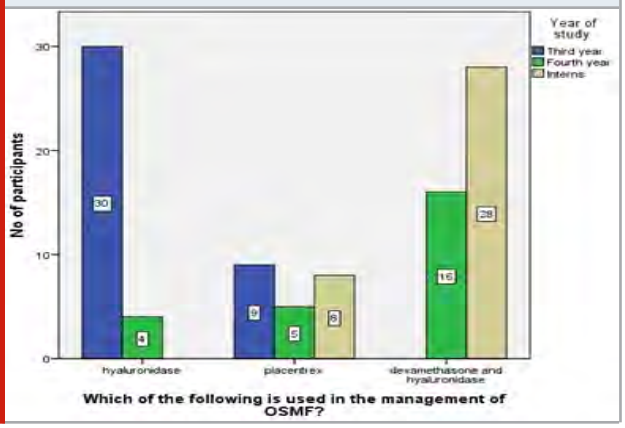
Graph 29: Bar graph showing comparison of responses based on year of study to the question, " Which one is the most common topical steroids in management of oral lichen planus?" X axis represents the questions and Y axis represents the number of participants .Majority of respondents reported that triamcinolone acetate 0.1% were the common topical steroids in management of oral lichen planus.(Pearson chi square value - 50.967 ; p -value = 0.00 < 0.05 which is statistically significant).



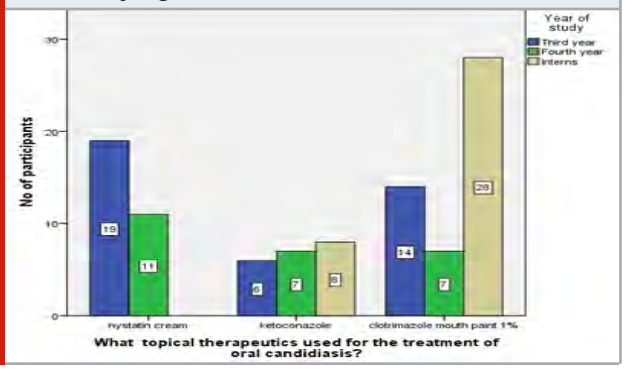
Majority of respondents reported that hyaluronidase was used in the management of OSMF. (Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant) [Graph 30]. Majority of respondents reported that clotrimazole mouth paint 1% were topical therapeutic is used for the treatment of oral candidiasis. (Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant)[Graph 31]. Majority of respondents reported that hexidine mouth rinse were the most common antiseptic mouth rinse prescribed by them in their dental practice(Pearson chi square ; p -value = 0.00 < 0.05 which

is statistically significant)[Graph 32].Interns were more aware about topical therapeutics in management of oral mucosal lesions. (Pearson chi square ; p -value = 0.00 < 0.05 which is statistically significant) [Graph 33].

Graph 30: Bar graph showing comparison of responses based on year of study to the question, "Which of the following is used in the management of OSMF" ?X axis represents the questions and Y axis represents the number of participants. Majority of respondents reported that hyaluronidase was used in the management of OSMF. (Pearson chi square value - 64.590 ; p -value = 0.00 < 0.05 which is statistically significant).

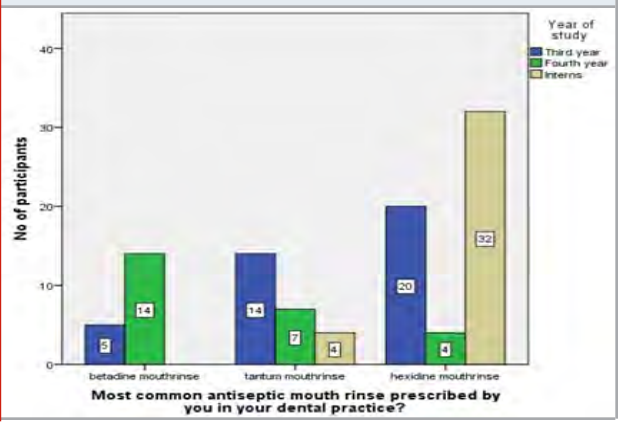


Graph 31: Bar graph showing comparison of responses based on year of study to the question, "What topical therapeutic is used for the treatment of oral candidiasis?" X axis represents the questions and Y axis represents the number of participants .Majority of respondents reported that clotrimazole mouth paint 1% were topical therapeutic is used for the treatment of oral candidiasis. (Pearson chi square value - 27.883 ; p -value = 0.00 < 0.05 which is statistically significant).

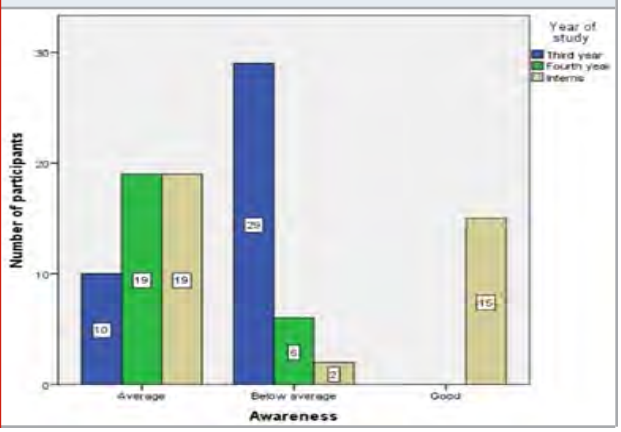


In this study 43% of the dental students reported that triamcinolone acetonide oro-base 0.1% were commonly used topical therapeutic in management of aphthous ulcer . Zouboulis et al., reported similar evidence that the combination of topical anesthetics (for example, lidocaine gel) during the day with an oral paste containing triamcinolone acetate also effective in treating aphthous ulcer.(Zouboulis, 2003) In Germany Altenburg et al., also reported similar evidence that the only drugs that have been approved to treat oral aphthous ulcers are corticosteroids ,topical antiseptic /anti-inflammatory agents such as triclosan and diclofenac, and local anesthetics such as lidocaine.(Altenburg et al., 2014)

Graph 32: Bar graph showing comparison of responses based on year of study to the question, "Most common antiseptic mouth rinse prescribed by you in your dental practice?" X axis represents the questions and Y axis represents the number of participants .Majority of respondents reported that hexidine mouth rinse were the most common antiseptic mouth rinse prescribed by them in their dental practice(Pearson chi square value - 44.609 ; p -value = 0.00 < 0.05 which is statistically significant).



Graph 33: Bar graph showing comparison of responses based on year of study and awareness about topical therapeutics in management of oral mucosal lesion among undergraduate dental students. X axis represents the questions and Y axis represents the number of participants. Interns were more aware about topical therapeutics in management of oral mucosal lesions. (Pearson chi square value - 60.475 ; p -value = 0.00 < 0.05 which is statistically significant).



Majority of 49% respondents reported that clotrimazole mouth paint 1% were the topical therapeutic used for the treatment of oral candidiasis. Akpan et al reported similar evidence that oral hygiene and topical antifungals were adequate for treating uncomplicated oral candidiasis.(Akpan and Morgan, 2002). This was in accordance with Guru P.E et al which states that 72%

of the dental students were aware about the effect of corticosteroids. The study also states that Oral Lichen planus as the most common Oral mucosal lesion ('Oral mucosal lesions', 2015) .A study stated that Oral Lichen planus was the most common oral mucosal lesion .(Daly, 2014) Majority of the dental students also answered that triamcinolone acetate was the treatment of choice for Oral Lichen Planus. (Gupta and Jawanda, 2015) Studies stated that Topical corticosteroids as the first line therapy for mucosal erosive lichen planus. (Omal et al., 2012) Oral Lichen Planus was found to be the most common compared to skin lichen planus.

Majority of dental students were aware that oral lichen planus was the most common oral mucosal lesion for prescribing topical steroids and triamcinolone acetate 0.1% was one of the common topical steroids in management of oral lichen planus. Kiran et al., reported similar evidence that betamethasone, fluticasone propionate spray, topical mometasone furoate microemulsion, clobetasol propionate in orabase, triamcinolone acetonide (mouthwash, topical, intralesional) had all shown to be effective in the symptomatic management of OLP.(Kiran et al., 2017). Limitations of the study includes dishonest answers in questionnaires by respondents and usage of a single online survey platform in a single university setting. Future study should aim at conducting surveys using multiple online survey platforms to include more participants in different university settings.

CONCLUSION

Within the limits of the present study, interns (15%) showed good awareness compared to the other undergraduate dental students followed by final years (19%) who had average awareness on use of topical therapeutic in management of oral mucosal lesions. Most of the third year dental students (29%) showed below averaged which emphasise a need on educational programs exclusively on topical therapeutics in management of oral mucosal lesions to be initiated from the beginning of clinical exposure for undergraduate students and educational programs on current updates of topical therapeutics is essential for undergraduates to ensure proper treatment protocol in dental practice.

ACKNOWLEDGEMENTS

The authors sincerely acknowledge Saveetha Dental College and Hospitals, Saveetha Institute of Medical And Technical Science for granting permission to conduct this questionnaire based study among dental students.

Author Contributions: The first author Nivethitha contributed towards data collection, data analysis and manuscript preparation, the second author, Uma Maheshwari contributed towards the study design, key concept, critical analysis and review of the study.

Conflicts of Interest: There was no conflict of interest as declared by the authors.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-37-43

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Patients Perception and Experience Undergoing Third Molar Removal - A Questionnaire Survey

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ABSTRACT

Surgical removal of impacted third molars is one of the most common procedures carried out in oral surgery. The aim of this study was to determine the patient's perception and experience of undergoing third molar removal; and if gender had any association with the responses surveyed . A questionnaire based survey was done among patients who visited our institution during December 2019 - January 2020. Participants had to respond to fifteen questions which were made available in typed hardcopy format. The questions were distributed to analyse the patients reasons for seeking removal of third molar , the intraoperative and postoperative experience with relation to the extraction procedure. The datas were collected and entered to an Excel sheet followed by statistical analysis done in SPSS by IBM. The statistical test used was the Chi-square test. More than 60% respondents had dental fear while waiting in the lobby and prior to extraction. However after commencement of procedure and administrating LA, more than 80% were comfortable through the procedure. But again, postoperative discomfort was felt by 80% patients and more than 50% patients were of the opinion that overall experience of third molar removal has increased their fear and anxiety to dental treatments. Hence, it may be important to incorporate altered protocols and novel techniques for removal of third molars.

KEY WORDS: THIRD MOLAR, EXTRACTION, SURGICAL REMOVAL, QUALITY OF LIFE.

INTRODUCTION

Dental anxiety is a recognised problem for both patients and dental health providers. Most people require extraction of the third molar due to pain, tooth decay or periodontal disease. Hence, third molar extraction is still one of the most frequent interventions in oral surgery (Sancho-Puchades et al., 2012; Savin and Ogden, 1997; Shafer et al., 1999). The most frequent indication for the extraction of third molars is pericoronitis. Other indications are infection, restorative reasons or caries, prophylactic indication or prevention of crowding are more controversial. Although impacted third molars may remain symptom-free indefinitely, they may be responsible for significant pathology(Sancho-Puchades et al., 2012; Savin and Ogden, 1997).

Patients undergoing surgical extraction of third molars suffer alterations in their daily routine because of pain and swelling(Coulthard, 2003; Ogden et al., 1998; White

ARTICLE INFORMATION

*Corresponding Author: madhulaxmi@saveetha.com
Received 27th July 2020 Accepted after revision 20th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/106

et al., 2003). Most third molar surgeries are performed without major complications. However, a major group of patients experience persistent pain and swelling with or without difficulty in mouth opening. Rarely but not uncommon, patients can also experience infection, dry socket, dentoalveolar fracture, paresthesia of the inferior alveolar nerve and of the lingual nerve, temporomandibular joint injury and even mandibular fracture. These complications can definitely affect the patients quality of life and further approach to future dental treatments. Quality of life is a difficult concept so that the result might have differences depending on individual perception (Colorado-Bonnin et al., 2006).

With a rich case bank established over 3 decades we have been able to publish extensively in our domain(Abdul Wahab et al., 2017; Abhinav et al., 2019; Eapen et al., 2017; J et al., 2018; Jain and Nazar, 2018; Marimuthu et al., 2018; Patil et al., 2017; Ramadorai et al., 2019; Senthil Kumar et al., 2019; Sweta et al., 2019; Wahab et al., 2018). Based on this inspiration we aimed to conduct a survey on patients perception and experience of undergoing third molar removal. However, the questionnaires to assess quality of life were designed to measure the quality, the effectiveness and the efficiency of the treatment methods as well as physical, psychological and social consequences for patients. The aim of this study was to determine the patient's perception and experience of undergoing third molar removal.

MATERIAL AND METHODS

This study was done as a questionnaire survey which was answered by the patients who visited our institution for suture removal post surgical removal of third molars. Fifteen questions were prepared which included two sets of questionnaires. Informed consent was taken from all participants who were willing to take the survey. Questionnaires were in English, and only those participants who could self read and answer were included in the study. Patients who did not know English, who had not had a surgical third molar removal and medically compromised patients were excluded from the study. Set 1questions included their personal details like age and gender. Set 2 included questions related to reason for extraction, how they felt before and during the extraction and while administering LA, their level of fear and its reason. Other questions like post extraction difficulty, level of anxiety and their attitude towards further dental treatments were also surveyed. 100 patients were included in the study. Datas were collected in a written format to avoid discussion and false results, thereby no bias was evidenced in the study. The datas were entered to an Excel sheet followed by statistical analysis done in SPSS by IBM. The statistical test used was the Chi-square test.

RESULTS AND DISCUSSION

Out of 100 patients who filled the survey 26% of them were females and remaining 74% were males (Figure-1). 24% of participants were between 20-30years, 55% of them were of 31-40 years and the remaining 21% of them were between 41-50years of age (Figure-2). 55% of the patients were between 31-40 years of age and 50% of them were males which were observed higher which showed a statistically significant association of gender with age (p=0.000) (Figure-3). 49% have undergone extraction because of pain which was observed higher in males(41%) which showed no significant association of gender with reason for extraction of wisdom tooth (p=0.174) (Figure-4).

Figure 1: Shows the bar graph of the distribution of gender among the patients who filled the survey where X-axis represents the Gender and Y-axis represents the percentage of patients who filled the survey. 26% of them were females(red) and remaining 74% were males(yellow).

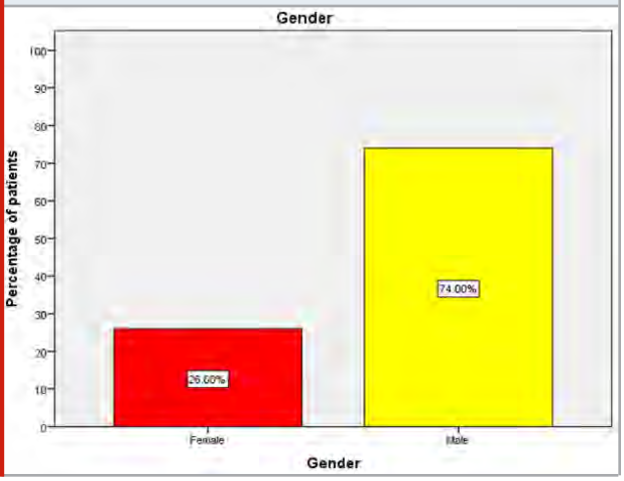


Figure 2: Shows the bar graph for distribution of age among the patients who filled the survey where X-axis represents the age and Y-axis represents the percentage of patients who filled the survey. Of this 24% of them were of age group 20-30years (Brown), 55% of them were of age group 31-40 years (Black) and remaining 21% of them were between 41-50years (Golden yellow).

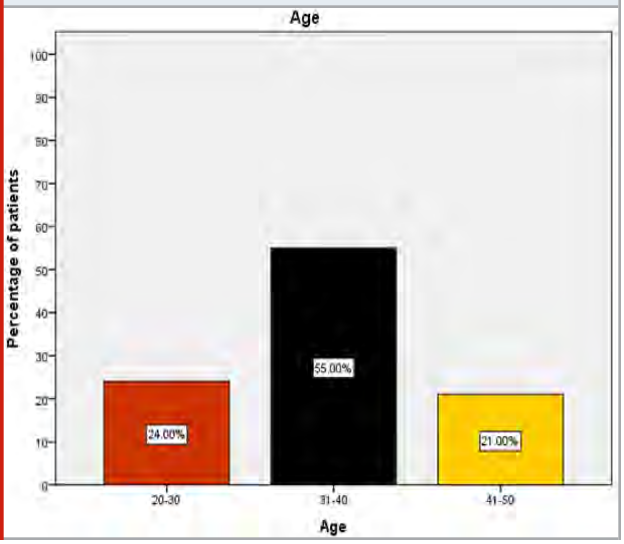


Figure 3: Shows the bar graph for association of gender with age,where X-axis represents the gender and Y-axis represents the no of patients who filled the survey. Of which 55% of them were between 31-40 years(black) of age with 50% males. Chi-square test was performed(Chi-square value - 76.375a , p=0.000) which showed a significant association of gender with age(p<0.05).

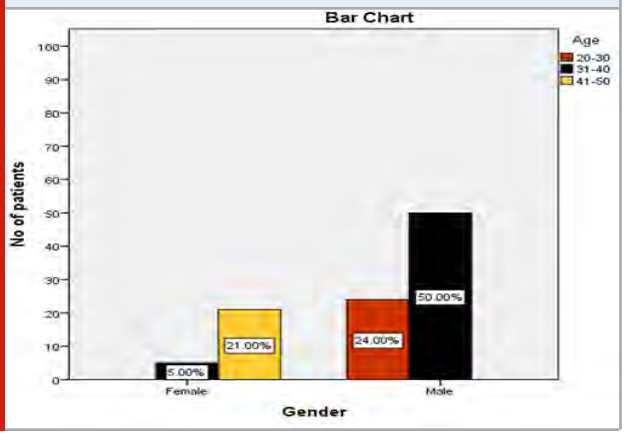
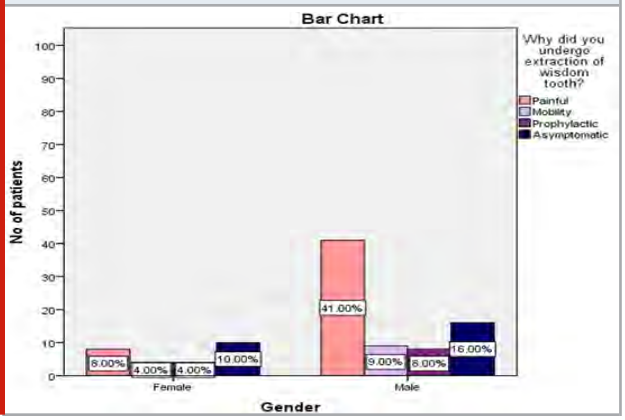


Figure 4: Shows the bar graph for association of gender with reason for extraction of wisdom tooth, where X-axis represents the gender and Y-axis represents the no of patients who filled the survey. 49% of them had undergone extraction because of pain(coral pink) with higher association of males(41%). Chi-square test was performed(Chi-square value - 4.971a , p=0.174) which showed no significant association of gender with reason for extraction of wisdom tooth (p>0.05).



86% did not experience pain after administering LA with higher male response(67%) which showed a significant association of gender with experience of the pain after administration of LA (p=0.027) (Figure-5). 42% of them experienced pain during extraction with a higher male response(34%) but gender showed no significant association with extraction experience (p=0.402) (Figure-6). 64% of them experienced fear before extraction with higher male response (47%) with no significant association of gender with fear before extraction (p=864) (Figure-7). 41% of them experienced fear for the treatment with higher male response(34%) with no significant association of gender with reason of fear before extraction(p=0.111) (Figure-8).

Figure 5: Shows the bar graph for association of gender with experience of the pain after administration of LA, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 86% of them did not (No-Green) experience pain after administering LA with higher association of males(67%). Chi-square test was performed(Chi-square value - 4.874a , p=0.027) which showed a significant association of gender with experience of the pain after administration of LA(p<0.05).

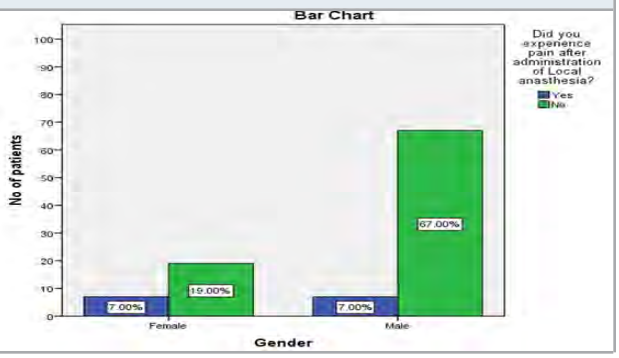
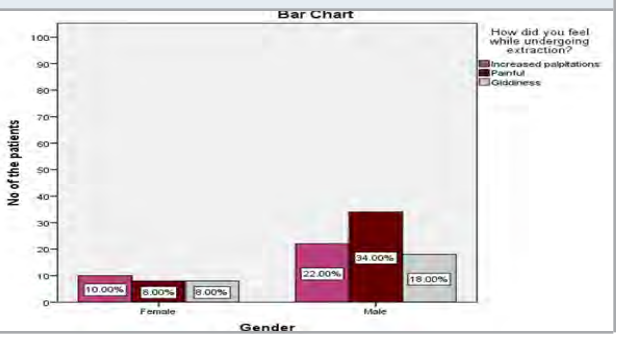


Figure 6: Shows the bar graph for association of gender with how the patients felt while undergoing extraction, where X-axis represents the gender and Y-axis represents the no of patients who filled the survey. 42% of them experienced pain(Maroon) during extraction with higher association of males(34%). Chi-square test was performed(Chi-square value - 1.821a , p=0.402) which showed no significant association of gender with how they felt while undergoing extraction(p>0.05).



70% of them felt uneasy in the waiting lobby before treatment with a higher male response(50%) with no significant association of gender with how the patients felt in the waiting lobby(p=0.536)(Figure-9). 81% of them had discomfort post extraction with higher male response(62%) with no significant association of gender with patients discomfort post extraction(p=0.231)(Figure-10). 41% of the patients experienced swelling with higher male response(31%) with no significant association of gender with the major difficulty patients experienced post extraction(p=0.825) (Figure-11).

Figure 7: Shows the bar graph for association of gender with experience of the fear before extraction, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 64% of them experienced fear(Yes-Blue) before extraction with higher association in male(47%). Chi-square test was performed (Chi-square value - 0.029a , p=0.864) which showed no significant association of gender with previous experience of fear before extraction(p>0.05).

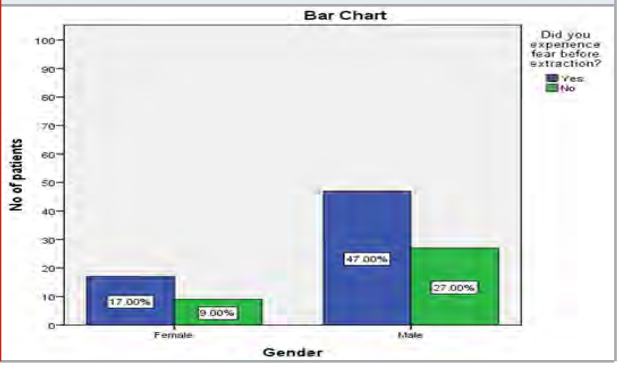
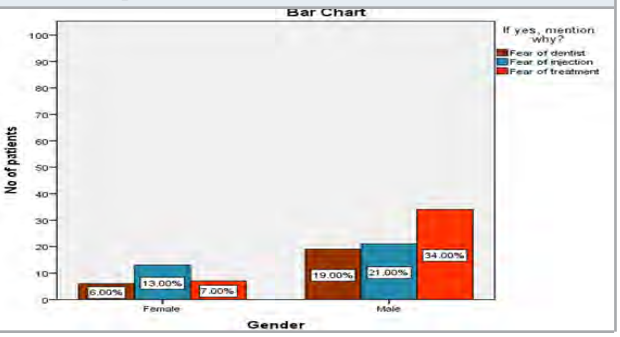


Figure 8: Shows the bar graph for association of gender with reason of fear before extraction, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 41% of them experienced fear for the treatment(orange) with higher association in males(34%). Chi-square test was performed(Chi-square value - 4.396a , p=0.111) which showed no significant association of gender with reason of fear before extraction(p>0.05).



46% of the patients were able to resume their normal activities within 5-10days with higher male response(37%) with no significant association of gender with the major difficulty patients experienced post extraction(p=0.158) (Figure-12). 80% of the patients had no fear for future treatment with higher male response(62%)with no significant association of gender with the fear of further dental treatments(p=0.111)(Figure 13). 77% of the patients felt that extraction had influenced the level of discomfort in their future dental treatments with higher male response(57%)with no significant association of gender with the influence of extraction procedure in their future dental treatments(p=0.991)(Figure-14). 53% of the patients had mentioned that their fear got increased with higher male response (47%) with a higher significant association of gender with the level of fear and anxiety towards extraction(p=0.000)(Figure-15).

Figure 9: Shows the bar graph for association of gender with how the patients felt in the waiting lobby, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 70% of them felt uneasy(gray) in the waiting lobby with higher association of males(50%). Chi-square test was performed(Chi-square value - 1.247a , p=0.536) which showed no significant association of gender with how the patients felt in the waiting lobby(p>0.05).

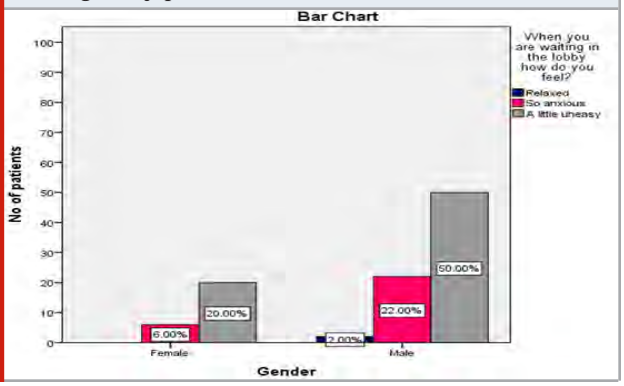
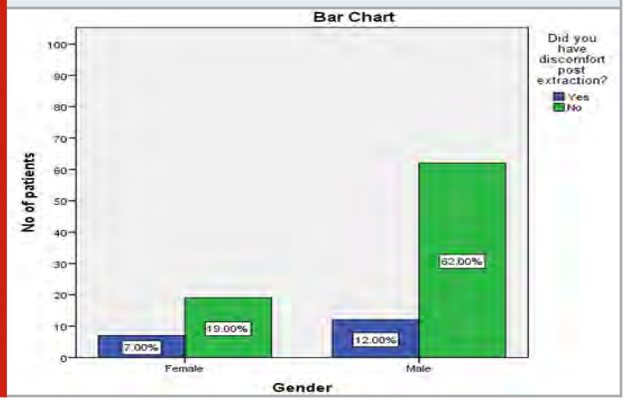


Figure 10: Shows the bar graph for association of gender with patients discomfort post extraction, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 81% of them didn't have discomfort(No-Blue) post extraction in association with males(62%). Chi-square test was performed(Chi-square value - 1.433a , p=0.231) which showed no significant association of gender with patients discomfort post extraction(p>0.05).



Out of 100 patients who filled the survey 74% were males which was in consensus with studies showing that most of the patients who underwent extraction were males (Sancho-Puchades et al., 2012). Out of which 55% were between 31-40 years, similar results were found that the mean age of patients who underwent extraction was found to be 39.8 +/- 13.6 years(Chuang et al., 2007). More than 60% respondents were uneasy and anxious while waiting in the lobby and prior to extraction which were

similar to the results that increased anxiety prior to the actual experience wherein most of the patients feared before entering a dental clinic(Berggren, 1986; Stefano et al., 2020). However after commencement of procedure and administering LA, more than 80% were comfortable through the procedure and had no postoperative discomfort which was in consensus with studies that after administering LA patients felt comfortable for extraction with no postoperative discomfort(Kamatham et al., 2017) (Whitehead, 1996).

Figure 11: Shows the bar graph for association of gender with the major difficulty patients experienced post extraction, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 41% of the patients experienced swelling(aqua blue) as their major difficulty post extraction with higher association of males(31%). Chi-square test was performed(Chi-square value - 0.903a , p=0.825) which showed no significant association of gender with the major difficulty patients experienced post extraction(p>0.05).

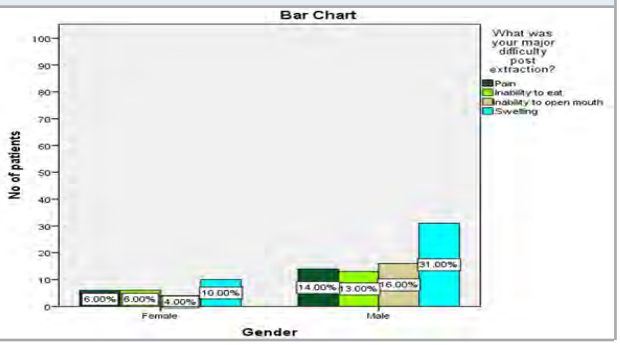


Figure 12: Shows the bar graph for association of gender with the time taken for resuming patients normal activity, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 46% of the patients were able to resume their normal activities within 5-10days(dark pink) with higher association of males(37%). Chi-square test was performed(Chi-square value - 5.202a , p=0.158) which showed no significant association of gender with the major difficulty patients experienced post extraction(p>0.05).

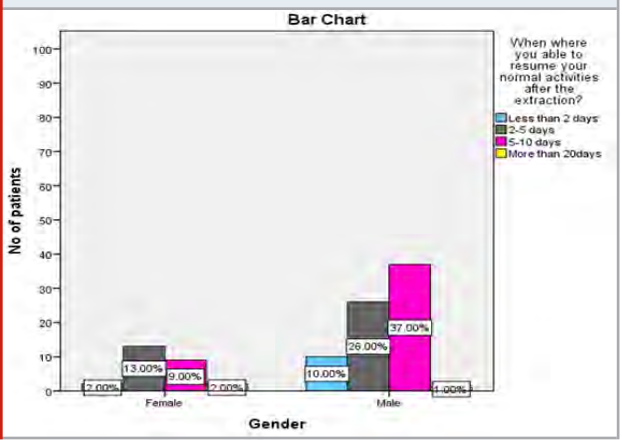


Figure 13: Shows the bar graph for association of gender with the fear of further dental treatments, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 80% of the patients had no(Green) fear for future treatment with higher association of male(62%). Chi-square test was performed(Chi-square value - 2.547a , p=0.111) which showed no significant association of gender with the fear of further dental treatments(p>0.05).

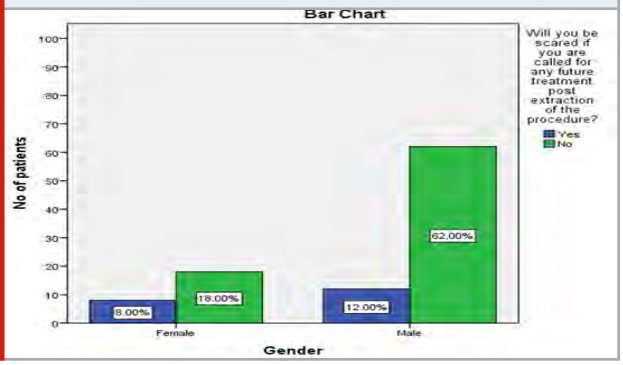
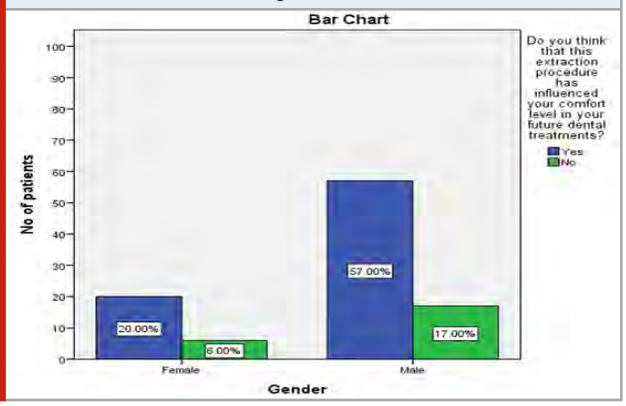
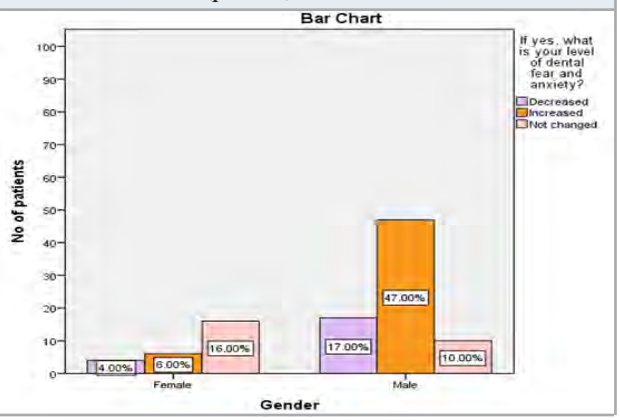


Figure 14: Shows the bar graph for association of gender with the influence of extraction procedure in their future dental treatments, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 77% of the patients felt that extraction had influenced the level of discomfort in future dental treatments (yes-Blue) with higher male response(57%). Chi-square test was performed(Chi-square value - 0.000a , p=0.991) which showed no significant association of gender with the influence of extraction procedure in their future dental treatments(p>0.05).



Among the post operative discomfort most patients complained swelling as a major difficulty which was in consensus with the other studies stating swelling as the major complication post extraction(Harbaugh et al., 2018; Roszkowski et al., 1997; Singh et al., 2014; Whitehead, 1996). However, 50% of patients resumed normal activity in less than 5 days. Fear of future dental treatments were alleviated in 80% patients though level of anxiety has increased in more than 50% patients after third molar removal which was in consensus with the studies that the level of fear and anxiety among the patients increased post extraction(Assad, 2020).

Figure 15: Shows the bar graph for association of gender with the level of fear and anxiety towards extraction, where X-axis represents the gender and Y-axis represents the number of patients who filled the survey. 53% of the patients had mentioned that their level of fear and anxiety increased(light orange) with higher association of males(47%). Chi-square test was performed(Chi-square value - 23.531a , p=0.000) which showed a significant association of gender with the level of fear and anxiety towards extraction(p<0.05).



CONCLUSION

Based on the results of this survey study, it can be concluded that dental extraction still remains as one of the most feared and anxious procedure and there was no significant differences in the perception of pain, discomfort or anxiousness between both genders. Though patients move to a comfort level after local anesthesia and through the procedure, the post operative normalcy to routine activities is as late as ten days for many patients. Also, the experience of third molar removal actually increased their anxiousness when they had to seek further dental treatments. These findings infer the need to incorporate altered protocols and novel techniques for enabling a less stressful surgical procedure while removing third molars.

ACKNOWLEDGEMENTS

The authors thank all the participants who were part of the study for giving their responses willingly and enabling in undertaking this survey.

Conflicts of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No 8 2020 Pp-44-47

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Prevalence of Oral Lesions in Anaemic Patients – A Hospital Based Study

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ABSTRACT

Oral lesion is an ulcer which is seen in the mucous membrane of the oral cavity. They may be seen individually or multiple lesions at the same time. It is presented with inflammation and secondary infection. The common oral lesions are stomatitis, erythema,candidiasis etc.The lesions can be evaluated by the sie location morphology, colour pain and duration.Patches that are red, white or mixed may indicate ulcerations.A white patch cannot be wiped off and so it may indicate leukoplakia and red patches are erythroplakia. The aim of this study is to analyse the oral manifestations presented by the patient's with hematological disorders like anaemia. Anaemic disorders are associated with orofacial signs and symptoms which is the major concern of this paper. It includes pallor, atrophic glossitis, angular stomatitis, dryness of mouth, burning sensation, ulcers. The patient's were checked for these manifestations in the oral cavity and assessed.20 anemic males and 20 anemic females aged between 30 years and 40 years were included in the study and were examined for any oral manifestations. the results showed more number of anemic patients are symptomatic and most common oral signs which are associated with anemia are pallor, oral aphthous ulcers and taste dysfunction. Eventhough atrophy is a common symptom we found a less significant association with anemia.

KEY WORDS: ANAEMIA, ORAL LESIONS, ANGULAR CHEILITIS, GLOSSITIS, PALLOR.

INTRODUCTION

A wide range of manifestation of diseases which causes damage to the internal organs are firstly shown in the oral cavity. Anaemia is a condition which can be either hereditary or acquired with an abnormal RBC (Henke and Pajonk, 2004). The major disorders observed commonly in the pro facial disorders are namely- anaemia, lymphoid disorder, bone marrow and immune deficiency and HIV virus (Long, Hlousek and Doyle, 1998). The most commonly affected region in the oral cavity is the oral mucous membrane followed by the periodontium. Upon examination of the mucous membrane and periodontitis, bleeding of gums and paleness in the mucous membrane are the commonest hematological disorders and treated in its early stage (Trandafir et al., 2016). Anaemia is most prevalent nowadays and it is caused due to decreased levels of red blood cells in an individual. It leads to

ARTICLE INFORMATION

*Corresponding Author: brundha.sdc@saveetha.com
Received 5th August 2020 Accepted after revision 27th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/107

inability of the blood to supply oxygen to tissues resulting in ischaemia or necrosis of tissues (Anderson, Aronson and Jacobs, 1999).

The other common oral manifestations seen in the oral cavity are angular cheilitis, atrophic glossitis, pallor of mucous membrane etc. Angular cheilitis is the inflammation or cracks on the corners of the mouth. Atrophic glossitis is the depapillation of the tongue. All these are the manifestations seen in iron deficiency anemia patients. The basic serological tests performed are hematocrit value and haemoglobin estimation to diagnose the type of anaemia (Wickramasinghe, 2006). Iron deficiency anaemia is the most common type of anaemia seen in the majority of the population and shows the above mentioned oral manifestations. It also includes other manifestations apart from oral manifestations like koilonychia (spoon shaped nails), pagophagia and dysphagia.

Megaloblastic anaemia is another subclass which is caused due to impaired DNA synthesis which leads to increase in the size of RBCs and abnormalities in platelets and leukocyte morphology (Derossi and Raghavendra, 2003). The oral manifestations seen in patients with megaloblastic anaemia include glossitis, cheilitis, ulcers, candidiasis and pallor of mucous membrane (McFarlane et al., 1967).It also exhibits another condition called the geographic tongue and it affects a lesser percentage of population like 10-12% (Sepuólveda et al., 2006) Aplastic anaemia often shows oral manifestations like multiple haemorrhages which is likely to be the first clinical sign (Sepuólveda et al., 2006). All hematological disorders produce common oral manifestations such as petechia, nose bleeding, post traumatic gingival hemorrhage etc.

A group of inherited disease that is caused due to defective synthesis of either alpha or beta chains of Hemoglobin is known as thalassemia which is a type of haemolytic anaemia, which is mostly asymptomatic (Clegg et al., 1968). It exhibits certain clinical features like chipmunk face, bossing of the skull etc (Modell, 1976).The other manifestations includes ulceration, candidiasis, viral infection, petechiae etc (Evans, Pogrel and Regezi, 2008) This research is an observational study conducted to analyse the most prevalent oral lesions seen in anaemia patients

MATERIAL AND METHODS

20 males and 20 females aged between 30 years and 40years , who visited the clinical laboratory of Saveetha dental college were included in the study and were examined for the oral manifestations. The pre medical and dental histories of the patients were collected. Oral cavity examinations are carried out by Mouth mirror and Probe. Sample is divided into two groups as Symptomatic and Asymptomatic despite the severity of anaemia. We checked for parameters like angular cheilitis, pallor of the mucous membrane, oral ulcers atrophy of the tongue and candidiasis.

Inclusion criteria: Patients with anaemia(Hemoglobin less than the normal for age and sex) was taken into the study and age limit set was 30-40 years. gender was not included.

Exclusion criteria: Patients not having anaemia and Anemia patients with chronic diseases were excluded from the study.

Table 1. The average value of the Participant's Haemoglobin, Haematocrit, RBC Count and MCV value are tabulated.

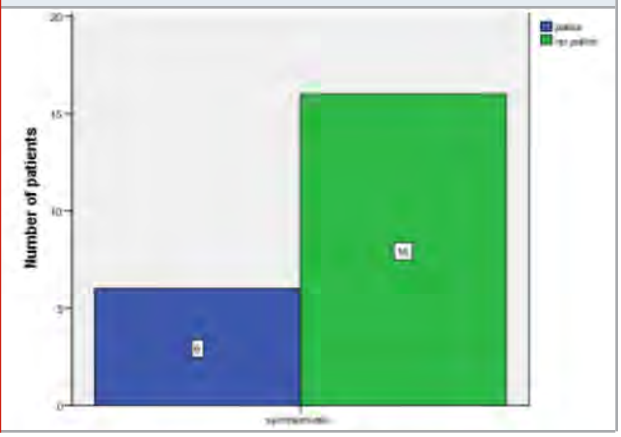
Test	Normal range	Patient's mean value
Haemoglobin	12-15.5 g%	7.2 g%
Hematocrit	36-45%	23.4%
RBC count	3.90-5.03 cells/cmm	1.63 cells/cmm
MCV	80-100 fl	144 fl

Table 2. Frequency distribution of study population.

Patients

symptomatic	N	Valid	22
		Missing	0
asymptomatic	N	Valid	18
		Missing	0

Figure 1: Bar chart showing the frequency of pallor among the symptomatic patients. 6 anemic patients are having pallor and 16 anemic patients don't have pallor.



RESULTS AND DISCUSSION

Oral manifestations like pallor, stomatitis were observed in patients at the beginning of the disease. These were observed in all patients regardless of the duration or severity of anaemia. Anaemic patients have lower haemoglobin levels which means the oxygen carrying capacity of haemoglobin is low. Since iron is required

for the oral epithelial cells and in case of iron deficiency anaemia the turnover is more rapid. Due to this it causes atrophy of the tongue (Neville et al., 2009). The basic serological tests performed are hematocrit value and haemoglobin estimation to diagnose the type of anaemia (Wickramasinghe, 2006). Iron deficiency anaemia is the most common type of anaemia seen in the majority of the population and shows the above mentioned oral manifestations. It also includes other manifestations apart from oral manifestations like koilonychia (spoon shaped nails), pagophagia and dysphagia.The role of dentists is a prime role as it is usually associated with oral manifestations. Due to an increase in the abnormal cells of the oral epithelium , it gives rise to a beefy red smooth erythematous tongue in these patients (Greenberg, 1981). Limitations of our study include, small sample size and non consideration of types of anemia. Future studies may be done to rectify with these limitations.

Figure 2: bar graph shows the frequency of ulcer among the symptomatic patients. 5 of them have ulcers and the remaining 17 of them not have ulcers.

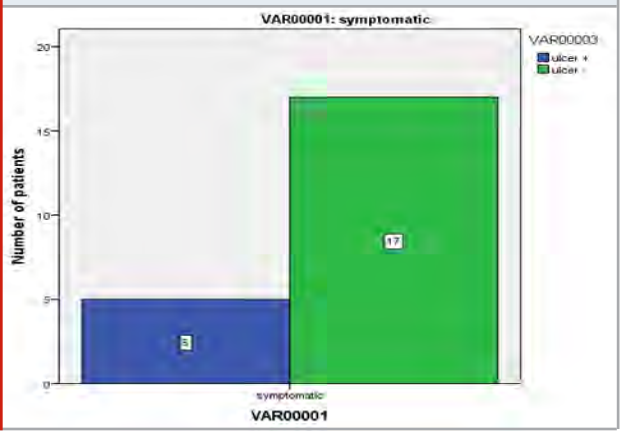
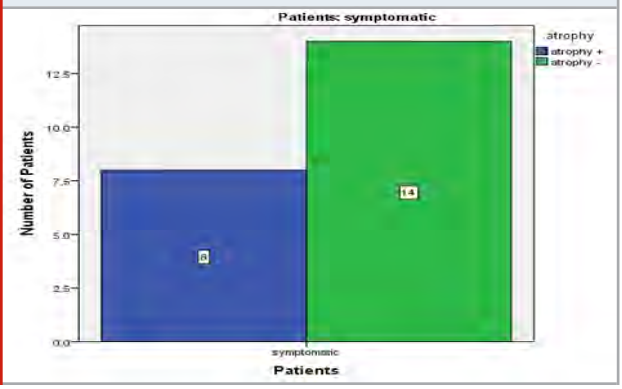


Figure 3: Bar graph shows the frequency of atrophy among the symptomatic patients where 8 of them have tongue atrophy and 14 of them don't have atrophy of tongue.



CONCLUSION

Within the limitations of the study we found that more number of anemic patients are symptomatic and most common oral signs which are associated with anemia are pallor, oral aphthous ulcers and taste dysfunction.

Figure 4: Bar graph shows the frequency of taste dysfunction among the symptomatic patients where 6 of them have taste dysfunction and 16 of them don't have taste dysfunction.

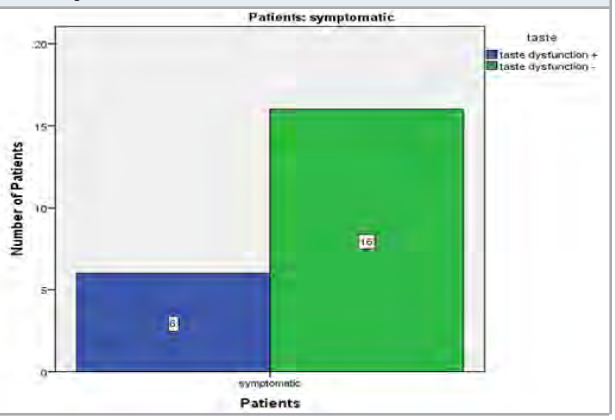


Table 2. Chi square analysis of the oral signs of anemia. This table shows that the signs like pallor, ulcers and taste dysfunction [P<0.05] are more commonly associated with anemia than atrophy[P >0.05].

Test Statistics

Patients		palor	ulcers	atrophy	taste
symptomatic	Chi-Square	4.545[a]	6.545[a]	1.636[a]	4.545[a]
	df	1	1	1	1
	Asymp. Sig.	.033	.011	.201	.033

Eventhough atrophy is a common symptom we found a less significant association with anemia.

ACKNOWLEDGEMENTS

We thank Saveetha Dental College for the support to carry out this study.

Conflict of Interest: None to declare

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-48-52

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A Retrospective Study on the Hematological Parameters of Diabetic and Non Diabetic Individuals

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ABSTRACT

Diabetes is seen to be a common endocrine disorder that is also associated with cardiac disease. Diabetes is also called a metabolic disorder associated with increased risk of vascular disease and hyperglycemia. One of the classical inflammatory marker associated with diabetes and cardiovascular disease is the elevation in the white blood cell count. This study aimed to find out the difference in the hematological parameters of the diabetic and non diabetic individual. The hematological parameter includes WBC(White blood cells), PCV(Packed cell volume), MCV(Mean corpuscular volume), and Platelet count. The complete blood count values of a sample of 42 patients was collected from the record, that consisted of 21 diabetic and 21 non diabetic patients. The data was collected from the laboratory and was analysed and then statistical analysis was given.The results showed that the hematological parameters showed the increase in the WBC and platelet count in diabetic patients than the non diabetic patients. We also found that there is no significant difference in the Packed cell volume and Mean corpuscular volume of the diabetic and non diabetic patients.

KEY WORDS: DIABETIC, NON DIABETIC, HEMATOLOGICAL,BLOOD, REPORTS..

INTRODUCTION

Retrospective study is a comparative study between 2 group individuals in this study the groups are the diabetic and non diabetic. Cardiac disease is caused by diabetes in some cases (Nanda et al., 2009). The primary cause for diabetes is cardiac disease. One main component of diabetes is inflammation (Nada, 2015). Diabetes is an endocrine health disorder which is predominantly seen in the individuals. Carbohydrate, fat and protein are produced from the living cells of plants and animals. Decreased production of insulin secretion causes changes in the metabolism of these substances (Alam et al., 2015). Blood is defined as a connective tissue with cellular elements suspended in plasma. Glycemic control is the prevention for the development of diabetic complication (Milosevic and Panin, 2019). Diabetes is a non communicable disease. The decrease in the hemoglobin concentration of the blood is anemia. The diabetic capital of the world is India. Mostly patients with diabetes and renal insufficiency are anemic (S., Srinivasa and K., 2017). Diabetes and Hyperglycemia play an important role in cardiovascular diseases. Hematological parameters include White blood cells (WBC), mean platelet volume (MPV), platelet to lymphocyte ratio (PLR) and neutrophil

ARTICLE INFORMATION

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Received 10th August 2020 Accepted after revision 25th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/108

to lymphocyte ratio (NLR). Increase in the White blood cell count gives an inflammatory marker associated with Cardiac diseases (Demirtas et al., 2015).

Routinely measured parameters are White blood cells count and hematocrit level was associated with insulin resistance. Blood glucose was analyzed using a hexokinase method (M and Christa M, 2014). According to the Epidemiology pattern several factors play an important role in the distribution of Type 1 diabetes-geographic, cultural, demographic, vitamin D exposure, obesity and environmental pollutants (Iz and Isaac IZ, 2012). Diabetes Mellitus are classified under 2 categories-Type 1 and Type 2 diabetes. Type 2 diabetes patients have increased risk of cardiovascular diseases. Diabetes when poorly treated causes various complications like retinopathy, nephropathy and oxidative stress that causes damage to the tissue and cell (Antwi-Baffour et al., 2018).

Table 1. Shows the WBC value of diabetic and non diabetic individuals, mean value of diabetic patients was 8115 cells/mm3 and non diabetic patients was 6210 cells/mm3.

Group Statistics

	VAR00001	N	Mean	Std. Deviation	Std. Error Mean
VAR00002	diabetic	21	8115.0476	2811.96448	613.62096
	non diabetic	21	6210.5714	2184.90340	476.78501

Diabetes mellitus patients are monitored by laboratory tests by finding the glycated proteins, insulin, urinary proteins, fructosamine, glucose in urine, C-peptide and kidney function (Milosevic and Panin, 2019). During pregnancy women develop high blood sugar levels and this condition is called Gestational diabetes. Mothers with gestational diabetes with poorly treated causes risk like low blood sugar and jaundice in born babies. Diabetes complication can cause morbidity and mortality (Hope and Ifeanyi, 2019). The changes in the hematological parameters are seen in patients with anemia. (Shukla, 2016). This study was done to compare the hematological parameters among diabetic and non diabetic patients.

MATERIAL AND METHODS

Sample collection: From the laboratory digital record system, 21 were diabetic individuals and 21 non diabetic individuals with a total of 42 patients were selected and their hematological parameters were noted down. This study was done in Saveetha dental college, clinical laboratory in the month of November 2019. This study was commenced after the approval by the institutional ethical committee, Saveetha Institution of Medical and Technical Science.

Sampling Method: Sampling method followed in our study was Random sampling method.

Inclusion Criteria: Random blood sugar level of more than 200 mg/dl was considered for diabetic individuals and less than 200 mg/dl was considered for non diabetic individuals. Age and sex were not considered.

Table 2. Shows the independent T test value of the comparison of the mean values of WBC count in diabetic and non diabetic patients.The WBC count of the diabetic patients was higher than the non diabetic patients of our study and the difference was also statistically significant. The P value of the comparative data was [P=0.019 (<0.05)].

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
VAR00002	Equal variances assumed	2.691	.109	2.451	40	.019	1904.47619	777.08083	333.93724	3475.01514
	Equal variances not assumed			2.451	37.698	.019	1904.47619	777.08083	330.94484	3478.00754

Table 3. Shows the PCV value of diabetic and non diabetic individuals, mean value of diabetic patients was 38% and non diabetic patients was 36%.

Group Statistics

	VAR00001	N	Mean	Std. Deviation	Std. Error Mean
VAR00003	diabetic	21	38.1429	6.10152	1.33146
	non diabetic	21	36.7619	1.86828	.40769

Exclusion Criteria: Pre-diabetic and hypertensive diabetic individuals were excluded.

RESULTS AND DISCUSSION

The tables below comparatively show that, higher value of WBC, PCV, MCV and platelets value in diabetic patients than non diabetic patients. It is associated with predicts the development of type 2 diabetes and sensitivity of insulin. Chronic low grade inflammation may be involved in pathogenesis of insulin resistance type 2 diabetes. People with diabetes particularly type 2 diabetes exhibit platelet reactivity. Hyperglycemia contributes to greater platelet reactivity through direct effect and by promoting glycation of platelet. Inflammation promotes platelet activation. Table 1 and 2 shows the comparative mean and independent t test values of the WBC count in diabatic and non diabetic patients. Table 3 and 4 shows the comparative mean and independent t test values of the PCV in diabatic and non diabetic patients. Table 5 and 6 shows the comparative mean and independent t test values of the MCV in diabatic and non diabetic patients. Table 7 and 8 shows the comparative mean and independent t test values of the platelet count in diabatic and non diabetic patients.

Table 4. Shows the independent T test value of the comparison of the mean values of PCV in diabetic and non diabetic patients. The PCV of the diabetic patients was higher than the non diabetic patients of our study. However, the difference was not statistically significant. [P=0.327 (>0.05)].

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
VAR00003	Equal variances assumed	28.862	.000	.992	40	.327	1.38095	1.39248	-1.43336	4.19526
	Equal variances not assumed			.992	23.718	.331	1.38095	1.39248	-1.49480	4.25670

Table 5. Shows the MCV value of diabetic and non diabetic individuals, mean value of diabetic patients was 85fl and non diabetic patients was 84fl.

Group Statistics

	VAR00001	N	Mean	Std. Deviation	Std. Error Mean
VAR00004	diabetic	21	85.5238	4.28508	.93508
	non diabetic	21	84.8571	3.46822	.75683

Table 6. Shows the independent T test value of the comparison of the mean values of MCV in diabetic and non diabetic patients. The MCV count of the diabetic patients was higher than the non diabetic patients of our study and the difference was also statistically significant.The P value of the comparative data was [P=0.583 (>0.05)]. 4.85m

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
VAR00004	Equal variances assumed	1.125	.295	.554	40	.583	.66667	1.20298	-1.76465	3.09798
	Equal variances not assumed			.554	38.335	.583	.66667	1.20298	-1.76794	3.10128

Cardiovascular complications are closely related to increase in platelet activation and aggregation. Platelet sizes are analyzed and the reactivity was seen (Varol et al., 2010). Insulin acts as a co factor of erythropoiesis (Ellinger et al., 2006). WBC plays an important role in the inflammatory response when the WBC is increased. Pre-diabetic and diabetic has increased in the WBC count. DM status has correlation with biomedical parameters (Worachartcheewan et al., 2013). Several studies show association with insulin resistance (Hanley

et al., 2009). Insulin is the main substance which helps in the decrease and control of diabetes. According to the article the diabetes individual had a lower amount of hemoglobin, RBC count and HCT. These similar lower concentrations were seen in the type 2 diabetes (Farooqui, Afsar and Afroze, 2019). Patients with type 2 diabetes had less hemoglobin content. One of the causes for the cardiovascular disease is low hemoglobin concentration.

Table 7. Shows the Platelet count of diabetic and non diabetic individuals, mean value of diabetic individuals was 259307 per microliter and non diabetic individuals was 321220 per microliter.

Group Statistics

	VAR00001	N	Mean	Std. Deviation	Std. Error Mean
VAR00007	diabetic	21	259307.6190	79727.86219	17398.04588
	non diabetic	21	321220.0000	95257.01911	20786.78574

Table 8. Shows the independent T test value of the comparison of the mean values of platelet count in diabetic and non diabetic patients. The platelet count of the diabetic patients was higher than the non diabetic patients of our study and the difference was also statistically significant. The P value of the comparative data was [P=0.028 (<0.05)].

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
VAR00007	Equal variances assumed	2.656	.111	-2.284	40	.028	-61912.38095	27106.87112	-116697.411	-7127.35083
	Equal variances not assumed			-2.284	38.797	.028	-61912.38095	27106.87112	-116750.386	-7074.37599

Diabetic nephropathy leads to cardiovascular disease (Salhen, Al Salhen and Mahmoud, 2017). In diabetes microvascular complications are high. The PLCR, PCT, PC and MPV were high in the diabetes individual when compared with the non diabetic individuals (Agarwal et al., 2018). The insulin resistance syndrome can be caused by elevation in the erythrocyte criteria. Changes in the glucose of the body even causes liver damage (Kamil, 2015). The hematological parameters are not associated with BMI and obesity. In the non obese people the hemoglobin, hematocrit and high RBC helps in identifying insulin resistance (Barazzoni et al., 2014). In the diabetic individuals the WBC level was high. Diabetes mellitus shows an increased level of platelets which are activated, young or large circulating in the blood. (Khudhur and Al-Ani, 2019). When the WBC level in the blood is elevated it is closely related to Multiple sclerosis (Vivek et al., 2018).

The oxygen carrying capacity can be predicted by using packed cell volume (Biadgo et al., 2016). Glucose lowers the amount of hemoglobin content in the blood (Varim et al., no date). According to the discussion found with the other articles it is clear that the hematological parameters of the diabetic individuals are seen to be high or more when compared to the non diabetic individuals. Limitations of our study include small sample size,patients with anemia and other disorders were not included in the study. future studies may rectify these limitations.

CONCLUSION

Within the limitations of our study, the hematological parameters showed the increase in the WBC and platelet count in diabetic patients than the non diabetic patients. We also found that there is no significant difference in the Packed cell volume and Mean corpuscular volume of the diabetic and non diabetic patients.

ACKNOWLEDGMENTS

The authors are thankful to Saveetha Dental College for providing reports for the research work.

Conflict of Interest: None to declare

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-53-58

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Effects and Alternatives to Haematinics on Anemic Patients–A Questionnaire Study

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ABSTRACT

Study of the alternatives and side effects of haematinics on anaemic patients. Anaemia is a condition which can be either hereditary or acquired with an abnormal RBC. Anemia are usually treated by Haematinics in the form of tablets, capsules and syrup and sometimes injection. Long term intake of haematinics produces some side effects like Gastritis, tooth staining, etc. This study was conducted to analyse the side effects experienced by anemia patients due to haematinics. This is a survey based study, A questionnaire was prepared regarding hematinics and alternate to haematinics. From the derived data the difficulty and side effects of haematinics were studied and analysed.Adverse effects of oral iron: epigastric pain, nausea, vomiting, gastritis, metallic taste, constipation (due to astringent effect) or diarrhea (irritant effect) are the usual adverse effects. Liquid preparations of iron causes staining of teeth. Many people preferred natural alternatives to haematinics. The survey says that some groups of people preferred natural products over hematinic drugs for their treatment of anaemia due to its side effects.

KEY WORDS: ANAEMIA, HAEMATINICS, HEMATOPOIESIS , IRON , VITAMIN B12 , FOLIC ACID..

INTRODUCTION

Anaemia is a condition which can be either hereditary or acquired with an abnormal RBC. (Guralnik et al., 2004). The major disorders observed commonly in the pro facial disorders are namely- anaemia, lymphoid disorder, bone marrow and immune deficiency and HIV virus. (Kilgore, 2006). Anaemia is common nowadays and it is caused due to decreased levels of red blood cells in an individual.

ARTICLE INFORMATION

*Corresponding Author: brundha.sdc@gmail.com
Received 3rd August 2020 Accepted after revision 23rd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/109

Hematinics- nutrient required for hematopoiesis. The main hematinics are iron, vitamin B12 and folate. Deficiency in these leads to anaemia. (Muretto, Angelucci and Lucarelli, 2002).

Iron plays an important role in certain basic physiological processes, particularly the synthesis of haemoglobin and myoglobin. Dietary sources rich in iron are meat, eggs and leafy vegetables. Increased absorption occurs when iron stores are diminished, and when erythropoiesis is active.(Klipstein-Grobusch et al., 1999) For adult males, 1 mg of iron absorbed each day is probably sufficient, but for adult females, 2 mg per day are required, and for pregnant females, 3 to 3.5 mg per day are necessary to meet the increased demands.Iron deficiency is a common disease in modern society, and is likely to remain so. It is not a definitive diagnosis, but a symptom complex, and in every instance where iron deficiency is demonstrated, a cause must be sought and identified with confidence

before treatment is commenced. An adequate history and physical examination are important in reaching this diagnosis; aided by a full blood picture, and, in most instances, a determination of the serum iron level and latent iron binding capacity. A careful menstrual history in iron-deficient women is essential.(Jiang et al., 2004)

Vitamin B12 is synthesised in higher animals indirectly from bacterial sources, and for man to have an adequate vitamin B12 intake, some form of dietary meat and animal products is essential. Hydroxocobalamin is a more efficient therapeutic agent than cyanocobalamin, and should be given by injection.(Montgomery, 1995) The daily requirement for vitamin B12 for the healthy adult is between 2 and 5 µg, representing up to 70 % of the dietary vitamin. Smaller doses will produce a therapeutic response in deficient states, but will not sustain health. The metabolism of vitamin B12 within the body is complex, and is not as clearly understood as the body's handling of iron. In the investigation of a patient with megaloblastic anaemia, the nature, extent and cause of the underlying disorder must be assessed. Peripheral blood cell counts and examination of cell morphology in the peripheral blood and bone marrow will assist the diagnosis.

Vitamin B12 deficiency may be diagnosed when low vitamin B12 serum levels have been demonstrated, when methylmalonic acid excretion in the urine is low, and when an optimum response to a standard dose of vitamin B12 is achieved. When vitamin B12 deficiency has been diagnosed, gastric causes should be sought in the first instance, usually by gastroscopy, testing for histamine-fast achlorhydria, and by demonstrating the failure to absorb a radioactive tracer dose of vitamin B12, which is absorbed when the defect is corrected by the addition of intrinsic factor.(de Sousa and Porto, 1998) If a gastric cause cannot be implicated, an intestinal cause of failure of absorption is likely. Dietary inadequacy leading to vitamin B12 deficiency is unusual, except in persons who are entirely vegetarian.

When a megaloblastic anaemia is demonstrated in the presence of pregnancy, during anticonvulsant therapy for epilepsy, or in the chronic alcoholic, folate deficiency is commonly the underlying cause. However, folate deficiency may be due to inadequate dietary intake, intestinal malabsorption, or an increased requirement due to cellular turnover, and in a number of cases, more than one of these factors may be involved.(Herbert et al., 1994) The diagnosis of folate deficiency requires the exclusion of vitamin B12 deficiency, demonstration of low serum folate, and possibly, a low red cell folate. Here again, the haematological response to a therapeutic dose of folate (200 µg daily, preferably by injection) is an important diagnostic feature. (Smith et al., 1997).

The body's folates are obtained from plant and animal foodstuffs, particularly liver and yeast, and they exist as polyglutamates of tetrahydrofolate. The dietary requirement (free folate) is between 150 and 200 µg per day. (Valk, de Valk and Marx, 1999). This study is conducted to assess and evaluate the effects caused by haematinics taken for longer duration by anaemia patients. And also to create awareness on the natural food and vegetables rich in iron and has the ability to increase RBC cells and Haemoglobin levels. (Nelson, 2009)

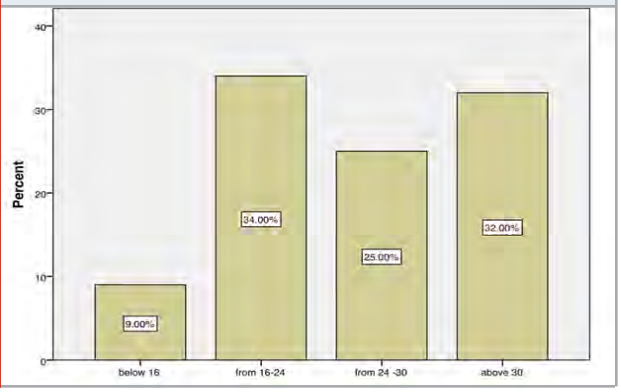
MATERIAL AND METHODS

This is a survey based study. A questionnaire was prepared regarding hematinics and anaemia .Anaemic patients were asked to fill the survey. It was attended by 100 patients. The questionnaire initially consisted of participant's demographic data such as the Age and gender The later questions were about their treatment, duration of treatment and side effects by haematinics. Once the required responses were received, the survey was closed and the data was taken and analysed statistically.

RESULTS AND DISCUSSION

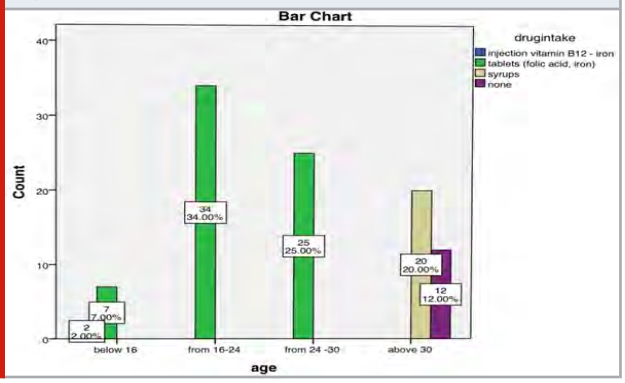
The treatment of choice for iron deficiency is iron, and it can and should be given orally in sufficient quantities to restore the body's storage to normal levels, in addition to achieve the desired elevation of the haemoglobin level. As a therapeutic agent for anemia,iron is simple,cheap and it is significantly effective in treating anemia . The simplest and most useful form of iron is ferrous sulphate, taken orally. Iron is one of the few therapeutic agents where oral therapy is more predictable and more effective than the systematically administered form.(Valk, de Valk and Marx, 1999) Many oral iron preparations exist, but they are no more efficient in producing an optimal haemoglobin response than ferrous sulphate. There may, however, be a need in some instances to use preparations other than ferrous sulphate in an endeavour to minimise symptoms of gastro-intestinal intolerance, an aspect which has been unduly emphasised in the past.(Valk, de Valk and Marx, 1999; Goddard et al., 2011).

Figure 1: Age group with Anaemia: From the 100 anaemic patients who had taken up the survey 9%(9 patients) regardless of sex were below 16 years of age, 34% were between the age of 16 to 24,around 25% of them were between 24 years to 30 years of age and 32% of patients were above the age of 30.



The principal benefit of slow or sustained release preparations appears to be the convenience of once-daily administration and their palatability; they do not appear to be any more efficient in delivering the desired amounts of iron to the body.(Mukhopadhyay and Mohanaruban, 2002) Intravenous and intramuscular iron are indicated rarely, in such instances as profound iron deficiency in a pregnant patient (to increase iron stores rapidly), where self-medication is unreliable, where there is genuine and severe gastro-intestinal intolerance, or where there is a clearly demonstrable gastro-intestinal absorptive defect. (Murphy and Hutchinson, 1994) Iron poisoning is due to the indigestion of iron, mainly in children where a fatal dose could be as little as 1g of ferrous sulphate. The treatment of iron poisoning is now well defined and includes use of the chelating agent desferrioxamine to assist in the removal of excessive amounts of the ingested iron.

Figure 2: Forms of Drug Intake which explains about the various forms of haematinic intake. Among 100 respondents, 66% of patients where under taking tablets-(Folic acid,Iron,Vit B complex), where 20% were taking haematinics in form of syrups(iron), 2% of the patients were taking parenteral forms of iron and Vit B12 through injections.



(Guyatt et al., 1992; Murphy and Hutchinson, 1994) The aim is to achieve a haematological remission and to replace the body stores of vitamin B12.(Smith, 2000) Oral vitamin B12 is indicated only in the patient in whom injections are undesirable (e.g. bleeding disorder). If the response to vitamin B12 therapy is poor or absent, it is likely that the megaloblastic anaemia is due to folate deficiency.(Patterson, 2003)

Oral administration of 5 mg folic acid is more than adequate in treating a deficiency state, even in the patient with intestinal malabsorption. Long-term folate therapy is probably required only in older people who have a nutritional deficiency which is not likely to be remedied by improvement in their dietetic habits.(Rimon et al., 2005) Prophylactic folate is probably desirable in pregnancy, given together with an iron supplement. Because the blood volume is usually normal or increased in megaloblastic anaemia, blood transfusion is seldom if ever indicated, except in the most unusual circumstances. (Daugherty, 2008)

Adverse effects of Iron: Adverse effects of oral iron: epigastric pain, nausea, vomiting, gastritis, metallic taste, constipation (due to astringent effect) or diarrhea (irritant effect) are the usual adverse effects.(Wolf et al., 2020) Liquid preparations of iron causes staining of teeth. (Högberg and Lindvall, 1964)

Figure 3: Bar chart explains the Treatment of the anaemic patient. 21% of patients were under haematinics, 8% of them never used haematinics, whereas 71% of those patients gave up haematinics as they attained normal levels of haemoglobin and some were affected by the side effects.

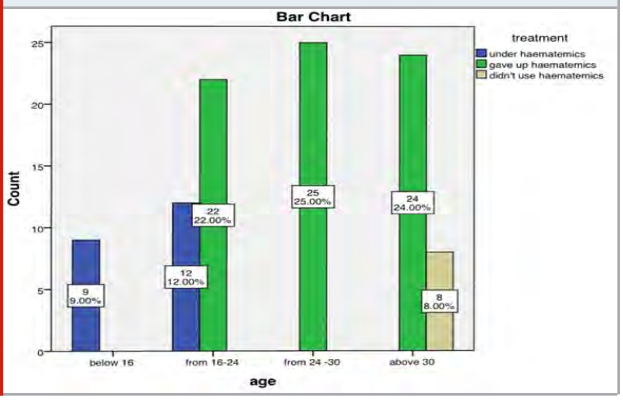
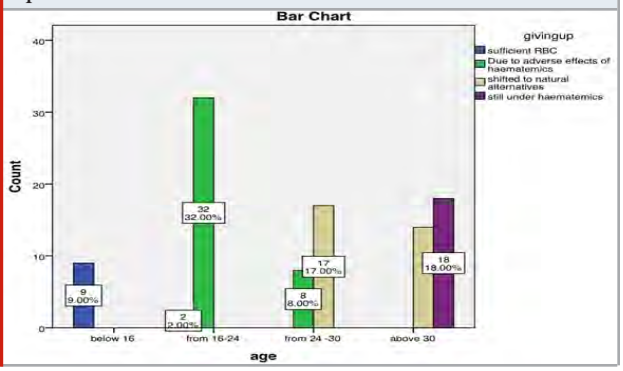


Figure 4: Shows the patients reasons for giving up Haematinics, where 18% of the patients were still under haematinics, 11% of them had given up as their RBC level has reached adequate, whereas 40% had shifted to natural alternatives and the rest 40% of the patients had given up on haematinics due to its adverse effects



Adverse effects on parenteral iron: Local- Pain at the site of injection, pigmentation of the skin and sterile abscess are seen. Systemic-fever, headache, joint pain, palpitation, difficulty in breathing, lymph node enlargement, and rarely anaphylaxis.(Tripathi, 2013a) Acute iron poisoning is common in infants and children in the womb, if the pregnant mother consumes about 10 tablets(1-2g). Manifestations include vomiting, abdominal pain, hematemesis, bloody diarrhea, shock, drowsiness, cyanosis, acidosis, dehydration, (Tripathi, 2013b)cardiovascular collapse and coma. Immediate diagnosis and treatment are important as death may occur in 6-12 hours.(Vani and Grover, 2003)

Natural foods that level iron deficiency – For anemia: There are many types of anemia. The most common type is iron deficiency anemia. Red blood cells contain a protein called hemoglobin. Hemoglobin is full of iron. Without sufficient iron, your body can't make the hemoglobin it needs to create enough red blood cells to deliver oxygen-rich blood throughout your body. (Tripathi, 2008)

A lack of folate and vitamin B-12 may also impact your body's ability to make red blood cells. If your body can't process B-12 properly, you may develop pernicious anemia. Natural food diet rich in iron and vitamin B helps in treating anemia.(Letsky, 1983)

Figure 5: Shows that 26% of those who undertook haematinics complained of its teeth staining and bad breath, 23% complained of gastritis due to haematinics, 7% said they had heartburn, 11% complained of ulcer, 17% said they had constipation due to haematinics, 11% complained of nausea and vomiting and 5% complained of diarrhoea.

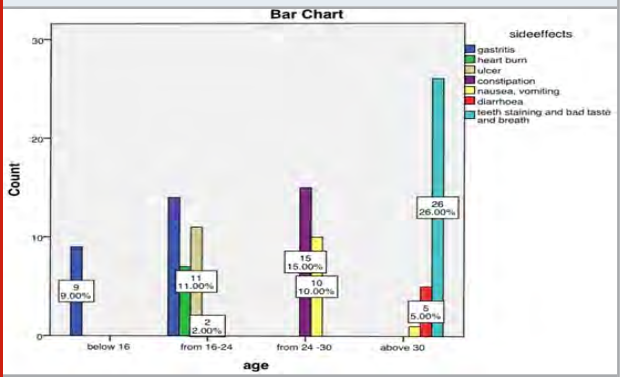
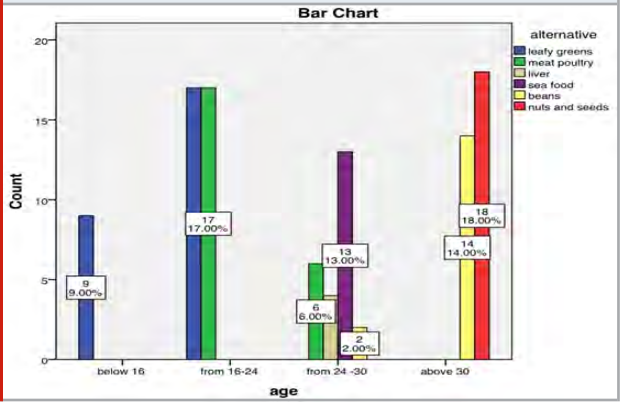


Figure 6: 26% of those used leafy greens as an alternative to haematinics, 23% took meat, poultry for their treatment, 4% consumed liver, 13% consumed seafood, 16% consumed beans and 18% consumed nuts and seeds and alternatives to haematinics so that it would help them with their anaemia.



1. Leafy green vegetables: Leafy greens, especially dark ones, are among the best sources of nonheme iron. They include:spinach,kale,collard greens,dandelion greens,Swiss chard. There are also folate-like leafy greens such as Swiss chard and collard greens. Citrus fruits, beans, and whole grains are good sources of folate. Some green leafy vegetables are high in iron, such as spinach and kale, are also high in oxalates. Oxalates are compounds stopping nonheme iron absorption. So, though consuming your greens as part of an overall diet of anemia is helpful, do not rely solely on them to treat your disease.(Burz et al., 2019) Vitamin C helps your stomach absorb iron.Leafy greens can increase iron absorption by eating food containing vitamin C, including oranges, red peppers & strawberries. Some greens, such as collard greens and Swiss chard, are healthy sources of both iron and vitamin C.

2. Meat and poultry: All meat and poultry contain heme iron. The best examples are red meat, lamb and poison. Poultry and chicken have lower amounts. Meat or poultry can increase iron absorption from nonheme foods, such as leafy greens.

3. Liver: Most people are scared about organ meats, but they are a great source of iron. Liver is arguably the most popular organ meat. It's rich in iron and folate. Some other iron-rich organ meats are heart, kidney, and beef tongue.(Abdel-Razeq and Hashem, 2020)

4. Seafood: Some seafood provides heme iron. Shellfish such as oysters, clams, and shrimp are good sources. Most fish contain iron. Fish high in iron include:sardines, canned in oil,canned or fresh tun,fresh salmon,fresh halibut,fresh perch,fresh haddock.

While both fresh and canned salmon are good sources of iron, the amount of calcium found in canned salmon is small. Calcium binds with iron and reduces its absorption. Calcium-high foods should not be eaten with iron-rich foods at the same time.

5. Fortified foods: Many foods are fortified with iron. Vegetarians who struggle to est other sources of iron could effectively make use of fortified foods. They include-fortified orange juice,fortified, ready-to-eat cereals,foods made from fortified refined flour such as white bread,fortified pasta,foods made from fortified cornmeal,fortified white rice.

6. Beans: Beans are good sources of iron for vegetarians and meat eaters alike. They're also inexpensive and versatile. Some iron-rich options are:kidney beans,chickpeas,soybeans,black-eyed peas,pinto beans,black beans,peas,lima beans

7. Nuts and seeds: Many types of nuts and seeds are good sources of iron. They taste great on their own or sprinkled on salads or yogurt.it is wise to choose raw nuts.. Some nuts and seeds that contain iron are:pumpkin seeds,cashews,pistachios,hemp seeds,pine nuts,sunflower seeds Almonds are also a good source of iron. They are perfect for a balanced diet, but since they are high in calcium, they can not increase the level of iron too much. (Pietra, Degrassi and Fusi-Schmidhauser, 2020)

Takeaway: No one food will cure anemia. However a balanced diet full of dark, leafy greens, noodles and seeds, fish , meat and beans, will help you to get the anemia you need. A skillet made of cast iron is a standard anemia diet. Foods cooked in cast iron absorb iron from the skillet.The most iron consumed by acidic foods and the least soluble foods cooked during short periods. Recall these recommendations if you adopt a diet plan for anemia:

Don't consume iron-rich foods that obstruct iron absorption with food or beverages. These include coffee or tea, eggs, foods high in oxalates, and foods high in calcium. To increase absorption, eat foods rich in iron that are high in vitamin C, such as bananas, tomatoes or strawberries. To boost absorption eat iron-rich foods with beta-carotene-containing foods, such as apricots, red peppers and beets. Eat a variety of heme and nonheme iron foods all day to increase your intake of iron. Use both heme and nonheme iron foods to improve iron absorption whenever possible. Add foods rich in folate and vitamin B-12 to support red blood cell production. (Golberg and Martin, 1964)

CONCLUSION

Hence by the survey we can conclude that people preferred natural products over hematinic drugs for their treatment of anaemia due its side effects. Majority of the study population prefer daily intake of natural products like green leafy vegetables, nuts, fruits helps in prevention and also in treating anaemia. The study population aged 16 years and 24 years were mostly affected by anemia, they were advised to take hematinics and majority of them gave up hematinics after 2-3 months of treatment due to its adverse effects.

ACKNOWLEDGEMENTS

The authors are thankful to Saveetha Dental college for providing a platform for carrying out the research.

Conflict Of Interest: The authors declare no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-59-64

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Survival Analysis of Extra-Alveolar TADs Used for Orthodontic Anchorage

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ABSTRACT

The objective of this study was to determine the survival rate of extra-alveolar implants after three months of placement. Also, a questionnaire on the subject's response to the implants were distributed. The records of patients who had extra-alveolar implants placed in the department of orthodontics were collected. A total of 32 samples were selected for this study - 7 Buccal Shelf (BS) implants and 25 Infra-Zygomatic Crest (IZC) implants. Stability of the TADs were checked using probe and tweezer on the third review. A questionnaire consisting of five questions were distributed to the subjects . Descriptive Statistics was calculated in terms of frequencies and percentages using SPSS software 23.00. Chi-square association test was also performed to associate the extra-alveolar TADs and the discomforts experienced after its placement . The results of this study showed that out of 32 implants only two reported with failure. From a patient point of view, restricted mouth opening, mild swelling was noted during the initial few days of placement. In this study , a high success rate of 93.75% was recorded for extra-alveolar TADs. Patient discomfort was observed initially after the placement of the TADs which subsided over a period of 2 weeks.

KEY WORDS: BUCCAL SHELF IMPLANTS, INFRA-ZYGOMATIC IMPLANTS, SURVIVAL ANALYSIS.

INTRODUCTION

A fundamental aspect of orthodontic biomechanics is anchorage control. During therapy, poor anchorage control may increase treatment time leading to an unfavorable result (Bondemark and r. Kurol, 1992). Concerns with commonly used extraoral devices include socially unacceptable esthetics, the potential for injury, and an impractical dependence on patient compliance (Samuels and Brezniak, 2002). The historical success of root-form dental implants to replace missing teeth supported the migration of implantology into orthodontics (Adell et al., 1981; Bra-nemark et al., 1986). The current interest in using implants as osseous anchors for orthodontics may represent a valuable alternative to conventional methods (Odman et al., 1988).

The application of orthodontic forces appears to have a positive effect on peri-implant osseous tissue (Wehrbein and Diedrich, 1993; Akin-Nergiza et al., 1998). Initially, large diameter implants were inserted into the alveolar process, the palate, and the retromolar area. More recently, strategically placed mini-implants, requiring minimally invasive surgery appear to have overcome many of the issues associated with the larger devices. While preliminary data look promising, mini-implants

ARTICLE INFORMATION

*Corresponding Author: ravindrakumar@saveetha.com
Received 27th July 2020 Accepted after revision 17th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/110*

have not equaled the success of root-form devices and concerns regarding design, osseointegration, post-insertion infection, and questions about optimal preload healing time remain subjects for further investigation (Bae et al., 2002; Lobb, 2006)(Costa, Raffainl and Melsen, 1998; Miyawaki et al., 2003)

Survival analysis is the most suitable method to analyze data that have as a principal end point the time until an event occurs. It is a popular method in biomedical research. Survival time can be defined broadly as the time until an event ('The statistical analysis of failure time data. By J.D. Kalbfleisch and R.L. Prentice. John Wiley & Sons, Inc., New York, 1980. xi 321 pp. U.S. 31.50, C 40.35. ISBN 0-471-05519-0', 1982; Lee and Wang, 2003). For an orthodontic-implant success-rate study, survival analysis seems to have several advantages. The most important feature of survival analysis is that some subjects in the study have not experienced implant failure at the end of the study or the time of analysis.

We usually cannot determine the exact time of implant failure but can notice that the failure happened only at discrete times,i.e, during patient visits. Survival analysis solves these problems irrespective of the original distribution of data, produces valuable information, including hazard characteristics and survival rates, and identifies risk factors (Lee et al., 2010). The aim of this study was to determine the survival rate of Extra alveolar implants, i.e, Infra-Zygomatic Crest (IZC) and Buccal Shelf (BS) screws, after three months of placement. Also, a questionnaire was distributed to the subjects and their response to extra-alveolar TADs were recorded .

Figure 1: Questionnaire on subject response to Extra-alveolar TADS

1. After the placement of the implant, did you have any pain?
(a) Very Mild (b) Mild (c) Moderate (d) Severe (e) Very severe

2. Was there any difficulty in opening your mouth during the week after placement of the implant?
(a) Very Mild (b) Mild (c) Moderate (d) Severe (e) Very Severe

3. Did you experience any ulcer or swelling in the mouth?
(a) Very Mild (b)Mild (c) Moderate (d) Severe (e) Very Severe

4. Did you experience any discomfort during the placement of the implant?
(a)Very Mild (b) Mild (c) Moderate (d) Severe (e) Very Severe

5. Did you experience any discomfort after the placement of the implant? (after 2 weeks)
(a)Very Mild (b) Mild (c) Moderate (d) Severe (e) Very Severe

MATERIAL AND METHODS

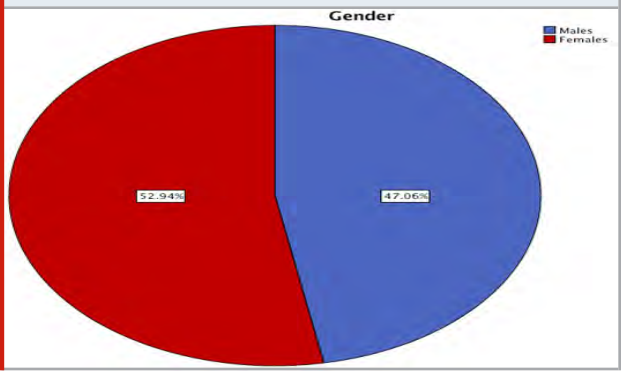
A total of 32 samples were included for this study. The records of patients who had extra-alveolar TADs placed from July 2019 to January 2020 in the department of orthodontics at Saveetha Dental College and Hospitals were collected. The subjects selected were undergoing fixed orthodontic appliance treatment with MBT bracket prescription. Among the 32 samples of TADs, 7 were Buccal Shelf (BS) implants and 25 were Infra-Zygomatic Crest (IZC) implants. Stability of the TADs were checked with probe and tweezer on the third review. The extra-alveolar TADs were used to retract the anterior segment with a controlled tipping force.

A questionnaire of six questions were distributed to the subjects and their data was recorded [Figure.1]. Descriptive Statistics was calculated in terms of frequencies and percentages using SPSS software 23.00. Chi-square association test was also performed to associate the extra-alveolar TADs and the discomforts experienced after its placement .

RESULTS AND DISCUSSION

Descriptive Statistics was calculated in terms of frequencies and percentages using SPSS software. Chi-square association test was also performed to associate between the extra-alveolar TADs and discomfort experienced by subjects after its placement. Among the total subjects selected 52.94% were females and 47.06% were males [Figure.2]. Among these subjects , it was observed that 78.13% of the TADs placed were Infra-Zygomatic Crest (IZC) implants and 21.88% wer Buccal shelf (BS) implants [Figure 3]. While assessing the stability of the extra-alveolar TAD, it was found that 93.75% of the TADs placed were stable and didn't show signs of any mobility [Figure. 4]

Figure 2: Pie Chart representing the percentage of males and females among the sample subjects.



Based on the questionnaire passed to the subjects, it has been inferred that most subjects experience severe form of pain after extra-alveolar TADs placement [Figure.5]. It was also observed that they experienced a mild form of difficulty during mouth opening [Figure.6], and they experienced severe form of ulcer/swelling after extra-alveolar TAD placement [Figure.7] . Two weeks after

placement of the implant, most subjects experienced only mild forms of discomfort [Figure. 8]. Among both IZC and Buccal Shelf implants , IZC was perceived to have only mild discomfort after placement [Figure. 9]. However, this was not found to be statistically significant (p value - 0.239)

Figure 3: Bar chart representing the type of extra-alveolar TADs used among the subjects. The X-axis represents the type of TADs used and the Y-axis represents the number of extra-alveolar TADs used among the subjects. It was observed that 78.13% of the TADs placed were Infra-Zygomatic Crest (IZC) implants.

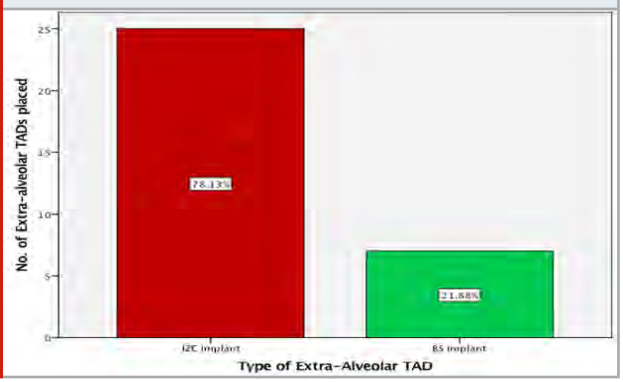
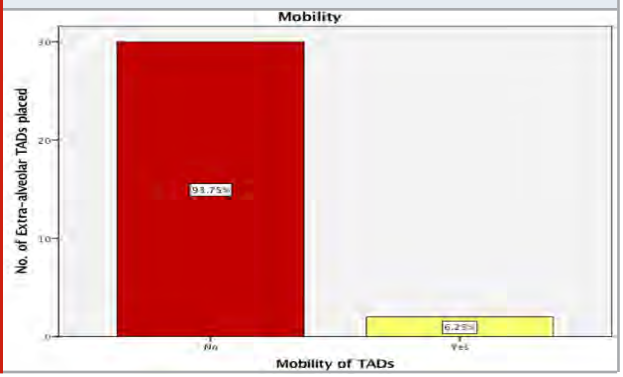


Figure 4: Bar chart representing if there was mobility of extra-alveolar TADs after three months of placement among the subjects. The X-axis represents if mobility was present . The Y-axis represents the total number of extra-alveolar TADs placed. It was observed that there was no mobility of TADs placed in about 93.75% of the samples placed. This was a 3 month survival report.



Our extensive research expertise ranged from epidemiological studies to randomised clinical trials that have been published in reputed journals(Felicita, 2017a, 2017b, 2018; Felicita, Thirumurthi and Jain, 2017; Korath, Padmanabhan and Parameswaran, 2017; Krishnan, Pandian and Rajagopal, 2017; Charles et al., 2018; Pandian, Krishnan and Kumar, 2018; Reddy et al., 2018; Chinnasamy et al., 2019). This knowledge was instrumental for us to assess the survival rate of extra-alveolar TADs used for orthodontic anchorage.

Figure 5: Pie chart representing the frequency distribution of pain experienced after extra-alveolar TAD placement. Majority of the subjects experienced moderate pain after TAD placement (41.18%).

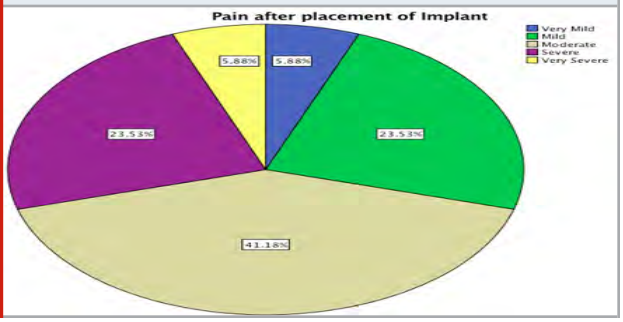


Figure 6: Pie chart representing the frequency distribution of difficulty in mouth opening after extra-alveolar TAD placement. It was observed that most subjects experienced severe difficulty in mouth opening (35.29%) after placement of extra-alveolar TAD.

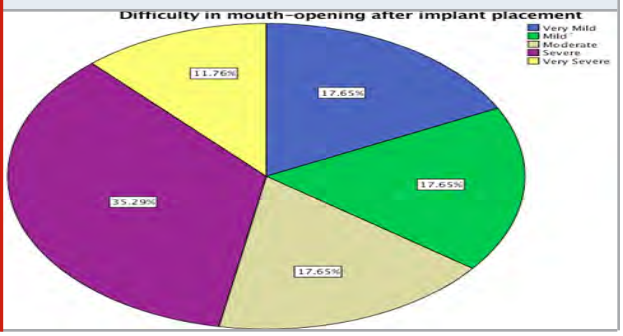
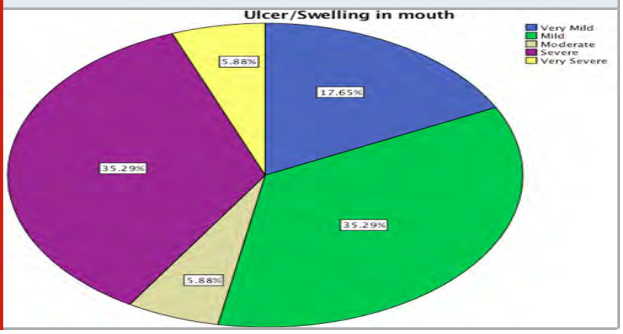


Figure 7: Pie chart representing the frequency distribution of occurrence of ulcer /swelling after the placement of extra-alveolar TADs. It was observed that most people experienced mild to severe forms of ulcers/ swelling after implant placement (35.29%).



In the present study it has been observed that the 3 month survival rate was acceptable in the majority of the cases. The subjects presented with stable and non-mobile extra-alveolar implants. The overall rate of success was 93.75%. This is favourable to reports by Park et al (Park, Kwon and Kwon, 2004), and Buchter et al (Büchter et al., 2005), who have reported 80% or greater success rates. According to previously published systematic reviews and meta-analyses, overall failure rates of mini-

implants seem to be approximately 13–14% . There was no one specific reason for failure rates of mini-implants. However, it is often followed by mobility which is further accompanied by inflammation(Papageorgiou, Zogakis and Papadopoulos, 2012).

Figure 8: Pie chart representing the frequency of discomfort experienced by the patient 2 weeks after the placement of extra-alveolar TADs. It was observed that majority experienced only mild discomfort after the placement of extra-alveolar TAD (41.18%)

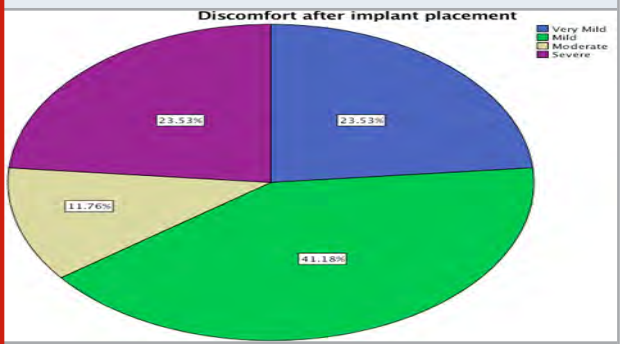
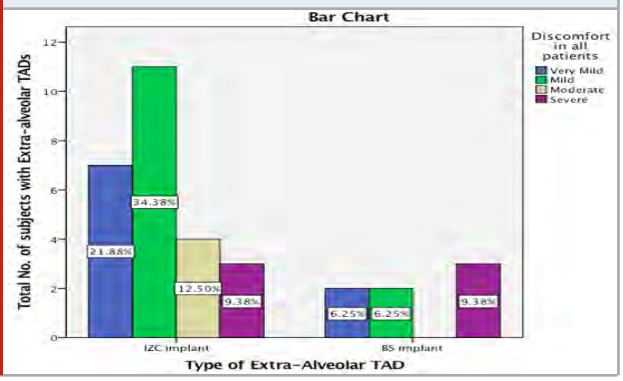


Figure 9: Bar graph representing the association between the type of extra-alveolar TAD and the discomfort faced by patients after placement of the implants. X axis represents the type of implant, y axis represents the number of subjects in whom implants were placed. Chi square association test was done and was found to be non-significant. Chi square value-4.218. df-3, p value-0.239 . It was inferred that most subjects with IZC implant experienced only mild discomfort compared to BS implant ; however this is not statistically significant (p>0.05)



Many studies have investigated the failure rate of TADs relative to a range of variables, such as gender, age, site of insertion, latency of loading, operator experience, and the physical characteristics of the screws . There has been some confusion in defining the failure of TADs in studies when they lose their ability to provide anchorage after they have met their goal, but while treatment continues (Miyawaki et al., 2003; Moon et al., 2008; Bayat and Bauss, 2010; Dalessandri et al., 2014). Most studies also include infection or inflammation as evidence of failure in addition to mobility (Wiechmann, Meyer and Büchter, 2007a; Chen et al., 2008; Viwattanatipa et al., 2009)

Lee et al. , carried out a survival analysis on 260 orthodontic implants (miniscrews) of the same type, and found a failure rate of 8.5%, representing 22 screws (Lee et al., 2010). Janssen et al, attempted to summarize the findings from 50 articles through a systematic review of studies published up to 2006 (Janssen et al., 2008). They were able to conclude that in humans, TADs have a success rate of 70–100% (Lee et al., 2010). The authors cautioned that randomized clinical trials should be conducted to determine more precisely the influence of the many variables that can contribute to the success or failure of TADs (Wiechmann, Meyer and Büchter, 2007b).

The limitations of this study include a small sample size, retrospective design and sampling technique.

CONCLUSION

Within the limitations of this study , the following findings were observed:

- A high success rate of 93.75% and failure rate of 6.25% was recorded for extra-alveolar TADs.
- Patient discomfort was observed after the placement of the TADs which subsided over a period of 2 weeks.
- Subjects with IZC implants experienced only mild discomfort after placement compared to Buccal shelf implants ; however, this is not statistically significant.

ACKNOWLEDGMENTS

I would like to record my deep sense of gratitude to my research supervisor Dr Ravindra Kumar Jain, Associate professor, Department of Orthodontics, Saveetha Dental College and Hospitals, Chennai for his guidance and encouragement with my work during all stages. There was an equal contribution from all the authors.

Conflict of Interest: There is no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-65-71

BBRC
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Knowledge, Awareness and Attitude of Predisposing Factors of Fatty Liver Among the General Population

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ABSTRACT

The aim of the study is to know the attitude and awareness of predisposing factors of fatty liver disease. Fatty liver disease is also known as hepatic steatosis, where excess fat builds up in the liver. There are two types of fatty liver disease alcoholic and nonalcoholic fatty disease. Alcoholic fatty liver disease is due to the heavy use of alcohol. Globally, approximately 2 million people die of the liver disease each year, and up to 50% of mortality with cirrhosis is attributable to alcohol. Nonalcoholic fatty liver disease is due to excess fat build-up in the liver with insulin resistance due to causes other than alcohol use. NAFLD is a liver disease associated with obesity, insulin resistance, type 2 diabetes mellitus, hypertension, hyperlipidemia, and metabolic syndrome. A study was conducted among 100 people by preparing a set of questions through an online survey method. The present study shows fatty liver diseases are caused by lifestyle changes, malnutrition and it can occur in nonalcoholic people. Fatty liver disease is a growing global health problem, affecting almost a quarter of the world's population. Fatty liver diseases are closely associated with obesity and metabolic syndrome, it is worrisome that its prevalence may soon reach epidemic proportions worldwide.

KEY WORDS: FATTY LIVER DISEASE, OBESITY, ALCOHOL.

INTRODUCTION

Fatty liver disease is also known as hepatic steatosis, where excess fat builds up in the liver. There are two types of fatty liver disease alcoholic and nonalcoholic fatty disease(Basra and Anand, 2011). Alcoholic fatty liver disease is due to the heavy use of alcohol. The liver breaks down most of the alcohol in the body and it can be removed from the body. During this process of breaking alcohol, it generates harmful substances. These harmful substances can damage liver cells ,weaken the body's natural defenses and promote inflammation. Alcoholic fatty liver disease is the earliest stage of alcohol-related liver disease. The next stages are alcoholic hepatitis and cirrhosis(Osna, Donohue, and Kharbanda, 2017). Globally, approximately 2 million people die of the liver disease each year, and up to 50% of mortality with cirrhosis is attributable to alcohol.

The alcohol-related liver disease represents one of the top 30 causes of death in recent studies on the global burden of disease. In 2010, the worldwide rate of alcohol-attributable cirrhosis death was 7.2 deaths per 100,000 people (4.6 in females and 9.7 in males) (Thursz et al., 2019). Nonalcoholic fatty liver disease is due to excessive fat build-up in the liver with insulin resistance due to

ARTICLE INFORMATION

*Corresponding Author: brundha.sdc@saveetha.com
Received 10th Augsut 2020 Accepted after revision 27th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/111

causes other than alcohol use. There are two types; non-alcoholic fatty liver (NAFL) and non-alcoholic steatohepatitis (NASH), with the latter also including liver inflammation(Younossi, 2019),('National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)', 2008).

NAFLD is a liver disease associated with obesity, insulin resistance, type 2 diabetes mellitus, hypertension, hyperlipidemia, and metabolic syndrome.NAFLD leading to liver fibrosis, cirrhosis, hepatocellular carcinoma, and liver transplantation. All of these complications of NASH can pose significant health, economic, and patient-experience burdens to the patients, their families, and society(Lieber, 2004)

People with fatty liver disease have no or few symptoms. Occasionally there may be tiredness or pain in the upper right side of the abdomen (Friedman et al., 2018). The major predisposing factors of fatty liver disease are alcohol (during the metabolism of alcohol in the liver it produces toxic metabolites like alcohol)(Angulo, 2002), metabolic like glycogen storage disease, Weber Christian disease, acute fatty liver of pregnancy, lipodystrophy (Bayard, Holt, and Boroughs, 2006), diet composition and quantity in particular omega-6 fatty acid lipids and fructose sugar, has an important role in disease progression from NAFL to NASH and fibrosis. Choline deficiency can lead to the development of NAFLD(Leermakers et al., 2015). Drugs and toxins like diltiazem, expired tetracycline, highly active antiretroviral therapy, glucocorticoids, tamoxifen, environmental hepatotoxins ,other celiac diseases, inflammatory bowel disease, HIV, hepatitis C (especially genotype 3), and alpha 1-antitrypsin deficiency causes fatty liver(Osman, Osman, and Ahmed, 2007), (Marciano, Savoia, and Vajro, 2016).

Two genetic mutations for NAFLD susceptibility have been identified and validated in large cohorts: the non-synonymous single-nucleotide polymorphisms (SNPs) in PNPLA3 and TM6SF2, as they have been shown to correlate with NAFLD presence and severity, but their roles for diagnosis remain unclear. Although NAFLD has a genetic component, the American Association for the study of liver disease does not recommend screening family members as there is not enough confirmation of heritability, although there is some evidence from familial aggregation and twin studies(Wong et al., 2018)Fatty liver disease can develop into liver cancer or fibrosis. Less than 10% of people with cirrhosis alcoholic fatty liver disease will develop hepatocellular carcinoma (Singh et al., 2015)

The diagnosis of fatty liver disease is identified by increased transaminases, especially ALT. The ratio of ALT/ AST is usually less than 1 but it is increased for the fatty liver diseased people. It is found during a health check-up or during the study of some other manifestation of the metabolic syndrome. Diagnosis may also be suspected by the accidental discovery of hepatomegaly or a radiological test carried out for another reason showing suggestive changes of fatty liver (Pagano, 2002). Although the final diagnosis should be confirmed by liver biopsy(Chalasani et al., 2018).

The treatment of the fatty liver disease depends on various factors, causes, etc that not all are identified. In more serious cases, medications that decrease insulin resistance, hyperlipidemia, and those that induce weight loss such as bariatric surgery as well as Vitamin E have been shown to improve or resolve liver function(Caballería et al., 2008). Fatty liver is an ever more prevalent disease involving 17 to 33% of the general population according to the different series and is increasing with the higher incidence of obesity(Bedogni et al., 2005).

MATERIAL AND METHODS

Sample Selection: A sum of 100 people of the general population were randomly selected from the university as a participant in the survey. The data collection questionnaire was developed after reviewing various similar literature .

Inclusion and Exclusion Criteria: Inclusion criterion set was the general population who were willing to attend the survey. Exclusion criteria was set for people who were not willing to participate.

Sampling Method: In the present study, the sampling method used is a random sampling method.

Data Collection and Tabulation: The questionnaire which was taken on a survey planet concerns about 15 questions mainly based on the concept of fatty liver. Their responses were entered into the excel sheets and then tabulation of the data finally and the question comparison was done. The representation of the data is through the bar graph.

Statistical Analysis: The statistical software used IBM SPSS V22.The statistical test used is Chi square test (p value). Type of analysis used were descriptive analysis,demographic data.

RESULTS AND DISCUSSION

The study shows (fig 1) 83% of people heard about fatty liver, (fig 2) 59% of people thought fatty liver diseases are hereditary. Kawaguchi and colleagues focused on establishing the genetic risk in Asian-descent patients(Kawaguchi et al., 2012). (Fig 3)70% of people think fatty liver diseases were preventable,(fig 4) 84% thought treatment available for fatty liver disease, (fig 5) 67% aware of fatty liver diseases are occur in nonalcoholic people, (fig 6) 82% thought fatty liver diseases are curable, (fig 7) 75% of people thought fatty liver disease cause serious health problems, (fig 8) 54% of people not known fatty liver is linked with diabetes. Lu et al. reported the prevalence of NAFLD in type 2 diabetes mellitus patients was significantly associated with elevated ALT (Lu et al., 2009). (fig 10) 62% of people are aware that it is linked with obesity and Bp, (fig 12) 54% thought fatty liver is linked with hepatitis.

Concurrent hepatitis C infection and steatosis have been associated with increased risk of disease progression. Genotype 3 is strongly associated with the presence of hepatic steatosis independent of sex, body mass index, and alcohol consumption. Current research suggests that one possible mechanism for hepatic steatosis in HCV is binding of the viral X gene product to LXR-alpha and upregulation of the transcription factor SREBP1c (sterol regulatory element-binding protein 1c)(Brown et al., 2005).

Figure 1: Pie chart represents the percentage of people heard about fatty liver. Red colour in the pie chart denotes"Yes" and blue colour denotes "No". A higher percentage of responses were Yes (83%).

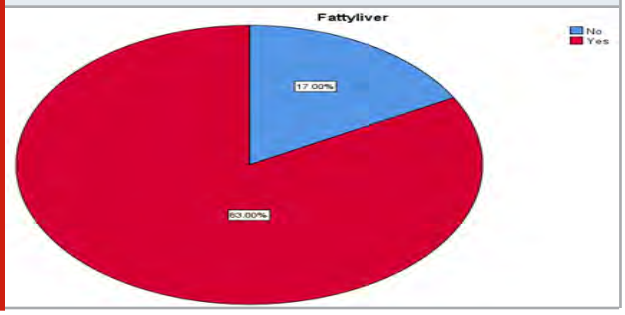


Figure 2: Pie chart represents the percentage of people thought fatty liver disease was hereditary. Red colour in the pie chart denotes"Yes" and blue colour denotes "No". Higher percentage of responses were Yes (59%).

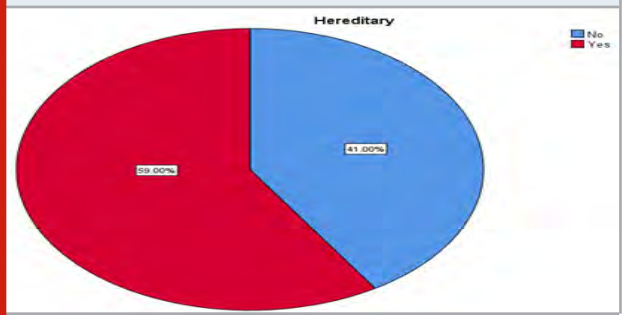


Figure 3: Pie chart represents the percentage of people thought about fatty liver diseases were preventable. Red colour in the pie chart denotes"Yes" and blue colour denotes "No". Higher percentage of responses were Yes (70%).

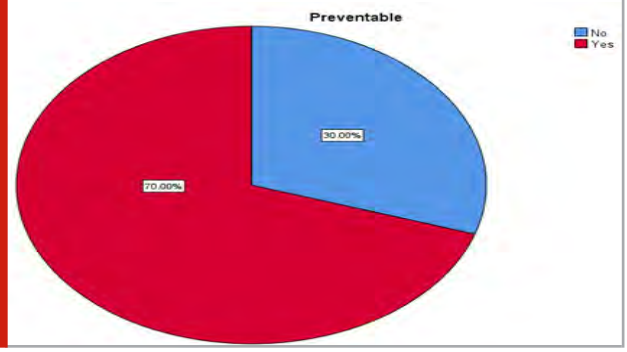


Figure 4: Pie chart represents the percentage of people thought about the treatment available for fatty liver diseases. Red colour in the pie chart denotes"Yes" and blue colour denotes "No". Higher percentage of responses were Yes (84%).

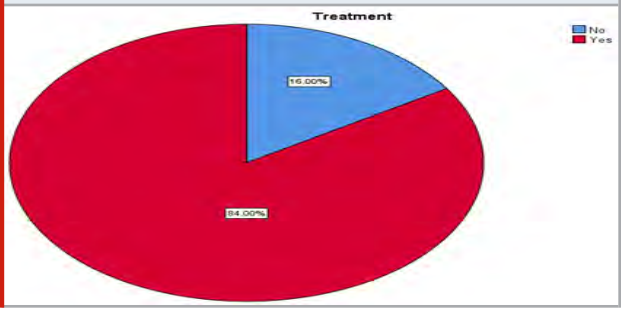


Figure 5: Pie chart represents the percentage of awareness about fatty liver diseases in nonalcoholic people. Red colour in the pie chart denotes"Yes" and blue colour denotes "No". Higher percentage of responses were Yes (67%).

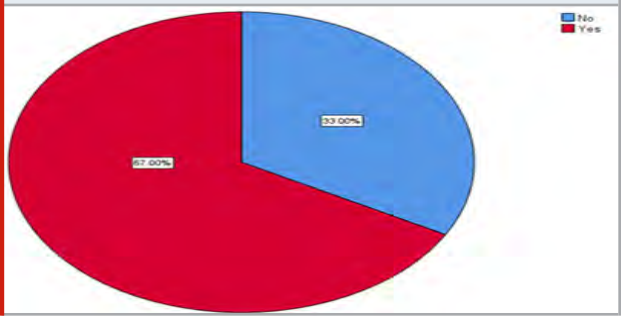
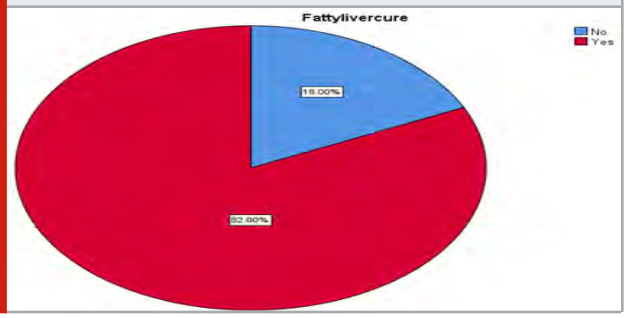


Figure 6: Pie chart represents the percentage of people thought fatty liver diseases are curable. Red colour in the pie chart denotes"Yes" and blue colour denotes "No". Higher percentage of responses were Yes (82%).



(Fig 13) 72% of people were aware of lifestyle changes causing fatty liver, (fig 15) 60% of people know fatty liver diseases are caused by medications,(fig 17) 61% of people thought fatty liver disease is linked with PCOS. Few interventional data exist for NAFLD in PCOS patients. There is one case with a response to diet, moderate weight loss, and exercise with an improvement in her histology findings at a post-treatment liver biopsy(Kneeman, Misdraji, and Corey, 2012). (Fig 18)60% are aware that it is caused by malnutrition.

Figure 7: Pie chart represents the percentage of people thought fatty liver diseases cause serious health problems. Red colour in the pie chart denotes"Yes" and blue colour denotes "No". Higher percentage of responses were Yes (75%).

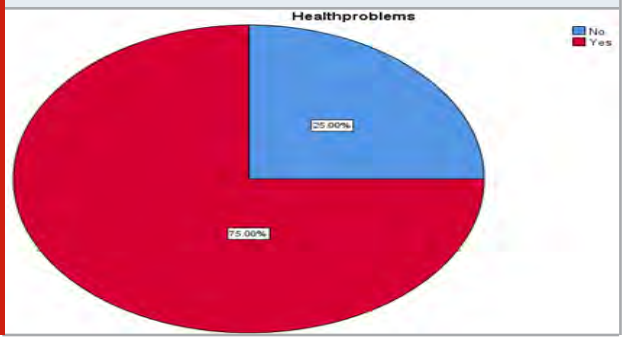


Figure 8: Pie chart represents the percentage of people thought fatty liver was linked with diabetes. Red colour in the pie chart denotes"Yes " and blue colour denotes "No". Higher percentage of responses were No (54%).

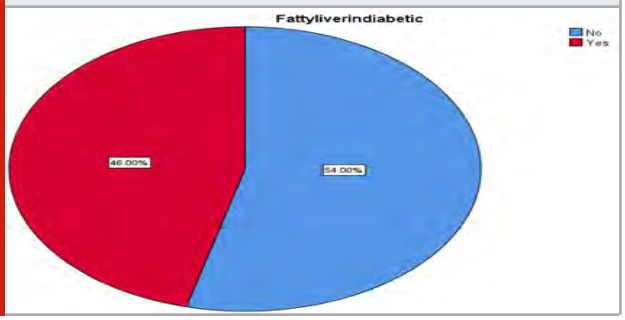
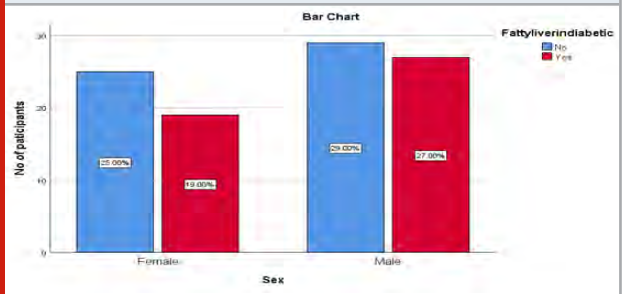


Figure 9: Bar chart showing the comparison of responses based on the question "Do you think fatty liver is linked with diabetes" between male and female. The X-axis represents the sex and Y-axis represents number of participants of which red colour denotes "Yes" and blue colour denotes "No" .Majority of the males thought fatty liver is not linked with diabetes.However the difference is not statistically significant (Chi square value -0.251,p value = 0.616(> 0.5 - indicating statistically not significant).



The cytosolic concentration of choline, a critical nutrient for lipoprotein secretion, also decreases, promoting lipid storage in hepatocytes(Hu et al., 2018). Our results demonstrated that fatty liver diseases are strongly associated with metabolic activities such as higher body fat, obesity, hyperlipidemia, and impaired fasting glucose(Dyson, Anstee, and McPherson, 2015). Lifestyle interventions aimed at weight loss and increased activity are essential for all patients with fatty liver disease and if sustained is effective in the treatment of fatty liver disease. For patients who develop advanced disease, they require surveillance for and management of the complications of cirrhosis (HCC, varices, osteoporosis) (Söderberg et al., 2010).

Figure 10: Pie chart represents the percentage of people thought fatty liver diseases were linked with Bp and obesity. Red colour in the pie chart denotes"Yes" and blue colour denotes "No". Higher percentage of responses were Yes (62%).

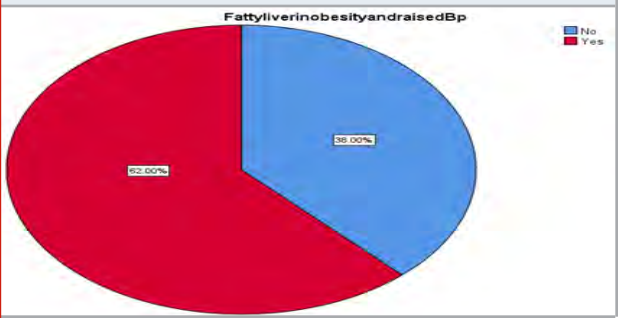


Figure 11: Bar chart showing the comparison of responses based on the question "Do you think obesity and raised Bp is linked with fatty liver" between male and female. The X-axis represents the sex and Y-axis represents number of participants of which red colour denotes "Yes" and blue colour denotes "No".Majority of the males thought fatty liver is thought fatty liver was linked with obesity and Bp.However the difference is not statistically significant (Chi square value -1.274,p value = 0.259(> 0.5 - indicating statistically not significant).

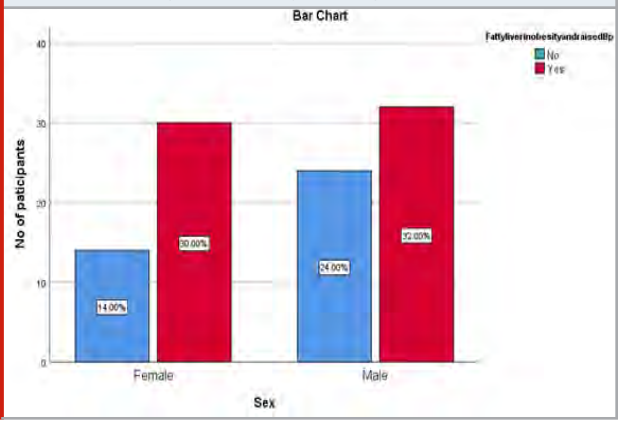


Figure 12: Pie chart represents the percentage of people thought fatty liver diseases were thought fatty liver is linked with hepatitis.Red colour in the pie chart denotes“Yes” and blue colour denotes “No”. Higher percentage of responses were Yes (54%).

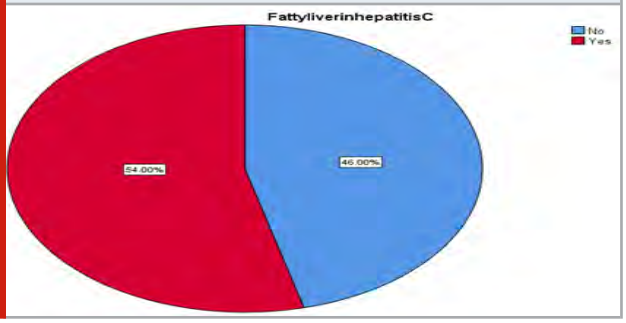


Figure 13: Pie chart represents the percentage of people aware about lifestyle changes cause fatty liver.Red colour in the pie chart denotes“Yes”and blue colour denotes “No”. Higher percentage of responses were Yes (72%).

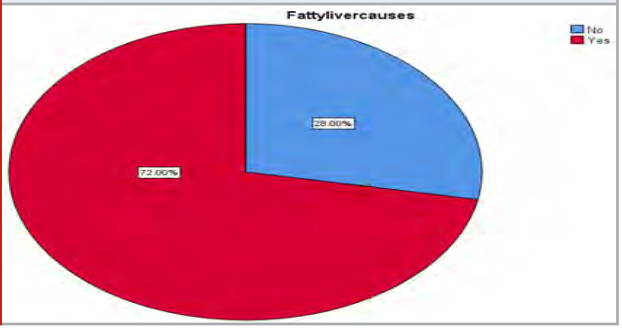


Figure 14: Bar chart showing the comparison of responses based on the question “Do you think fatty liver is caused by lifestyle changes” between male and female. The X axis represents the sex and Y-axis represents number of participants of which red colour denotes “Yes” and blue colour denotes “No” .Majority of the males thought fatty liver is caused by lifestyle changes.However the difference is not statistically significant (Chi square value - 1.08,p value = 0.298(> 0.5 - indicating statistically not significant).

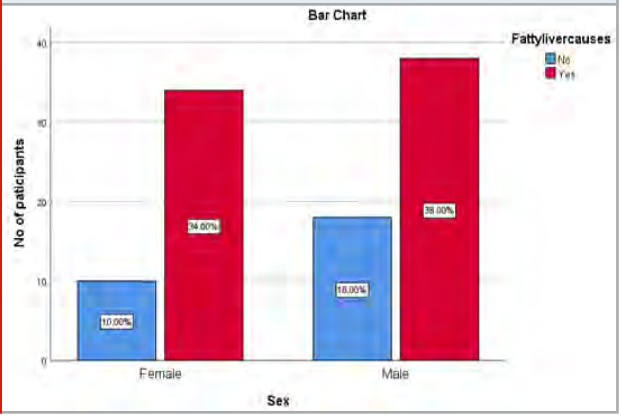


Figure 15: Pie chart represents the percentage of people thought medications cause fatty liver.Red colour in the pie chart denotes“Yes” and blue colour denotes “No”. Higher percentage of responses were Yes (60%).

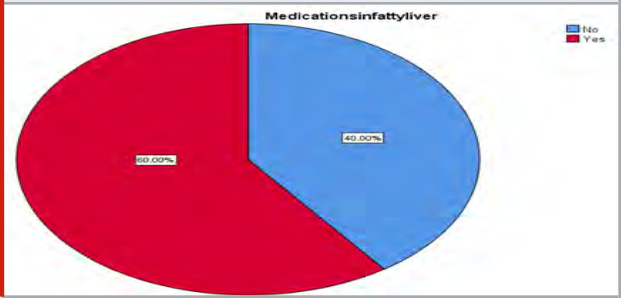


Figure 16: Pie chart represents the percentage of people thought PCOS is linked with fatty liver.Red colour in the pie chart denotes“Yes” and blue colour denotes “No”. Higher percentage of responses were Yes (61%).

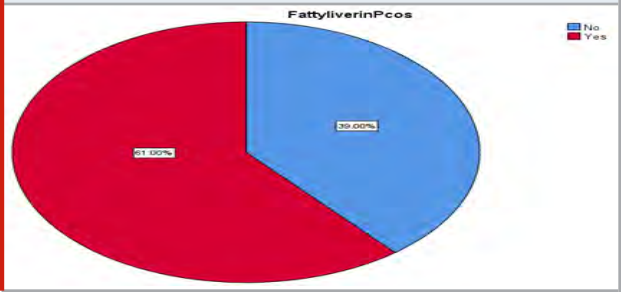


Figure 17: Bar chart showing the comparison of responses based on the question “Do you think fatty liver is linked with PCOS” between male and female. The X axis represents the sex and Y-axis represents number of participants of which red colour denotes “Yes” and blue colour denotes “No” .Majority of the males thought fatty liver is linked with PCOS.However the difference is not statistically significant (Chi square value - 2.56 ,p value = 0.113 (> 0.5 - indicating statistically not significant).

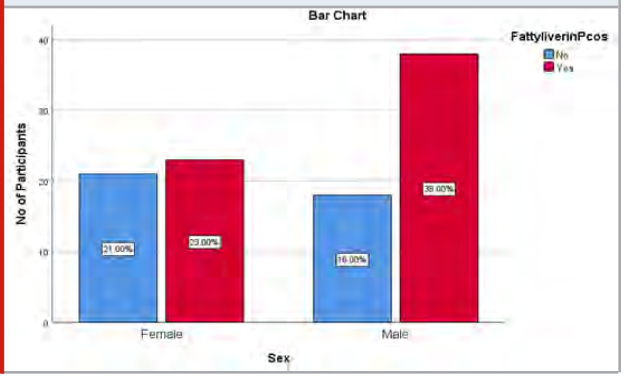
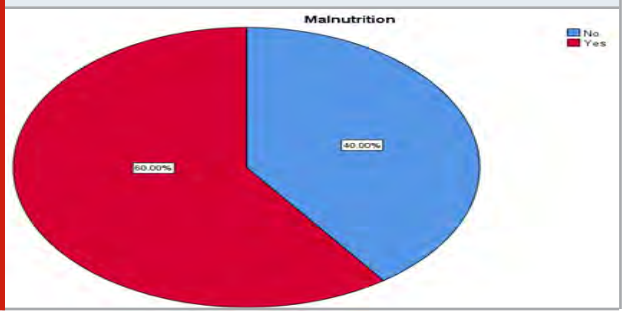


Figure 18: Pie chart represents the percentage of people thought malnutrition causes fatty liver.Red colour in the pie chart denotes"Yes"and blue colour denotes "No". Higher percentage of responses were Yes (60%).



CONCLUSION

Within the limitations of the study we concluded that a majority of the males are more aware about fatty liver than females and also we found that fatty liver diseases are caused by lifestyle changes, malnutrition and it can occur in nonalcoholic people.

ACKNOWLEDGEMENTS

The authors like to thank the participants of this survey for spending their valuable time.

Conflict of Interest: None declared

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-72-76

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Management of Teeth with Necrotic Pulp and Open Apices – Clinical Practice Guidelines

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ABSTRACT

The endodontic treatment of permanent teeth with open apices and necrotic pulp is considered one of the most complex challenges for clinicians. Tooth with open apices show thin radicular walls have increased susceptibility to fracture, the wide lumen of the apical foramen makes it difficult to maintain the filling material inside the root canals and Difficult for proper cleaning mechanically. In order to avoid excessive root weakness the treatment of such cases depends on various factors and is a multifactorial process. This study aims to formulate certain guidelines which the clinician can follow in such case scenarios to best provide a treatment outcome for such case scenarios.

KEY WORDS: IMMATURE TOOTH APEX, ENDODONTIC TREATMENT, PERMANENT TEETH, ROOT CANAL SYSTEM.

INTRODUCTION

The endodontic treatment of permanent teeth with open apices and necrotic pulp is considered one of the most complex challenges for many clinicians. Usually, these teeth are associated with young people who develop early cavities, have a morphological anomaly or have suffered a dental trauma that prematurely halts root development (Flanagan, 2014) The cause of open apex formation in permanent teeth is due to a wide variety of factors such as pathological (external inflammatory root resorption) or iatrogenic (over-instrumentation) factors, that modify the mature apical lumen diameter (Plascencia et al., 2017). Various methods have been employed by different authors for the assessment for the growth of tooth development. Several authors have used different classification for the assessment of root development (Sapir and Shapira, 2008).

The most commonly used is the classification given by Cvek et al (4) who had arrived at a classification for root development by doing a retrospective study on 885 single rooted teeth. Cveks described the stages of tooth development in 5 stages, Stage 1: less than half the root length, Stage 2: half the root length, Stage 3: 2/3 of the root length, Stage 4: Wide open apical foramen with almost complete root formation, Stage 5: Closed apical foramen formation with complete mature apex formation. While in Stage 5 the root formation is complete but the other stages such as Stage 1-3 have an open apex formation and cause a dilemma in the treatment protocol among various clinical practitioners.

The major dilemma is seen in conditions where the root development is classified into the first 3 stages due to the various treatment modalities available such

ARTICLE INFORMATION

*Corresponding Author: subash@saveetha.com
Received 29th July 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/112

as apexification (Rafter, 2005; Sapir and Shapira, 2008) or regenerative endodontic procedure (Lee et al., 2015) depending on the various factors (Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019; Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019).

Definitions

Regenerative endodontic procedures can be defined as biologically based procedures designed to replace a damaged structure, including dentin and root structure as well as cells of the pulp-dentin complex (Murray, Garcia-Godoy and Hargreaves, 2007). Apexification is a method to induce a calcified barrier in a root with an open apex or the continued apical development of an incompletely formed root in teeth with necrotic pulp (25) (AAE-2015)

Considerations

Different factors are to be considered for the treatment of such cases

1. Age
2. Patient Cooperation
3. Apex diameter
4. Degree of infection in the canal
5. Degree of root formation of the immature tooth

Age: It is seen in various reports that the patient of a young age has a better success rate of regenerative endodontic procedure compared to older individuals. It was seen that ages of 8-16 years are the more ideal candidates for regenerative endodontic procedure depending on various clinical studies (Banchs and Trope, 2004; Araújo et al., 2017). Patient Cooperation: This is another major factor associated with the treatment selection for management of immature permanent tooth. One of the main disadvantages for revascularization procedure is the follow-recall period in which the patient requires to come in subsequent time intervals for evaluation

Apex Diameter: The width of the apex diameter plays an important role in the treatment selection criteria with literature showing that if the apex diameter is more than 1.1mm then the treatment of choice is apexification

Degree of infection in the canal: Elimination of microbial organisms form the root canal system is one of the major criteria for the disinfection.

Degree of root formation of the immature tooth: Various authors (Kahler and Rossi-Fedele, 2016; Austah et al., 2018; Kim et al., 2018), have successfully done the treatment of the immature tooth with open apex but many of the authors have not taken in regard the degree of root formation of the tooth. Recently literature has shown that the degree of root formation also plays a role in the development of the immature permanent tooth with open apex.

Mechanism of Action of Root Formation: The major criteria for regenerative endodontic therapy are to release as many growth factors as possible which enables the physiological development of the root. These growth factors are present in the dentinal matrix. The most commonly seen growth factors are TGF-β1, fibroblast growth factors 2 (FGF2) and platelet derived growth factors (PDGF) with each of the growth factors being specific in its function such as TGF-β1, FGF2, VEGF and insulin-like growth factors stimulate cell proliferation, BMP and FGF2 promote dentinogenesis and PDGF and vascular endothelial growth factors (VEGF) controls angiogenesis. The combined effect of these growth factors enables the continuous development of the roots until the root formation is complete (30).

Management of Tooth With Necrotic Pulp and Open Apex

1. Pulp sensibility testing: The use of pulp sensibility testing gives the clinician invaluable information on the health status of the pulp. Various tests have been administered for the assessment such as cold test, Electric pulp testing, and Heat tests. Fuss et al (Fuss et al., 1986) in their in-vivo study had done an analysis in which they assessed the pulpal response and found dichlorodifluoromethane (DDM) to be much superior compared to CO2 snow. Levin et al (Levin, 2013)showed that the response had been similar to permanent tooth with mature apex in most of the case scenarios. The non vital tooth usually shows negative response due to failure to stimulate the nerve stimulus in the tooth.

2. Access opening: The access opening can be done using Endo access bur. One of the major factors to be considered for such case scenarios is the preparation of straight-line access from the coronal reference to the apex. Schroeder et al (Schroeder, Walton and Rivera, 2002)had done a study to evaluate the significance of straight line access and found that canals with a straight line access had shown a lesser deviation of working length when compared to curved canals This necessitates the significance of straight line access.

3. Working length determination: The working length should be kept 2mm short of apex followed by which enlargement of the coronal orifice is done using Gates glidden drills. The orifice enlargement is done followed by cleaning and shaping of the canal is done using Hand instruments such as K – files up to the desired length.

4. Instrumentation: Growth factor and other cells are essential for the regeneration process could also be eliminated by instrumentation. Two types of cells are required to achieve a normal root development: odontoblasts and epithelial cells of Hertwig's epithelial root sheath (Zeichner-David et al., 2003). Another

one of the factors to be considered is the apical area inflammation which secondary odontoblasts with vital stem cell preservation. For the regenerative endodontic procedure, minimal instrumentation has shown major success in the treatment of tooth because it has shown in various studies that minimal instrumentation better treatment outcome when compared to complete instrumentation due to studies showing that it does not interfere or degrade the SCAP cells present in the apical papilla region (Galler, 2016).

5. Disinfection of the Root Canal System: Disinfection of the root canal system is critical for the success of endodontic treatment procedure as this has a major effect on the prognosis of treatment. The presence of infection has many adverse effects which prevents regeneration, repair and stem cell activity. Chemical disinfection of the root canal system is not solely dependent on bactericidal and bacteriostatic properties of the agents as these irrigants and medicaments should not damage the survival and proliferative capacity of the patient's stem cells. It is recommended in guidelines that an irrigation regimen of 5.25% sodium hypochlorite is recommended for 1 minute. A study done by Mohmmed et al (Mohmmed et al., 2017)had shown different results showing that even with the irrigation of 5.25% sodium hypochlorite for 1 minute couldn't efficiently clear out the E. faecalis biofilm. Martins et al (Martin et al., 2014) have shown that fusage of 1.5% sodium hypochlorite had lesser effect on the SCAP cells when compared to 6% sodium hypochlorite used in their study. Another one factor to be considered is the biocompatibility issue for these commonly used irrigants which have shown to have cytotoxic potential to the cells. In order to counter this various other alternative irrigants have been used such as Noni juice and Aquatine EC. Further research should be done for seeing its significance in clinical scenarios.

In the case of apexification the irrigation protocol to be used is 5.25% sodium hypochlorite and 17% EDTA solution as a final irrigant (Shabahang, 2013). It is seen that tissue dissolving capacity of sodium hypochlorite varies depending on the concentration used the recommended protocol to be used is 5.25% sodium hypochlorite and 17% EDTA as final irrigation for cases with mature apex formation but chances of extrusion of these chemical agents is much higher for a tooth with immature apex. The clinician should take utmost care when using solutions for these types of case scenarios and care should be taken when doing these types of cases. One of the methods of reduction of apical extrusion is the use of EndoVac system which is a negative pressure system designed to enable the removal of the irrigant from the canal. This is supported by different studies. Gade et al (Gade et al., 2013) had shown the advantage of using an EndoVac system for the removal of apical extruded irrigants when compared to conventional needles or needles used with microcannula. chlorhexidine

6. Intracanal Medicaments: The use of intracanal medicaments is another factor to be considered for the disinfection of the root canal system. The ideal requirement of any intracanal medicament is its subsequent release of antimicrobial action for a long period of time when placed in the canal. The most recommended intracanal medication used is calcium hydroxide introduced by Herman in 1920. It is given by Siqueira et al (Siqueira and Lopes, 1999)that the mechanism of antimicrobial action of calcium hydroxide is by these 3 process; damage to the bacterial cytoplasmic membrane, protein denaturation and damage to the DNA. The use of a vehicle is one of the critical factors for the application of the calcium hydroxide in the intracanal space. For instance a viscous vehicle will remain in the canal for a longer period of time compared to a water-based vehicle used (Mohammadi and Dummer, 2011).

Another most commonly used intracanal medicament is triple antibiotic paste (TAP) found by Banchs and Trope consisting of metronidazole, ciprofloxacin and minocycline. It was based on the concept of LSTR therapy which employs a combination of various antibacterial drugs for the disinfection of oral infectious lesions including dentinal, pulpal and periradicular lesions. It was found that the majority of the bacteria in the infected root canal dentin are obligate anaerobes for this reason metronidazole was taken as a first choice among the antibacterial drugs . The use of triple antibiotic paste has shown major success in the reduction of the microbial count in the infected root canal system and has shown that even in low concentration such as 1, 0.1 and .01 mg/ml has the ability to eradicate Enterococcus faecalis colonies with less effect on the viability of stem cells.

It is also shown to have much better antibacterial potential to calcium hydroxide. One of the major adverse effects of use of TAP is the discolouration of the tooth when placed for extended periods with many case reports supporting the same. The reason being the presence of minocycline. In order to negate the use of double antibiotic paste is advised which consists of metronidazole and ciprofloxacin (Vijayaraghavan et al., 2012). One of recently introduced intracanal medicament used in endodontics is emdogain which is shown to have significantly higher antimicrobial effect and lesser deleterious effects the stem cell activity (Wang et al., 2018).

Protocol To Be Followed For Necrotic Teeth With Open Apices

1st Visit

- Pre Evaluation of the case using clinical history and radiographic findings
- Access opening with EndoAccess Bur followed by which working length determination is done
- Cleaning and shaping of the root canal system with subsequent irrigation using 1.5% sodium hypochlorite (20ml) and saline irrigation (40ml).
- Final irrigation to be done using 2% Chlorhexidine gluconate (5ml) or 1% Alexidine Digluconate (5ml).
- Activation of the bisguanide based irrrigant (5ml) using Sonic or Ultrasonic activation

- Placement of an intracanal medicament –Double Antibiotic Paste or Modified Triple Antibiotic paste/ Emdogain

2nd Visit – After 1 week

- Evaluation of the tooth – radiographic examination followed by pain assessment of the individual
- Irrigation of the canal using Saline to remove the medicament
- Copious Irrigation using 1.5 % Sodium hypochlorite and final irrigation of 17% EDTA (20ml, 5 mins) followed by which the canals are dried using paper points.
- During the irrigation procedure the patient should be asymptomatic completely with no debris coming from the canal.
- In the presence of any craze lines, fractured tooth the recommended protocol to be followed is apexification followed by Full Veneer Crown.
- In the presence of only discoloration with no fracture or minimal fracture requiring no additional treatment such as post endodontic restoration then the adviced protocol to be followed is revascularization. The selection of the treatment modality revascularization depends on various factors such as age of the patient which should be less than 25 years and cooperative patient.
- If the root length is more than 2/3rd using Cveks criteria evaluation is done on radiograph - the recommended treatment protocol is apexification.
- If the root length is less than 2/3rd using Cveks criteria radiographic evaluation is done -treatment protocol that can be followed is revascularization.
- Recall after a duration of 1 month, 3 months, 6 months, 1 year, 2 years, 5 years for follow-up
- CBCT Evaluation after a 1 year of the tooth of interest to evaluate the dentin thickness

CONCLUSION

The following practice guideline is effective for the treatment of immature teeth with open apex and is a major dilemma among all the dental practitioners. This guideline provide an show an effective way to the clinician for the management of immature open apex

ACKNOWLEDGMENTS

None

Conflict of Interest: None

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-77-80

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Effect of Beetroot Juice on Anaemic Patients –an Analytical Study

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ABSTRACT

Anaemia is a common name for a range of disorders that affect red blood cells. Red blood cells contain hemoglobin, which is responsible for carrying oxygen in the blood. To generate red blood cells, the body needs vitamin B12, iron and folic acid. If one or more of these factors are deficient, anaemia will develop. It is one of the most under-diagnosed conditions, if left untreated and can lead to many serious complications such as cardiovascular disease and compromised immune function.This aim of the study is to assess and evaluate the role of beetroot juice in increasing the Haemoglobin level and other Haematological parameters like MCV, MCH and MCHC. A group of 9 people with anaemia were selected for the study. Beetroot juice mixture was given to the group twice a day for 3 weeks. MCV, MCH, Hb% are recorded before and after consumption by sending blood samples to the clinical lab of Saveetha Dental college. There was a significant raise in Hb level and slight improvement seen in MCV, MCH,and MCHC. It shows Beetroot juice can treat anaemia thereby increasing Hb level faster and more efficiently. Beetroot juice can be given as an alternative for Hematinics as they show immediate response of raising Haemoglobin level and other hematocrit parameters. Also they don't produce any side effects even if it is consumed for months.

KEY WORDS: ANEMIA, BEETROOT JUICE, PLATELETS, RED BLOOD CELL..

INTRODUCTION

Anaemia is characterized by lessening in the aggregate sum of hemoglobin or the quantity of red cells. Iron insufficiency pallor is a type of paleness because of the absence of adequate iron to form ordinary red cells (Anderson, Frazer and McLaren, 2009). Iron insufficiency is the prevalent reason for weakness crosswise over nations. In both genders, ladies are commonly affected (McLean et al., 2009) (Kassebaum et al., 2014). Different components liable for pallor during pregnancy are gestational age, equality, continuous birth interim, history of overabundance seeping during period, intestinal parasitic contamination, jungle fever, interminable disease, and blood misfortune during pregnancy (Alemayehu et al., 2016) (Kaul et al., 2013).

Since the general iron prerequisite expands two-to three folds during puberty because of high development spurt and the loss of 12.5-15 mg iron every month, juvenile young ladies are helpless against paleness. Iron deficiency during youth is a nourishing issue and it has irreversible

ARTICLE INFORMATION

*Corresponding Author: brundha.sdc@saveetha.com
Received 9th August 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/113

negative consequences for development of psychological growth and work execution (H. et al., 2018)(Bank and World Bank, 2003). Anaemia is a typical worry in geriatric age. In this populace, it can have fundamentally more serious complexities more than in the youthful grown-ups and can incredibly hamper the personal satisfaction (Lafuente et al., 2001).

The common beet plant of north america has it's tap root named as beetroot.It is one of a few developed assortments of Beta vulgaris developed for their palatable taproots and leaves (called beet greens); they belong to delegated B.vulgaris Subsp vulgaris Conditiva' Group (Okamura, Tokuzane and Dohi, 2013). According to Bakhru, creator of "Nourishments That Heal", said that beetroot juice is useful for treating sickness in youngsters and adolescents. Nirman Walker (2010) undertakes that beetroot assembles red corpuscles with betalain and adds tone to blood by enlarging the Hemoglobin levels. The charge of beetroot acquire is low in comparison with other iron-rich veg-tables (Rauha et al., 2000). Beetroot juice is used as a paleness solution for youngsters and adolescents, as per H.K.Bakhru, creator of food that heals''.

Table 1. Shows the Hb, MCV, MCH and MCHC before and after consumption of beetroot juice

	Before Consumption				After consumption			
Patients	Hb (g/dl)	MCV (fl)	MCH (pg)	MCHC (g/dl)	Hb (g/dl)	MCV (fl)	MCH (pg)	MCHC (g/dl)
1	11	77.5	24	31	12.5	79	25.7	32.7
2	11	88.5	29.5	32.2	12	90	30.4	33.7
3	8.4	83	26	31	9.2	84	27.3	32.6
4	11	83.5	25.2	32.5	13.4	85	26.7	33.6
5	11.6	84	26	31	12.4	85	27.6	32.6
6	9	87.5	27.2	31.2	10.5	89	28.9	32.4
7	11	80.5	26	32.5	12.2	82	27.3	33.2
8	8.2	89.5	28	31	9.3	91	29.6	32.4
9	9.4	92	29.2	30.5	10.7	93	30.3	32.6

Table 1a.

	Mean	Standard Deviation	SEM
Before	10.178	1.433	0.478
After	11.356	1.489	0.496

Student's paired T test- p- valueP value is less than 0.0001

Table 2. Haemoglobin (Hb) level in anaemic patients.

	Mean	Standard Deviation	SEM
Before	85.111	86.444	1.543
After	4.629	4.586	1.529

Student's paired T test- p valueP value is less than 0.0001

Table 3. Mean Corpuscular Value (MCV) value in Anemia patients.

	Mean	Standard Deviation	SEM
Before	26.789	1.836	0.612
After	28.200	1.665	0.555

Student's paired T test-p value P value is less than 0.0001

Table 4. Mean Corpuscular Hemoglobin (MCH) in Anaemic patients.

	Mean	Standard Deviation	SEM
Before	31.433	0.753	0.251
After	32.867	0.502	0.167

Student's paired T test- p valueP value is less than 0.0001

Easton Patrick-says that expending beetroot juice or beet as cooked vegetable in a plate of mixed greens is exceptionally gainful in treating anemia. Beetroot contains a few profoundly bioactive phenolics, for example, rutin, epicatechin and caffeic corrosive which are likewise known to be phenomenal cancer prevention agents (Patel, Luke and Jeenath Justin Doss, 2017) The specialist saw that there is less spotlight on evaluation and the board of pallor among juvenile young ladies. Beetroot juice has positive effects on human blood and blood forming characteristics because of its higher iron substance. It recovers and reactivates the red cells. It supplies new oxygen to the body and helps the typical capacity of vesicular relaxing. In light of these the present examination was attempted by the analysts to concentrate on the requirements of the immature girls (Zielinnska-Przyjemska et al., 2009) The beetroot being a basic nourishment with pH from 7.5 to 8.0 has been acclaimed for its medical advantages, specifically for its sickness battling cell reinforcement potential.

Huge measure of nutrient C and nutrients B1, B2, niacin, B6, B12 while the leaves are a brilliant wellspring of nutrients seen in beetroot (Dallman and Siimes, 1979). In iron insufficiency the convergence of hemoglobin is stopped by the confined stock of iron. This in turn have its effects on reduction in hemoglobin (Hb), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin Concentration(MCHC) (Neelwarne, 2012). This aim of the study is to assess and evaluate the role of beetroot juice in increasing the Haemoglobin level and other Haematological parameters like MCV, MCH and MCHC.

MATERIAL AND METHODS

The mixture is prepared by extracting juice of beetroot of about 200 ml. 10 gm of sugar is added to the mixture. The resulting juice mixture is given in the midday and evening (two times a day) for 3 weeks.

MCV, MCH, Hb% are recorded before and after consumption by sending blood samples to the medical lab of Saveetha dental college.

Inclusion criteria: People with anemia of various age groups were included in this study.

Exclusion criteria: People with diabetes, allergic to Beetroot juice were excluded in this study. People with anaemia of inherited disorders and hemolytic anaemia are also excluded.

RESULTS AND DISCUSSION

Beet juice is considered to be a blood purifier, improves blood structure and cures diseases of the circulatory system, large intestine and digestive system. Drinking fresh beet juice may help in reversing anemia or other blood issues such as high cholesterol. The interventional study was conducted among 9 female anemia patients (16) . Among them 5 female patients have mild anaemia and 4 female patients have moderate anaemia.

Table 1 shows the values of the patient's Hb, MCV, MCH and MCHC values before and after consumption of beetroot juice. The normal value of Hb in Males are 14-16 g/dl, Females 12-15 g/dl. The normal values of MCV are 81-97 fl, MCH are 28-53 pg, MCHC are 33-35 g/dl. From Table 2,3,4 and 5, it is seen that there was a significant raise in Hb level and slight improvement or changes seen in MCV, MCH and MCHC as the p value is less than 0.001. It shows Beetroot juice can treat anaemia by increasing the Hb level faster and more efficiently. This result supports the study conducted by Videl et al to compare the effectiveness of uncooked beetroot''s iron content with the synthetic iron content absorption. Vitamin C helps in rapid absorption of iron. As beetroot contains vitamin C as a natural substance, it helps in faster absorption. As Beetroot are rich in iron and Vitamin B12, it can be given as a supplement in treating Iron deficiency and Pernicious or Megaloblastic anaemia. As prevention is better than cure, we can advise the anemia patients to have beetroot juice regularly to reduce the complications of anemia. This study is a pilot study as the sample size is small (9 participants), further research has to be carried out about the role of beetroot in increasing the red blood cell count.

CONCLUSION

Within the limitations of the study, we conclude that Beetroot juice can treat anaemia by increasing the Hb level faster and more efficiently. Beetroot appears to be a powerful dietary source for several pathological disorders. Beetroot is one of the best ways to increase Hemoglobin levels. It is not only high in iron content but also contains folic acid, potassium and fiber. Therefore it is better to drink beetroot juice daily to ensure healthy blood count instead of undergoing long term hematinic therapy.

ACKNOWLEDGMENTS

We thank saveetha dental college for the support to conduct the study.

Conflict of intreast: There is no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-81-85

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Comparative Study on Effects of Beetroot Juice and Dates in Iron Deficiency Anemia Patients

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ABSTRACT

Anaemia is a haematological disorder affecting most commonly the females. Though there are various haematinics available in market to increase the Red Blood Cell Count, it has some side effects also. The aim of this study is to evaluate the effects of natural substances like dates and beetroot juice on anaemia patients and to compare which has prominent and rapid effect in increasing all haematocrit values within a short duration of time. A total of 10 anemia patients were selected. They were divided into two groups. Sample A were given beetroot juice of 250ml. 125ml in the midday and 125 in the evening(two times a day). Sample B were given 28 (250g) dates per day. 14 in the midday and 14 in the evening (two times a day) for other sets of patients. MCV, MCH, MCHC and Hb% are recorded before and after consumption by sending blood samples to the medical lab of Saveetha dental college.There was a significant raise in Hb level and slight improvement or changes seen in MCV, MCH and MCHC in the patients who consumed Beetroot juice than the patients who consumed dates. Hence, we can conclude that both the beetroot juice and dates show invariably great effect in treating anaemia. But compared to dates, beetroot juice produces significant rise in Haemoglobin, MCV, MCH and MCHC.

KEY WORDS: BEETROOT JUICE, ANEMIA, HAEMOGLOBIN, RED BLOOD CELL, DATES.

INTRODUCTION

Anemia is a diminishing in the aggregate sum of red platelets or Hemoglobin in the blood or a brought capacity of the blood down to convey oxygen. (Peerschke, 2002). When anemia comes on slowly the symptoms are feeling tired, weakness,shortness of breath,and a poor ability to exercise (Janz and Hamilton, 2010). The diagnosis of anemia in men is based on a Hemoglobin less than 13 g/dl 14 g/dL; in women it is between 12 to13 g/dL (Nissenson et al., 2005). Certain groups of individuals such as pregnant women benefit from the use of iron pills for treating anaemia (Bhutta et al., 2013). On assessment, the signs shown may incorporate whiteness yet this is certainly not a dependable sign.A bluish discolouration of the sclera may be noticed in some cases of iron deficiency anemia (Goodier, 2009). The most widely recognized reason for weakness is blood misfortune yet this typically doesn't cause any enduring side effects except if a generally hindered RBC creation creates, thus most normally by iron inadequacy. (Institute and National Cancer Institute, 2020). It is hard

ARTICLE INFORMATION

*Corresponding Author: brundha.sdc@saveetha.com
Received 1st August 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/114

to quantify the RBC mass legitimately so the hematocrit or the Hemoglobin in the blood are regularly utilized rather to by implication gauge the worth (Uthman, 2009).Different elements liable for iron deficiency during pregnancy are gestational age, equality, continuous birth stretch, history of overabundance seeping during feminine cycle, intestinal parasitic contamination, jungle fever, interminable sickness and blood misfortune during pregnancy (Alemayehu et al., 2016).

The commonest reason for weakness is iron inadequacy, henceforth, it is regularly known as iron wholesome pallor (Fe). Sickliness influences around 33% of the total populace, a large portion of the cases are brought about by iron lack, this is a significant general medical issue worldwide. Iron is a component required for the development of hemoglobin. At the point when feeble red platelets separate, iron is discharged, put away and reused. Iron is put away as Hemosiderin and ferritin. A lady needs around 15 mg of iron to supplant the iron misfortune during feminine cycle. In instances of inordinate draining or ordinary seeping in feminine cycle, iron misfortune ought to be supplanted. In light of menstrual midpoints 60 ml of blood for each month, which is equivalent to 30 mg of iron, ladies need an additional milligram for every day to be ingested to look after parity. This shows how much ladies are getting influenced by pallor.

Beetroot is the taproot part of a beet plant (Eiger, 2009) typically referred to in North America as beet otherwise called table beet, garden beet, sugar beet, red beet, super beet or brilliant beet. It is one of a few developed assortments of Beta vulgaris developed for their edible taproots and leaves. At the point when beet juice is utilized, it is generally steady in nourishments with a low water content,, for example, solidified oddities and natural product fillings (Francis, 1999). Late investigations give proof that Beetroot ingestion offers gainful physiology impacts that give clinical results to hypertension, atherosclerosis, type 2 diabetes and dementia (Ninfali and Angelino, 2013). Beetroot is a rich source of photochemical compound that includes ascorbic acid, carotenoids, phenolic acids and flavonoids. Beetroot is likewise one of only a handful not many vegetables that contain a gathering of exceptionally bioactive colors known as betalains.

(Lee et al., 2005). Nirman walker claimed that Beetroots build red corpuscles with betalain and add tone to blood by increasing Hemoglobin levels (Priya et al., 2013). The Beetroot being a basic food with pH from 7.5 to 8 has been acclaimed for its medical advantages, specifically for its infection battling cancer prevention agent potential, huge measure of nutrient C and nutrients B1, B2, niacin, B6, B12 while the leaves are an astounding wellspring of nutrient A (Zielinnska-Przyjemska et al., 2009).Betanin acquired from the roots is utilized mechanically as red food shading to improve the shading and kind of tomato glue, sauces, sweets, sticks and jams, frozen yogurt, candy and breakfast grains among different applications (Lock, Grubben and Denton, 2004).

Dates are fruits that contain iron which is enough to match the needs of iron , vitamin C, vitamin B complex and folic acid that can help the formation of red blood cells , so that by consuming the dates can help improve the formation of red blood cells and prevent anemia (Rahmani et al., 2014). Protein , carbohydrates and fats in dates support the synthesis of Hemoglobin (Sotolu, Kigbu and Oshinow, 2014). The combination of dates rich in glucose, Calcium, Iron, Zinc, Copper, Phosphorous, Niacin and content of vitaminA is able to improve Hemoglobin levels in anemic patients ('Assessment of yield and nutritional composition of fruit of wild date palm (Phoenix sylvestris Roxb.) cultivars', 2017). Dates are wealthy in selenium, manganese, copper and magnesium and these are required with regards to keeping our bones sound and forestalling osteoporosis. The potassium in dates assists with decreasing cholesterol and diminishes the danger of a stroke. Several studies were conducted showing intake of beetroot juice and dates increases the Haemoglobin level of anaemia patients. The aim of the study is to evaluate among Beetroot juice and Dates which has the better effects on iron deficiency anaemia patients.

MATERIALS AND METHODS

10 anemia patients were selected and divided into two groups Sample A and Sample B. Sample A group were given 28 dates (250g). 14 dates in the midday and 14 dates in the evening. Sample B groups were given Beetroot juice of 250ml. 125 ml in the mid day and 125 ml in the evening (two times a day). Both the groups were advised to continue the same for 21 days. The selected subjects were not suffering from any other chronic illness. Consent letter was signed by the participants and documented. MCV, MCH, MCHC and Hb% of the subjects were recorded before and after consumption by sending blood samples to the medical lab of Saveetha Dental College.

Inclusion criteria: Patients with iron deficiency anaemia due to irregular menstruation.
Female patients with age groups between 15-30 years.

Exclusion criteria: Patients with diabetes, malignancy and other interminable illnesses. Patients under haematinics treatment. Patients under ayurvedic and homeopathic treatment.

RESULTS AND DISCUSSION

As iron deficiency anaemia is most prevalent among females, the participant chosen for this experimental study were females. The subjects of the study were between the age group of 15- 30 years of female. The process of iron deficiency takes several stages to become anaemia. If the iron deposits do not meet with iron intake, there will be significant reduction in haemoglobin concentration.

Group A, consumed Dates for 21 days.

Table 1.1: Hb value in Anaemia Patients.

	Mean	Standard deviation	SEM
Before	8.300	2.380	1.064
After	8.500	2.380	1.064
Student paired T test p value	<0.0001		

Table 1.2: MCV values in anemia patients.

	Mean	Standard Deviation	SEM
Before	86.000	9.328	4.172
After	86.760	8.812	3.941
Student paired T test p value	<0.05		

Table 1.3: MCH Values in Anemia patients

	Mean	Standard Deviation	SEM
Before	32.160	7.905	3.535
After	33.220	7.826	3.500
Student paired T test p value	<0.0001		

Table 1.4: MCHC values in anaemia patients.

	Mean	Standard Deviation	SEM
Before	32.240	2.180	0.975
After	33.440	2.503	1.119
Student paired T test p value	<0.0001		

Their average value of Haemoglobin level (Table1.1), MCV (Table1.2), MCH(Table 1.3) and MCHC(Table1.4) were compared with before and after experiment by Student's t paired test value. From the tabulation it is clear that there is significant raise in all values of blood parameters after consumption of dates. The combination of dates rich in glucose, Ca, Fe, Zn, Cu, P and niacin content of vitamin A is able to improve hemoglobin levels in anemic patients.

Group B, had Beetroot juice for 21 days. Their average value of Haemoglobin level (Table2.1), MCV (Table 2.2), MCH(Table 2.3) and MCHC(Table 2.4) were compared with before and after experiment by Student's t paired test value. From the tabulation it is clear that there is a significant raise in all values after consumption of Beetroot juice.

Table 2.1: Hb values in anaemia patients

	Mean	Standard Deviation	SEM
Before	8.000	1.559	0.697
After	8.440	1.483	0.663
Student paired T test p value	<0.0001		

Table 2.2: MCV value in Anaemia patients

	Mean	Standard Deviation	SEM
Before	24.440	5.899	2.638
After	26.660	6.189	2.768
Student paired T test p value	<0.0001		

Table 2.3: MCH value in Anaemia patients.

	Mean	Standard Deviation	SEM
Before	74.880	15.006	6.711
After	77.240	14.156	6.331
Student paired T test p value	<0.05		

Table 2.3: MCH value in Anaemia patients.

	Mean	Standard Deviation	SEM
Before	31.540	2.110	0.944
After	33.080	2.406	1.076
Student paired T test p value	<0.05		

This result supports previous studies reporting that beetroot is an excellent source of iron (Biondo et al., 2014). Beetroot (Beta vulgaris L.) is a main source of iron, nitrate, sodium, potassium, and betalain among vegetables. Easton Patrick (2011) states that consuming

beetroot juice or cooked beet in salads is highly beneficial in treating anemia. The cost of beet root is also low as compared to other iron-rich vegetables and it is easy to store .

Figure 3.1: Comparison of Haemoglobin level between Dates and Beetroot juice

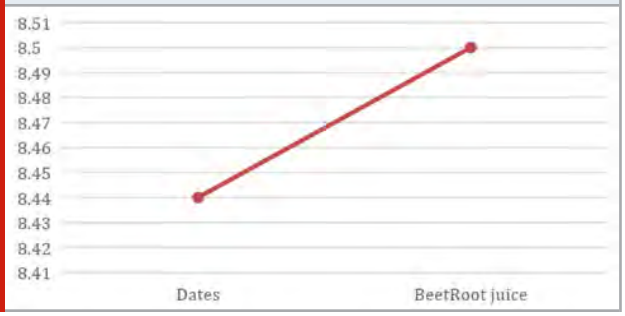


Figure 3.2: Comparison of MCV between Dates and Beetroot juice

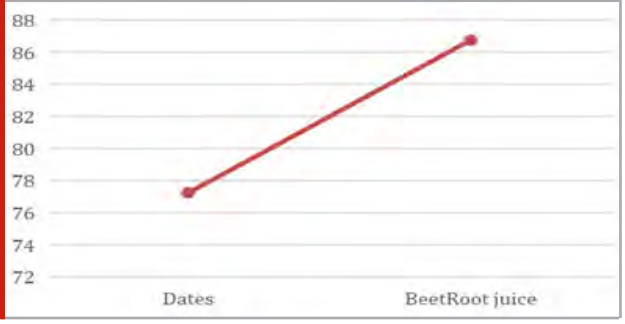


Figure 3.3: Comparison of MCH between Dates and Beetroot juice.

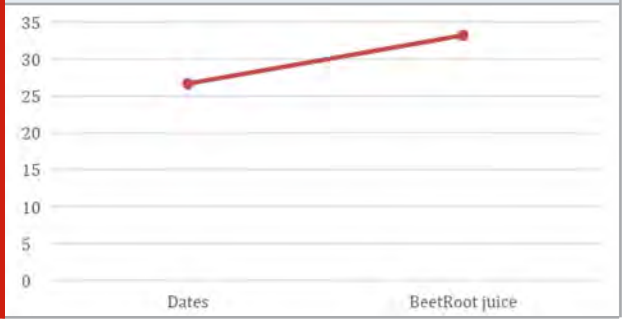
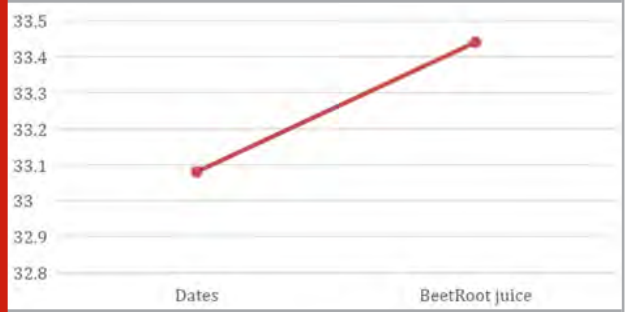


Figure 3.4: Comparison of MCHC between Dates and Beetroot juice



When compared between Group A and Group B, there was a significant raise in Hb level (Figure3.1) and slight improvement or changes were seen on MCV (Figure3.2), MCH (Figure3.3) and MCHC (Figure3.4) in patients who consumed Beetroot juice than the patients who consumed dates. It shows that both beetroot juice and dates can increase Hb level but beetroot juice increases the Hb level faster and more efficiently when compared to dates. If iron deposits have not been met with iron intake (Fe) there will be anemia symptoms accompanied by decreased hemoglobin. This study was a pilot study comprising only 10 subjects. Also, the duration of the study was just 3 weeks. It does not deal with other types of anaemia. As beetroot juice and date fruits are also good sources of vitamins, further research has to be done to analyse whether there is possibility in treating other forms of anaemia like pernicious and megaloblastic anaemia.

CONCLUSION

Based on the obtained data beetroot appears to be a powerful dietary source for several pathological disorders. Beetroot is one of the best ways to increase Hemoglobin levels. It is not only high in iron content but also folic acid along with potassium and fiber. Consuming both beetroot juice and dates increase the Hemoglobin in anemic patients but when compared to dates, beetroot juice increases the Hemoglobin more efficiently and rapidly. Therefore it is better to drink beetroot juice daily to ensure healthy blood count.

ACKNOWLEDGEMENTS

We thank Saveetha dental college for the support to carry out this study.

Conflict of Interest: None to declare

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Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-86-89

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Morphological and Morphometric Analysis of Vertebra Prominens with Reference to Spinous Process and its Clinical Implications

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ABSTRACT

Anatomy of the pedicles of the seventh cervical vertebra (C7) at the cervicothoracic junction isn't like other cervical vertebrae. Fixation of C7 is required at some point of cervical vertebra and top thoracic injuries in clinical practice.The 7th cervical (neck) vertebra (C7) is also the outstanding vertebra due to the length of its spinous manner (the projection off the again of the vertebral body).The spinous method of the top thoracic vertebra (T1) just below C7 is every now and then even greater outstanding than that of the vertebra prominens. However, the everyday pedicle screw insertion methods may additionally have troubles in clinical practice primarily based on the anatomical features of C7. In everyday spinal surgical operation practice, correct interpretation of the information provided from computed tomography (CT) imaging is very critical to visualize the applicable bone anatomy and make accurate decisions. This observe is to explore a brand new pedicle screw insertion method for C7 and to provide anatomical and radiographic basis for clinical application. From the present study the total length of the vertebra is calculated, the length from the vertebral foramen to the spinous process is calculated ,the breadth of the middle part of the spinous process is calculated, and the breadth of the tip of the spinous process is calculated and their mean values and their standard deviation is calculated accordingly.

KEY WORDS: MORPHOMETRY, CERVICAL VERTEBRA, VERTEBRA PROMINENS, SPINOUS PROCESS, CLINICAL SIGNIFICANCE.

INTRODUCTION

Vertebra prominens is also known as the seventh cervical vertebra. One of the uniqueness of this vertebra is that it has a long and prominent spinous process which can be felt from the skin surface, hence the name is vertebra prominence. The seventh cervical vertebra (C7) is also the longest cervical vertebra due to the length of its spinous manner which is one of the atypical features of this vertebra. The spinous method of the top thoracic vertebra (T1) just below C7 is every now and then even greater outstanding than that of the vertebra prominens (Schilling, 2011). The spinous process is brief and bifid, the 2 divisions being regularly of unequal size (Pranati, Babu and Ganesh, 2017). Because the spinous methods are so short, positive superficial muscles (the trapezius and splenius capitis) attach to the nuchal ligament rather than directly to the vertebrae; the nuchal ligament itself attaching to the spinous approaches of C2–C7 and to the posterior tubercle of the atlas (Gray, 2018).

ARTICLE INFORMATION

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Received 1st August 2020 Accepted after revision 30th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/115

C7 possesses the standard cervical vertebral capabilities however has some distinct features are spinous technique leads to a rounded tubercle and isn't bifid, C7 transverse foramina are small, and do now not transmit the vertebral artery, (Seppan et al., 2018) C7 anterior tubercle is small, and is the site of attachment for scalenus pleuralis and supra pleural membrane, C8 nerve, which does not have an related cervical vertebra, exits in the C7-T1 vertebral foramen under C7 (Stamatakis, 2000), C7 may also own a cervical rib, C7 foramen can also transmit the posterior vertebral vein (if doubled), and might transmit the gray ramus from the inferior cervical ganglion to the anterior ramus of C7, vertebral artery may additionally input at this level (typically it enters the cervical transverse foramen at C6) (Matshes and Juurlink, 2004).

Vertebra prominens (C7) is characterized as the most prominent among the cervical vertebrae, which makes it an anatomical landmark for the recognition of other spinous processes (Stonelake, Burwell and Webb, 1988). Unlike the notched spinous techniques of the C3-C6 vertebrae, the vertebra prominens resemble the T1 vertebra with a spinous method that is large, straight, and flattened on the give up. The give up of the nuchal ligament, which supports the muscle tissues of the neck and connects the occipital bone of the cranium to the C7 vertebra, attaches at the tip of the spinous system. The spinous method of C7 generally projects directly posteriorly. Unlike normal cervical vertebrae, the spinous method of C7 isn't always bifid (Ranasinghe, Yuvaraj Babu and Mohanraj, 2018). The funicular part of the ligamentum nuchae attaches to the unmarried posterior tip of the C7 spinous system (Xu et al., 1995). The muscular tissues connected to the spinous method are Trapezius, Rhomboid minor, Serratus posterior superior, Splenius capitis, Spinalis cervicis, Semispinalis thoracis, Multifidus Thoracis, Interspinales. The aim of the present study was to analyze the morphology and the morphometrical analysis of vertebra prominence and to understand its clinical importance.

MATERIAL AND METHODS

A total of 33 dried human cervical vertebra (C7) were collected from the Department of Anatomy of Saveetha Dental College and from the Institute of Anatomy, Madras Medical College, Chennai. All C7 vertebrae are numbered serially and arranged. Any broken and abnormal bones were rejected from study. The morphology and morphometry of C7 vertebrae are analyzed with reference to its spinous process. From the present study the total length of the vertebra prominens (TL), the length from the vertebral foramen to the spinous process (VL), the breadth of the middle part of the spinous process (VB) and the breadth of the tip of the spinous process (SB) were measured using a sliding vernier caliper. The photograph of the C7 vertebrae depicting its morphological aspects are shown in Figure 1. All the readings were noted and transferred to the Excel sheet. The mean values and their standard deviation are calculated accordingly. The obtained mean values are represented graphically with ± Standard deviation (SD).

RESULTS AND DISCUSSION

The analysed data showed that the mean total length of the vertebra prominens (TL) was found to be 36.92 ± 0.075 mm. The mean length from the vertebral foramen to the spinous process (VL) was 10.48 ± 0.066 mm. The mean breadth of the middle part of the spinous process (VB) was found to be 7.61 ± 0.034 mm. The mean breadth of the tip of the spinous process (SB) was 8.14 ± 0.037 mm. The mean of all the morphometric measurements of C7 vertebrae are shown in Figure 2.

Figure 1: Photograph of superior view of vertebra prominens showing the various dimensions measured. The total length of the vertebra prominens (TL) indicated by white arrow line, the length from the vertebral foramen to spinous process (VL) indicated by yellow arrow line, the breadth of the middle part of the spinous process (VB) indicated by red arrow line and the breadth of the tip of the spinous process (SB) indicated by black arrow line are shown here.

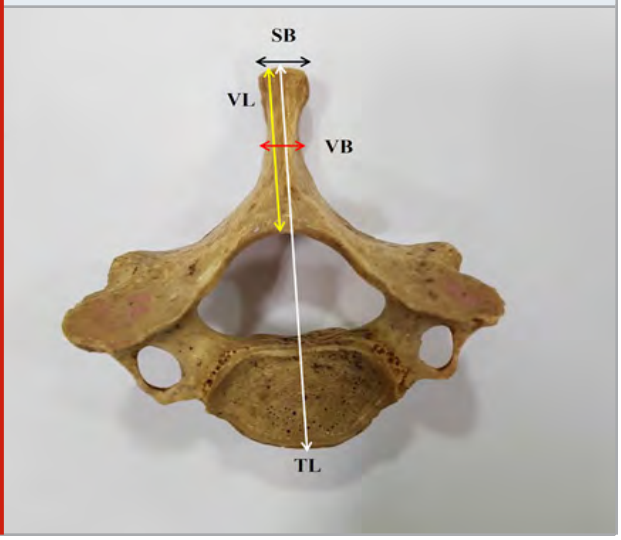
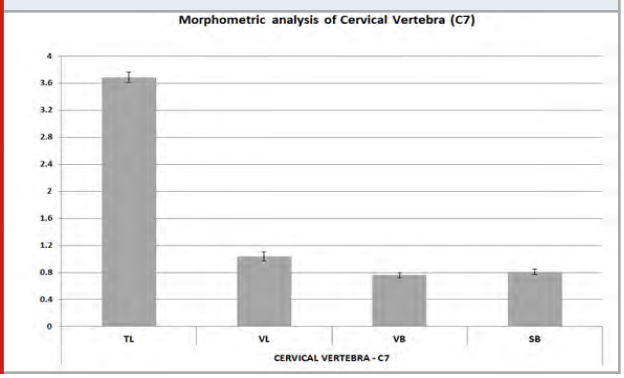


Figure 2: Graph showing the mean of all the morphometric measurements of C7 vertebrae. The total length of the vertebra prominens (TL), the length from the vertebral foramen to the spinous process (VL), the breadth of the middle part of the spinous process (VB) and the breadth of the tip of the spinous process (SB) are expressed as Mean ± SD in mm.



The vertebra prominens, or C7, has an exceptionally long and outstanding spinous procedure, that's palpable from the skin surface. As a variation, seventh cervical vertebra is associated with an abnormal more rib, known as a cervical rib, which develops from the anterior root of the transverse process (Muthukumar and Mohanraj, 2019). These ribs are typically small, but may now and again compress blood vessels (such as the subclavian artery or subclavian vein) or nerves within the brachial plexus, causing pain, numbness, tingling, and weakness in the top limb, a condition known as thoracic outlet syndrome (Ravichandran, Yuvraj Babu and Mohanraj, 2018). Very rarely, this rib takes place in a pair (Umakanth, Babu and Mohanraj, 2018).

The lengthy spinous manner of C7 is thick and nearly horizontal in direction. It is not bifurcated, and leads to a tubercle that the ligamentum nuchae attaches (Mary, Babu and Mohanraj, 2018). This manner isn't usually the most distinguished of the spinous processes, being found most effective about 70% of the time, C6 or T1 can every now and then be the most outstanding
(Greiner, 2017).

While C7 vertebra is anatomically very just like thoracic vertebra, the cervicothoracic junction presents several demanding situations to the backbone general practitioner in operation settings(Shahzan, Babu and Mohanraj, 2018). The transition from the mobile, lordotic cervical backbone to the fixed, kyphotic, thoracic segment, (Keskin et al., 2015)Relative lack of epidural area and the improved medial angulation wanted for pedicle cannulation at C7 and essential adjoining neural and vascular structures at these degrees make surgical intervention more challenging and probably hazardous(Jang et al., 2011).

In everyday spinal surgical operation practice, ok interpretation of the information provided from computed tomography (CT) imaging is very critical to visualize the applicable bone anatomy and make accurate decisions(Kumar, Babu and Mohanraj, 2018). This situation is specially valid in the C7 vertebra, wherein morphometric measurements are essential elements that may restrict surgical success(Vignesh, Babu and Mohanraj, 2018). Skeletally mature teenagers and its C7 vertebra should injure mainly in serious unstable traumas, neoplastic or infectious lesions (Ramieri et al., 2011).

CONCLUSION

From the present study the morphometric parameters and the variation of vertebra prominens are analysed. The clear understanding and knowledge on its morphometry and occasional variations may be helpful for surgeons and other clinicians dealing with this region. It also provides valuable information and orientation for orthopedicians involved in the surgical and other treatment procedures. Thus within the limitations of the study, we can conclude that the morphological and morphometrical analysis of vertebra prominens has several clinical implications which were emphasised from the present study.

ACKNOWLEDGEMENTS

Nil

Conflict of Interest: None declared.

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-90-93

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Knowledge and Awareness on the Effects of Radiation Emitted from Electronic Gadgets During Pregnancy Among Women

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ABSTRACT

A pregnant woman is exposed to so many environmental influences that it may be tough to pinpoint just one that may affect her pregnancy. In today's technology driven world, everyone relies on their cell phone to stay in touch with friends and family, get their work done, keep track of what's going on around them.Widespread concerns have been raised about exposure to electromagnetic fields from sources used for mobile telecommunication. Indeed, mobile phone use has increased considerably along with reducing its costs, and developing countries are establishing mobile telecommunications rather than the more expensive fixed-line systems. Exposure to radio frequency electromagnetic field (RF-EMF) during pregnancy could affect the growth and development of the foetus and the duration of pregnancy, either directly due to radiation of the foetus and placenta or indirectly as a result of altered maternal physiology. A questionnaire based survey was conducted among 100 women to analyse their awareness, exposure time on gadgets etc and the results were analysed. Most of the women are not aware of the effects of radiation, the amount of radiation they are exposed to and also specific absorption rate (SAR) value. Women need more awareness about the usage of gadgets, time limits, radiation etc which can be achieved through health education. The aim of the study is to create awareness on the effects of radiation emitted from electronic gadgets during pregnancy among women.

KEY WORDS: RADIATION, GADGETS, PREGNANCY, EFFECTS. SAR VALUE, RF-EMF.

INTRODUCTION

We often forget that pregnancy is a wellness and not an illness. Though it is a blessing for all the expecting couples, it brings along a set of concerns and problems. A pregnant woman is exposed to various environmental hazards which may be tough to pinpoint just one that may affect her pregnancy. In today's technology driven world, everyone relies on their cell phone to stay in touch with friends and family, get their work done, keep track of what's going on around them. In current era the digital world has expanded far beyond the desktop, and consumers now have the choice to choose from an array of devices that will satisfy their need for "anytime, anywhere" access gather information on news, family, friends and entertainment (Smith, 2010). Ionizing radiation, which includes particles (alpha and beta particles) and some electromagnetic radiation (gamma rays and x-rays), can directly and indirectly alter the normal structure of a living cell. Non Ionizing radiation commonly interacts with tissue through the generation of heat (Brent, 1999) .Widespread concerns have been raised about exposure to electromagnetic field (EMF) from sources used for mobile telecommunication (Repacholi, 2001; Toropainen, 2003; Divan et al., 2008).

ARTICLE INFORMATION

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Received 29th July 2020 Accepted after revision 22nd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/116

Indeed, mobile phone use has increased considerably along with reducing its costs, and developing countries are establishing mobile telecommunications rather than the more expensive fixed-line systems. The health effect of EMF on pregnancy has remained controversial despite efforts to reach consensus (Li et al., 2002).Cell phones generate radio frequency- electromagnetic fields resulting in local exposure of the human body to RF-EMF. During pregnancy, the embryo and foetus are very sensitive to radiation. While in the pre implantation period, high radiation exposure may cause the death of the embryo. Exposure to RF-EMF during pregnancy could affect the growth and development of the foetus and the duration of pregnancy, either directly due to radiation of the foetus and placenta or indirectly as a result of altered maternal physiology (Tsarna et al., 2019).Several international researchers have also found that radiation exposure during pregnancy is one of the causes of autism in children. The recently concluded Danish study on the adverse effects of exposure to radiations during pregnancy resulting from cell phone usage,on the development of children found that there is greater incidence of psychiatric disorders like behavioural difficulties such as emotional and hyperactivity problems, in the children of mothers exposed to radio frequency radiations.

Some studies in rats or mice have shown that extended RF-EMF exposure in pregnant dams was linked to hyperactivity, altered neurons, or impaired cognition in offspring (Aldad et al., 2012; Haghani, Shabani and Moazzami, 2013; Zhang et al., 2015). Also there is scientific support that maternal prenatal exposure can have an effect on the development of the unborn child and also in animal studies. The most used gadgets are cell phones as it is the most personal device ever and incidentally,a mini microwave that you are carrying around, then a WiFi after all is a mini cell tower and they are hardly switched off. Every mobile phone is rated according to the level of radiation that it gives out. This rating is called the specific absorption rate (SAR) value. The SAR value gives the maximum amount of radiation, or energy, that is absorbed by the body while using the phone. The laptop on its underside has a very high EMF exposure at point of contact and heavy proximities which can be harmful for adult fertility.

MATERIAL AND METHODS

This was a cross-sectional survey study done to assess the knowledge and awareness level on the effects of radiation emitted from electronic gadgets during pregnancy. The sample size of 100 was used for this study. A self structured questionnaire with 15 questions was developed and circulated among 100 women to analyse their awareness level. The questionnaire contained time of exposure to gadgets, marital status, effects of radiation etc. The results were statistically analysed based on the charts obtained from results.

RESULTS AND DISCUSSION

The knowledge and awareness on the effects of radiation emitted from electronic gadgets during pregnancy among women were assessed. On analysing the data, most of them are working women so they have more chances of using gadgets like laptops. 96% of the women are exposed to gadgets like cell phones, laptop, tablet (Fig.1). The vast increase of satellite and earth telecommunication, broadcasting systems, cell phones, and other telecommunication systems have exposed houses, workplaces and promenades to radiations caused from electromagnetic signals (Abad et al., 2016). On assessing the time spent on gadgets each day, 66% of the women spend more than 3 hours on their gadgets and 31% of them spend 1-2 hours per day(Fig.2). About 79% of the women have WiFi connection in their home or work place(Fig.3). Cell phones are the most used gadget among most of the women(Fig.4). Wireless Local Area Network (WLAN) protocols are an increasing alternative to wired data networks in workplaces.

Figure 1: Bar graph representing the responses of women exposed to gadgets.

Figure 2: Bar graph representing the responses for time spent on gadgets each day.

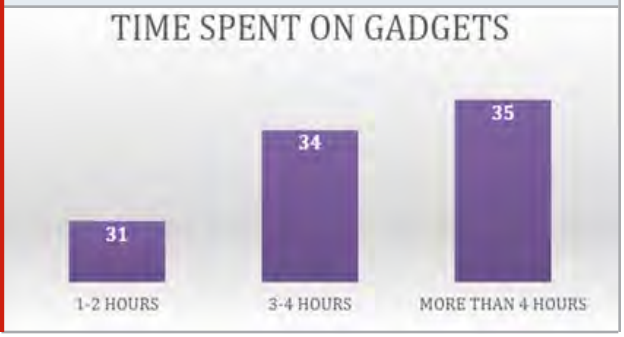


Figure 3: Bar graph representing the responses for availability of Wifi connection in their home/work place.

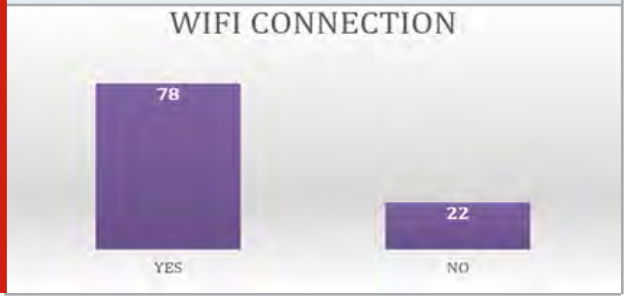
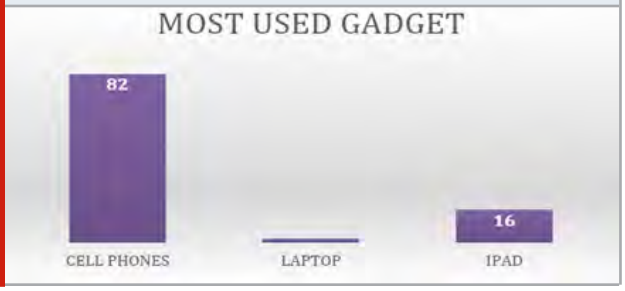


Figure 4: Bar graph representing the responses for most used gadget.



Access points in houses, public places, schools and hospitals provide signals for this communication service, known as wireless fidelity (WiFi). As happened previously with other electromagnetic-field (EMF) sources, the fast increase in WLAN use raised public concern regarding possible health effects (Sambucci et al., 2010). The point of adding WiFi as a criteria is because WiFi routers emit a lot of radiation and in fact it is a mini tower. When it comes to device for personal communication, the cell phone remains the "gadget of choice". 63% of the women seem to be aware of the amount of radiation they are exposed to and 37% of the women are not aware(Fig.5). Most of the women seem to be aware of the fact that it is harmful to use gadgets during pregnancy. They were asked about the harmful effects. They are growth retardation in foetus, impaired brain function, hyperactivity etc(Fig.6). Surprisingly 67% of the women are not aware of the term SAR value and also not aware of the SAR value of their mobile phone(Fig.7).

Figure 5: Bar chart representing the responses for awareness on the amount of radiation they are exposed

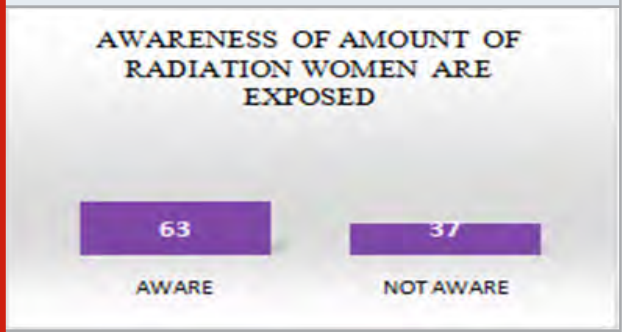
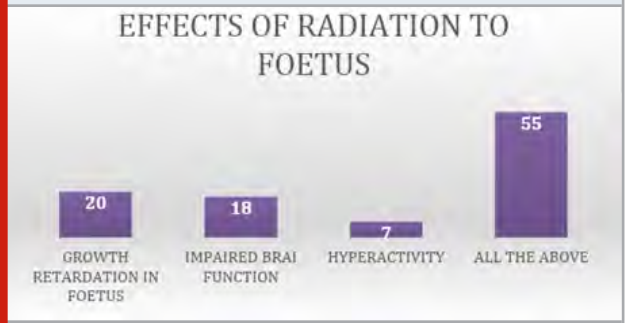
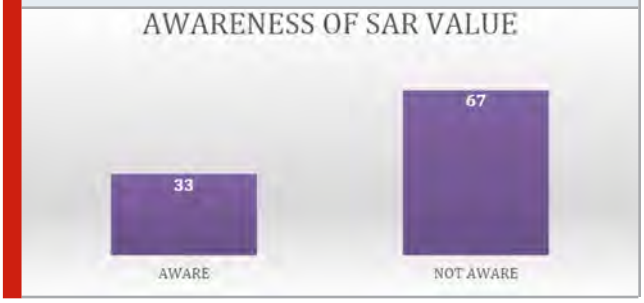


Figure 6: Bar chart representing the responses for harmful effects of radiation to foetus



Specific absorption rate (SAR) is a measure of the rate of radiofrequency (RF) energy absorption by the body from the source being measured, i.e., cell phone in this case. While SAR values serve as an important tool in judging the maximum possible exposure to RF energy, a single SAR value will not provide sufficient information concerning the amount of RF exposure under regular usage conditions to reliably compare different cell phone models (Bhoil, Kumar and Bhoil, 2015). 33% of the women are aware of it. The ways in which pregnant women can avoid radiation were assessed. They are usage of telephone instead of mobile, switch off WiFi when not in use, avoid carrying mobile in pocket etc.

Figure 7: Bar chart representing the responses for awareness on SAR value.



Many studies show that exposure to mobile phones before and after birth may increase a child's risk for developing certain behavioral problems, including hyperactivity, inattention, and problems getting along with peers. But in a Spanish birth cohort study researchers found no associations between maternal cell phone use during pregnancy and child's early mental development (Vrijheid et al., 2010). However excessive exposure to radiation from gadgets may harm the foetus and the mother too. So it's better to prevent and minimise the use of gadgets during the period of pregnancy for a safer aspect.

CONCLUSION

From this study, we conclude that most of the women are not aware of the effects of radiation emitted from electronic gadgets during pregnancy. Pregnancy poses special considerations in regard to radiation exposure. Exposure to EMF is found to be increasingly common, but its potential influence on human health has not been thoroughly studied, especially in pregnant women. Yet there is no conclusive evidence to justify that the use of a mobile phone or other gadgets during pregnancy is hazardous. There is limited information available on the association between EMF exposure during pregnancy and reproductive outcomes. But very high exposure to radiation may cause a harmful effect on foetus. However, it is best to be sensible during pregnancy.

ACKNOWLEDGEMENTS

The authors are thankful to Saveetha Dental College for providing a platform to express their knowledge.

Conflict Of Interest: The authors declare no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-94-99

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Knowledge, Awareness and Attitude Towards Predisposing Factors to Diabetes Mellitus Among General Population in Chennai

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ABSTRACT

Diabetes mellitus is a disorder or chronic illness which can lead to premature death and significant disability . It is an epidemic and therefore the risk or problems associated with this disorder can be minimised by early diagnosis and management. Diabetes is characterised by hyperglycemia which is caused due to lack of insulin secretion , improper insulin action or both. There are a lot of causative disorders and diseases that can lead to diabetes but diabetes is also one such causative disorder as it alone can pave way for other diseases. Hypertension, obesity, periodontitis and other dental problems , congestive heart failure to name a few are diseases that arise due to diabetes. In a nutshell , diabetes is a two way boat which can be caused by other diseases/disorders or cause other diseases/disorders. To vary what we eat and how we balance our lifestyle is a necessity.

KEY WORDS: DIABETES MELLITUS, PREDISPOSING FACTOR, AWARENESS.

INTRODUCTION

Diabetes mellitus is a disorder or chronic illness which can lead to premature death and significant disability . It is an epidemic and therefore the risk or problems associated with this disorder can be minimised by early diagnosis and management. (Daousi, 2006) Diabetes is characterised by hyperglycemia which is caused due to lack of insulin secretion, improper insulin action or both.(Kharroubi, 2015)This comes with dysfunction, long term damage and failure of different organs like eyes , kidney , nerves, heart and blood vessels.(Association and American Diabetes Association, 2007) Retinopathy, nephropathy and neuropathy with risk of amputations and foot ulcers are commonly associated with diabetes. Lipoprotein abnormalities and hypertension is also seen. (Amor et al., 2020)(Yari et al., 2020)

According to studies done in the recent past there are millions of adults who are at a very high risk of developing diabetes due to their sedentary lifestyle, age , obesity and genetic factors. (Aynalem and Zeleke, 2018) As the disorder rate is high , it is very much essential for the general population to have awareness on a broad scale for prevention and management.(Zubkova et al., 2019) About 90% of the population suffering from diabetes are said to have Type 2 . (Mercaldo, Nardone and Santone, 2017)

ARTICLE INFORMATION

*Corresponding Author: brundha.sdc@saveetha.com
Received 26th July 2020 Accepted after revision 19th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/117

The population for this study was chosen from Chennai city and most of them tested are above the age of 23 . Diabetes mellitus is caused due to multiple factors and can affect even a newborn owing to the genes or the lifestyle maintained by the mother . Therefore strategies of elimination of diabetes mellitus can be done only if the general population have minimum awareness and knowledge. (Asfandiyarova, 2015) Certain studies conclude that around 30 % of the people are not diagnosed.(Buell, Kermah and Davidson, 2007; Mercaldo, Nardone and Santone, 2017) This can lead to death or other major problems . Diabetes is one of the leading causes of death in some countries. (Olefsky, 2001) Certain environmental factors as we discussed earlier are also responsible towards contributing towards the disease.(Hales, Nicholas Hales and Barker, 2001) Not being diagnosed by this disorder is harmful and can eventually lead to death owing to the high glucose content in the body followed by other diseases.(Kyvik and Green, 2008)

This epidemic of diabetes is becoming underway and studies are being done to know if diabetes is becoming the biggest epidemic of the 21st century.('John F. Maher, MD, FACP, FRCP(I) 1929–1992', 1993) The increasing prevalence is mainly seen in obese children and adults and also to those belonging to older age groups. The cardinal characteristic feature of diabetes mellitus is an increase in glucose levels. Insulin resistance is the characteristic metabolic defect of this disorder. This can lead to morbidity and premature mortality (Deshpande, Harris-Hayes and Schootman, 2008) .As we all know, the main treatment for diabetes is increasing insulin content in the body. A huge increase in the insulin levels can lead to a condition called Hyperinsulinemia which is also dangerous.As mentioned earlier, there are a lot of causative disorders and diseases that can lead to diabetes but diabetes is also one such causative disorder as it alone can pave way for other diseases.(Finucane and Popplewell, no date) Hypertension, obesity, periodontitis and other dental problems, congestive heart failure to name a few are diseases that arise due to diabetes. (Williams, 2011) In a nutshell, diabetes is a two way boat which can be caused by other diseases/disorders or cause other diseases/disorders. (Accordino et al., 2020) To vary what we eat and how we balance our lifestyle is a necessity.

MATERIAL AND METHODS

The study was conducted with the help of a cross sectional questionnaire which was circulated with the help of social media and the internet. The target population were mostly the middle aged people of Chennai. The questionnaire consisted of 20 questions that tested their knowledge, attitude and awareness regarding predisposing factors to diabetes mellitus. The questions consisted of major risk factors commonly seen like obesity, lifestyle, age, alcoholism and smoking habits, hypertension, hyperglycaemia etc.

RESULTS AND DISCUSSION

Figure 1: Pie chart representing 42% of the respondents are of the age group 30-40 (Blue), 35% of the respondents are of the age group 40-50 (Red) while the remaining are of the age group 50-60(Green).

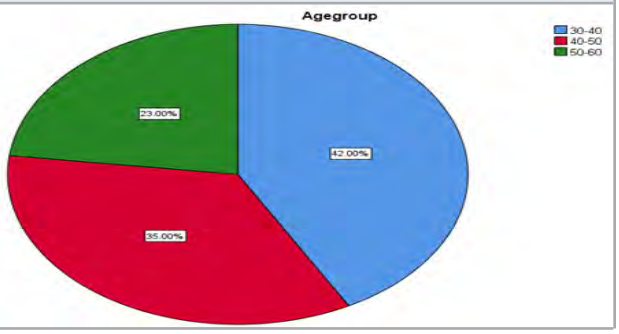


Figure 2: Pie chart representing 69% of the respondents are Females (Blue) while the remaining 31% of the respondents are males. (Red)

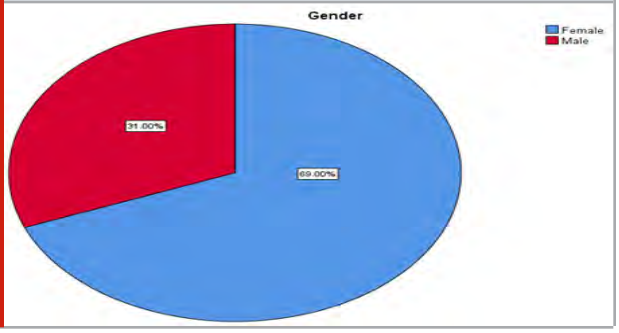


Figure 3: Pie chart representing that 86% of the respondents reported that obesity is a risk factor to diabetes (Red) whereas the rest 14% have reported the opposite (Blue).

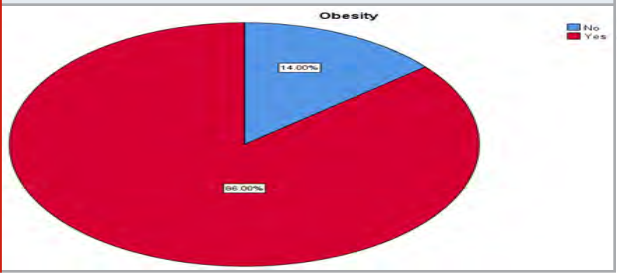


Figure 4: Pie chart representing that 30% of the respondents reported that pancreatitis is a risk factor to diabetes (Red) whereas the rest 70% have reported the opposite (Blue).

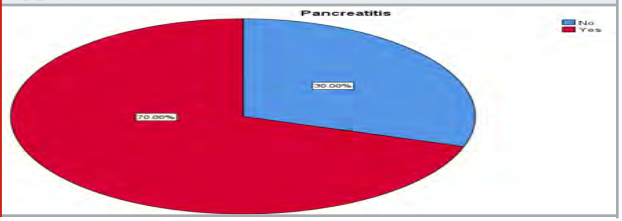


Figure 5: Pie chart representing that 68% of the respondents reported that age is a factor that predisposes to diabetes (Red) whereas the remaining 32% have reported the opposite (Blue).

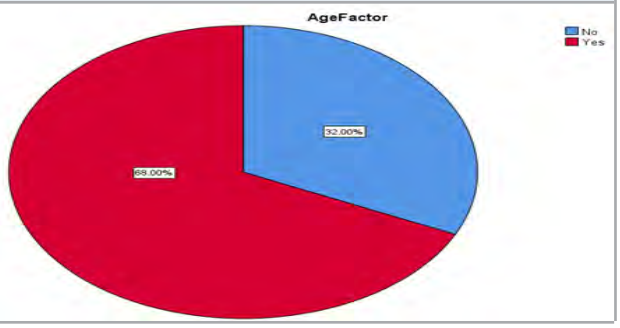


Figure 6: Pie chart representing that 61% of the respondents reported that polycystic ovarian disease in women increases the risk of diabetes (Red) whereas the remaining 39% have reported the opposite (Blue).

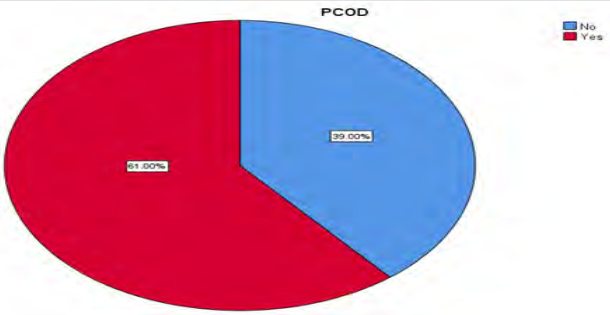


Figure 7: Pie chart representing that 79% of the respondents reported that hereditary is a factor of diabetes (Red) whereas the remaining 21% have reported the opposite (Blue).

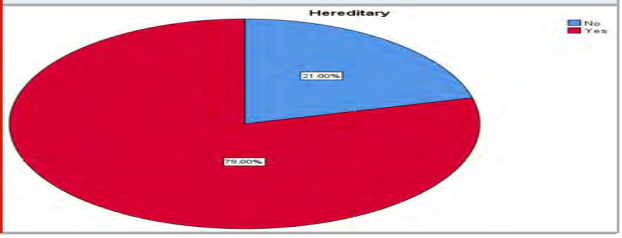


Figure 8: Pie chart representing that 59% of the respondents reported that high blood pressure levels can lead to diabetes (Red) whereas the remaining 41% have reported the opposite (Blue).

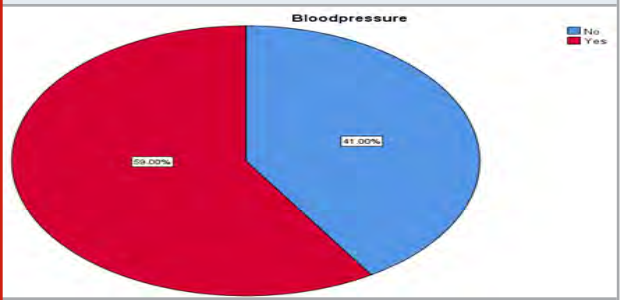


Figure 9: Pie chart representing that 79% of the respondents reported that inactive lifestyle is a cause for diabetes (Red) whereas the remaining 21% have reported the opposite (Blue).

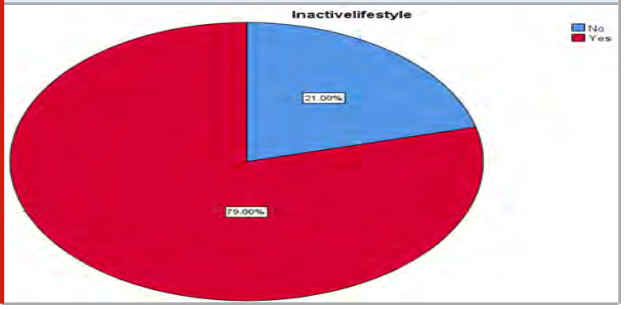


Figure 10: Pie chart representing that 68% of the respondents reported that smoking can increase the risk of diabetes (Red) whereas the remaining 32% have reported the opposite (Blue).

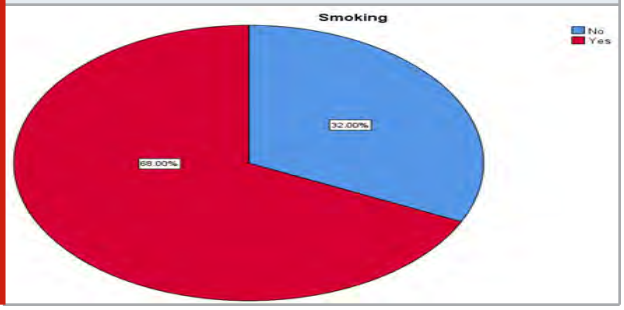


Figure 11: Pie chart representing that 59% of the respondents reported that diabetes can lead to pancreatic cancer (Red) whereas the remaining 41% have reported the opposite (Blue).

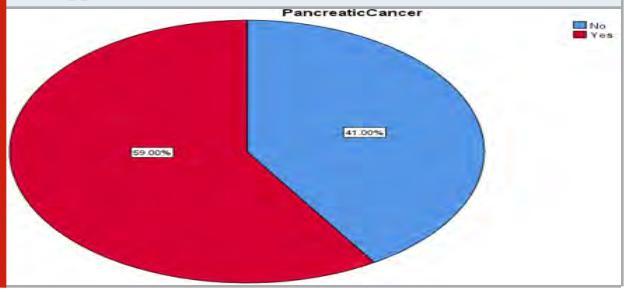


Figure 12: Pie chart representing that 66% of the respondents reported that high levels of triglycerides lead to diabetes (Red) whereas the remaining 34% have reported the opposite (Blue).

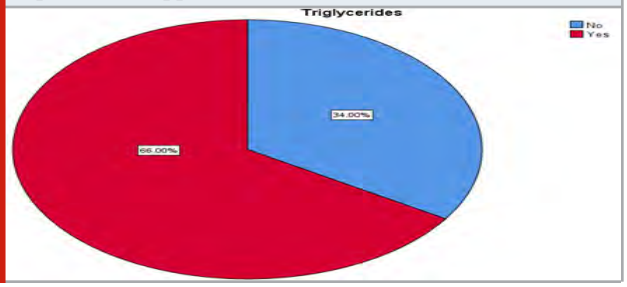


Figure13: Pie chart representing that 60% of the respondents reported that gestation can cause diabetes (Red) whereas the remaining 40% have reported the opposite (Blue).

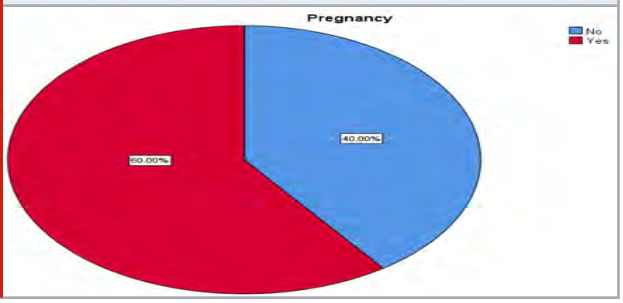


Figure 14: Pie chart representing that 77% of the respondents reported that cardiovascular disease can arise due to diabetes (Red) whereas the remaining 23% have reported the opposite (Blue).

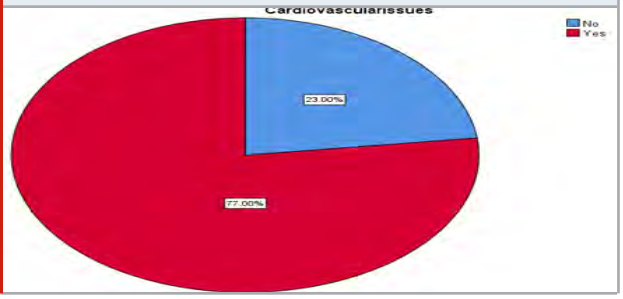


Figure 15: The bar graph demonstrates the association between the age group and the response of people towards the awareness of blood pressure being a predisposing factor to diabetes mellitus (% responses). X axis represents the age group and Y axis represents the response of awareness of the people on blood pressure being a predisposing factor to diabetes mellitus (% responses).Majority of the respondents between the age group 30-40 (27%) have shown to be more aware in comparison to the age groups 40-50 (23%) and 50-60(9%). Chi square analysis was done, Pearson Chi square value = 4.891, the P value is 0.087 (p>0.05), which is found to be statistically not significant.

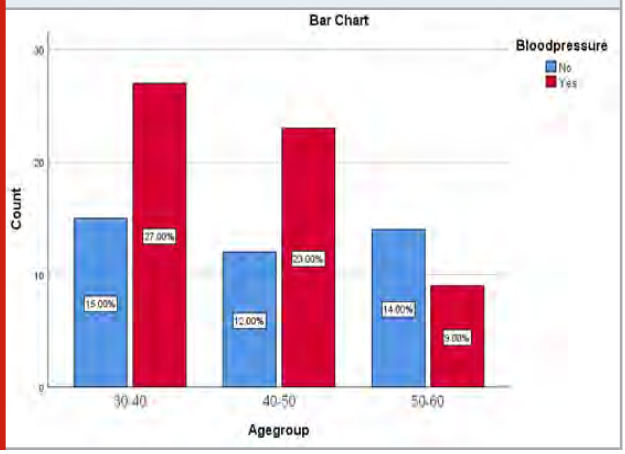


Figure 16: The bar graph demonstrates the association between the age group and the response of people towards the awareness of inactive lifestyle being a predisposing factor to diabetes mellitus (% responses). X axis represents the age group and Y axis represents the response of awareness of the people on inactive lifestyle being a predisposing factor to diabetes mellitus (% responses). Majority of the respondents between the age group 30-40 (33%) have shown to be more aware in comparison to the age groups 40-50 (28%) and 50-60(18%). Chi square analysis was done, Pearson Chi square value = 0.33, the P value is 0.983 (p>0.05), which is found to be statistically not significant.

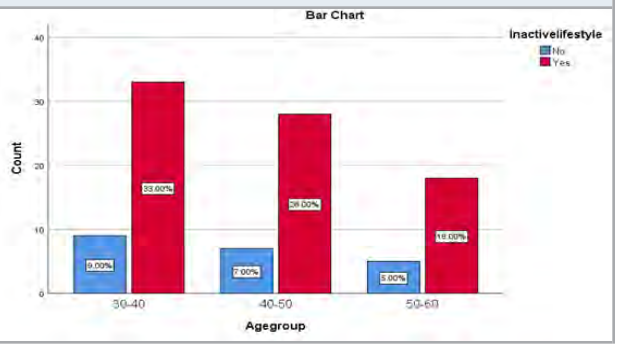


Figure 17: The bar graph demonstrates the association between the age group and the response of people towards the awareness of smoking being a predisposing factor to diabetes mellitus (% responses). X axis represents the age group and Y axis represents the response of awareness of the people on smoking being a predisposing factor to diabetes mellitus (% responses).Majority of the respondents between the age group 40-50 (27%) have shown to be more aware in comparison to the age groups 30-40 (26%) and 50-60(15%). Chi square analysis was done, Pearson Chi square value = 2.143, the P value is 0.342 (p>0.05), which is found to be statistically not significant.

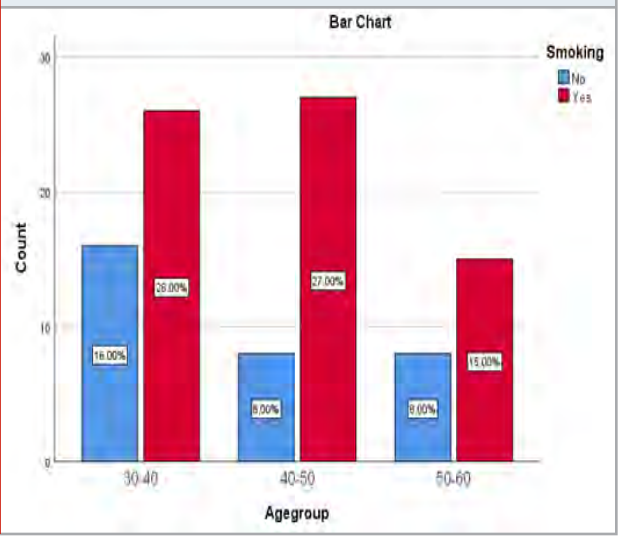


Figure 18: The bar graph demonstrates the association between the age group and the response of people towards the awareness of age being a predisposing factor to diabetes mellitus (% responses). X axis represents the age group and Y axis represents the response of awareness of the people on age being a predisposing factor to diabetes mellitus (% responses).Majority of the respondents between the age group 30-40 (34%) have shown to be more aware in comparison to the age groups 40-50 (20%) and 50-60(14%). Chi square analysis was done, Pearson Chi square value = 5.672, the P value is 0.59 (p>0.05), which is found to be statistically not significant.

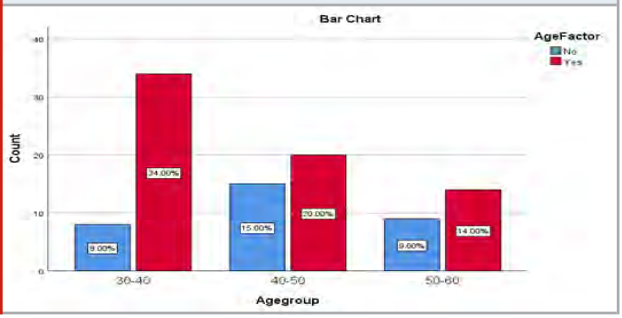
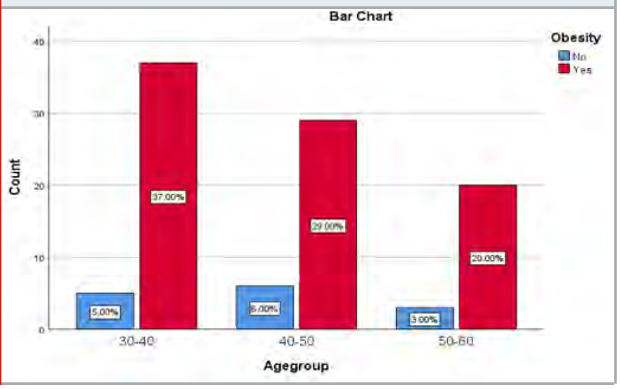


Figure 19: The bar graph demonstrates the association between the age group and the response of people towards the awareness of obesity being a predisposing factor to diabetes mellitus (% responses). X axis represents the age group and Y axis represents the response of awareness of the people on obesity being a predisposing factor to diabetes mellitus (% responses).Majority of the respondents between the age group 30-40 (37%) have shown to be more aware in comparison to the age groups 40-50 (29%) and 50-60 (20%). Chi square analysis was done, Pearson Chi square value = 0.458, the P value is 0.795 (p>0.05), which is found to be statistically not significant.



CONCLUSION

The results of this study demonstrated that there is significant knowledge on predisposing factors to diabetes mellitus among the general public.In risk patients with diabetes, all the predisposing factors have equal contribution to the disease with obesity, lifestyle and hereditary being the most common causes. Diabetes mellitus comes with other associated disorders and therefore the control of diabetes is essential. This control can mainly be brought about only by the people themselves. Therefore, awareness on the same is very important.

ACKNOWLEDGEMENTS

We thank Saveetha dental college for the support to carry out this study.

Conflict of Interest: None to declare

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-100-103

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Research Communications

A Study on Unusual Foramen in the Middle Cranial Fossa in Adult South Indian Dry Skulls

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ABSTRACT

Foramen Vesalius is present in anteromedial side of the foramen ovale. It connects the pterygoid plexus with the cavernous sinus and transmits a small emissary vein which drains the cavernous sinus. The main importance of this foramen is that it offers a path for the spread of an infection from the extracranial source to the cavernous sinus. Foramen innominatus is found between foramen spinosum and foramen ovale if present it transmits the lesser petrosal nerve. Neurosurgeons should be very precautious about these unusual foramina. The main aim of this study is to analyse the presence of foramen vesalius and foramen innominatus in the middle cranial fossa. For the present study, 30 dry human cranial fossa of unknown sex from the Department of Anatomy, Saveetha Dental College and Hospitals, Chennai was examined. From the study, the incidence of unusual foramina was 23.3%. Foramen vesalius was present in 10% of the total skulls and foramen innominatus was present in 13.3% of the total skulls studied. Knowledge about this unusual foramina will be useful for neurosurgeons while conducting surgeries.

KEY WORDS: CAVERNOUS SINUS, FORAMEN INNOMINATUS, FORAMEN VESALIUS, MIDDLE CRANIAL FOSSA.

INTRODUCTION

This study deals with the unusual foramina present in the middle cranial fossa. Foramina are the openings that are present in the base of the skulls that allow passage of important structures such as nerves and blood vessels. The greater wing of the sphenoid contains three consistent foramina and other small variable foramina. The consistent foramina are the foramen rotundum, foramen ovale and foramen spinosum, accessory foramina includes foramen vesalius and foramen innominatus, these are present close to foramen ovale (Raval, Singh and Rajguru, 2015). Foramen vesalius connects the pterygoid plexus with cavernous sinus. The importance of this foramen is that it provides a path for infections to spread from the extracranial source to the cavernous sinus (Kumar, Sehgal and Roy, 2016). This foramen is also called as the emissary sphenoidal foramen.

The emissary sphenoidal foramen differs in size among different individuals, and is not always present on both the sides of the sphenoid bone (Mazengenya and Ekpo, 2017). Many studies were conducted to evaluate the importance of this emissary vein passing through this foramen ,this provides a better understanding of the morphology of this particular structure that has significance in the spreading infections from extracranial origin into the skull and also in neurological techniques such as

ARTICLE INFORMATION

*Corresponding Author: yuvarajbabu@saveetha.com
Received 7th August 2020 Accepted after revision 27th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/118

radio frequency(Chaisuksunt et al., 2012). Foramen innominatus is found between foramen spinosum and foramen ovale, this helps in the transmission of lesser superficial petrosal nerve, a very small tympanic branch of the glossopharyngeal and also several branches of the facial nerve.

Various studies are done on usual and unusual foramina present in the middle cranial fossa and its clinical importance (Paraskevas, Nitsa and Koutsouflianiotis, 2015), (Maina, Ducati and Lanzino, 2007). (Khairnar and Bhusari, 2013). (Prakash et al., 2019). From the previous studies we come to a conclusion that several studies were conducted on foramen ovale and foramen spinosum which are present in the middle cranial fossa but our study mainly focuses on unusual foramina such as foramen vesalius and foramen innominatus and its clinical significance.

Previously our department has published extensive research on various aspects of dentistry (Begum et al, 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about study of unusual foramina in middle cranial fossa in adult south indian dry skulls and its clinical significance.

MATERIAL AND METHODS

For the present study, 30 dry adult human cranial fossa of unknown sex from the Department of Anatomy, Saveetha Dental College and Hospitals, Chennai, India was used. Each skull was studied for the presence of foramen vesalius and foramen innominatus and the records were tabulated accordingly.

RESULTS AND DISCUSSION

Unilateral right foramen vesalius was present in 2 out of 30 skulls (6.7%). Bilateral foramina vesalius was present in 1 out of 30 skulls (3.3%) (Figure 1). Unilateral right foramen innominatus was present in 3 out of 30 skulls (10%). Unilateral left foramen innominatus was present in 1 out of 30 skulls(3.3%) (Figure 2).Both the foramina were not present in 23 skulls out of 30 skulls (77%).

Table 1. Incidence of Foramen Vesalius and Foramen Innominatus in 30 cranial cavity examined

Right unilateral foramen vesalius	Left unilateral foramen vesalius	Right unilateral foramen innominatus	Left unilateral foramen innominatus	Bilateral foramina vesalius	Bilateral foramina innominatus	Both the foramina not present
2/30	0/30	3/30	1/30	1/30	0/30	23/30

Figure 1: Red arrows shows bilateral foramen Vesalius

Foramen vesalius is an inconsistent foramen located between foramen rotundum and foramen ovale. In newborn's, the foramen is about 1.0mm in length, in the adults at the right side about 2mm in length and on the left side 1.4mm in length. The width increases from 1.0 to 1.14mm at the right side and from 1.0 to 1.3 mm at the left side (Lang, Maier and Schafhauser, 1984).

In most of the cases foramen vesalius is symmetrical in nature but in few cases it is asymmetrical, this is caused

Figure 2: Red arrow shows unilateral foramen Innominatus on Left side

Table 2. Comparison Of incidence of abnormal foramen in current and previous studies

Author	Year of study	Incidence	Bilateral	Unilateral
Gupta N et al	2014	34%	14%	20%
Raval et al	2015	60%	32%	35%
Nayak et al	2018	30%	20%	10%
Present study	2020	23.3%	3.3%	20%

due to invasion by nasopharyngeal melanoma, a rare type of head and neck mucosal melanoma, angiofibroma which is a benign tumour that is made up of blood vessels and fibrous tissue, carotid -cavernous fistula with drainage through the emissary vein ais a result from an abnormal communication between the arterial and venous systems within the cavernous sinus in the skull or neurofibromatosis which is a genetic neurological disorder that can affect the brain, spinal cord, nerves and skin (Lanzieri et al., 1988). Regarding the differences between the male and female gender, no remarkable differences were observed, although the occurrence of this foramen was more common in females compared to males (Gupta, Ray and Ghosh, 2005).

Nauma Hafeez et al states that the occurrence of foramen vesalius and foramen innominatus were 20% and 13% respectively (Hafeez and Thenmozhi, 2016). Neha Gupta et al, states that foramen vesalius was found to be present in 68 skulls out of which it was found bilaterally in 28 skulls and unilaterally in 40 skulls (Gupta N et al., 2014). Nayak et al, states that the foramen vesalius is a common anatomical variation and the incidence of the foramen vesalius was found to be 30% (20% bilateral and 10% unilateral) (Nayak et al., 2018) [Table 2]. The recognition of anatomical structures and their possible structures will be helpful to differentiate between normal from potentially abnormal structures during computed tomography and Magnetic resonance imaging.

CONCLUSION

In our study, the incidence of these foramina was 23.3%, which is considerably lower than other previous studies. The exact cause of these variations that were observed in our study might be due to genetic, nutritional, environmental or other unknown reasons. The incidence of Foramen vesalius and Foramen innominatus were 10% and 13.3% respectively. Knowledge about these unusual foramina would be useful to neurosurgeons while conducting surgeries .

ACKNOWLEDGEMENTS

We acknowledge Department of Anatomy for allowing us to use bones from their collection for this study

Conflict of Interest: The author declares that there is no conflict of interest in the present study.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-104-107

BBRC
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Research Communications

Morphometric Analysis of Chin Shape in Inverted Mandible and Mid Symphysis Menti Angle

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ABSTRACT

In human anatomy, the skull 's facial skeleton, the outer surface of the mandible, is distinguished by a slight ridge in the median line, suggesting the mandibular symphysis or junction line in which the two lateral halves of the mandible usually unite at an early life (1-2 years). This is not a true symphysis, since there is no cartilage between the mandible's two hands. The main aim of the study is to measure the mid symphysis menti angle in the inverted aspect. 30 unsexed dry human skulls were taken from the Department of Anatomy, Saveetha Dental College and Hospital. Protractor was used to measure the mid symphysis menti angle in the inverted aspect of the mandible. The average measurement of mid symphysis menti angle was 76.16° and the shape of the mental protuberance for most of the samples were oval shaped. Our study has tried to analyse the mid symphysis menti angle and chin shape in the inverted aspect of mandibles, this data may be useful for surgeons in planning their surgery in the mandibular region.

KEY WORDS: MID SYMPHYSIS MENTI ANGLE, MENTAL PROTUBERANCE, MANDIBLE, CHIN SHAPE.

INTRODUCTION

The human mandible is routinely utilised as a part of the assessment of biological identity in forensic anthropological and odontological practice (Fouhil and El Fouhil, 2012; Rehman, Parveen and Ishaq, 2016). It is morphologically distinct from other primates both in terms of proportions and specific anatomical features(Bennack, 1981). They are also being used since olden time to ascertain the sex of an individual, because they show sexual dimorphism(G and Vinay, 2013). It is the largest and strongest bone in the face with horizontally curved body that is convexed forwards with two broad rami, which ascend from the posterior end of the body, Therefore it remains the most durable bone of the facial skeleton and retains its shape better than other bones(G and Vinay, 2013; Batel et al., 2014). The human mandible is also found to resist post mortem damage and forms an important source of information about the sexual dimorphism. It forms the chief articulating segment of the skull(Posso and Donatelli, 2006), Thus it is the platform for dental surgeons to work with.

Different authors have highlighted the utility of odontological strategies in morphological, metric highlights and non-metric qualities in the mandible, including discrete regions, for example, symphyseal morphology and shape, gonial edge, gonial reversal and eversion, ramus flexure, generally shape from circular fourier analysis(7) and separating capacities dependent

ARTICLE INFORMATION

*Corresponding Author: yuvarajbabu@saveetha.com
Received 4th Aug 2020 Accepted after revision 23rd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/119

on their measurements among others in the appraisal of biological sex and ancestry(8,9). Most recently, a number of studies used geometric morphometric approaches(Fabre et al., 2014) address issues of biological identity. Previous studies on dried mandibles include study of their angle in mixed population in which the angle varied between 110 degrees to 142 degrees from old to young age people and facial height was also calculated with this bone(Malik et al., 2017).

Although measurements of several thousands of mandibles taken for anthropological purposes have been published, they are actually of little value in some cases. Primarily this can be due to the fact that the technique of measurement has never been standardised and many of the data obtained by those techniques which have been most widely used cannot be compared accurately in cases where direct comparison should be possible. There are only a few publications related to inverted aspect of mandible and midsymphis menti angle, the present study is aimed at morphometrically analysing the chin shape in inverted mandible and mid symphysis menti angle. The need for such type of study is due to increased incidence of accidents where a number of unidentified cases are obtained and these measurements may be useful for their reconstructive procedures.

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years (Govindaraju, Jeevanandan and Subramanian, 2017a, 2017b; Panchal, Gurunathan and Shanmugaavel, 2017; Ravikumar, Jeevanandan and Subramanian, 2017; Jeevanandan and Govindaraju, 2018; Nair et al., 2018; Ravikumar et al., 2018, 2019; Ravindra et al., 2018, 2019; Subramanyam et al., 2018; Vishnu Prasad et al., 2018; Jeevanandan, Ganesh and Arthilakshmi, 2019; Ramadurai et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Veerale Panchal, Jeevanandan and Subramanian, 2019; Vignesh et al., 2019; V. Panchal, Jeevanandan and Subramanian, 2019; Samuel, Acharya and Rao, 2020). With this inspiration we planned to pursue research on morphometric analysis of chin shape in inverted mandible and mid symphysis menti angle.

MATERIAL AND METHODS

For the current study 30 dried unsexed mandibles of the South Indian population were examined from the Department of Anatomy, Saveetha Dental College and Hospital. The shape of mental protuberance and mid symphysis menti-angle was measured using a protractor keeping the mandible in inverted aspect, the measurements were recorded separately for each parameter and the readings were tabulated and statistically analysed.

RESULTS AND DISCUSSION

In this study out of the 30 samples used, 13 samples had round shaped mental protuberance and the remaining 17 mandibles had oval shaped mental protuberance. The mean value of mid symphysis menti angle is 76.16°+ 2.43° , in which the largest mid symphysis menti angle was 85° and smallest mid symphysis menti angle was 71°.

Table 1. Minimum, Maximum and average Midsymphysis menti angle in mandible

	Mid Symphysis menti angle in degrees
Maximum Angle	85°
Minimum Angle	71°
Average value of Mid symphysis menti angle	76.16° + 2.43°

Roy in his study of chin shape evaluated the proportion of external chin to identify those with diverse morphology, he used protuberantia mentalis for differentiation but we considered mid symphysis menti angle and mental protuberance, subjects falling between the age group of 18-25 years were selected because most of the mandible growth was completed by that time and SN-MP (facial divergence angle) was the parameter used were mean value for males was 23±5.9° and for females it was 24.2±5°. (Roy et al., 2012).

In a similar study by Maneesha Sharma on morphometric analysis of mandible in Indian population, the author focused on helping in identification of mutilated bodies by determining the sex of the obtained mandible, they also tried to set up some parameters of mandible as indicators of sex in Indian population, for this the length, angle and minimum breadth of mandible were considered and the mean length was 17.22cm, this study gave 60% accuracy in sex determination (Sharma et al., 2016). A well established racial difference in the facial mandibular dimension had been found to exist by various researchers in various facial types.

CONCLUSION

Since most of the research are not being done on mid symphysis menti angle, thus knowing the accurate chin shape and mid symphysis menti angle may prove to be helpful in mandibular surgical procedures for people at a particular area in case of accidents and in case of corrective jaw surgeries performed to enhance appearance.

ACKNOWLEDGEMENTS

We acknowledge Department of Anatomy for allowing us to use bones from their collection for this study

Conflict of Interest: The author declares that there is no conflict of interest in the present study.

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-108-111

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Morphometric Analysis of Stylomastoid Foramen Location and its Clinical Importance

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ABSTRACT

The stylomastoid foramen is located between the styloid process and mastoid process of the temporal bone. Facial nerve and Stylomastoid branch of posterior auricular artery passes through this stylomastoid foramen. The facial nerve can be blocked at this stylomastoid foramen but it has high risk of nerve damage. For Nadbath facial nerve block, stylomastoid foramen is the most important site. Facial canal ends at this foramen and it is the important motor portion of this stylomastoid foramen. A total of 50 dry skulls from the Anatomy Department of Saveetha Dental College were studied to locate the position of the centre of the stylomastoid foramen with respect to the tip of mastoid process and the articular tubercle of the zygomatic arch by a digital vernier caliper. All measurements were tabulated and statistically analysed. In our study, we found the mean distance of stylomastoid foramen from mastoid processes 16.31±2.37 mm and 16.01±2.08 mm on right and left. Their range is 10.48-23.34 mm and 11.5-21.7 mm. The mean distance of stylomastoid foramen from articular tubercle is 29.48±1.91 mm and 29.90±1.62 mm on right and left. Their range is 26.77-34.73 mm and 26.72-34.17 mm. This study helps to determine the precise location of the stylomastoid foramen in relation to various anatomical structures which will be very helpful for the surgeons to plan surgeries in this region.

KEY WORDS: STYLOMASTOID FORAMEN, FACIAL NERVE BLOCK, MASTOID PROCESS, ARTICULAR TUBERCLE.

INTRODUCTION

The stylomastoid foramen is located between the styloid process and mastoid process of the temporal bone. Facial nerve and Stylomastoid branch of posterior auricular artery passes through this stylomastoid foramen (Varshney and Sharma, 2015). The facial nerve can be blocked at this stylomastoid foramen but it has high risk of nerve damage. For Nadbath facial nerve block, stylomastoid foramen is the most important site (Nadbath and Rehman, 1963). Facial canal ends at this foramen and it is the important motor portion of this stylomastoid foramen. The facial nerve travels along the bony canal and proceeds the nerve towards the stapedius along the chorda tympani (Karaca et al., 2019). The root of the styloid process is anterior to stylomastoid foramen and lateral to jugular foramen. The structures present around the stylomastoid foramen are the styloid process, mastoid process, jugular surface and stylopharyngeus.

When describing the stylomastoid foramen various researches have studied the importance of various anatomical structures that are passing through the stylomastoid foramen. Stylomastoid Foramen is the most frequently employed method of anesthesia in cataract surgery. Knowing the exact location of the foramen is of great importance to surgeons and anaesthetists in locating the trunk of the facial nerve in various procedures

ARTICLE INFORMATION

*Corresponding Author: yuvarajbabu@saveethal.com
Received 8th Aug 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/120

(Wakasugi, 1972). There are four types of facial block: van Lint's block, Atkinson block, O' Brien block and Nadbath block(Hessemer, 1994). Van Lint's block: The peripheral branches of the facial nerve are blocked within van Lint 's block. 2.5 ml of anesthetic solution is administered just above the eyebrow and below the lower orbital margin, 2 cm below the lateral orbital margin at the edge of the outer eye canthus(Schimek and Fahle, 1995). O' Brien's block: Otherwise known as facial nerve trunk block. The block is done at the level of the neck of the mandible near the condylar process(Warner, Martino and Davidson, 1995). Atkinson's block: The superior branch of the facial nerve is blocked by inserting the anesthetic solution at the inferior zygomatic bone margin. Nadbath block: Furthermore, called as modified O'Brien's method. Here the facial nerve is blocked at the stylomastoid foramen.

With a rich case bank established over 3 decades we have been able to publish extensively in our domain (Abdul Wahab et al., 2017; Eapen, Baig and Avinash, 2017; Patil et al., 2017; Jain and Nazar, 2018; J et al., 2018; Marimuthu et al., 2018; Wahab et al., 2018; Abhinav et al., 2019; Ramadorai, Ravi and Narayanan, 2019; Senthil Kumar et al., 2019; Sweta, Abhinav and Ramesh, 2019). Based on this inspiration we aim to locate the styloid foramen with two measurements, from the tip of the mastoid process to stylomastoid foramen and the other measurement is from the articular tubercle to the stylomastoid foramen. Most of the previous studies located stylomastoid foramen with respect to the tip of mastoid process and jugular foramen. But here we also measure the distance with the articular tubercle which was not done by any other author. With this we can find the exact location of stylomastoid foramen.

Figure 1: Measurement of Distance between Stylomastoid foramen to mastoid process (A) and articular tubercle (B)

MATERIAL AND METHODS

A total of 50 dry unsexed skulls from the Anatomy Department of Saveetha Dental College were examined to locate the position of the centre of the stylomastoid foramen with respect to the tip of mastoid process and the articular tubercle of the zygomatic arch by a digital vernier caliper (Figure 1 A,B). All measurements were tabulated and statistically analysed.

RESULTS AND DISCUSSION

In our study, we found the mean length of stylomastoid foramen to mastoid process 16.31±2.37 mm and 16.01±2.08 mm on right and left. Their range is 10.48-23.34 mm and 11.5-21.7 mm. The mean length of stylomastoid foramen to articular tubercle is 29.48±1.91 mm and 29.90±1.62 mm on right and left. Their range is 26.77-34.73 mm and 26.72-34.17 mm

Table 1. Range and mean distance of Stylomastoid foramen from mastoid process and articular tubercle right and left side.

	Stylomastoid foramen to mastoid process		Stylomastoid foramen to articular tubercle	
	Range	Mean	Range	Mean
Right	10.48-23.34 mm	16.31±2.37 mm	26.77-34.73 mm	29.48±1.91 mm
Left	11.5-21.7 mm	16.01±2.08 mm	26.72-34.17 mm	29.90±1.62 mm

Previous author studied about the morphometric analysis of stylomastoid foramen and its clinical application in facial nerve block with a total of 100 dry skulls and found the mean distance of centre of foramen from the tip of mastoid process as 16.01±2.08mm on right and 16.31±2.37 mm on left side. He also showed that 83.5% of skulls had stylomastoid foramen located anterior to the line passing through the anterior border of the mastoid process (Varshney and Sharma, 2015). Another author concluded that the position of stylomastoid foramen for the left side is 50% along the XY axis. Also said that the left side distance was higher than the right side distance and this can also be referred for Nadbath facial block (Kumagami, Nishida and Dohi, 1976).

Another study concluded that the trunk of the facial nerve was in proximity to the stylomastoid artery, which originated from the posterior auricular artery in 70% of the specimens, from the occipital artery it is 20% and directly from the external carotid artery it is 10%. The stylomastoid artery passed medially to the trunk of the facial nerve in 63 of the specimens and laterally in 37% (Bourdon et al., 2000).

Knowledge of the trunk of the facial nerve is essential for preserving the nerve during surgical procedures of the mastoid process, parotid gland, the cranial base and the facial nerve (Baker and Conley, 1979). Most commonly, the facial nerve is in relation to the stylomastoid

artery that arises from the posterior auricular artery. The stylomastoid artery also originates from occipital or peripheral carotid arteries. In 19 cases of 30 the stylomastoid artery passes medially to the nerve, and 11 cases laterally [Moreau et al, 2001]. Another study concluded during the examination of cranial bones, we observed an abnormality in one of the right temporal bones. In this variation, the stylomastoid foramen was not completely formed on the temporal bone, and instead of the foramen, the sulcus was located on the bone [Celik et al, 1997]

No author took the distance of stylomastoid foramen with respect to articular tubercles. There was no significant difference in the location of stylomastoid foramen between its sides from the anatomical landmarks.

CONCLUSION

This study helps to determine the precise location of the stylomastoid foramen in relation to various anatomical structures which will be very helpful for the surgeons to plan surgery in this region.

ACKNOWLEDGEMENTS

We acknowledge Department of Anatomy for allowing us to use bones from their collection for this study

Conflict of Interest: The author declares that there is no conflict of interest in the present study.

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-112-115

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Morphometric Analysis of Tubercles at the Anterior Margin of Foramen Magnum

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ABSTRACT

The basilar part Occipital bone is formed by the initial three primitive vertebrae (or occiput blasts), the most caudal of which is alleged occipital vertebra . The peculiarity prompts anomalous bone arrangement in the region of the anterior edge of foramen magnum, either in the midline or potentially along the side. This peculiarity is known as the third condyle, remnants of occipital vertebra and is ossified with the odontoid bone.The aim of this study is to analyse the morphology of tubercles present at the anterior margin of foramen magnum. 72 south Indian adult unsexed human skulls were analyzed for the appearance of precondylar tubercles from the Department of Anatomy, Saveetha Dental College & Hospitals.The distance from both mastoid process, external occipital protuberance are measured by using vernier calliper. Out of these 72 skulls, 3 skulls showed unilateral midline tubercles. In this study, The occurrence of tubercle at the anterior margin of the foramen magnum is 4.16%.

KEY WORDS: FORAMEN MAGNUM ANOMALIES, TUBERCLE IN ANTERIOR MARGIN, OCCIPITAL VERTEBRAE.

INTRODUCTION

The skull has a pinnacle importance in the vertebral column. The foramen magnum is the huge opening in the occipital bone, and transmits significant neurovascular structures (Standring et al., 2005). Anomalies found around the foramen magnum may be of clinical significance as is closely related to vascular and nervous structures. Position of this tubercle may be related to traumatic medullary lesions of the occipito-vertebral region.

ARTICLE INFORMATION

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Received 27th July 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/121

The tubercles within the foramen are significant as they could interfere with the sensitive structure that goes back and forth from the skull. It is very significant in the field of neurology that such structures may intervene in the development at the atlanto-occipital joint (Ahmed et al., 2015). It is additionally significant within the field of neurology that such structures may impede at the atlanto-occipital joint (Prakash et al., 2011). Previously our department has published extensive research on various aspects of dentistry (Begum et al, 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about morphometric analysis on the tubercles at the anterior margin of the foramen magnum.

MATERIAL AND METHODS

72 unsexed South Indian adult human skulls from the Anatomy Department of Saveetha Dental College were

examined for the presence of tubercle in the anterior margin of Foramen magnum. The skulls with tubercles at foramen magnum were examined further, parameters of the tubercles are measured. The distance from mastoid process, external occipital protuberance were measured using vernier callipers.

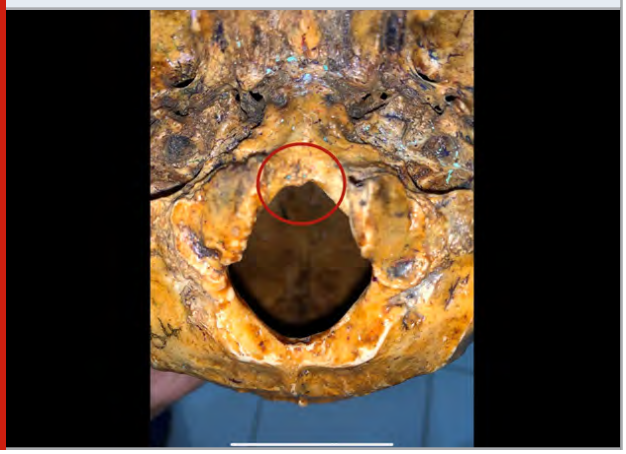
RESULTS AND DISCUSSION

From the research we found that 3 out of 72 skulls had tubercle at the anterior margin of the foramen magnum. The occurrence of tubercle at the anterior margin of the foramen magnum is 4.16%. The failure of distal occipitoblasts to intertwine with other bones creates an unusual bony appearance on the outer surface of skull around foramen magnum, an anomaly called as "appearance of occipital vertebra"(Lombardi, 1961). Failure in Hypochondrial ossification during development may show a rigid arrangement in that region, called tubercle (Fig.1)(Vasudeva and Choudhry, 1996).

Table 1. The table shows the length of the tubercle from the landmarks in the skull(mastoid process, external occipital protuberance).

Distance from Anatomical landmarks	Right Mastoid Process	Left Mastoid Process	External Occipital Protuberance
SKULL 1	4.57 cm	4.36 cm	6.62 cm
SKULL 2	5.48 cm	5.47 cm	6.55 cm
SKULL 3	4.86 cm	4.57 cm	7.56 cm

Figure 1: Shows the tubercle at the anterior margin of the foramen magnum



Besides being of anthropological and ethnological importance, these variations might be significant in a clinical setting. Protruding vertebral components along the anterior edge of foramen magnum intervened between the basiocciput and the atlas may decrease the periphery of the foramen or cause asymmetry (Nicholson and Sherk, 1968; Vinken and Bruyn, 1968). Extended middle or paramedian tubercle's ventral to the foramen may shape a pseudojoint with the apical section of the odontoid process, in this way influencing the important tracts passing through the atlanto-occipital articulation(Cagle, 1989).

Romanes and Basmajian in their research said that tubercles at the anterior margin can intervene in the important structures passing through the foramen magnum, A similar explanation is portrayed by Bergman et al (Bergman, Afifi and Miyauchi, 2018). In the research done by Naderi et.al, its occurrence has been accounted for to be 0.8% (Naderi et al., 2005). The frequency of tubercles at foramen magnum has been reported as 0.5-0.8% in the research done by Prakash B.S (Prakash et al., 2011). Lakhatia et.al has done a research in which, out of 422 skulls that were examined , 22 skulls the projection took the form of a tubercle measures 0.5-1.5mm in length , whereas in 32 skulls the tubercle is 2-2.5mm , 2skulls were 4mm. Tubercle was present in 15% of skulls examined (Lakhtakia et al., 1991). Out of 66 skulls studied 1.5% are with the tubercle in the research done by Blaszczyk et.al, all the skulls were mostly of Russian population (Błaszczyk, Kaszuba and Kochanowski, 1980).

In the research done by Lombardi et.al, the incidence of tubercles was of 0.28% mainly of the western world population (Lombardi, 1961). In the research done by Harrower et.al, 382 skulls have been studied, 1.3% incidence was found, It was from the population of South American people (Harrower, 1923). In the research done by Vasudeva et.al, Out of 265 skulls, 37 skulls showed tubercles at the anterior margin, 2% occurrence was found, it is from the northern part of India (Vasudeva and Choudhry, 1996). In the research done by Trotter et.al, Pre condylar and anterior marginal tubercles are formed in 2% of skulls of Negros, This research was done on skulls of South African population (Trotter, Broman and Peterson, 1960). In the research done by Vanquest et.al, 38 skulls out of 450 skulls showed the presence tubercle, which is 0.85% of incidence, it was mainly of European population (Pastor Vázquez, Gil Verona and García Porrero, 1999). Surendra et.al research concluded that " presence of tubercle at the anterior margin is not a normal incidence and is not found in all people" (Al-Motabagani and Surendra, 2006).

In the research done by P.K.Lakhatia (Lakhtakia et al., 1991) the percentage of tubercles found to be 15% which is higher than our study of 4.6% occurrence. In the researches done by Ahmed (Ahmed et al., 2015), Blaszczyk et.al (Błaszczyk, Kaszuba and Kochanowski, 1980), Haritha (Harrita and Santhanam, 2019), Broman. GE (Trotter, Broman and Peterson, 1960), Surendra (Al-Motabagani and Surendra, 2006) the percentage of tubercles found was less than the occurrence in our study. Limitations of the study are less number of skulls and restriction of sample to specific local region. Future extension lies in the field of orthopedics and neurology as such peculiarities may cause pressure of the neural structures and furthermore research may be needed.

CONCLUSION

Anatomically, the location of an insignificant precondylar tubercle may create neurological signs of pressure since it is situated outside the periphery of foramen magnum. Our report of incidence of 4.6% of tubercle in the anterior margin of foramen magnum would help neurologists and surgeons about anomalies in the region around foramen magnum.

ACKNOWLEDGEMENTS

We acknowledge Department of Anatomy for allowing us to use bones from their collection for this study

Conflict of Interest: The author declares that there is no conflict of interest in the present study.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-116-120

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Evaluation of Plaque Retention in Stainless Steel and Ceramic Brackets – A Qualitative Comparative Study

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ABSTRACT

To evaluate the plaque retention in stainless steel and ceramic brackets using OHI-S Index and Turesky et al Modified Quigley Hein Plaque Index. The study was done on 40 subjects who were scheduled for fixed orthodontic treatment. The plaque index of subjects was recorded according to the OHI-S index and Turesky et al Modified Quigley Hein Plaque Index methods . Descriptive statistics and Independent sample t-test was used to see the difference in plaque index in factors having two variables. Also chi-square test was performed to associate between the frequency of brushing and the plaque indices.The mean of metal brackets with OHI-S index was 1.36 +0.72 and Turesky Index was 1.58+ 0.74 .Mean of ceramic brackets with OHI-S index was 1.68 + 0.38 and Turesky Index was 1.63 + 0.94 . On doing independent -t- tests, t was observed that the ceramic brackets showed higher plaque index scores than metal brackets, but this was not statistically significant. The difference in plaque index between stainless steel and ceramic brackets proved to be statistically insignificant, thereby concluding that in terms of plaque reduction ,any one of the two brackets could be used.

KEY WORDS: CERAMIC BRACKETS, METAL BRACKETS , TURESKY ET AL MODIFIED QUIGLEY HEIN PLAQUE INDEX , OHI-S INDEX.

INTRODUCTION

The placement of orthodontic appliances creates a favorable environment for the accumulation of a microbiota and food residues.(Owen, 1949) Maintenance of good oral hygiene is extremely important during the fixed orthodontic treatment. Despite oral hygiene maintenance instructions, the clinical experience as well as literature(Marsh, 1995)(Marsh and Bradshaw, 1995) has shown the accumulation of dental plaque on the teeth. The dental plaque that accumulates can harbor a diverse microflora which could produce toxic products and acids. As a result, the tooth structure and also the supporting structures are jeopardized. The hazards of microbial films can range from simple gingivitis and white spot lesions to severe interdental bone loss and carious cavitations. It has been estimated that some 60% of dental infections, including gingivitis, white spot lesions, dental caries and periodontal disease are due to microbial biofilms. (Costerton, Stewart and Greenberg, 1999).

Adhesion of microorganisms to surfaces is a result of electrostatic interactions and van der Waals forces. (Christersson et al., 1989) Although it is clear that initial attachment is an important factor governing further

ARTICLE INFORMATION

*Corresponding Author: navaneethan@saveetha.com
Received 3rd Aug 2020 Accepted after revision 22nd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/122*

colonization, the mechanism of attachment and those of subsequent adhesion may differ significantly.(Gibbons, 1989) Decreased wettability may inhibit direct adhesion and colonization of bacteria on to the appliances. (AlMulla, 2014). Clinical studies have shown an increase in biofilm formation combined with an ecological change of the microbial profile after bracket insertion. (Lee et al., 2005),(Paolantonio et al., 1997),(Zachrisson and Zachrisson, 1972)The shift in amount, composition, metabolic activity, and pathogenicity of the oral microflora can lead to generalized gingival inflammation and incipient carious lesions.(Atack, Sandy and Addy, 1996)(van Gastel et al., 2008)(Chapman et al., 2010) (Øgaard et al., 1988)

In addition to the inefficient brushing practices, there are a lot of factors that can affect plaque accumulation. Some of these factors are related to the clinical practices such as the type of brackets, type of ligation, duration of orthodontic treatment and frequency of patient appointments.(Gastel et al., 2009)(Alves de Souza et al., 2008)(Türkkahraman et al., 2005)(Lobb, 2006) The others are related to the patient socio-demographic factors like eating habits, age, gender and Socio-economic Status. (Islam, Shaikh and Fida, 2014) There are a number of factors that can influence the plaque accumulation around orthodontic brackets. Hence, it is important to know all those factors that can help in reducing plaque and those which are associated with increase in plaque retention. The incorporation of these factors in normal orthodontic clinical practice and in patient education will help to avoid most of the hazards related to dental plaque.

In most cases, fixed orthodontic treatment consists of brackets made of stainless steel.Because of the increase in needs for more esthetic treatment options among young individuals, the usage of tooth colored brackets made of ceramics is highly preferred. After their introduction in 1986, various types of ceramic brackets are currently available by all major orthodontic manufacturers. (Birnie, 1990)(Fox and McCabe, 1992) Since then it has gained widespread popularity in clinical practise. Therefore, the objective of this study was to compare the plaque accumulated with ceramic and metal orthodontic brackets in order to clarify which bracket type had a higher plaque retaining capacity.

MATERIAL AND METHODS

This was a cross-sectional analytical study carried out at the Orthodontics Department at Private Dental institute. A total of 40 subjects were selected who were further divided into two groups– Group A and Group B. Group A consisted of 20 ceramic bracket patients and Group B consisted of 20 metal bracket patients. Both the groups were tested by the following Plaque Indices- OHI-S Index and Turesky et al Modified Quigley Hein Plaque Index. Their records were collected and maintained in Google Sheets.

Dental Indices used: In (Cugini, Thompson and Warren, 2006)Turesky et al Modified Quigley Hein Plaque Index (TQH) , the mesial, distal, and mid surfaces of facial and lingual aspects were scored. After disclosing with Two-Tone dye, the scores were recorded

Scoring was as follows: 0 is no plaque/debris, 1 is separate flecks of plaque at the cervical margin of the tooth; 2 is a thin continuous band of plaque (up to 1 mm) at the cervical margin of the tooth; 3 is a band of plaque wider than 1 mm but covering less than one third of the crown of the tooth; 4 is plaque covering at least one third but less than two thirds of the crown of the tooth and 5 is plaque covering two thirds or more of the crown of the tooth.

In OHI-S Index , the surfaces that were measured were labial/buccal surfaces of upper and lower first molars (16,26,36,46); followed by one upper central incisor (11) and lower central incisor (31). It consists of debris index (DI-S) and calculus index (CI-S).

The following is the criteria for classifying: The score for debris-index represents 0 for No debris or stain present; 1 for Soft debris covering not more than one third of the tooth surface being examined or the presence of extrinsic stains without debris regardless of surface area covered; 2 for Soft debris covering more than one third but not more than two thirds of the exposed tooth surface and 3 for Soft debris covering more than two thirds of the exposed tooth surface.

The score for calculus -index represents 0 for No calculus present; 1 for Supragingival calculus covering not more than one third of the exposed tooth surface being examined; 2 for Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface, or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth and 3 for Supragingival calculus covering more than two thirds of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth.

The average of both the DI-S and CI-S are combined to obtain the OHI-S. The C I-S and D I-S values may range from 0 to 3 ; the O H I-S values, from 0 to 6. Inclusion criteria included subjects with intact set of teeth and treatment with orthodontic fixed appliance for at least one month of wear, subjects of 15 years of age and above, and subjects using manual toothbrushes. Exclusion criteria included any physical limitations that might compromise normal toothbrushing technique, any evidence of neglected oral hygiene or major hard or soft tissue lesions or trauma, a medical condition with a requirement of antibiotic therapy or anti-inflammatory medications. Descriptive statistics along with independent t-test was performed between the two groups . Also chi-square test was performed to associate between the frequency of brushing and the plaque indices. The statistical analysis was performed with the help of SPSS software 23.00.

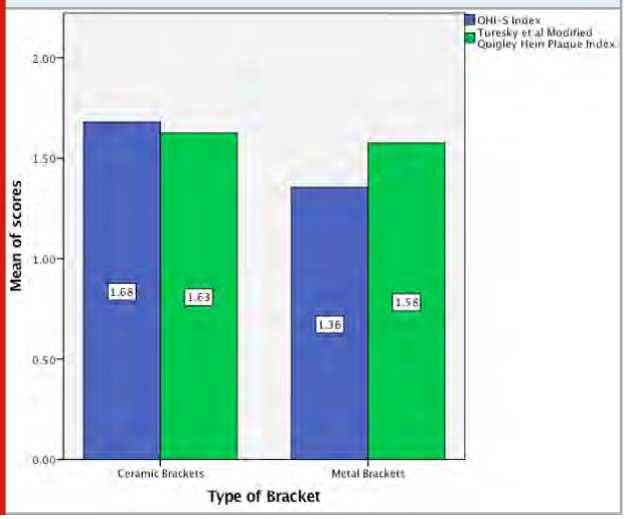
RESULTS AND DISCUSSION

Descriptive statistics along with independent t-test was performed between the two groups . Also chi-square test was performed to associate between the frequency of brushing and the plaque indices. The mean of metal brackets with OHI-S index is 1.36 +0.72 and Turesky Index is 1.58+ 0.74. Mean of ceramic brackets with OHI-S index is 1.68 + 0.38 and Turesky Index is 1.63 + 0.94 [Table. 1] It was observed that subjects with ceramic brackets had higher plaque index scores than those with metal brackets ; however this was not statistically significant (p>0.05) [Figure.2] It was inferred that the subjects who brushed twice a day showed lower plaque index score as compared to subjects who brushed once a day; however this was not statistically significant (p>0.05)[Figure. 3].

Table 1. Descriptive statistics to find mean and standard deviation of the index scores obtained from both groups

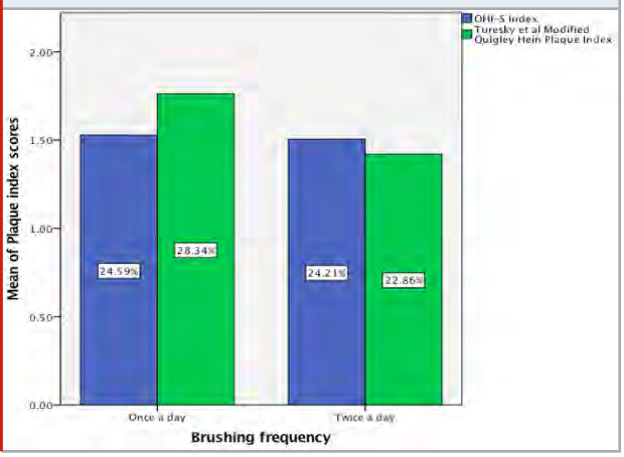
	Mean	Std Dv	Mean Diff	Sig (2-tailed)
Group A - Ceramic brackets				
OHI-S score	1.68	0.368	0.325	0.081
TQH score	1.63	0.935	0.050	0.852
Group B - Metal brackets				
OHI-S score	1.36	0.723	0.325	0.084
TQH score	1.58	0.743	0.050	0.852

Figure 1: Bar chart representing independent t-test performed between ceramic and metal bracket groups. The X-axis represents the type of bracket and the Y-axis represents the mean of plaque indices scores. Independent t-test was performed and was found to be statistically not significant (P value >0.05). It was observed that subjects with ceramic brackets had higher plaque index scores than those with metal brackets ; however this was not statistically significant (p>0.05)



Our extensive research expertise ranged from epidemiological studies to randomised clinical trials that have been published in reputed journals(Felicita, 2017a, 2017b, 2018; Felicita, Thirumurthi and Jain, 2017; Korath, Padmanabhan and Parameswaran, 2017; Krishnan, Pandian and Rajagopal, 2017; Charles et al., 2018; Pandian, Krishnan and Kumar, 2018; Reddy et al., 2018; Chinnasamy et al., 2019). This knowledge was instrumental for us to compare the plaque retention in ceramic and metal brackets. In the present study, it was attempted to address the factors which can affect the plaque around the two types of fixed appliances - metal and ceramic brackets. On doing independent 't' tests , the values show that the difference in plaque accumulation in ceramic and metal brackets were insignificant.

Figure 2: The bar chart represents the association between brushing frequency among the subjects and the plaque index scores. The X-axis represents the brushing frequency and the Y-axis represents the mean of the plaque indices scores. Chi-square association was done and it was found not to be statistically significant, [Chi-square value for OHI-S =12.27 , p value = 0.51; Chi-square value for TQH= 13.07 , p value= 0.67] ; It was inferred that the subjects who brushed twice a day showed lower plaque index score as compared to subjects who brushed once a day; however this was not statistically significant (p>0.05).



A number of researchers have worked on various sociodemographic and clinical factors to search out their relevance to plaque accumulation. Some studies have found.that adolescents exhibit higher levels of plaque as compared to the adults(Boyd and Baumrind, 1992) (Boyd et al., 1989). But in some studies, the difference in plaque accumulation among different age groups was compared and found to be statistically insignificant although all the three groups had moderate levels of plaque (Islam, Shaikh and Fida, 2014) .

The subjects, after putting the fixed appliances, are instructed about the type of brush, timing and frequency of brushing in order to maintain optimal oral hygiene. Usually, the given instructions are to brush the teeth at least twice daily before going to bed and after breakfast. The use of interdental brush to clean between the brackets

is also prescribed. In study by Islam ZU et al, a significant decrease of plaque levels was found in subjects who brush the teeth twice or more than twice daily as compared to those who brush once per day. Furthermore, the subjects who used the interdental brush in addition to the normal brush have shown reduced plaque levels when compared to the subjects who only used the normal brushing for cleaning their teeth (Islam, Shaikh and Fida, 2014).

They also showed that the subjects who brushed their teeth after breakfast have significantly reduced levels of plaque than the subjects who exercised brushing before breakfast. Some studies show that the use of mouthwash has been shown to reduce the level of plaque and gingivitis (Lindel et al., 2011). Generally, the ceramic brackets have been shown in studies to accumulate more plaque as compared to the metallic brackets (Gastel et al., 2009) (Anhoury et al., 2002). This was similar to our present study results ; however it was found not to be statistically significant. On the contrary, a more recent and controlled study has shown a significantly lower amount of biofilm on ceramic brackets than on stainless steel brackets(Lindel et al., 2011). This may be due to the fact that the subject with ceramic brackets are more conscious about the esthetics and oral hygiene than subjects with metal brackets .

Our study showed that subjects who maintained good oral hygiene and brushed twice daily showed lesser incidence of plaque; although this was not statistically significant. In clinical practice, the decision of bracket selection is more dependent on the basis of oral hygiene maintenance. The clinician would suggest the bracket system most suited for the patient according to their hygiene(Islam, Shaikh and Fida, 2014). This means that the amount of plaque may be kept at minimum if the brushing practices are exercised precisely and frequently, irrespective of how long the duration of treatment extends and which type of bracket was used on the patient. From the discussion above, it seems that the maintenance of really good oral hygiene during fixed orthodontic treatment is more dependent on the brushing practices and fewer on the clinical practices.

The subjects who comply with the use of normal and interdental brushing, the timing of brushing and frequency of brushing is less prone to plaque accumulation. (Islam, Shaikh and Fida, 2014) The elastomeric module accumulates more plaque, must be used with caution in patients with poor oral hygiene as shown in this and other studies.(Alves de Souza et al., 2008)(Lobb, 2006) Therefore, patients' education on oral hygiene maintenance must be a part of the orthodontic treatment. For these reasons, proper methods of instructions by means of verbal, brochures and video tapes must be devised and incorporated in clinical practice. The limitations of this study was small sample size and sampling technique.

CONCLUSION

Within the limitations of the study , the following conclusions can be made :

- The difference in plaque index between stainless steel and ceramic brackets proved to be statistically insignificant, thereby concluding that in terms of plaque reduction ,any one of the two brackets could be used.
- Patients with metal brackets seem to have lesser plaque accumulation as compared to ceramic brackets , even though it is not statistically insignificant. This could be attributable to differences in surface characteristics in ceramic and metal brackets.
- Patients who brushed twice a day showed lesser retention of plaque compared to patients who only brush once a day. However this was not statistically significant.

ACKNOWLEDGMENTS

I would like to record my deep sense of gratitude to my research supervisor Dr Navaneethan R, Reader, Department of Orthodontics, Saveetha Dental College and Hospitals, Chennai for his guidance and encouragement with my work during all stages. There was an equal contribution from all the authors.

Conflict of Interest: No conflict of interest.

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Comparative Evaluation of Colour Stability Among Cad Cam and Resin Interim Restoration- an in Vitro Study

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ABSTRACT

The provisional restorations are used for an interim period in fixed prosthodontics. In a few situations, it can also be used as a long term provisional restoration. In the case of long term provisional restorations, the major concern is the aesthetics and function. In anterior tooth replacement, colour stability is the main criteria for selection of material. Colour stability can be affected by various reasons. The aim of the study is to evaluate the colour stability on CAD-CAM interim restoration and the conventional interim restoration. Eight samples each of heat cure provisional and CAD-CAM resin milled provisional are fabricated and tested in a toothbrush simulator for a period of 24hrs. The average period of abrasion is for 9 months. Pre-test and post-test measurement of its absorbance using spectrophotometer done. The results showed that CAD-CAM provisional restorations have better colour stability than conventional heat-cured provisional restorations even after 9 months. This can be due to less monomer residue, better mechanical properties. Colour stability is an important criterion when anterior restoration is concerned. Discolouration of the restoration can be due to various factors that may lead to patient dissatisfaction. The CAD-CAM provisional restorations can be a better choice as a long term provisional restoration in the aesthetic zone.

KEY WORDS: PROVISIONAL RESTORATIONS, CAD-CAM TEMPORIZATION, COLOUR STABILITY, AESTHETICS, TOOTHBRUSH SIMULATOR.

ARTICLE INFORMATION

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Received 8th Aug 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/123

INTRODUCTION

In fixed prosthodontics, replacement of missing teeth is the primary aim of treating patients to regain aesthetics and function. The restoration done can be either tooth-supported prosthesis or implant-supported prosthesis. In tooth-supported prosthesis evaluation of abutment teeth are at-most important for treatment success. An implant-supported prosthesis can be either immediate loading or delayed loading. In implant-supported prosthesis, the formation of gingival collar especially in the anterior region is important in the aesthetic point of view. In immediate loading of implants, permanent restorations either with metal-ceramic or all-ceramic will be challenging in the aesthetic area, due to unpredictability in the healing of soft tissue. In such situations, interim restoration is one of the choices.

There are various interim restorative materials available. Polymethyl methacrylate (PMMA) is one of the most commonly used denture base material(Sepúlveda-Navarro et al., 2011) (Goiato et al., 2013).The types of PMMA resin includes heat-cured resin, auto-polymerizing acrylic resin, light-cured resin, microwave processing resin, computer-aided design/computer-aided manufacturing (CAD/CAM) PMMA block resin(Tuna et al., 2013; Choi et al., 2018). The most commonly used PMMA resins are heat cured and CAD-CAM resin. Heat cured polymethylmethacrylate (PMMA) resin is the most widely used material for the construction of removable prostheses and for interim fixed restoration. The advantages include low cost, ease of manipulation, adequate physical and mechanical properties and disadvantages include poor colour stability and abrasion(Berger et al., 2006)(Berger et al., 2006; Palaskar, Mittal and Singh, 2013; Gungor, Gundogdu and Duymus, 2014).

CAD/CAM technology has multiple prosthetic applications including the fabrication of intra-coronal and extra-coronal restorations, crowns, fixed partial dentures and more recently, the construction of complete denture and maxillofacial prostheses. CAD/CAM allows the use of novel materials with improved characteristics but it is crucial to understand and assess the mechanical properties of these newer materials(van Noort, 2012).With advancement in digital dentistry, PMMA based polymer blocks are replacing the conventional method of using acrylic resin for the fabrication of interim crowns(Alp, Murat and Yilmaz, 2019)

The aesthetic outcome is an important factor for anterior restorations. The colour stability should be adequate to the patient's expectation and satisfaction(Heydecke et al., 2003; Sahin et al., 2016). Hence it is essential to understand the colour stability of different materials in order to obtain the best treatment outcome for the patient. A Spectrophotometer is used to analyse the colour stability of different materials. It is a scientific standardized colorimetric equipment for matching and measuring colors that gives information about the reflectance curve as a function of wavelengths in the entire visible range and thus numerically specifies the perceived color of an object. CIELAB color coordinates system is a very useful mode that provides information about location of object color in a uniform 3-dimensional color space. It quantifies the color in terms of three coordinate values L*, a*and b*. Here L* represents brightness or lightness (value) and a* and b* serve as numeric correlates both for hue and chroma.(Hong et al., 2009).

Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about the colour stability of the heat polymerized resin interim restoration and CAD CAM milled interim restoration.

MATERIAL AND METHODS

A total of 16 samples are fabricated for the study. These samples are divided into two groups. Group 1 Heat polymerized resin interim restoration (Fig 1) Group 2 CAD-CAM milled resin interim restoration (Fig2) The samples are fabricated after virtual designing using the CAD software(3Shape- Trios). This technique is followed to have seven thicknesses and form. The virtual design is directly converted into CAD CAM Interim restoration by direct milling (I-Core, Germany). For heat polymerized resin interim restoration, the virtual design is milled with pattern resin and the pattern resin is converted into heat polymerized resin interim restoration. The pretest absorbance ΔE values are measured using the spectrophotometer (VITA easyshade V) (fig 3A and 3B)

Figure 1: Heat cure interim samples

Figure 2: CAD-CAM interim samples

Figure 3. (A): Pre-test absorbance ΔE value for heat- cured provisional

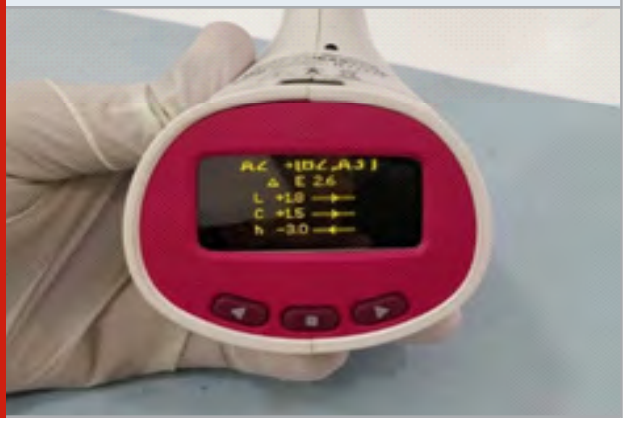


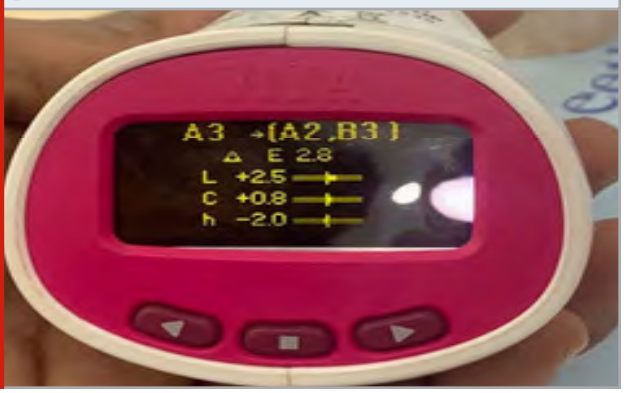
Figure 3 (B): Pre-test absorbance ΔE value for CAD-CAM provisional

Figure 4: Toothbrush simulator with samples.

The samples are made to run in a toothbrush simulator for 24 hrs continuously with coloured toothpaste (Fig 4). Toothbrush simulator is a device used for the simulation of tooth-cleaning processes by commercially available toothbrushes. The toothbrushes used for the study are with medium graded bristles. The tooth brushing machine included eight holders for toothbrushes. Each toothbrush worked on 1 specimen. The holders for the toothbrushes are customized for the toothbrush handle to hold the toothbrush in place. The specimens are mounted with standardized key lock fixations. The bristles of the toothbrush are aligned without pressure perpendicularly contacting the specimen surface. After 24hrs, the specimens are retrieved from the tooth brush simulator and the posttest measurement of its absorbance are recorded using the spectrophotometer and ΔE values measured. (Fig 5A and 5B)

Figure 5 (A): Post-test absorbance ΔE value for Heat-cured provisional

Figure 5 (B): Post-test absorbance ΔE value for CAD-CAM provisional



RESULTS

Conventional heat cure based PMMA interim restorations in the present study showed significantly higher colour change as compared to PMMA-based CAD/CAM interim restorations. Statistical analysis with one way anova test using SPSS software is done to obtain results. From (figure 6), it is seen that the average ΔE value in heat cure provisional shows a large difference in each sample. Sample 2 and 6 had the highest difference with ΔE values 3.7 and 3.4 followed by sample 7 with ΔE value of 2.7 respectively. However the average ΔE value in CAD-CAM provisional showed small differences in all 8 CAD-CAM samples with values ranging between 0.2- 0.7 as shown in (figure 7). Table 1 shows one way ANOVA test done which is statistically significant with $p<0.001$. This is due to increased wear resistance of CAD-CAM interim restoration and optimal condition during which polymerization of CAD/CAM materials takes place,

therefore resulting in improved monomer-to-polymer conversion rate in addition to low polymerization shrinkages.

Figure 6: Bar chart showing the pre treatment, post treatment and ΔE value values of heat cure provisional restorations in 8 samples. X axis represents the heat cure restoration samples and Y axis represents the mean value. Blue denotes pretreatment values, red denotes post treatment values and green denotes ΔE value. Heat cure provisional samples show larger differences in ΔE values One way ANOVA test is done and p<0.001

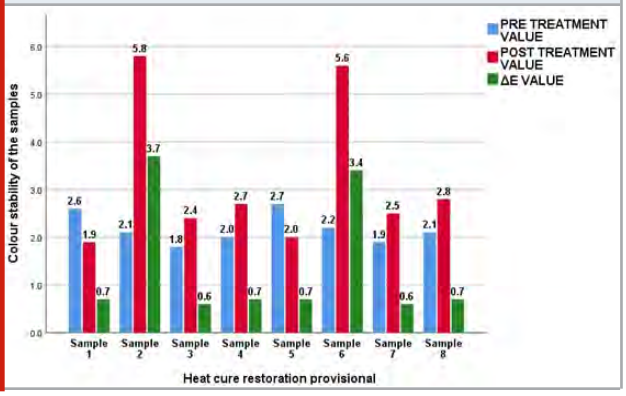
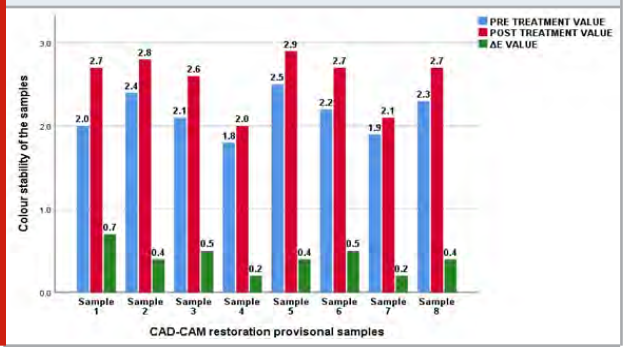


Figure 7: Bar chart showing the pre treatment, post treatment and ΔE value values of CAD-CAM provisional restorations in 8 samples. X axis represents the CAD-CAM restoration samples and Y axis represents the mean value. Blue denotes pretreatment values, red denotes post treatment values and green denotes ΔE value. The CAD-CAM sample shows a lesser difference in ΔE value in each of the samples. One way ANOVA test is done and p<0.001.



DISCUSSION

In long term provisional restorations especially in the anterior region, aesthetics is the main concern. To obtain optimal aesthetics, size, shape, colour of the restoration is at-most important. Size and shape of the restorations are in the hands of the dental technicians. But colour and colour stability is one of the major issues in anterior restorations. The colour stability of the restorations can be affected by several factors like surface roughness, absorption of fluids, accumulation of stains, dissolution, erosion by beverages, and degradation of the material(Goiato et al., 2013; Moon, Powers and Kiat-amnuay, 2014)

Colour assessment can be done either by visual examination using shade guides or by using spectrophotometry. This visual examination is subjective to physiological and psychological factors based on the surrounding light. Spectrometry eliminates the subjective evaluation and the surrounding light will not affect the true value of colour (Moon, Powers and Kiat-amnuay, 2014), Colour changes in the restoration denotes the ageing or damage to the material used(Waliszewski, 2005; Oguz et al., 2007; Goiato et al., 2010). CAD-CAM blanks have less residual monomer, improved optical properties when compared to conventional heat cured resin(Güth and Dent, 2012; Güth et al., 2012). In this study, CAD/CAM PMMA resins are compared with a heat cure resin by running it through a brushing simulator. The colour change is determined for all long term provisional restoration as they increase over time. There are intrinsic and extrinsic factors that can cause discolouration of restoration as well(Zuo et al., 2016).

CAD/CAM long term provisional restorations have better colour stability, less porosities, mechanical properties, and fit than the conventional provisional restorations(Yao et al., 2014; Rayyan et al., 2015) The average brushing period of an individual is around 5 minutes per day. In this study, the abrasion is done using a brushing stimulator continuously for 24 hrs. Using the spectrophotometry the colour stability is evaluated after the estimated period of 9 months. The results state that the CAD-CAM provisional has more colour stability than conventional heat-cured provisional even after the usage of 9 months.

CONCLUSION

The present study concludes that CAD-CAM long term provisional restorations have better colour stability than the conventional heat-cured provisional restorations. CAD-CAM provisional restoration gives better mechanical properties, more aesthetic appeal that ultimately gives a better patient satisfaction.

Conflict of Interest: There were no conflicts of interest as declared by the authors.

ACKNOWLEDGEMENTS

The authors thank everyone who enabled us to carry out this study.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-127-130

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Efficacy of 6% Sodium Hypochlorite and 2% Glutaraldehyde in Decontamination Of Surgical Instruments: an in-Use Assay

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ABSTRACT

Soiled surgical instruments are always carrying the risk of transmitting the infection while handling and cleaning. As per the CDC and ADA recommendation, decontamination is essential to avoid the risk of transmission of blood borne pathogens. Two chemicals are universally accepted for this purpose, 6% sodium hypochlorite and 2% glutaraldehyde. This study is done to find out the efficacy of these two disinfectants in decontaminating the blood stained instruments. Two sets of samples are collected. One set from the discarding jar that contains 6% sodium hypochlorite and the other set from the jar containing 2% glutaraldehyde. 10 samples from hypo were collected and 3 samples from the glutaraldehyde are collected so far. The samples were transported to the microbiology laboratory and processed. Exposure time for hypo is 30 mins and for glutaraldehyde it is 2 hours (CDC recommendation). The collected samples were processed without any time delay. 20µl of the sample was transferred to BHI agar and incubated for 24 hrs at 37°C aerobically. After the incubation, the total CFU were calculated and tabulated. It is concluded that 2% glutaraldehyde shows best results compared to that of 6% sodium hypochlorite solution in decontamination of soiled surgical instruments. Though both the chemical solutions are universally accepted for decontamination of soiled surgical instruments. The aim of study is to evaluate the effect of decontamination of surgical instruments with 6% sodium hypochlorite in comparison with 2% glutaraldehyde.

KEY WORDS: SODIUM HYPOCHLORITE, GLUTARALDEHYDE, SURGICAL INSTRUMENTS, DECONTAMINATION, DISINFECTANTS.

INTRODUCTION

Sodium hypochlorite (NaOCI) is the most widely used disinfectant in the medical field despite the increasing availability of other disinfectants (Mekonnen et al., 2015). Sodium hypochlorite is considered as the ideal disinfectant and it has an excellent cleaning action. It is considered to be the effective disinfectant on surgical instruments (Fukuzaki, 2006). Sodium hypochlorite disinfection processes majorly depend on the concentration of the chlorine and the pH of the solution (Vianna et al., 2004). Despite being one of the most traditional disinfectants, hypochlorite remains studied and compared with other technologies and products. It was presented that hypochlorite showed superior action or equivalence to most other products with broad microbicidal action, including spores, and progressive action as longer exposure time and concentration, especially those related

ARTICLE INFORMATION

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Received 7th Aug 2020 Accepted after revision 25th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/124*

to HAIs transmission (Health care associated Infections) (Pereira et al., 2015).

There are various agents for sterilizing dental instruments like dry heat, steam, chemicals etc. They are also widely used for decontamination of soiled surgical instruments (Rani and Others, 2016). Safe and effective decontamination procedures must be carried out before instruments are put into the appropriate equipment for sterilization. These procedures should be performed to remove gross contamination by blood, saliva and dental materials that harbor microorganisms and impair the sterilization process. In addition, the method of handling, concentrations of blood packaging and wrapping instruments during decontamination and sterilization also has become significant due to recent concerns regarding the transmission of blood borne disease (Sanchez and Macdonald, 1995; Ashwin and Muralidharan, 2015). The use of 2% glutaraldehyde in an automated machine system to decontaminate endoscopes is well established disinfection. This is considered universally for decontamination of instruments and for sterilization (Corcoran, Holton and Ridgway, 1994). Compared to hypo solution , 2% glutaraldehyde is showing better activity in decontaminating surgical instruments according to this study.

Soiled surgical instruments are always carrying the risk of transmitting the infection while handling and cleaning. As per the CDC and ADA recommendation, decontamination is essential to avoid the risk of transmission of blood borne pathogens (Cardoso et al., 1999). Previous studies have indicated that alkaline 2% glutaraldehyde was considered as an adequate sterilizing medium for medical and surgical instruments. Two chemicals are universally accepted for this purpose, 6% sodium hypochlorite and 2% glutaraldehyde. Sodium Hypochlorite has some antimicrobial activity in endodontic practice in decontamination especially 6% Sodium hypochlorite as recommended by ADA. It has resistant bacterial spores. In dentistry, sterilization of gutta percha is done with 0.5 to 4% hypo (Ozalp, Okte and Ozcelik, 2006; Renuka and Muralidharan, 2017). This study has been done to find out the efficacy of these two disinfectants in decontaminating the blood stained instruments.

According to some research, 2% glutaraldehyde is not capable of disinfecting gutta percha even after 15 mins. It should be kept for 8 to 10 hours for disinfection. Also a low percentage of NaOCl is effective in decontaminating gutta percha. High percentage may lead to damage in periapical tissues (Paiva et al., 2013; Shahana and Muralidharan, 2016). Instruments Scientific articles and increased publicity about the potential for transmitting infectious agents in dentistry have focused attention on dental instruments as possible agents for pathogen transmission. According to the research by American Dental Association, surgical and other medical instruments which penetrate soft tissues or bones are classified as critical devices that should be sterilized after each use or simply discarded.

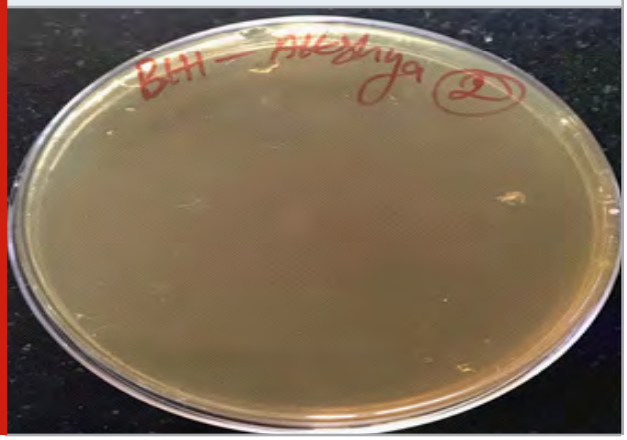
Some instruments are not intended to penetrate soft tissues or bone in the oral cavity (e.g., amalgam condensers, and air/water syringes) but that could contact oral tissues are classified as semicritical, but sterilization after each use is recommended if the instruments are heat-tolerant (Rutala and Weber, 2008). The basis of antimicrobial activity, Asporin (2% alkaline glutaraldehyde) should be recommended for chemical sterilization or high level disinfection of dental instruments and if only disinfection is required, Virkon may be a possible alternative, even if used with a higher exposure time (Angelillo et al., 1998).

In this study, we compared the efficiency of decontamination of surgical instruments with two solutions 6% Sodium hypochlorite and 2% Glutaraldehyde. It is tested against bacterial colonies and counted accordingly. Some research studies have concluded that 2% alkaline glutaraldehyde shows more efficacy in decontamination. These solutions have been considered universally by CDC and ADA.

MATERIAL AND METHODS

Two sets of samples are collected. One set from the discarding jar that contains 6% sodium hypochlorite and the other set from the jar containing 2% glutaraldehyde. 10 samples from hypo were collected and 10 samples from the glutaraldehyde are collected. The samples were transported to the microbiology laboratory and processed. Exposure time for hypo is 30 mins and for glutaraldehyde it is 2 hours (ADA recommendation). The collected samples were processed without any time delay. 20µl of the sample was transferred to BHI agar and incubated for 24 hrs at 37°C aerobically. After the incubation, the total CFU were calculated and tabulated.

Figure 1: Plate showing nil growth by decontamination with 2% glutaraldehyde solution



RESULTS AND DISCUSSION

The obtained results for this study are shown in table 1 and in figure 1, 2 and 3. Thus the tabulated results (Table 1) shows the comparison of 6% sodium

hypochlorite and 2% glutaraldehyde in decontamination of surgical instruments. Bar graph included in this study (Figure 3) depicts the number of bacterial colonies found in comparing 6% sodium hypochlorite with 2% glutaraldehyde in decontamination of surgical instruments.

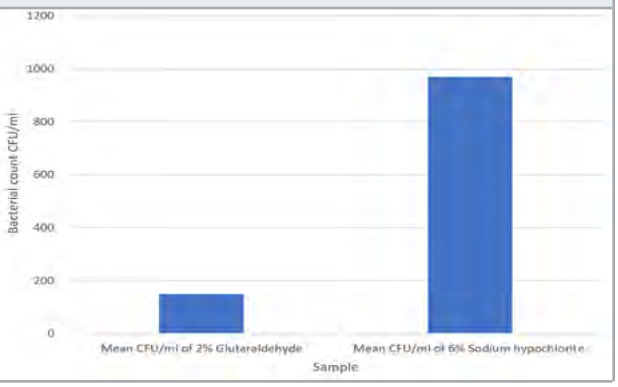
Figure 2: Plate showing growth with decontamination of 6% sodium hypochlorite for solution in an agar plate

Table 1. Shows the comparison of decontamination of surgical instruments with 6% sodium hypochlorite and 2% glutaraldehyde in CFU/ml. It is clear that the amount of bacterial colonies reduced more in 2% glutaraldehyde than 6% sodium hypochlorite solution.

Sample	6% Sodium hypochlorite	2% Glutaraldehyde
1	3800	100
2	100	0
3	850	100
4	400	100
5	200	100
6	350	200
7	850	0
8	2400	200
9	400	300
10	350	100
	Mean : 970	Mean : 150

Previous study concluded that among the disinfectants 0.5% Sodium hypochlorite and 2% glutaraldehyde are considered as effective spray disinfectant on irreversible hydrocolloid impression material. It is suggested that they are effective against gram positive and gram negative organisms (Dandakery et al., 2003). Efficacy of cidex plus 3.2% glutaraldehyde solution has been evaluated for the disinfection of fiberoptic endoscopes. It is said that it has greater antimicrobial property against bacterial spores, vegetative organisms, mycobacterium and fungi. It is concluded that it is more effective that 2% glutaraldehyde (Akamatsu et al., 1997). 2% glutaraldehyde has greater efficacy as disinfectant in arthroscopy and its procedures. It has been estimated that 2 percent glutaraldehyde is effective as a disinfecting agent when used for twenty minutes of cold soaking of metal and glass arthroscopic surgical instruments (Johnson et al., 1982). Thus it has been concluded that 2% glutaraldehyde is more effective in decontamination of surgical instruments than 6% sodium hypochlorite.

Figure 3: Bar Graph showing the comparison of mean CFU of 6% sodium hypochlorite and 2% glutaraldehyde solution in decontamination of surgical instruments. X axis represents the mean CFU of the samples collected and Y axis represents the bacterial count. It is concluded that 6% of sodium hypochlorite (Blue) shows more bacterial count than 2% glutaraldehyde (Orange) solution in decontamination of surgical instruments.



CONCLUSION

Surgical instruments are used in dental clinics, hospitals etc. Most of the recorded concentration shows that there is a vast difference seen between 6% sodium hypochlorite and 2% glutaraldehyde solution. It is seen that 2% glutaraldehyde shows best results compared to that of 6% sodium hypochlorite solution in decontamination of soiled surgical instruments. Though both the chemical solutions are universally accepted for decontamination of soiled surgical instruments.

ACKNOWLEDGEMENTS

We thank saveetha dental college for the support to conduct the research study.

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-131-136

BBRC
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Knowledge and Awareness About Oral Lesions in HIV Patients Among Dental Students

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ABSTRACT

Infection with Human Immunodeficiency Virus Type 1 (HIV-1) and the resultant Acquired Immune Deficiency Syndrome (AIDS) is a major public health challenge in modern times. The oral health care setting has become a helpful environment for the early detection of HIV infection because most of its lesions present orally during the first stages of the disease. The aim of the study is to assess knowledge and awareness about oral lesions in HIV patients among dental students. It is an online based questionnaire study in which 10 questions were circulated through an online forum through google forms and results were analysed using SPSS. In this study nearly 78% of the dental students are aware that HIV patients can be suspected from oral lesion and about 78% of the dental students are aware that pseudomembranous candidiasis is the common oral manifestation seen in HIV patients and 89% of the students are aware that oral examination is an essential component for early diagnosis of HIV. Nearly 78% of the dental students are aware of oral lesions in HIV patients and still 22% of them are unaware of the oral lesions. Hence, it is important to create awareness among dental students.

KEY WORDS: ORAL LESIONS, CANDIDIASIS, HIV, AIDS, LYMPHOCYTES.

INTRODUCTION

Human immunodeficiency virus (HIV) was discovered in 1981 since then an epidemic infection has been spread all over the world. HIV is the virus that causes AIDS. HIV attacks the CD4 positive T cells, destroys the immune system. The acquired immunodeficiency syndrome (AIDS) is the end stage of HIV infection. The management of AIDS is based on monitoring the disease progression and involves the administration of antiretroviral drugs. The health care workers are at high risk of disease transmission through body fluids. Some infectious diseases have extended incubation periods or window periods during which antibodies cannot be detected(Alanazi and Alharbi, 2019). It may take 10 to 15 years for an HIV positive person to develop AIDS. According to the CDC guidelines every patient is considered to be infected with a blood borne pathogen irrespective of the known serostatus of the same('Corrections: Guideline for Infection Control in Healthcare Personnel, 1998', 1998).

Infection can occur during exposure of the blood of an infected patient through needle sticks or splash to exposed mucous membranes. Invasive oral procedures more involve contact with blood and saliva that may contain HIV(Erasmus, Luiters and Brijlal, 2005). Dental health care situations implement specific strategies to prevent the disease transmission among oral health care workers, and from patient to patient(Ogunbodede,

ARTICLE INFORMATION

*Corresponding Author: mebingeorgem.sdc@saveetha.com
Received 30th July 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/125

Folayan and Adedigba, 2005). Health care workers should have satisfactory knowledge about HIV/AIDS and their behavior should be proper to take care of such patients(Singh et al., 2017).

Many oral lesions have strong association with HIV infection. Along with the HIV infected individuals T helper cell count, they show the severity of immunosuppression. It is important for dental professionals to identify these lesions early and allow them to receive appropriate treatment for their HIV infection and related oral infection(Jones, 1994).

Dental expertise is necessary for proper management of oral manifestations of HIV infection, but many patients do not receive proper dental care. Common HIV related oral conditions include xerostomia, candidiasis, oral hairy leukoplakia, periodontal diseases such as linear gingival erythema and necrotizing ulcerative periodontitis, Kaposi's sarcoma, human papillomavirus associated warts, and ulcerative conditions including herpes simplex virus lesions, recurrent aphthous ulcers, and neutropenic ulcers(Cecaro, 2015).

Oral lesions can be associated with acute pain, difficulty to swallow, difficulty in eating. They may also change facial appearance. In immunocompromised patients Candida species can create a variety of oral lesions such as localized and disseminated candidiasis(Moniaci et al., 1990; Kolokotronis et al., 1994). Oral candidiasis is the most common feature of AIDS in the mouth, with a prevalence of 70% to 90%(Berberi, Noujeim and Aoun, 2015). Hairy leukoplakia, non-Hodgkin's lymphoma, and Kaposi's sarcoma have a strong association with HIV infection and are denoted as AIDS defining conditions(Holmes and Stephen, 2002; Ramírez-Amador et al., 2003; Berberi and Noujeim, 2015). In some cases, enlargement of the parotid glands and adenopathy can be observed during head and neck examination of HIV infected patients(Vigneswaran and Williams, 2014; Bunn and van Heerden, 2015). The aim of the study is to assess knowledge and awareness about oral lesions in HIV patients among dental students.

MATERIAL AND METHODS

The study was initiated after receiving ethical approval from the scientific review board of Saveetha Dental College and Hospitals I.t is a descriptive cross sectional study it consisting of 10 questions which was circulated among 100 population of dental students in chennai and the responses was collected through google forms and the data was analysed statistically and the result was obtained. Analysis software used was SPSS version 23. An online platform known as google forms was used. The questionnaire was uploaded on this site and the data was verified by an external viewer. Data was reported to excel and later exported to SPSS for analysis. The results were analysed and the responses were tabulated in the form of bar charts.

Figure 1: Bar chart depicting the awareness about oral manifestation in HIV of the participants. Shows 78% of them were aware that HIV patients can be suspected from oral manifestations and 22% of them were unaware of it.

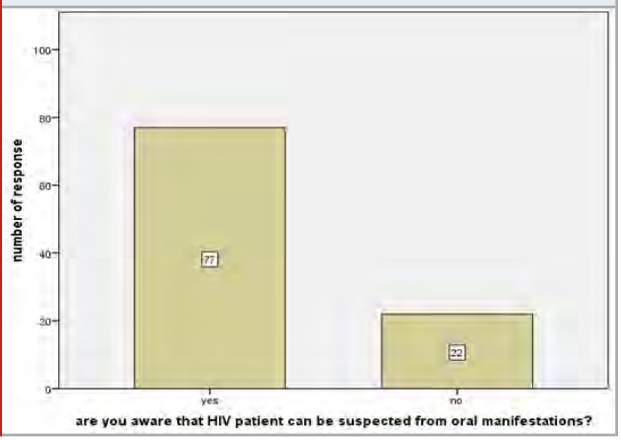
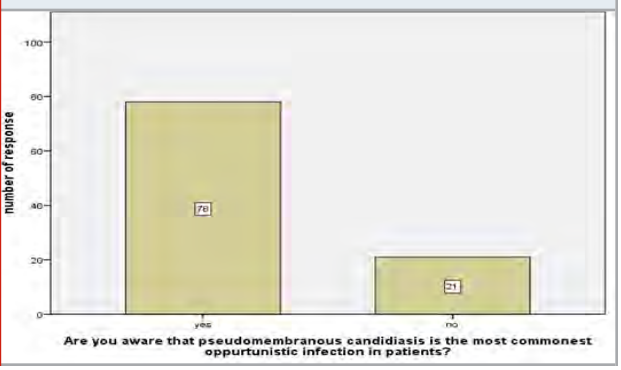


Figure 2: Bar chart depicting the awareness about common common opportunistic infection in HIV of the participants. Shows 78.7% of the students are aware that pseudomembranous candidiasis is the most common opportunistic infection seen in HIV patients and 21% of them were unaware of it.



RESULTS AND DISCUSSION

By the results tabulated, it is seen that the level of awareness and knowledge about oral lesions in HIV patients among dental students is good. In this study the participants were 57.5% of them were undergraduates and 42% of them were postgraduates. Nearly 78% of them were aware that HIV patients can be suspected from oral manifestations and 22% of them were unaware of it (figure 1). About 78.7% of the students are aware that pseudomembranous candidiasis is the most common opportunistic infection seen in HIV patients and 21% of them were unaware of it (figure 2). In this study 83.8% of them are aware about periodontal diseases associated with HIV and 16% of them are not aware of it. In this study 72.7% of the students say tongue, 9% of them say buccal mucosa, 5.5% of them say floor of the mouth, is the most commonly affected site for pseudomembranous candidiasis. In this study 83% of the students are aware

that destruction of CD4 lymphocytes causes oral lesions in HIV patients, 16% of them were unaware of it (figure 3). About 73.7% of the students say Kaposi Sarcoma, Non Hodgkin lymphoma, Hairy leukoplakia are the other oral lesions seen in HIV patients (figure 4).

Figure 3: Bar chart depicting the awareness about cause of oral lesions in HIV of the participants. Shows 83% of the students are aware that destruction of CD4 lymphocytes causes oral lesions in HIV patients, 16% of them were unaware of it.

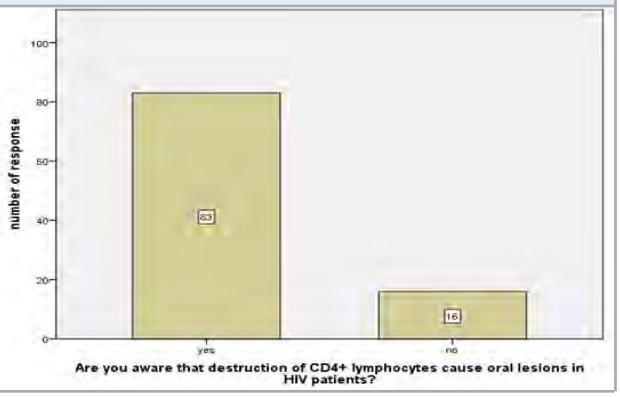
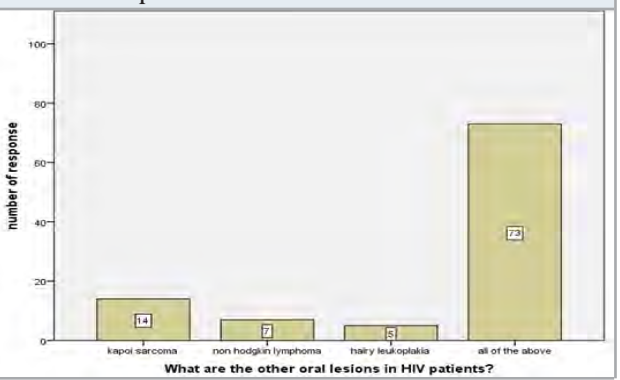


Figure 4: Bar chart depicting the distribution of response of the participants about oral lesions in HIV patients. 73.7% of the students say Kaposi Sarcoma, Non Hodgkin lymphoma, Hairy leukoplakia are the other oral lesions seen in HIV patients.



In this study 87.8% are aware that oral pseudomembranous candidiasis can represent in different clinical presentations and 12% of them were unaware of it. In this study 85.8% of students were aware about the treatment measure for candidiasis and 14% of them were unaware of it. In this study 89% of the students are aware that oral examination is an essential component for early diagnosis of HIV (figure 5). Undergraduates are more aware than postgraduate students about the diagnosis of HIV from oral manifestation (figure 6). Undergraduates are more aware than postgraduate students about the most common opportunistic oral infection in HIV patients (figure 7). Postgraduates and undergraduates said that Kaposi sarcoma, non Hodgkin lymphoma and hairy leukoplakia are that lesion commonly seen in HIV patients (figure 8). Undergraduate students are more aware than postgraduates about the importance of oral examination in early diagnosis of AIDS (figure 9).

Figure 5: Bar chart depicting the awareness about importance of oral examination in early diagnosis of AIDS. Shows 89% of the students are aware that oral examination is an essential component for early diagnosis of HIV and 10% of them were unaware of it.

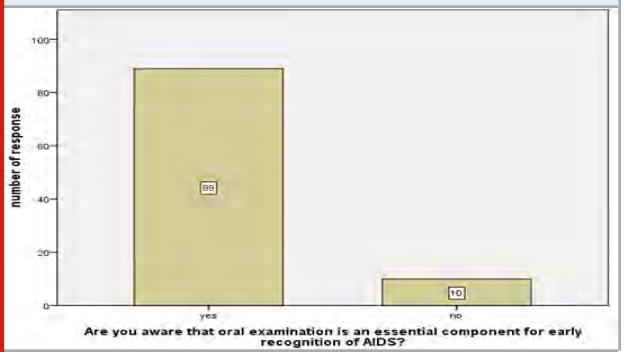
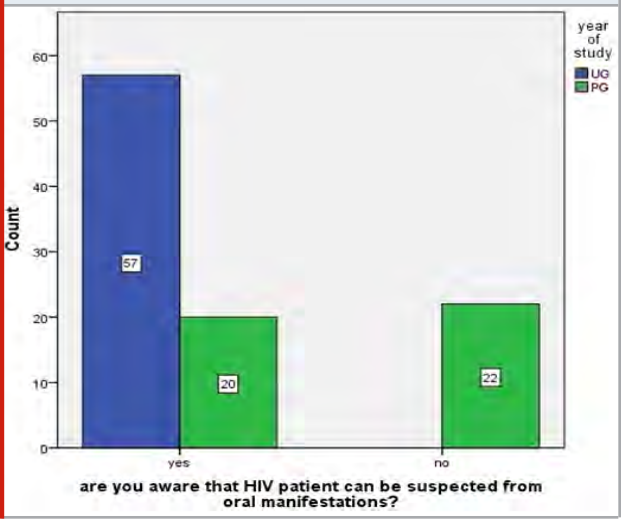


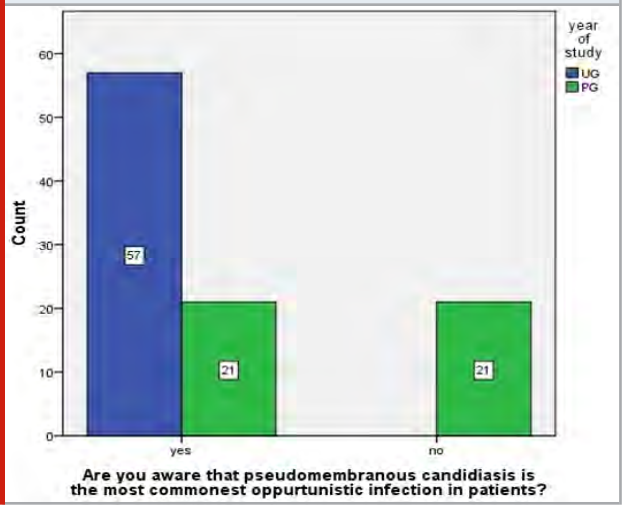
Figure 6: Bar chart represents the association of awareness of diagnosis of HIV from oral manifestation and year of study. Where the blue colour denotes undergraduates, green colour postgraduates The X axis represents the question "Are you aware that HIV patients can be suspected from oral manifestation?" and the Y axis represents the year of study. Undergraduates are more aware than postgraduate students about the diagnosis of HIV from oral manifestation. Pearson chi square value = 38.388, p=0.00<0.05, significant association.



Based on the results tabulated it is seen that dental students have good knowledge regarding oral lesions in HIV patients. In this study about 78% of the dental students are aware that HIV infection can be suspected from oral lesions. Less than half (42.6%) of the respondents had good knowledge, a finding far lower than the 72.7% reported in a study(Singh et al., 2017) and also about 82.1% were reported in(Sadeghi and Hakimi, 2009). Oral candidiasis, Kaposi Sarcoma and periodontal disease are the three most commonly

associated oral lesions by respondents in this study, finding similar to this study reported Kaposi's sarcoma, oral candidiasis and hairy leukoplakia, are three of the most common oral lesions in HIV patients (Lorosa et al., 2019) and another study that reported that most dental students were aware of the association of hairy leukoplakia, oral Kaposi's sarcoma, oral candidiasis and thrush are the clinical variant associated with HIV infection(M et al., 2015).

Figure 7: Bar chart represents the association of awareness of most common opportunistic oral infection in HIV patients and year of study. Where the blue colour denotes undergraduates, green colour postgraduates The X axis represents the question "Are you aware that pseudomembranous candidiasis is the most commonest opportunistic infection in patients?" and the Y axis represents the year of study. Undergraduates are more aware than postgraduate students about the most common opportunistic oral infection in HIV patients. Pearson chi square value = 36.173, p=0.00<0.05, significant association.



Participants are aware of different types of oral manifestations such as oral candidiasis, while their knowledge of the management of specific oral manifestations and the problems associated with oral manifestations was more limited(Kahabuka et al., 2007). Most participants (58.5%) were aware of predispositions towards the occurrence of oral lesions such as oral candidiasis (60.0%) in HIV and most of these (72.0%) are aware that these lesions are curable(Mwangosi, Ibrahim E A and Tillya, 2012). Some of these lesions may have a predictive value, warning of a progression from HIV seropositivity to clinically manifest as AIDS. They are often indicators for immune suppression and can be used for early diagnosis and management of patients with AIDS(Agbelusi and Wright, 2005; Arendorf et al., 2007). Oral lesions in HIV may also serve as markers for immune system destruction and disease progression and may also indicate poor prognosis(Adurogbangba et al., 2004).

Figure 8: Bar chart represents the association of oral lesion in HIV patients and year of study. Where the blue colour denotes undergraduates, green colour postgraduates The X axis represents the question "what are the other oral lesions in HIV patients?" and the Y axis represents the year of study. Postgraduates and undergraduates said that Kaposi sarcoma, non Hodgkin lymphoma and hairy leukoplakia are that lesion commonly seen in HIV patients. Pearson chi square value = 25.981, p=0.00<0.05, significant association.

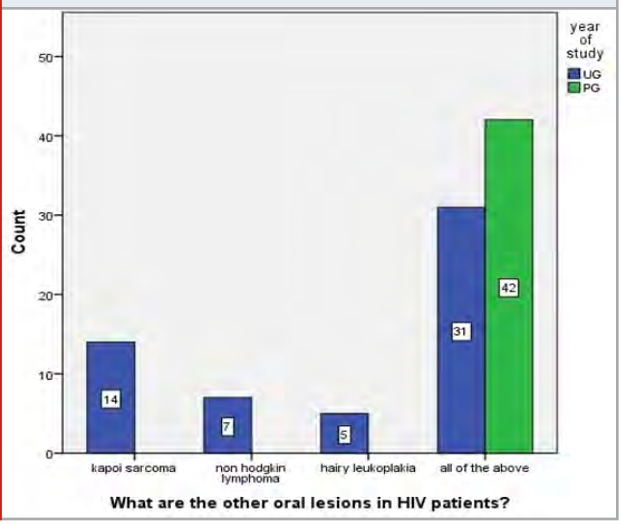
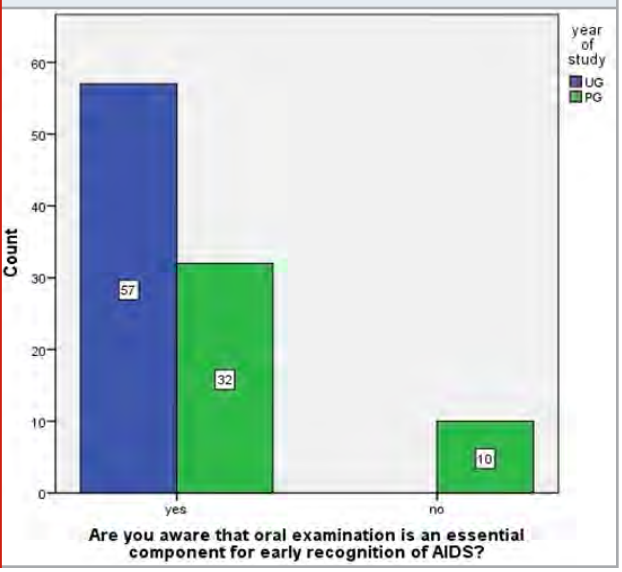


Figure 9: Bar chart represents the association of awareness about the importance of oral examination in early diagnosis of AIDS and year of study. Where the blue colour denotes undergraduates, green colour postgraduates The X axis represents the question "Are you aware that oral examination is an essential component for early recognition of AIDS?" and the Y axis represents the year of study. Undergraduate students are more aware than postgraduates about the importance of oral examination in early diagnosis of AIDS. Pearson chi square value = 15.096, p=0.00<0.05, significant association.



There was a much lower level of knowledge of awareness of the association of facial palsy, drug reactions, trigeminal neuralgia, thrombocytopenic purpura, and salivary gland disease with HIV infection. A finding similar to a previous study where there was a much lower level of knowledge of erythematous candidiasis, HIV associated salivary gland disease, oral melanotic hyperpigmentation and idiopathic thrombocytopenic purpura(Lorosa et al., 2019). However, students needed a broader knowledge of lesions strongly associated with HIV. Students should also be educated that even the lesions strongly associated with HIV are not exclusive to HIV. Kaposi's sarcoma, oral candidiasis, and hairy leukoplakia may also be seen in patients not infected with HIV.

The limitations of studies using cross-sectional data such as in our study are that it measures HIV knowledge and attitude towards oral lesions in HIV patients at only one point in time. This knowledge and attitude may evolve with changes or exposure to HIV related information and new situations. We have not analysed other factors which can influence the knowledge and attitude such as years of experience in clinics. Further longitudinal studies need to be carried out to address these limitations with larger sample sizes.

CONCLUSION

Within the limits of our study, , Nearly 78% of the dental students are aware of oral lesions in HIV patients and still 22% of them are unaware of the oral lesions. 89% of the students are aware that oral examination is an essential component for early diagnosis of HIV. Future dentists having good knowledge of HIV will be able to do prompt adequate diagnostic investigations for confirmation. Furthermore, this will enable proper recognition and accurate diagnosis of the oral lesions as well as early treatment with ultimate reduction in mortality of the HIV infected patient.

ACKNOWLEDGEMENTS

Nil.

Conflict of Interest: None Declared.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-137-143

BBRC
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Research Communications

Relationship Between Sociodemographic Factors and Oral Cancer Awareness Among Outpatients in Chennai- A Hospital Based Study

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ABSTRACT

Oral cancer is a preventable disease and cessation of cancer causing habits like smoking, alcohol consumption and smokeless tobacco significantly reduces the risk of development within 5-10 years. Early detection of small cancers of certain sites such as tip of tongue and lip results in better prognosis. To assess the relationship between sociodemographic factors and oral cancer awareness - a hospital based study. The survey consisted of 300 patients who accompanied to Saveetha Dental College, Chennai. The questionnaire included 3 sets of questions along with sociodemographic factors such as age, gender, education, marital status and occupation. The first set consists of 5 questions (general awareness). The second set consists of 6 questions (knowledge of symptoms). The third set consists of 4 questions (knowledge of risk factors). A total of 300 participants participated in the study comprising 65% males and 35% females. A significant difference was noted in general awareness level, knowledge of symptoms and knowledge of risk factors with respect to age, gender, occupation, education, and marital status (P <0.05). Within the limitations of this study, among the different age groups, 18-30 age group; across gender, male participants; participants with single marital status; among the different education level, graduates and employed people among different occupational status were found to have high level of general awareness, knowledge of symptoms and knowledge of risk factors of oral cancer. Therefore it is evident that the sociodemographic factors do play a vital role in oral cancer awareness and was significantly related to the awareness level and knowledge of symptoms and risk factors.

KEY WORDS: ORAL CANCER, AWARENESS, SOCIODEMOGRAPHIC FACTORS, SYMPTOMS, RISK FACTORS.

INTRODUCTION

In India, carcinoma of oral cavity accounts for 200,000 deaths annually worldwide approximately and particularly in India it is 46,000 (Agrawal et al., 2012). There is evidence that oral cancer is less common in the developed ones when compared to the developing countries in which it is more common. Cancer is the most common cause of mortality and morbidity in the developing and the developed countries and is a menace to public health (Formosa et al., 2015). Due to cultural, ethnic, and geographic factors and the popularity of addictive habits, oral cancer frequency is high in India. In terms of incidence among men and third among women, it ranks number one. A smokeless tobacco product called gutka is extremely popular in India (Ariyawardana et al., 2007). It renders the population and the youth especially to a higher risk of developing oral submucous fibrosis which is a premalignant disease. It results in an increased

ARTICLE INFORMATION

*Corresponding Author: leelavathi.sdc@saveetha.com
Received 3rd Aug 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/126

incidence of oral cancer in younger patients (Elango, Iyer and Kuriakose, 2009).

Smoking, alcohol use, human papillomavirus infections, smokeless tobacco products, with alcohol and smoking having synergistic effects are the risk factors to develop oral cancer. The risk factors to develop oral cancer burden differs across various regions. In India, betel quid with or without tobacco and smokeless tobacco products are the greater risk factors for oral cavity cancer. Betel leaves (leaves of betel vine), areca nut, lime and tobacco are the main ingredients of betel quids (Mudur, 2005). When compared to non-tobacco users, the tobacco users have the risk of developing oral cancer 10-20 times higher than the non-tobacco users (Horowitz, Canto and Child, 2002). The risk of oral cancer increases with the increase of duration of betel chewing and the frequency. It is a disease which can be prevented with cessation of cancer causing habits and significantly reduces the risk of disease development within 5-10 years (Scott, McGurk and Grunfeld, 2008).

Additional risk factors include poor nutrition, especially iron, vitamin A and C deficiency and excessive consumption of alcohol. The prognosis of the affected people have not improved over the years, in spite of the numerous advances which have taken place related to cancer therapy and rehabilitation (Pancharethinam et al., 2016). However, the history of risk factors, signs and symptoms of oral cancer and pre-cancer provides some encouragement that early detection and management of small cancers results in better prognosis (Rogers, Hunter and Lowe, 2011). Patients with oral cancer report to the health professionals at advanced stages, this is mainly due to the lack of awareness of signs, symptoms and risk factors of oral cancer and to associate the sociodemographic factors with the awareness level in the high risk population of south India (Lawal et al., 2012). The aim of this study is to assess the relationship between sociodemographic factors and oral cancer awareness in chennai- a hospital based study.

We have successfully completed numerous epidemiological studies for the betterment of our community (Prabakar, John, Arumugham, Kumar and Sakthi, 2018a, 2018b; Prabakar, John, Arumugham, Kumar and Srisakthi, 2018; Vishnu Prasad et al., 2018; Khatri et al., 2019; Manchery et al., 2019; Shenoy, Salam and Varghese, 2019, Sriram and Leelavathi, 2019, Murthy, Sindhu Priya Kuppusamy and Leelavathi, 2019, Shankar and Leelavathi, 2019, Patturaja, Leelavathi and Jayalakshmi, 2018). In this research we are analyzing the relationship between sociodemographic factors and oral cancer awareness in chennai.

MATERIAL AND METHODS

Study design: The survey was conducted among a random sample of 300 patients who reported to a private dental college and hospital in Chennai for routine dental examination and treatment. The study population included individuals from in and around Chennai who visited the institute. Participants of 18 years of age and above were included in the study and individuals who were diagnosed with oral cancer at any point of their lifetime were excluded from the study. An interviewer-administered questionnaire was provided to the participants.

Data collection: A structured questionnaire was prepared and the questionnaire consisted of 15 close-ended questions assessing the participant's general awareness about oral cancer, knowledge of its early signs and symptoms, and also the risk factors associated with oral cancer. It also included sociodemographic information such as age, sex, occupation, education level and marital status.

Questions and variables: First section of the questionnaire comprised five questions and it assessed the general awareness of oral cancer. The second section consisted of six questions assessing the participant's knowledge of signs and symptoms of oral cancer. The third section was to assess the knowledge of risk factors associated with oral cancer, and it consisted of four questions. Response categories for each of the questions were yes, do not know, and no and were scored as 3, 2, and 1, respectively. The participants were instructed to give only the most appropriate answer.

Data analysis: The statistical data of sociodemographic factors were given in percentage. The data was collected and analysis was done using SPSS software by IBM. Statistics analysis of this study is described in terms of mean and association of knowledge and practice with sociodemographic variables was done using one-way ANOVA test.

RESULTS AND DISCUSSION

In this study out of 300 patients(n=300), (195)65% were males and (105)35% were females. The age distribution of this study was as follows; 41% belong to 18-30 years of age, 23% belong to 31-40 years of age, 21% belong to 41-50 years of age and 15% belong to >50 years of age. In this study, 37% were illiterate, 28% were students and 35% were graduates. 33% of them were single and 67% of them were married. Occupational status of the study was as follows; 49% of them were employed, 23% of them were unemployed and 28% of them were students (Table 1).

Among the different groups of age, general awareness, knowledge of symptoms and knowledge of risk factors were more in case of people with 18-30 years of age(Figure 1). The mean value of scores of the questionnaire was significantly found higher in the youngest age group(18-30 years) and least in people greater than 50 years of age (Table 2). Males were found to have higher mean value in general awareness, knowledge of symptoms and knowledge of risk factors than the females (Figure 2).

It was significant that males had higher awareness levels than the females(Table 3). Awareness was significantly

higher among the participants who were single with a mean score of 13.2 for general awareness, 16.5 for knowledge of symptoms and 11.3 for knowledge of risk factors (Table 4) whereas it was least among the participants who were married with a mean score of 11.1 for general awareness, 15.4 for knowledge of symptoms and 10.2 for knowledge of risk factors (Figure 3). The educational level of the participants were categorised as graduates, students and illiterates (Table 5). Graduates were found to have significant increase in mean score for general awareness, knowledge of symptoms and risk factors followed by students and then illiterates (Figure 4). On account of the occupational level of the participants, employed people were found to have increased levels of awareness than students and unemployed people (Figure 5, Table 6).

Table 1. This table shows the sociodemographic data of the participants of this study.

Sociodemographic data of the participants	
Sociodemographic profile	**Percentage(No. of participants)**
Age	
18-30	41%(123)
31-40	23%(69)
41-50	21%(63)
>50	15%(45)
Gender	
Male	65%(195)
Female	35%(105)
Education	
Illiterate	37%(111)
Student	28%(84)
Graduate	35%(105)
Marital status	
Single	33%(99)
Married	67%(201)
Occupation	
Employed	49%(147)
Unemployed	23%(69)
Student	28%(84)

Table 2. This table shows the mean scores for general awareness, knowledge of symptoms, and knowledge of risk factors for different age groups (One way ANOVA test- p value< 0.05, significant).

Age groups	General awareness(out of 15)	Knowledge of symptoms(out of 18)	Knowledge of risk factors(out of 12)
18-30 years	13.5	15.9	11.1
31-40 years	12.8	15.1	10.8
41-50 years	12.2	14.4	10.2
>50 years	11.8	13.8	9.8
F value	402.2	85.40	146.5

Oral cancer is the 11th most common cancer in the world, accounting for an estimated 300,000 new cases and 145,000 deaths in 2012 and 702,000 prevalent cases over a period of five years (Bray et al., 2013). Oral cancer is one among the preventable diseases and is associated with several risk factors. But oral cancer is reported to cause high mortality rates which inturn contributes to the global cancer burden. The buccal mucosa is the most common site for oral cancer in South and Southeast Asia; in all other regions, the tongue is the most common site (Bray et al., 2015).

Figure 1: Bar graph represents the association of age and oral cancer awareness. The x-axis represents the age and y-axis represents the mean value. The blue colour represents the general awareness, green colour represents the knowledge of symptoms and ted colour represents the knowledge of risk factors. The mean value of the awareness decreases as the age of the participants increases. Analysis was done and there is a significant association of age and the oral cancer awareness (One way ANOVA test- p value< 0.05, significant).

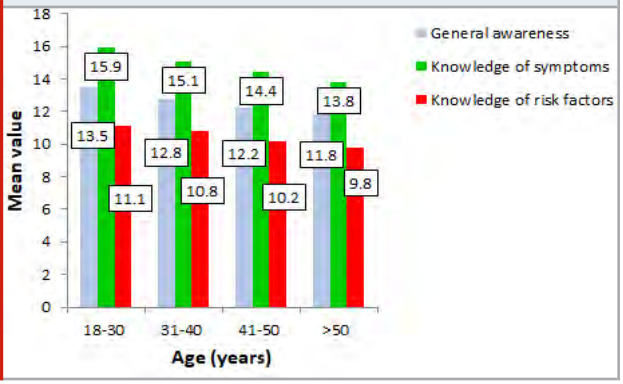

Table 3. This table shows the mean scores for general awareness, knowledge of symptoms, and knowledge of risk factors across gender (One way ANOVA test- p value< 0.05, significant).

Gender	General awareness(out of 15)	Knowledge of symptoms(out of 18)	Knowledge of risk factors(out of 12)
Male	13.2	15.1	10.2
Female	12.9	14.4	9.8
F value	411.382	55.748	199.060

Oral cancer remains the most common cancer among the male population and is the third most common cancer among women after cervical and breast cancer in India (Kavarodi, Thomas and Kannampilly, 2014). High incidence rates are seen among the subpopulations of women in Southern India because of tobacco chewing (Gupta, Ariyawardana and Johnson, 2013). Awareness and knowledge of oral cancer in a given population was related to the prognosis of the cases identified. Because the enhanced awareness on oral cancer specifically in relation to its risk factors and symptoms and in general can possibly lead to early clinical presentation of symptoms of oral cancer. The lack of knowledge of people in recognising early symptoms of oral cancer

may lead to ignoring early precancerous lesions (Villa et al., 2011).

Figure 2: Bar graph represents the association of gender and oral cancer awareness. The x-axis represents the gender and y-axis represents the mean value of awareness scores. The blue colour represents the general awareness, green colour represents the knowledge of symptoms and red colour represents the knowledge of risk factors. The mean value was found to be higher in males compared to females inferring that males were more aware about the symptoms and risk factors of oral cancer. Analysis was done and there is a significant association of gender and the oral cancer awareness (One way ANOVA test- p value< 0.05, significant).

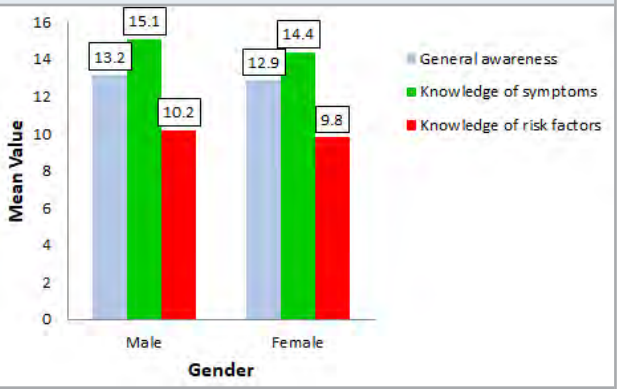

Figure 3: Bar graph represents the association of marital status of the participants and oral cancer awareness. The x-axis represents the marital status and y-axis represents the mean value. The blue colour represents the general awareness, green colour represents the knowledge of symptoms and ted colour represents the knowledge of risk factors. Awareness level was found to be high in single participants and comparatively low in married participants. Analysis was done and there is a significant association of marital status and the oral cancer awareness (One way ANOVA test- p value< 0.05, significant).

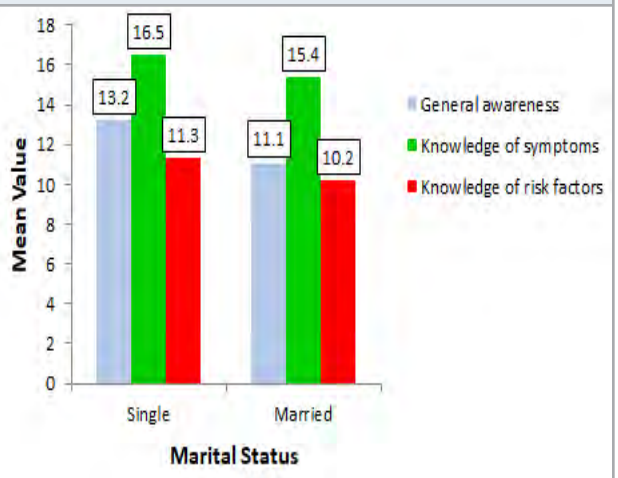

Table 4. This table shows the mean scores for general awareness, knowledge of symptoms, and knowledge of risk factors for marital status (One way ANOVA test- p value< 0.05, significant).

Marital status	General awareness(out of 15)	Knowledge of symptoms(out of 18)	Knowledge of risk factors(out of 12)
Single	13.2	16.5	11.3
Married	11.1	15.4	10.2
F value	421.56	66.89	175.45

Table 5. This table shows the mean scores for general awareness, knowledge of symptoms, and knowledge of risk factors for different education groups (One way ANOVA test- p value< 0.05, significant).

Education	General awareness(out of 15)	Knowledge of symptoms(out of 18)	Knowledge of risk factors(out of 12)
Graduate	13.6	16.9	11.5
Student	13.1	16.3	11.2
Illiterate	10.4	13.8	9.9
F value	435.45	71.727	185.581

Sociodemographic factors like age, gender, marital status, occupation and education level were found to be significantly associated with awareness of oral cancer in this study. The results indicated that the educational level of participants were directly related to the general awareness, knowledge of symptoms and knowledge of risk factors. This finding is in accordance with previous study, which stated that awareness level was directly proportional to the education level of the participants (Nigam et al., 2019). Whereas the age of

the participants were inversely proportional to the awareness of the oral cancer. The significant increase in awareness level was attributed to the youngest age group(18-30 years). The awareness level in this younger population may be attributed to mass media exposure, health awareness programs, and anti tobacco campaigns. This is contradictory with the study by Misirlioglu et al., which documented that older participants were more aware of the signs of oral cancer compared with younger participants (Yardimci et al., 2013).

Figure 4: Bar graph represents the association of education level of participants and oral cancer awareness. The x-axis represents the education level and y-axis represents the mean value. The blue colour represents the general awareness, green colour represents the knowledge of symptoms and ted colour represents the knowledge of risk factors. The mean score is greater in case of graduates, followed by students and least in illiterates. Analysis was done and there is a significant association of education level and the oral cancer awareness (One way ANOVA test- p value< 0.05, significant).

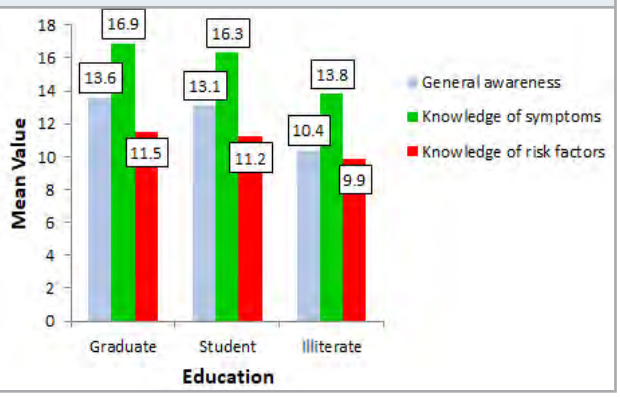

Figure 5: Bar graph represents the association of occupation and oral cancer awareness. The x-axis represents the occupation and y-axis represents the mean value. The blue colour represents the general awareness, green colour represents the knowledge of symptoms and ted colour represents the knowledge of risk factors. Awareness level was found to be highest in employed and least in unemployed. Analysis was done and there is a significant association of occupation and the oral cancer awareness (One way ANOVA test- p value< 0.05, significant).

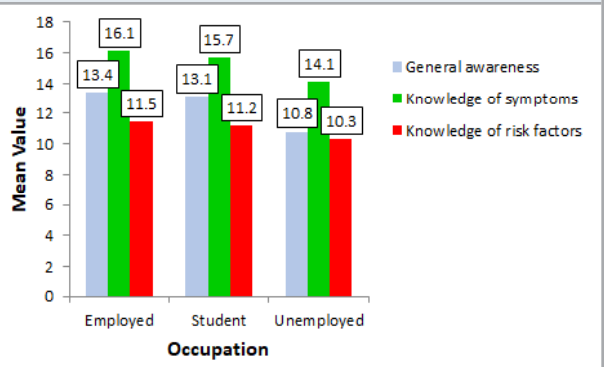

Table 6. This table shows the mean scores for general awareness, knowledge of symptoms, and knowledge of risk factors for occupation groups (One way ANOVA test- p value< 0.05, significant).

Occupation	General awareness(out of 15)	Knowledge of symptoms(out of 18)	Knowledge of risk factors(out of 12)
Employed	13.4	16.1	11.5
Student	13.1	15.7	11.2
Unemployed	10.8	14.1	10.3
F value	418.030	47.125	177.909

In this study, employed participants showed significant higher awareness levels in all the three domains of occupation. Unemployed had the least awareness level. In gender wise knowledge, males were found to have significant awareness levels with higher mean scores compared to females. This is contradictory with the study that stated that women were found to be more aware than men (Ghani et al., 2013). Patients in this study had a good knowledge about the risk factors of oral cancer. The participants had a poor knowledge about the synergistic effect of smoking and alcohol on oral cancer which can be a factor for the increased occurrence of oral cancer among this population. Exposure to both alcohol and tobacco increases the risk of oral and pharyngeal cancer when compared with risk associated with exposure to either habit (Pelucchi et al., 2008). The respondents who were single have significant mean scores for the general awareness, knowledge of symptoms and risk factors compared to the married respondents which again indicate the significance of education of the youngest age group on oral health and awareness.

A multifaceted approach that integrates health education, alcohol and tobacco control, early detection of oral cancer, and early treatment is needed to decrease the burden of this eminently preventable cancer (Shimpi et al., 2018). Improving awareness among the primary care practitioners and general public, investing in health services to provide screening and early diagnosis services for alcohol and tobacco users, and providing adequate

treatment for those who are diagnosed with invasive cancer are critically important control measures of oral cancer. Limitation of this study was that it included the people who accompanied the patients to the hospital.

CONCLUSION

Within the limitations of this study, among the different age groups, 18-30 age group; across gender, male participants; participants with single marital status; among the different education level, graduates and employed people among different occupational status were found to have high level of general awareness, knowledge of symptoms and knowledge of risk factors of oral cancer. Therefore it is evident that the sociodemographic factors do play a vital role in oral cancer awareness and was significantly related to the awareness level and knowledge of symptoms and risk factors. Intensive level of awareness is highly recommended in the older age group, females, married people, illiterates and unemployed people. India has an increased incidence of oral cancer patients, therefore it is very much necessary to conduct screening programs and to create awareness of general knowledge and knowledge of symptoms and risk factors of oral cancer.

ACKNOWLEDGEMENTS

The authors of this study would like to express their gratitude towards everyone who facilitated and enabled us to carry out this study successfully. We would also thank the institute for this study.

Authors Contribution: Bharathi R carried out the study by conducting the survey, collecting data and drafted the manuscript after performing the necessary statistical analysis. Leelavathi L aided in conception of the topic, participated in the study design, statistical analysis and supervised in preparation of the manuscript. All the authors had equally contributed in developing the manuscript.

Conflict of Interest: There were no conflicts on interest as declared by the authors

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-144-149

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Knowledge, Awareness and Practice of Oral Premalignancy And Oral Cancer Screening and Diagnosis Among Medical Professionals - A Questionnaire Survey

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ABSTRACT

In developing countries like India, Oral cancer is considered to be the leading cause of mortality. Under such a scenario prompt detection and treatment of this devastating disease is a must. Detection of early oral changes and referrals of patients to specialists as and when required remain in the hands of general practitioners. Lack of knowledge and awareness about oral premalignant lesions and oral cancer among medical students and doctors continue to be alarming as it dims the light on the necessity of knowledge about oral cancer and may contribute to delay in diagnosis and treatment. With this study, we aim to assess the knowledge, awareness and practice of medical professionals about oral premalignant lesions and oral lesions. A cross sectional, digital questionnaire based study was conducted among 377 medical professionals using 20 closed ended relevant questions. The collected data were consolidated and statistically analysed using IBM SPSS Version 20. The study revealed that 61.80% of participants were unaware of premalignant lesions and conditions out of which 65.25% were not aware that these lesions and conditions can exist asymptomatically. 71.09% of participants were aware that oral cancer can be diagnosed at early stages. However, 68.7% of participants were unaware of the investigative procedures done for early detection. More than half the total participants (53.3%) felt that they did not have sufficient knowledge concerning prevention of pre malignant oral lesion and conditions. This study concludes that more than 60% prospective medical professionals lack the knowledge about oral cancer and its diagnosis. This study hopes to shed light to the negligence of medical practitioners on a malignancy so relevant and yet left so unaware of. This study over all establishes the importance to improve the level of competency of the medical professionals in diagnosing and preventing oral premalignant lesions and oral cancer.

KEY WORDS: PREMALIGNANT LESION, CONDITION, ORAL CANCER.

ARTICLE INFORMATION

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Received 1st Aug 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/127

INTRODUCTION

A tumor is any abnormal proliferation of cells, which may be either benign or malignant. Benign tumors remain confined to the location of its origin, never invading the normal tissue of the surrounding nor causing metastasis by spreading to distant body sites. A malignant tumor on the other hand causes both invasion to the surrounding normal tissue and causes metastasis by spreading throughout the body by the circulatory or lymphatic systems. Malignant tumors are the only tumors referred to as cancer, and it is their ability to invade and metastasize makes it unpredictable and dangerous. (Cooper and Hausman, 2004). Oral cancer accounts for less than 5% of the total incidence of all malignancies that occur in the human body, out of which, approximately half of the oral cancer patients die of their disease(Wright, 1994). Oral cancer is considered to be the leading cause of mortality in a developing country like India.

With a rich case bank established over 3 decades we have been able to publish extensively in our domain (Abdul Wahab et al., 2017; Eapen, Baig and Avinash, 2017; Patil et al., 2017; Jain and Nazar, 2018; J et al., 2018; Marimuthu et al., 2018; Wahab et al., 2018; Abhinav et al., 2019; Ramadorai, Ravi and Narayanan, 2019; Senthil Kumar et al., 2019; Sweta, Abhinav and Ramesh, 2019). Based on this inspiration we aim to assess the knowledge, awareness and practice of oral premalignancy and oral cancer screening and diagnosis among medical professionals.

Precancerous lesion or premalignant lesion is a tissue in the human body having undergone alterations morphologically in which oral cancer is more likely to occur than its apparently normal counterpart. These precancerous lesions include leukoplakia, erythroplakia, and the palatal lesions of reverse smokers.(Sarode, Sarode and Tupkari, 2014) Precancerous or premalignant condition is a generalized state associated with significantly increased risk of cancer. The precancerous conditions include submucous fibrosis, lichen planus, epidermolysis bullosa, and discoid lupus erythematosus. (Pindborg et al., 1997).

India, being a part of the Asian subcontinent, our attitude and resilience towards oral cancer needs to be retaught and our interest in knowledge, preventive measures and treatment modalities have to be in par with the scientific and medical advancements that occur that will help in the early diagnosis, prevention and rightful treatment protocol choice.(Brignardello-Petersen, 2020) India presents with a higher incidence of head and neck cancer contributing up to 7.8% of the global cancer burden and 8.33% of global cancer deaths. More than 2 lakh new cases of head and neck cancers are diagnosed every year. (Prasad, 2014). This study aims to assess the knowledge, awareness and practice of medical professionals about oral premalignant lesions and oral lesions and hopefully improve the level of competency of the medical professionals in diagnosing and preventing oral premalignant lesions and oral cancer.

MATERIAL AND METHODS

A cross sectional, questionnaire based study was conducted among 377 medical professionals. A self designed, closed ended questionnaire containing 20 questions of relevance to understand the knowledge and awareness of medical professionals on oral cancer and premalignancy was framed. Questionnaire survey was conducted on Google forms where 377 medical professionals took part in the survey. The survey was conducted after informed consent from the participant. A total of 377 surveys were examined and evaluated with cross verification of data for the elimination of errors which could've aroused in the course of this study. Medical professionals who have graduated MBBS or are currently doing their internship were considered in this study. Inclusion of all available data with no form of sorting process has helped minimize sampling bias and stating applicable validity to the study.

Data was collected by means of Google forms. Medical students who had not joined the internship and other residents unwilling to participate were all excluded from the study. Out of a total of 392 participants, 15 participants were excluded from the study based on the exclusion criteria. A total of 377 patients were considered in this study. All the surveys were conducted with prior taken permission and consent making sure that the participant details remain confidential. Data was collected and verified by an external examiner and the statistical evaluation was done using IBM SPSS version 20. All results underwent statistical analysis at a confidence interval of 95%.

RESULTS AND DISCUSSION

Out of a total of 392 participants who have taken part in the survey, 15 participants were excluded from the study as 7 did not answer the relevant questions and 8 participants were medical students in their early academic years. Out of the considered 377 participants, 20 self designed, closed ended questions were provided (Table 1). On consideration of the participant awareness of premalignant lesion and conditions, out of a total of 377 participants, 233 participants have replied No (61.8%) whereas only 144 participants have replied Yes (38.2%) [Figure 1] Considering the participants' awareness on whether premalignant lesions are always symptomatic, out of a total 377 participants, 246 have mentioned Yes, accounting for 65.3% whereas 131 participants have replied No (34.7%). [Figure 2] Responding to the question whether oral cancer can be diagnosed in an early stage, out of a total of 377 participants, 268 have agreed with the statement (71.1%) and 109 participants have disagreed with the statement (28.91%).

[Figure 3] Out of a total of 377 participants to which the question, "do you know about the investigative procedures done for early detection of oral cancer", 259 participants have replied No (68.7%) and 118 participants have replied Yes (31.3%) [Figure 4] Considering the assessment of sufficient knowledge concerning the

prevention and detection of pre malignant lesions and conditions, 201 participants out of the total 377 have said No (53.3%) whereas 176 participants, accounting for 46.7% of the total participants have replied Yes. [Figure 5].

Table 1. Shows he survey questions and responses

Survey Questions	Response YES	Response NO
1.Are you aware about oral cancer?	278	99
2. . Do you know the various risk factors for oral cancer?	203	174
3.Are you aware of pre malignant lesions and conditions?	144	233
4. Are tobacco and alcohol the only etiological factors for oral cancer?	287	90
5. Do you think that the pre malignant lesions are always symptomatic?	246	131
6. Do you think that oral cancers can be diagnosed in early stage?	268	109
7. Oral cancer is a hereditary disease?	143	194
8. Does the risk of oral cancer increase with age?	205	172
9. Do you know about the investigative procedures done for the early detection of oral cancer?	259	118
10. Is oral cancer a preventable disease?	104	273
11. Lesions associated with smokeless tobacco generally resolve after discontinuation of these products.	212	165
12. Signs of lymph node – The most important characteristic of oral cancer metastasis is a hard painless fixed lymph node?.	208	169
13. Early detection improves 5 year survival rates in oral cancer?	294	83
14. Annual oral cancer examinations should be provided for those of 40 years of age and above?	302	77
15. Do you feel that you have sufficient knowledge concerning prevention and detection of pre malignant oral lesions and conditions?	176	201
16. Do you examine patients' oral mucosa routinely?	153	224
17. If your answer is No to the above question, do you screen the oral mucosa if the patients are in high risk categories?	218	6
18. Do you record tobacco and alcohol use in personal history?	257	120
19. Do you take biopsy in patients with suspicious lesions?	249	128
20. Where would you refer a patient to dentist if you suspected an oral malignancy?	109	268

Figure 1: Pie chart showing percentage of response of participants to the question 'are you aware of premalignant lesions and conditions?' where 61.80% of participants stated No (turquoise) and 38.20% participants stated Yes (violet).

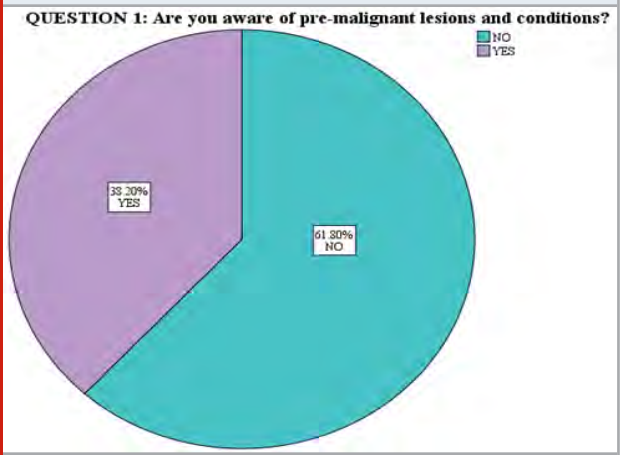
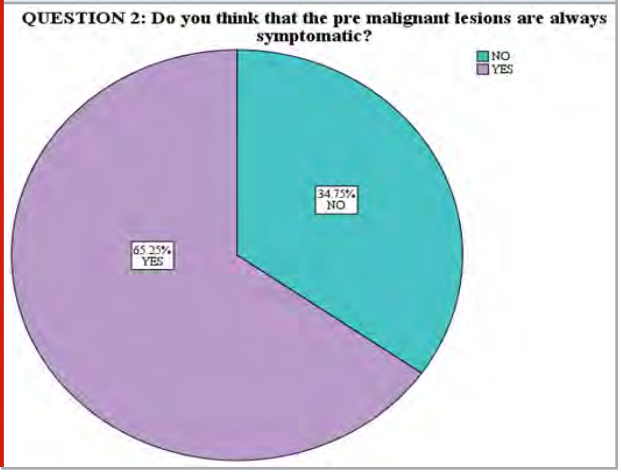


Figure 2: Pie chart showing percentage of response of participants to the question 'do you think pre malignant lesions are always symptomatic?'. 65.25% of participants responded Yes(violet) and 34.75% participants responded No (turquoise).



WHO in 1978 classified 'precancer' into 'lesions' and 'conditions'.(Organization and Others, 1973). Precancerous lesion or premalignant lesion is a tissue in the human body having undergone alterations morphologically in which oral cancer is more likely to occur than its apparently normal counterpart. (Sarode, Sarode and Tupkari, 2014) A state of disease associated with a significantly increased risk for the development of cancer is Precancerous or premalignant condition. (Pindborg et al., 1997). According to Lodi et al, pre malignant lesions include leukoplakia, erythroplakia, erythroleukoplakia, lichen planus, oral submucous fibrosis (Thomson, 2012)and premalignant conditions include advanced age, tobacco, smoking, or betel squid use, patients undergoing immunosuppression therapy, actinic keratosis, oral human papillomavirus infections, syphilis infections, discoid lupus erythematosus, xeroderma pigmentosa, dystrophic epidermolysis bullosa. (Lodi and Porter, 2007; Thomson, 2012; Liu et al., 2016). Early identification of the lesion and condition will help prevent its escalation to the status of malignancy.

Figure 3: Pie chart showing percentage of response of participants to the question 'do you think oral cancer can be diagnosed at an early stage?'. 71.09% of participants responded Yes(violet) and 28.91% participants responded No (turquoise).

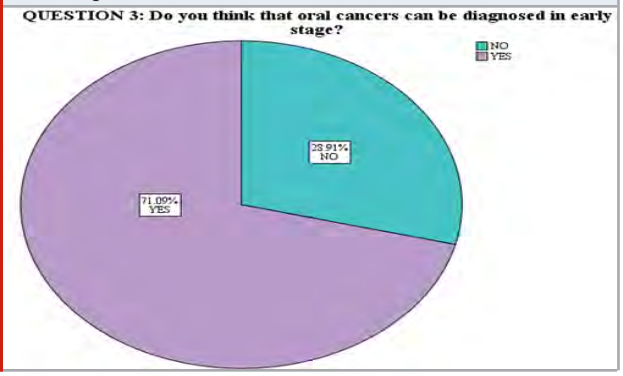


Figure 4: Pie chart showing percentage of response of participants to the question 'are you aware of the investigative procedures for the early diagnosis of oral cancer?' Out of a total of 377 participants, 259 participants have replied No (68.7%) (turquoise) and 118 participants have replied Yes (31.3%) (violet).

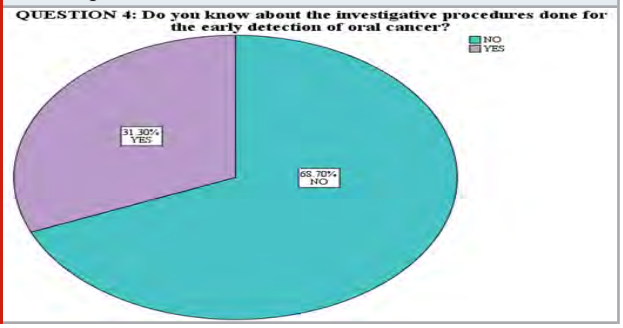
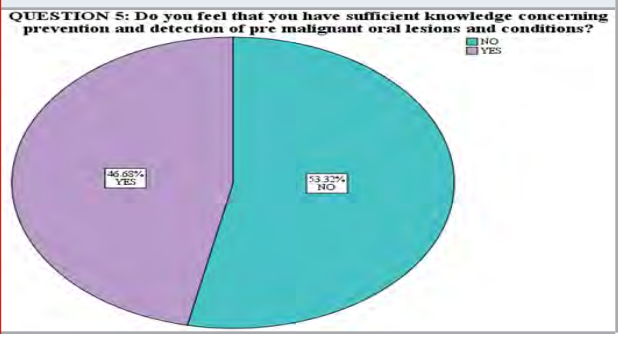


Figure 5: Pie chart showing percentage of response of participants to the question 'do you feel that you have sufficient knowledge concerning prevention and detection of pre malignant oral lesions and conditions?' 201 participants out of the total 377 have said No (53.3%) (turquoise) whereas 176 participants, accounting for 46.7% of the total participants have replied Yes (violet).



Medical practitioners who are in the first line of patient management, if educated on the signs of premalignant lesions and conditions and screening methods would help in early detection and diagnosis at a very primitive state. Screening tests done by medical practitioners should be highly applicable and acceptable to the general population, be cost effective, detect pre malignancy early at its natural stage, having a high positive predictive value and low false negatives making it highly sensitive.(Nair et al., 2012) Patients with a history of habits of smokeless or smoke form of tobacco, betel nut chewers and other deleterious habits, when approached for treatment to a medical practitioner should screen the patient for pre malignant lesions and conditions. Screening can be carried out by conventional oral examination using normal (incandescent) light and further by modern investigative and pathological tests. Oral screening is most effective in detecting premalignancy. Patients pertaining to other treatment with a positive history of deleterious habits should undergo a compulsory oral screening to rule out the presence of oral pre malignant lesions and conditions.

This will play a vital role in determining the five year life span of the patient which is crucial in understanding the outcome and prognosis of the disease and helps reduce mortality of the patients affected by it. Modern advancements in the area of imaging and radiology has helped shed light on the detection modalities such as oral cavity examination, supravital staining, oral cytology and optical technologies. Advanced optical technology such as spectroscopy, fluorescence spectroscopy, elastic scattering (reflectance) spectroscopy, Raman spectroscopy, fluorescence imaging, optical coherence tomography, narrow-band imaging, and multimodal optical imaging are of wide use to help identify and diagnose oral premalignant lesions and conditions at a very onset stage. (Steele and Meyers, 2011; Punyani and Sathawane, 2013; Yardimci et al., 2014).

Late diagnosis of oral cancers is usually made due to the lack of knowledge the clinician or the doctor has in

identifying and diagnosing pre malignant lesions and conditions. Loss of chances to identify and characterise the disease are mainly of three in nature. Ignorance of the symptoms , lack of consciousness in patients, and a transient phase of negation are the factors that withhold the patient from visiting a doctor which are regarded as the "first time loss". The "second time loss" happens by the absence of medical and dental professionals' consciousness and absence of timely diagnosis. The final and "third time loss" is the period from the diagnosis to the start of therapy.(Thomas et al., 2003; Waal and van der Waal, 2009). Lack of knowledge and awareness about oral premalignant lesions and oral cancer among doctors of the medical profession continue to be alarming as it dims the light on the necessity of knowledge about oral cancer and may contribute to delay in diagnosis and treatment which may lead to an increased rate of mortality holistically. Therefore, knowledge is essential to help guide in early diagnosis, prevention and treatment of oral cancer.

CONCLUSION

Primary health care physicians play a very vital role in early diagnosis of oral premalignant lesions considering their progressive nature. The results of this survey study showed that more than 60% prospective medical professionals lack the knowledge about oral cancer and its diagnosis. To decrease the burden of this eminently preventable cancer, a multi faceted approach that integrates health education, tobacco and alcohol control, early detection, and early therapy is required. This study hopes to shed light on the need to improve the level of competency of the medical professionals in diagnosing and preventing oral premalignant lesions and oral cancer.

ACKNOWLEDGEMENTS

The authors express their sincere gratitude to all the respondents who had willingly participated in the study

Authors Contribution: Dr. Sam John Koshy carried out the retrospective study data retrieval, statistical analysis, sequence alignment and drafted the manuscript. Dr. Madhulaxmi M. conceived the study, participated in its design and coordination and helped draft the manuscript.

Conflicts of Interest: There were no conflicts of interest as defined by the authors.

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Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-150-155

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Squamous Odontogenic Tumour – A Paradoxical Pathology

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ABSTRACT

Squamous odontogenic tumors (SOTs) are neoplasms being benign, local in origin and infiltrative in capacity that localize to the periodontium. In total, only less than 50 cases have been reported since the first description of SOTs in 1975. The most common site of occurrence of the lesion in the maxilla, incisor area and in the mandible, the bicuspid-molar region. Squamous odontogenic tumors show a characteristic triangular-shaped, unilocular radiolucency of the alveolar bone, with the wide base of the radiolucency localized between the diverging apices of the adjacent roots, radiographically. Here, we report an unusual presentation of the tumour in the periapical region of the mandibular incisor region mimicking radicular cyst clinically but with a major histological variation.

KEY WORDS: SQUAMOUS ODONTOGENIC TUMOR, ORAL AND MAXILLOFACIAL TUMOR, ODONTOGENIC TUMORS.

INTRODUCTION

Paradoxical refers to something that seems self-contradictory. It often depicts an identity so impossible or difficult to understand because of two opposite facts or characteristics it contains. (PARADOXICAL | meaning in the Cambridge English Dictionary, no date) This case report is in fact of a paradoxical pathology because of how clinically contradictory it was when compared to all the literature present to refer to. Its contradiction has made this stand a notch different from all other cases judging by its clinical significance and presentation.

ARTICLE INFORMATION

*Corresponding Author: madhulaxmi@saveetha.com
Received 27th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/128*

World Health Organization (WHO) tumor classification published in 1971(Philipsen and Reichart, 2006) has shed an understanding on the presence of a lesion called Squamous Odontogenic Tumor. A novel and completely revised WHO classification from 2005, encompassed the histopathological and genetic criteria of SOTs, described this pathology as a group of epithelial odontogenic tumors comprising within the ameloblastoma family, consisting of solid/multicystic, extraosseous/peripheral, desmoplastic and unicystic ameloblastoma, and squamous, adenomatoid, calcifying and keratocystic odontogenic tumors(World Health Organization and International Agency for Research on Cancer, 2005).

Squamous odontogenic tumors (SOTs) are rare benign tumors of the periodontium that possess an unknown etiology and were first described in 1975 by Pullon et al (Pullon et al., 1975; Perdigão et al., 2004). In the literature, a little over fifty cases have been reported worldwide (Reichart and Philipsen, 1990; Saxby, Rippin and Sheron,

1993). Squamous odontogenic tumors are slow-growing, locally infiltrating tumors with only a few clinical signs and symptoms which vary from patient to patient. Mobility of the teeth, increased periodontal pocket depth, sensitivity, swelling of the alveolar process, swelling and erythema of adjacent gingiva and moderate pain are the most widely accepted indicators for the underlying tumor. (Reichart and Philipsen, 1990; Saxby, Rippin and Sheron, 1993; Philipsen and Reichart, 1996). SOTs have also been reported to occur in various age groups, yet mainly affect adults in the third decade of life (Kim, Mintz and Stevens, 2007). Literature has shown that the male to female gender predilection is 1.4:1 (Reichart and Philipsen, 1990; Ruhin et al., 2007). The jaw most commonly affected is the mandible more often than the maxilla, with an increased preference of occurrence in the posterior premolar and molar area. Maxillary SOTs are described to be primarily present in the anterior area, and appear to be more aggressive in nature when compared with SOTs in the mandibular area(Reichart and Philipsen, 1990)(Reichart and Philipsen, 1990; Ruhin et al., 2007)(Reichart and Philipsen, 1990).

Squamous odontogenic tumors derive from the epithelial cell rests of Malassez where tumor appear on the lateral root surface. The typical radiographic presentation is a triangular radiolucent defect involving the lateral root surface of erupted and vital teeth(Cillo, Ellis and Kessler, 2005). The wide base of the radiolucency is localized between the diverging apices of the adjacent roots (Haghighat, Kalmar and Mariotti, 2002). The prognosis of squamous odontogenic tumor therapy is good if surgical enucleation of the whole lesion is done with curettage of the affected area with extraction of the affected teeth, if present. Recurrence appears to be rare, and may occur due to incomplete tumor removal.

With a rich case bank established over 3 decades we have been able to publish extensively in our domain (Abdul Wahab et al., 2017; Eapen, Baig and Avinash, 2017; Patil et al., 2017; Jain and Nazar, 2018; J et al., 2018; Marimuthu et al., 2018; Wahab et al., 2018; Abhinav et al., 2019; Ramadorai, Ravi and Narayanan, 2019; Senthil Kumar et al., 2019; Sweta, Abhinav and Ramesh, 2019). Here, we report an unusual presentation of the tumour in the periapical region of the mandibular incisor region mimicking radicular cyst clinically but with a major histological variation.

Case Report: A 26 year old male patient reported to the Department of oral and maxillofacial surgery complaining of pain and swelling on the right side of his face for a duration of 3 years. Pain was intermittent and slowly increased in intensity over 3 years as the patient was negligent to the initial signs and symptoms. Swelling subsequently increased with accompanying pain and discomfort while mastication and speech. Patient had a history of bruxism. There were no other relevant medical, surgical, family or personal history. On clinical examination, a definitive swelling of the face on the right side was evident with a size of 3 X 3 centimeters extending from the right corner of the mouth, 3 centimeters medial to the angle along the lower border of the mandible. Skin discolorations were evident on the right side The skin over the swelling appeared shiny with a firm consistency, with absence of tenderness on the affected area. The borders were well defined with absence of warmth over the swelling, ulcerations and pulsations.

On intraoral examination, the lower anterior teeth of the left side (31) showed discolorations suggestive of non vitality. The remaining anterior teeth were tender on vertical percussion. A swelling of the right side vestibule extending from the region of the right mandibular canine to the left lateral incisors were observed with absence of pain on palpation of the vestibule. [Figure 1] On radiographic analysis, orthopantomography of the patient revealed well defined, circumscribed, definitive bordered periapical radiolucency, diffused triangular in shape extending from the peri apical region of the right mandibular canines to the left mandibular canine measuring approximately around 3 X 5 millimeter in size periapically of each tooth. [Figure 2]

Figure 1: Intra oral image of the left, center and right side of the patient while in occlusion revealing discoloration of the lower anterior teeth of the left side (31) and swelling of the right side vestibule extending from the region of the right mandibular canine to the left lateral incisors.

Figure 2: Pre-operative orthopantamography revealing well defined, circumscribed, definitive bordered periapical radiolucency, diffused triangular in shape extending from the peri apical region of the right mandibular canines to the left mandibular canine measuring approximately around 3 X 5 millimeter in size periapically of each tooth

Patient history, clinical examination and radiological investigation suggested a provisional differential diagnosis of a benign pathology - radicular cyst in relation to the non vital teeth or a benign tumour. As patient was reluctant for local anaethesia procedure, treatment plan was made for an excisional biopsy under General anesthesia. Surgical procedure followed

a crevicular incision followed by releasing incisions extending from the region of the right mandibular canine to the left mandibular canine and the lesion was exposed. Enucleation of the lesion and post- enucleation prophylactic saucerization of the bone adjacent to the lesion was done. Simultaneous apicectomy with retrograde mineral trioxide aggregate filling and osseous reconstruction using Concentrated Growth Factors and xenograft Bone grafts (Geistlich Bio-Oss) was done as the lesion resembled a cyst on surgical exloration. [Figure 3].

Figure 3: Exposed pathology intra operatively.

Figure 4: (a) Enucleation of the lesion and post- enucleation prophylactic saucerized bone. (b) Concentrated growth factors along with the osseous reconstruction xenograft(Bio Oss) placed for bone regeneration.

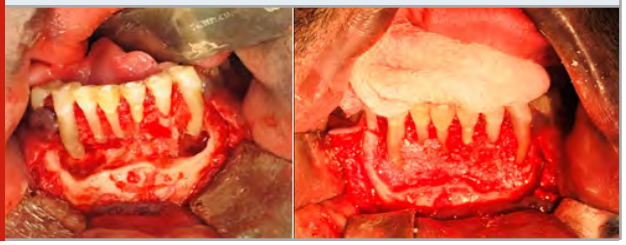
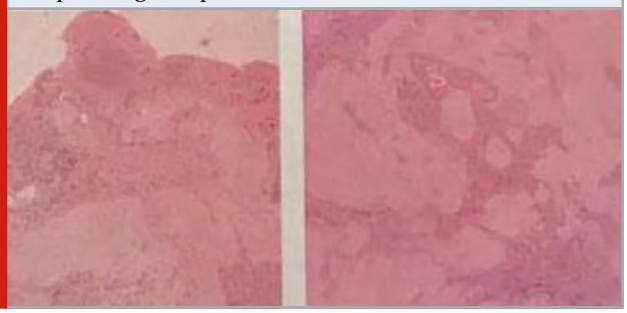


Figure 5: Enucleated pathological specimen

Concentrated growth factors were extracted from the patients blood along with the osseous reconstruction xenograft(Bio Oss) acting as both a membrane and a growth potentiating component to enhance the development of neovascularization and osseous reformation. [Figure 4]. The specimen on histopathological analysis showed odontogenic epithelial lining with non keratinized stratified squamous epithelium of variable sizes. The connective tissue wall was dense and fibrous composed of several foci of intense chronic inflammatory cells. It also showed proliferating odontogenic epithelial rest cells with squamous metaplastic changes along with vacuolization of cells. Moderate vascularization and evidence of hemorrhage was also evident. Areas of peripheral resorbing bone were seen with evidence of an area of overlying stratified squamous epithelium. [Figure 5]

Figure 6: Histopathological microscopic examination of the pathological specimen.



The histopathological report stated it as suggestive of inflammatory odontogenic cyst with squamous odontogenic tumor-like projections. [Figure 6]. The patient underwent regular follow-ups every week for the first month post operatively and 6 months post operatively, with no clinical symptoms nor complaint about any pressure or sensitivity disturbances in the affected area. [Figure 7 & 8].

Figure 7: Postoperative orthopantomography image.

Figure 8: Image of One week follow up postoperatively.

DISCUSSION

Squamous odontogenic tumors are rare, benign, locally infiltrative neoplasms that many authors have elicited about. Many authors have indiscriminately and extensively studied and described cases of squamous odontogenic tumor in the past. (Pullon et al., 1975; Doyle et al., 1977; Hopper, Sadeghi and Pricco, 1980; McNeill, Price and Stoker, 1980; van der Waal, de Rijcke and van der Kwast, 1980; Carr, Carlton and Marks, 1981; Goldblatt, Brannon and Ellis, 1982; Cataldo, Less and Giunta, 1983; Norris et al., 1984; Kristensen, Andersen and Jacobsen, 1985; Monteil and Terestri, 1985; Warnock et al., 1985; Mills et al., 1986; Leider, Jonker and Cook, 1989; Baden et al., 1993; Kusama et al., 1998; Perdigão et al., 2004; Ruhin et al., 2007; Siar et al., 2010; Malathi et al., 2012; Bansal and Joshi, 2013; Virapara, Rajput and Shah, 2018)

On comparing with cases of SOT diagnosed world wide, the age at the time of initial diagnosis ranged between 8 and 67 years, with a mean age of 36.3 years. Patients aged 20–29 show an increased rise in the visibility of SOT's. The gender ratio of female to male predilection from as reported in the literature ranges from 1:1.2 to 1:1.4. The mandible was involved in 57.1% of all cases and the maxilla in only 38.8% with remaining having variations in the site of occurrence.

According to the present literature, the incidence of SOT is low with just over 50 cases reported worldwide. The tumor usually grows slowly and demonstrates a lack of symptoms for a long standing period of time. The radiographic and clinical characteristic features of SOT are neither unique nor sufficient for the final diagnosis and because of which, chances are that SOT may be confused with a number of other pathologies(Perdigão et al., 2004). Therefore, distinctive clinical, radiological and histological aspects are necessary for avoiding a misdiagnosis that may result in serious negative implications for the patient (Ide et al., 1999). There has been an increased predominance in the third decade for SOT, however studies have proved it to appear in any age. The youngest patient reported in the literature was a 9-year-old boy with maxillary SOT that was treated with local surgical tumorectomy.(Ide et al., 1999; Ruhin et al., 2007)(10). The maxilla appears to be involved more often in the region of the incisors, whereas the premolar and molar areas appear to be more involved in the mandible.

SOT presents as a locally infiltrative neoplasm and has been known to infiltrate into adjacent tissues, with resorption of the alveolar bone and invasion of the overlying gingival and oral mucosa. (Robson, 2001) The etiology of SOT is yet to be interpreted for correct and rightful diagnosis with timely effect. However, immunohistochemical evaluation performed in studies described in literature revealed positive reactivity of varying intensity in the neoplastic epithelial cells for the Notch1, Notch2 and Notch3 transmembrane receptors and their ligands. These findings suggest that these receptors play a role in the cytodifferentiation of squamous odontogenic tumors.(Siar et al., 2010).

Although squamous odontogenic tumors are considered to be benign neoplasms, the local expansiveness and clinical behaviour of the tumor indicates the possibility of carcinomatous transformation. In 1999, Ide et al (Ide et al., 1999) reported a rare occurrence of intraosseous squamous cell carcinoma arising in association with squamous odontogenic tumors. The enucleated specimen of the tumor revealed a characteristic pattern of SOT. However, within 2 months, aggressive bone destruction exhibiting the typical findings of intraosseous squamous carcinoma was described. Recent studies have revealed that an odontogenic tumor, which is difficult to access, is prone to the development of recurrence. This may be due to the inability of the surgical treatment to fully remove all tumor cells due to lack of accessibility or due to its normal like morphology..(Ide et al., 1999).

Treatment of SOT consists of the surgical enucleation of the whole lesion, curettage of the affected area with extraction of the affected teeth, if present. More extensive lesions with infiltrating neighboring structures require more radical interventions such as en bloc resection. (Jones et al., 2011; Badni, Nagaraja and Kamath, 2012; Tarsitano, Agosti and Marchetti, 2012; Bansal and Joshi, 2013): (Baden et al., 1993) CGF, Concentrated Growth Factors are described as a miracle in regenerative dentistry. CGF is a new regeneration platelet aggregate which is used widely in oral surgeries. It contains various growth factors which enhances its action and promotes wound healing and growth potentials. CGF is currently used best with autologous bone particles to help induce bone regeneration and connective tissue attachment. CGF is a fibrin tissue adhesive with properties of haemostasis and tissue sealant properties making it effective on placement. It accelerates osteogenesis and promotes wound healing. CGF improves the stability of the wound that is required for the attachment of a new connective tissue to the root surface. It promotes epithelial, endothelial and epidermal regeneration and decreases scarring.

It has antimicrobial properties due to high concentration of leukocytes. It acts as an anti-antigenic agent on chronic non healing wounds.(Y, 2018) Its most important factor is the induction of bone regeneration when added to xenografts like Bio Oss which potentiates and plays a vital role in the regeneration of lost or cauterized bone in the course of enucleation of a pathology. Many factors have contraindicated with literature in this described case making it indeed paradoxical pathology. The most common site of occurrence as per literature in mandible was the posterior region,(Perdigão et al., 2004) whereas in this case, SOT was present in the mandibular anterior region extending for the right mandibular canine to the left mandibular canine region. However in sync with the literature, the tooth was non vital and radiographically exhibited a triangular radiolucency of the peri apical region of the involved teeth.

ACKNOWLEDGEMNTS

The authors thank Dr Jones for his support in providing the images needed to complete this case report.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-156-161

BBRC
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Knowledge and Awareness About Dental Procedures Among Parents Before and After Educational Intervention

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ABSTRACT

This study aims to determine the knowledge and awareness about dental procedures among parents before and after educational intervention. Different educational interventions about oral health and treatment have been used varying from the simple delivery of information to more complex programs involving psychological and behavior change strategies Knowledge, attitudes, intentions, beliefs, behaviors, use of dental services and oral health status and adoption of lifestyles have all been targeted for change as a result of these interventions, which has stood the test of time as dentistry's most pioneering testimony towards concern with the prevention of oral diseases and creating awareness among the patients about their treatment. It includes a questionnaire based study.The survey was conducted among 100 parents who visited a private dental institution. A self administered questionnaire was used.The results were obtained and statistically analysed through SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. The results showed significant correlation between the knowledge and attitudes of parents about dental procedure and the oral health of their children. It is concluded that the awareness of parents about dental procedure and their prevention is not satisfactory before educational intervention. Thus after the educational intervention the parents are much clear about the etiology and prevention for the dental disease.

KEY WORDS: PARENTS, EDUCATIONAL INTERVENTION, DENTAL PROCEDURES, CARIES.

INTRODUCTION

The most common dental diseases in children are dental caries and periodontal diseases which are the most important etiological factors in the pathogenesis of these diseases are frequent intake of sugar and lack of oral hygiene. Dental caries occur as a result of a complex interplay of social, behavioral, cultural, biological and dietary risk factors. Too frequent consumption of food containing sticky and sugar material and lack of fluoride are the main factors for the development of dental caries(Burt, 1994). Dental caries are easily preventable with a judicious preventive regimen including fluorides. Therefore, most dental health education efforts are concentrating on motivating and informing the parents and children to restrict frequent intake of sugar, brushing their teeth with fluoride toothpaste and to have regular visits to the dentist(Sanadhya et al., 2014).

Despite the considerable decrease in the prevalence of dental caries among children for the past few decades,

ARTICLE INFORMATION

*Corresponding Author: mebingeorgem.sdc@saveetha.com
Received 29th July 2020 Accepted after revision 25th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/129*

a significant proportion of children are still affected by these dental diseases(Marthaler, 2004). Since dental caries is well recognized as a dietary carbohydrate modified bacterial infectious disease, the caries prevention in young children has been reliant on parents being acquainted with information on dental health and having right attitudes towards their oral health(van Houte, 1994). The primary aetiology of dental caries consists of presence of Streptococcus mutans then fermentable carbohydrates metabolized into organic acids in a susceptible tooth surface(Ripa, 1988). Other factors such as oral hygiene, feeding patterns and various other habits are also associated with dental caries. Less studied areas of oral health are parental awareness, cultural attitudes and social influences knowledge regarding dental caries, which are now thought to be a contributing factor(Shugars, 2001; Sobo and Loustaunau, 2010).

Different educational interventions about oral health and treatment have been used varying from the simple delivery of information to more complex programs involving psychological and behavior change strategies(Halawany et al., 2018). Knowledge, attitudes, intentions, beliefs, behaviors, use of dental services and oral health status and adoption of lifestyles have all been targeted for change as a result of these interventions, which has stood the test of time as dentistry's most pioneering testimony towards concern with the prevention of oral diseases and creating awareness among the patients about their treatment.

Dental health education can result in enhanced oral health status objective measures and behaviors although it may be less effective in changing attitudes and knowledge(Ehizele, Chiwuzie and Ofili, 2011). It helps dentists to reach children families and communities influencing their attitudes and behaviors at a formative stage(Shenoy and Sequeira, 2010). Oral health education can be provided by means of professional instruction by using models, posters, charts, brochures, leaflets, audio-visual aids, or PowerPoint presentations.

Several studies have reported positive outcomes of oral health educational interventions with a positive outcome in terms of oral cleanliness(Yazdani et al., 2009), significant changes in oral health behaviors, brushing skills(Vanobbergen et al., 2004), caries control regimens, plaque and gingival scores (Zanin et al., 2007) and also in the incidence of dental caries, improved oral hygiene and established positive oral health practices and awareness on dental treatments(Tai et al., 2009). Hence, this study aims at determining the knowledge and awareness about dental procedures among parents before and after educational intervention.

MATERIAL AND METHODS

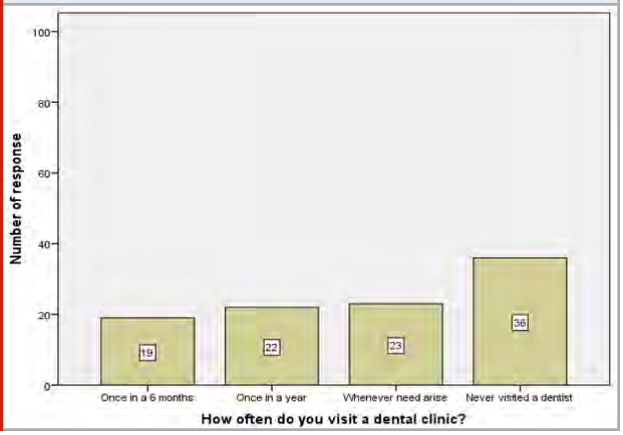
The study was initiated after receiving ethical approval from the institutional ethical committee. Survey was undertaken to evaluate the awareness and knowledge about the dental procedures among parents before and after educational intervention. A total of 100 parents who visited a private dental institution was included in the study. A self administered questionnaire was used. The questionnaire consisted of the major aspects of knowledge and awareness about dental treatment. This survey was a questionnaire based study which consisted of 15 questions.

Data collection: The survey was taken by 100 parents who visited a private dental institution All data was entered in an excel sheet. Data was analysed by multiple logistic regression analysis using SPSS software version 20 .Chi square test was used to find an association between the study variables. p value less than or equal to 0.005 was taken statistically significant. Inference of the study is given below.

RESULTS AND DISCUSSION

The study estimates the awareness and knowledge about the dental treatment among the parents by means of a subjective evaluation of the response of the participants on the questionnaire. Out of 100 participants, the gender distribution of the patients was reported as 37% were males and 63% were females. It was inferred that among the parents the males(37%) have reported higher in number than females. Figure 1 reveals that the majority of parents never visited a dentist (36%) followed by once in a year (22%), once in 6 months(19%) and whenever need arises (23%). Most common cause for not visiting a dentist on a regular basis or reason for disliking visiting the dentist was fear and anxiety (48%) which is illustrated in figure 2. The frequency distribution of the chief complaint of a child is illustrated in figure 3.

Figure 1: Bar chart distribution showing the frequency of dental visit by the participants. X axis represents the number of dental visits and Y axis represents the number of the participants who responded. Majority of the respondents reported that they have never visited a dentist (36) followed by once in a year (22), whenever need arises (23) and once in 6 months (19).



It is inferred that the majority of the patient complaints of dental pain (44%), discolouration of tooth (22%), bleeding gum injuries to the tooth(20%) and swelling. Figure 4 explains the awareness about the fact that

if deciduous teeth are extracted before their shedding periods, the upcoming permanent teeth may have some ill effects and it is inferred that (51%) parents are unaware of it. Majority of the participants reported that the most important way to prevent dental caries is by reducing the frequency intake of sugar (35%) followed by frequently brushing the teeth and regular visits to a dentist (figure 5).

Figure 2: Bar chart distribution showing the response of parents to the question about the reason for not visiting a dentist. X axis represents the question "If you do not visit the dentist the reasons are" and Y axis represents the number of the participants who responded. Majority of the respondents reported that they are afraid of dentists (48) followed by afraid of dental instruments (27), afraid of sitting in the waiting room (5) and no time (20).

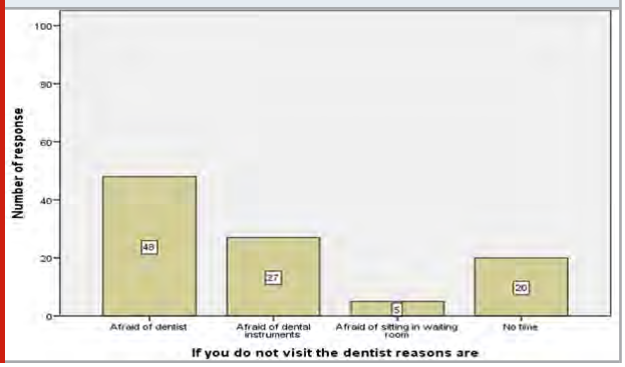
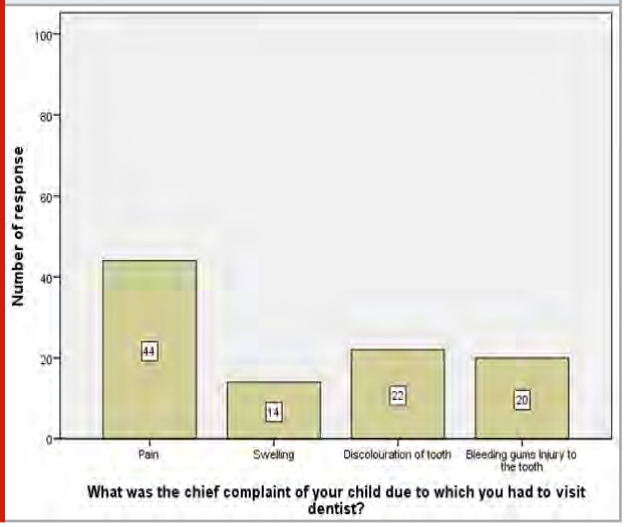


Figure 3: Showing the frequency distribution of the patient's chief complaint. X axis represents the chief complaint of a child and Y axis represents the number of the participants who responded. It is inferred that the majority of the patients had a complaint of pain (44) followed by discolouration of tooth (22), bleeding gums (20) and swelling (14).



Most of the parents were unaware about "what is root canal treatment?" before the programme but after the programme more than half of the parents responded correctly (figure 6). Regarding the association between the total knowledge score for awareness on root canal treatment and educational intervention, it was found that the highest score was reported after the educational intervention and the study interestingly also found a significant correlation (p=0.000) between educational intervention and the awareness about root canal treatment. There was a drastic increase in knowledge about the etiology of dental caries at the end of the programme. Figure 7 shows the association between the total knowledge score of awareness on dental caries and educational intervention, it was found that the highest score was reported after the educational programme. Pearson's correlation to assess the educational intervention and knowledge on cause of dental caries was found to be statistically significant p =0.00($p<0.05$).

Figure 4: Showing the frequency distribution of awareness of the participants about the fact that if deciduous teeth are extracted before their shedding periods, the upcoming permanent teeth may have ill effects. X axis represents the participants awareness on deciduous teeth extraction before their shedding periods and Y axis represents the number of the participants who responded. The bar chart shows that the majority of the participants are unaware of it (51).

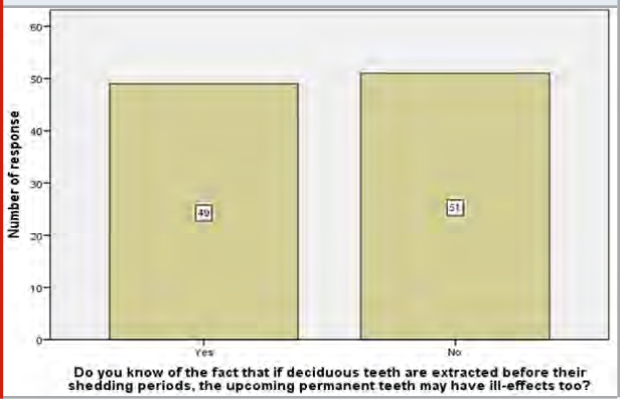


Figure 5: Bar chart distribution showing response of parents to the question about prevention of dental caries. X axis represents the question "What do you think is the most important way to prevent dental caries?" and the Y axis represents the number of the participants who responded. Majority of the respondents reported that dental caries can be prevented by reducing the frequency of sugar intake (35).

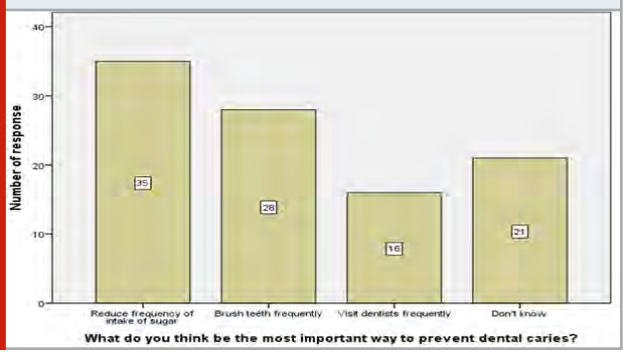


Figure 6: Bar chart represents the association between the awareness about root canal treatment and educational intervention. X axis represents the educational intervention (before - blue and after - green) and Y axis represents the question"What is root canal treatment". The highest score was reported after the educational intervention (green). Chi square test was performed and association between the awareness about root canal treatment and educational intervention was found to be statistically significant. Pearson's correlation value =0.000 (p<0.05), hence statistically significant.

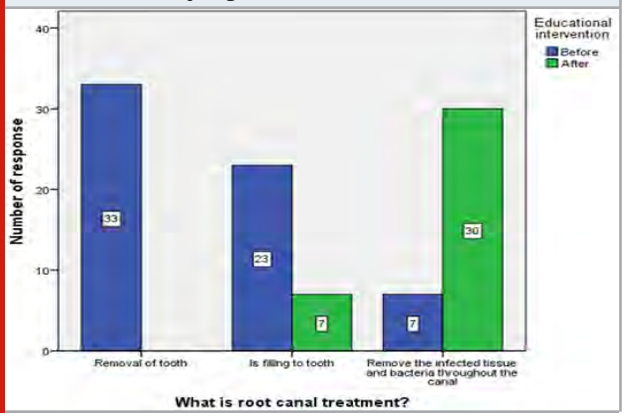
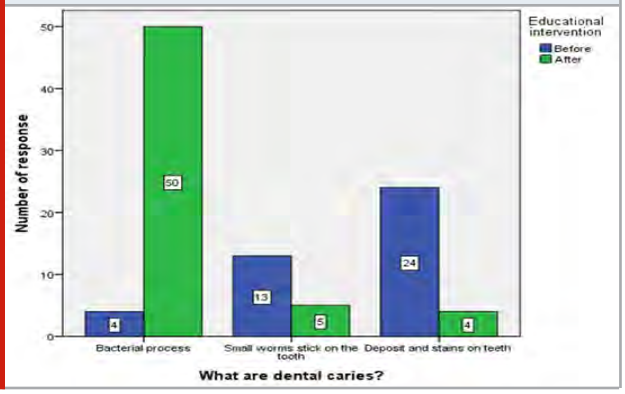
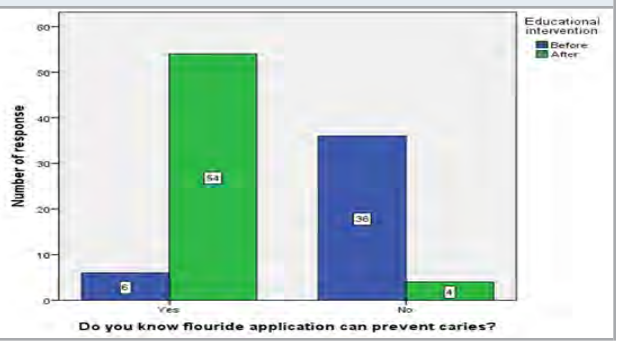


Figure 7: Bar chart represents the association between the etiological factors of dental caries and educational intervention. X axis represents the educational intervention (before - blue and after - green) and Y axis represents the question"What is dental caries". The highest score was reported after the educational intervention (green). Chi square test was performed and association between the awareness about etiological factors of dental caries and educational intervention was found to be statistically significant. Pearson's correlation value =0.000 (p<0.05), hence statistically significant.



The knowledge about fluoride application was increased from among 16% participants to 54% participants (Figure 8). The association between the total knowledge score of awareness about fluoride application and educational intervention, it was found that the highest score was reported after the educational programme. Pearson's correlation to assess the educational intervention and knowledge on fluoride application was found to be statistically significant p =0.00(p<0.05). Figure 9 represents the knowledge scores of the study subjects. There was a significant difference noted in regarding the questions about factors responsible for periodontal disease among the children . About 34% of parents understood the factor responsible for periodontal disease after educational intervention. Chi square test was performed and reported p=0.00(p<0.05), which is statistically significant. After the educational programme 91% of the participants reported that after the explanation given by the dentist they understood the dental procedure(Figure 10). Apart from knowledge and attitude, there was drastic improvement in the practices related to oral health after the programme.

Figure 8: Bar chart represents the association between fluoride application and educational intervention. X axis represents the educational intervention (before - blue and after - green) and Y axis represents the question"Do you know fluoride application can prevent caries?". The highest score was reported after the educational intervention (green). Chi square test was performed and association between the awareness about fluoride application and educational intervention was found to be statistically significant. Pearson's correlation value =0.000 (p<0.05), hence statistically significant.



This study presented a comprehensive overview of the oral health knowledge, behavior and consent towards their dental treatment. Most of the study subjects reported irregular dental attendance and this finding is consistent with the findings of holst et al and ismail et al (Holst, Schuller and Grytten, 1997; Ismail, Tanzer and Dingle, 1997). This can be explained by this that the majority of the study sample did not visit the dentist due to dental fear and anxiety. This pattern of behaviour may indicate barriers to dental services and utilization which needs to be explored in future studies. In this study the parents reported that the most important way to prevent dental caries is by reducing the frequency intake of sugar (35%). This result is in accordance with studies conducted by walsh et al and petersen et al (Walsh, 1985; Petersen and Esheng, 1998). The relationship between dental caries,oral hygiene and a sugary diet was addressed as well(Redmond et al., 2001; Vanobbergen et al., 2004).

In the present study it was found that there was an increase in the overall knowledge score about dental treatment which was similar to the study conducted by

(Farias et al., 2009). There was no gender variation in knowledge, attitude and practices before and after the education programme. At the end of the study, parents seemed to have gained improved knowledge about the treatment, cause and prevention of tooth decay and gingival disease.The dentist must make the parents understand the value of oral hygiene measures and dental treatment which help the child to remain caries free(Sistani et al., 2017).

Figure 9: Bar chart represents the association between the etiological factors for periodontal disease and educational intervention. X axis represents the educational intervention (before - blue and after - green) and Y axis represents the question"Factors responsible for gingival or periodontal disease". The highest score was reported after the educational intervention (green). Chi square test was performed and association between the etiological factors for periodontal disease and educational intervention was found to be statistically significant. Pearson's correlation value =0.000 ($p<0.05$), hence statistically significant.

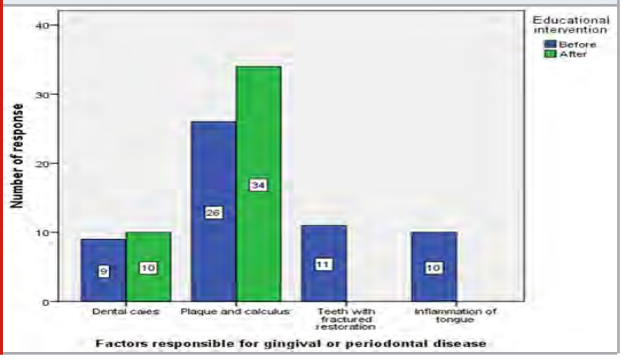
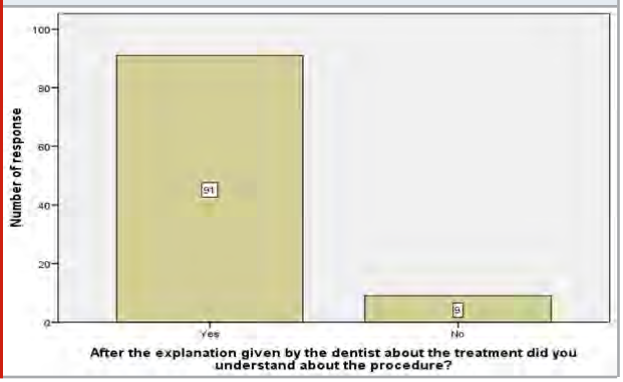


Figure 10: Bar chart distribution showing responses of parents to the question about satisfaction about the programme. X axis represents the question "After the explanation given by the dentist about the treatment did you understand about the procedure?" and the Y axis represents the number of the participants. Majority of the participants understood the dental procedure after the explanation given by the dentist (91).



Several limitations of this study need to be addressed. Because of a smaller study population, the findings obtained from these self-reported data can only be generalized within this population. The short time period between the before and after programme need to bring about a substantial change may be considered as other limitations of this study.

CONCLUSION

Within the limits of our study, we found that parents had some knowledge regarding the oral health and dental treatments but they were not able to use this knowledge in practical because of various factors like time constraint, some beliefs related to the oral care. It is concluded that the awareness of parents about dental procedure and their prevention is not satisfactory before educational intervention. Thus after the educational intervention the parents are much clear about the etiology and prevention for the dental disease.Therefore, the dentist must include these health education programmes into their counselling session to parents when they attend the hospitals with their children and help the parents to modify their lifestyle.

Author Contribution: All authors have equally contributed to the research.

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-162-166

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Awareness on Dry Socket and its Management Among Undergraduate Dental Students – A Questionnaire Survey

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ABSTRACT

Dry socket lesion is a post-extraction socket exhibiting exposed bone which is not covered by a blood clot or healing epithelium. This is one of the most common post extraction complication encountered in routine dental practise. This survey was done to check the knowledge and practise in management of dry sockets among undergraduate dental students. An online questionnaire was shared among 95 participants consisting of final year dental students and dental interns. There were 10 sets of close ended questions shared on survey planet . Based on the answers from the survey, the data was compiled and analyzed. Chi square test of statistical analysis was used with the aid of SPSS software version 20.0. The survey was taken up by 31.58% (n = 30) fourth year students and 68.42% (n = 65) intern students. More than 60 % students gave correct responses to questions related to etiology, clinical presentation and management of dry socket. There were a smaller number of students who gave correct answers to the pathogenesis of the condition (51%). Both final year and intern students displayed an overall good knowledge about dry socket and its management. However, intern students showed better understanding than fourth year students which was statistically significant with $p < 0.05$ to three out of ten questions. It can be concluded that dental students eventually gain better insight in the subject with increasing clinical years.

KEY WORDS: ALVEOLAR OSTEITIS, BACTERIA, EXTRACTION, IRRIGATION, MEDICAMENT, PLASMIN.

INTRODUCTION

Dry socket, also referred to as fibrinolytic osteitis or alveolar osteitis, is a complication of the post extraction socket (Mamoun, 2018). A dry socket lesion is a post-extraction socket exhibiting exposed bone which is not covered by a blood clot or healing epithelium and exists inside or around the perimeter of the socket for days after the extraction procedure (Bowe et al., 2011). Patients following extraction will not be able to stop the tongue stimulating the socket when food particles get impacted. This mechanical stimulation on the exposed bony structure under the extracted socket which can be acutely painful to touch.(Bowe et al., 2011). The impacted food particles and bacteria present can dislodge the blood clot with the exposed bone and prolong the healing time of the exposed socket.(Sharma et al., 2017).

This phenomenon results in formation of toxins causing irritation of the exposed bone structure, halitosis and jaw pain (Birn, 1970). Though the cause of dry sockets are not well known, there are certain etiological factors

ARTICLE INFORMATION

*Corresponding Author: madhulaxmi@saveetha.com
Received 2nd Aug 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/130

and personal factors like poor oral hygiene, smoking, oral contraceptive use, traumatic extractions with heavy luxation of tooth can correlate with an increased incidence of dry sockets (Catellani et al., 1980). The socket can be completely exposed to the level of the bone or can be lined by infectious food debris or weakly clumped bacterial material.

There can be some amount of healing that is exhibited on the occlusal layers of the socket (Abhinav et al., 2019; Freudenthal et al., 2015; Mamoun, 2018). The basic treatment of dry sockets involves the irrigation of the infected socket using saline or chlorhexidine gluconate, povidine iodine.(Freudenthal et al., 2015) This irrigated socket is filled with a medicaments like zinc oxide eugenol pack(Birn, 1973; Kumar et al., 2015). Measures are taken for optimal visualisation to reduce the contact of irrigation needles with the bone and proper removal of the debris in all aspects of the socket(Nusair and Abu Younis, 2007). Forceful curettage is contradicted in the case of dry sockets as it can spread the infection. Dry sockets can also be anesthetised and curetted to induce fresh bleeding to facilitate the healing of the socket(H, 2011). With a rich case bank established over 3 decades we have been able to publish extensively in our domain.

(Abdul Wahab et al., 2017; Abhinav et al., 2019; Eapen et al., 2017; J et al., 2018; Jain and Nazar, 2018; Marimuthu et al., 2018; Patil et al., 2017; Ramadorai et al., 2019; Senthil Kumar et al., 2019; Sweta et al., 2019; Wahab et al., 2018). Based on this inspiration we aim to create an awareness on dry sockets. The aim was to assess and evaluate the knowledge on dry sockets among final year students and intern dental students.

MATERIAL AND METHODS

An online questionnaire was shared among 95 participants consisting of final year dental students and dental interns. There were 10 sets of close ended questions shared on survey planet . The study was conducted in December 2019. Inclusion criteria were that the participants had to be in their final year or internship year. Prefinal year and specialists were excluded from the study. Participants only willing to answer all the survey questions were included after taking their informed consent. The questionnaire was prepared in a such a way to incorporate all clinical aspects of dry socket. Questions regarding etiology, pathogenesis, clinical features and management of dry socket were precisely framed. The responses of the survey were tabulated with the use of excel sheets. The analysis of the responses was done with the help of a statistical software SPSS version 20.0. Chi square tests were used to check for statistical significance.

RESULTS AND DISCUSSION

The study showed that out of the 95 participants who took part in the survey, 31.58% of them were fourth year students and 68.42% of them were intern students (figure 1). 17.89% fourth year and 46.32% intern students answered correctly for the question on the most common site of incidence for alveolar osteitis as mandibular posterior region. This response did not have any statistically significant difference among the students in different years of study (p=0.097 > 0.05 .(figure 2). 12.63% fourth year and 41.05% interns answered correctly to the question, what is the pathogenesis for dry sockets as plasminogen pathway. The response has a statistical significance and the interns were better aware of the pathogenesis of dry sockets when compared to final years with p=0.036 < 0.05 (figure 3).

Figure 1- represented the frequency of fourth year students and interns who took part in the survey. X axis represents the year of study of the participants and Y axis represents the number of fourth year and intern students who participated in the survey.

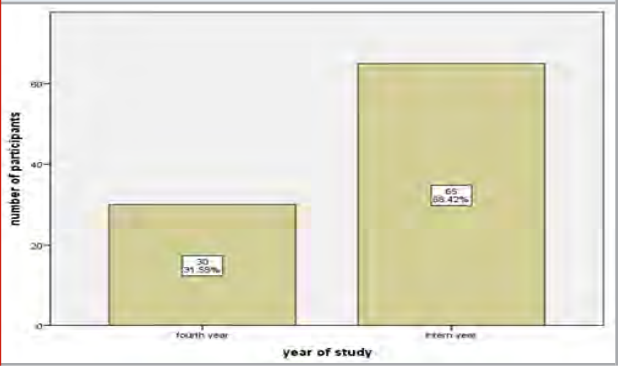
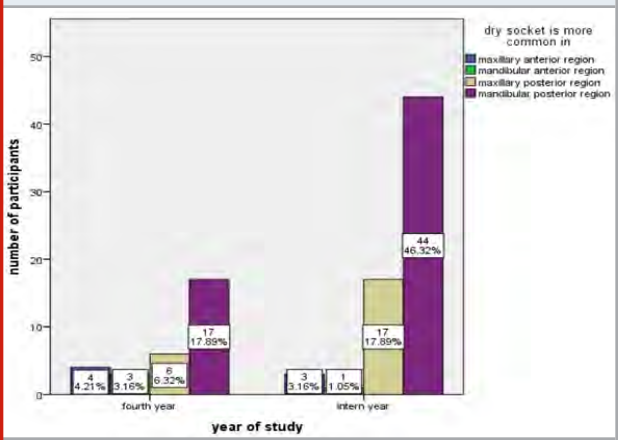


Figure 2: Represents association between the response to the question, dry socket is common in which quadrant. X axis represents year of study and Y axis represents the number of participants. 64.21% participants agreed that mandibular posterior quadrant was the most common site (purple). The association of response to the year of study was not statistically significant with p value = 0.097 > 0.05 using chi square test.



16.84% fourth year and 46.32% interns answered correctly to the question, dry sockets occurrence is seen after how many days of tooth extraction as 2-5 days. The responses did not have any statistical significant

differences among the students in different years of study(p=0.14 > 0.05) (figure 4). 21.05% fourth year and 65.26% interns answered correctly to the question, is smoking a etiological cause for the incidence of dry socket as yes. The responses were statistically significant as the most interns responded correctly when compared to final year students(p=0.00 < 0.05).(figure 5) 11.58% fourth year and 44.21% answered correctly to the question, what is the most widely used medicament for dry sockets as alvogyl. There was a statistical significance and more interns answered correctly when compared to final year students(p=0.016 < 0.05).(figure 6)

Figure 3: Represents association between the response to the question, activation of which pathway leads to dry sockets . X axis represents year of study and Y axis represents the number of participants. 53.68% participants chose the most apt answer which was plasminogen pathway activation causes dry sockets (green). The association of response to the year of study was statistically significant with p value = 0.036 < 0.05 using chi square test, showing that intern students were more sure of the correct answer compared to the final year students.

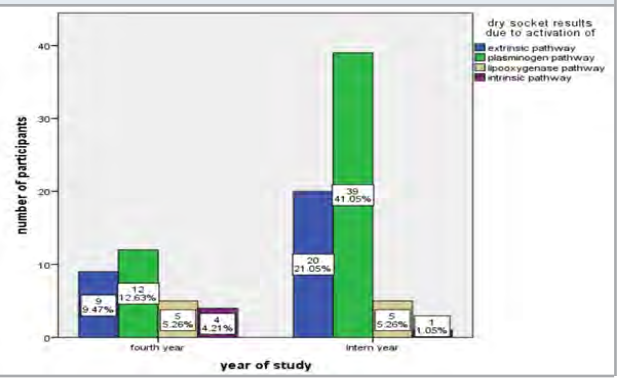


Figure 4: Represents association between the response to the question, incidence of dry socket occurs after how many days. X axis represents year of study and Y axis represents the number of participants. 63.16% participants knew the correct answer that dry socket incidence is seen 2-5 days following extraction (green). The association of response to the year of study was not statistically significant with p value = 0.14 > 0.05 using chi square test.

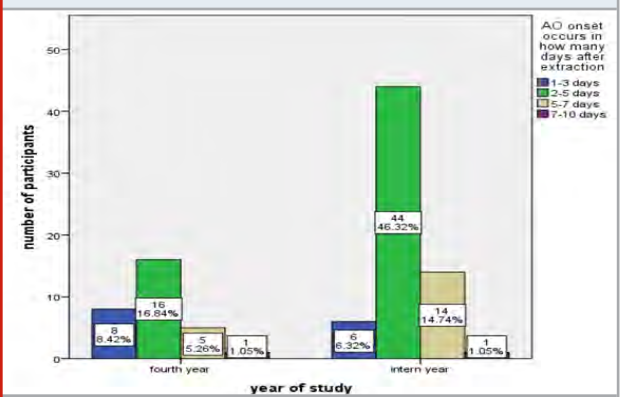


Figure 5: Represents association between the response to the question, is smoking a risk factor for the dry sockets. X axis represents year of study and Y axis represents the number of participants. 86.31% participants agreed that smoking is a risk factor for the incidence of dry sockets(purple). The association of response to the year of study was of high statistical significance with p value = 0.0 > 0.05 using chi square test, showing that intern students were were more aware that smoking is a predisposing factor to AO.

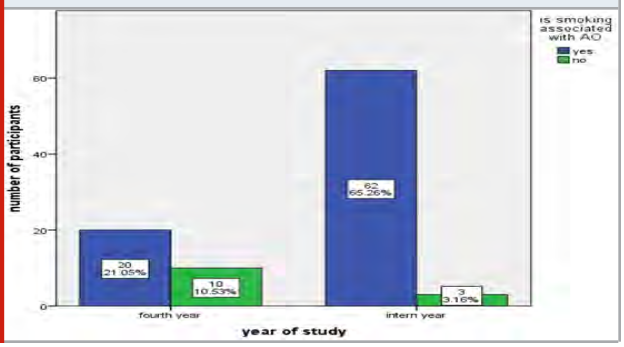
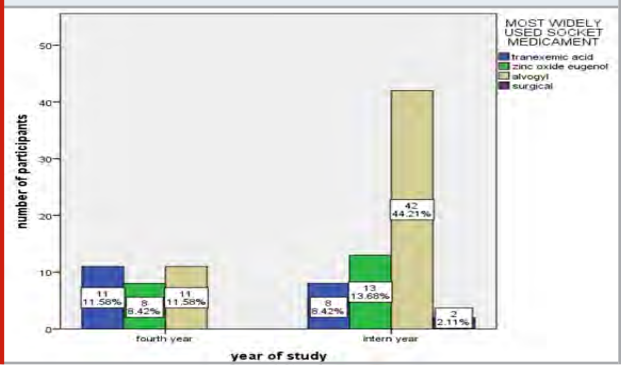


Figure 6: Represents association between the response to the question, which medicament is the most widely used medicament for dry sockets .X axis represents year of study and Y axis represents the number of participants. 55.79% participants agreed that alvogyl is the most widely used medicament for dry sockets(white). The association of response to the year of study was statistically significant with p value = 0.016 <0.05 using chi square test.



Dry sockets or fibrinolytic alveolitis or alveolitis sicca dolorosa is one of the most common complaints following extraction of teeth.(Alexander, 2000) There is a variation in the existence of dry sockets where the most common existence being in the mandibular third molar region following the extraction of the tooth.(Lilly et al., 1974) The study by Mohammed B Younis,et al. showed that there was an overall incidence of dry sockets in patients with an incidence of 3.2%, approximately 1% to 5% of all extractions and in up to 38% of mandibular third molar extractions.(H, 2011). Our survey showed that most students were aware about the common site of incidence of dry socket.

Dry socket is caused mainly due to the disintegration of the blood clot by fibrinolysis.(Krekmanov, 1981)

Plasminogen, the precursor of plasmin, circulates in the blood and binds to clots at wound sites. It is an important molecule that aids in the formation of blood clot, helping to induce fibrinolysis in the wound site. In cases of dry sockets there is lack of blood flow at the site because of bacterial and food debris present over the site of the wound, thereby delaying the healing of the extraction site and causing ischemia (Syrovets et al., 2012). This ischemia prevents initial blood clot to reform through additional bleeding and may prevent the immune system to act the site through local capillaries to initiate an inflammatory response to resorb the necrotic bone cells. (Chapin and Hajjar, 2015) 53.58% students were able to answer this correctly among which 41.05% were intern students.

The incidence of dry sockets was mainly observed after 2-5 days following post extraction. The food particles and bacteria present inside the extraction socket hinder the healing of the wound and lead to the formation of toxins, causing irritation to the exposed bone leading to acute to chronic pain at the site of occlusion.(Porter, 1989) Many factors like smoking, use or oral contraceptive could trigger the formation of alveolar osteitis. Smoking and use of oral contraceptives both facilitate blood clotting throughout the body which can reduce blood circulation into the extraction socket correlating with the increased incidence of dry socket lesions in an individual.(Meechan et al., 1988) Our study correlates with this statement as 21.05% fourth year students and 65.25% interns were aware of smoking increasing the chances for the incidence of dry sockets and 10.53% fourth year students and 35.79% interns were aware that the use of oral contraceptives increased the chances for the incidence of dry sockets.

The basic treatment for dry sockets involves irrigation of the sockets using saline or chlorhexidine gluconate. The debris is completely removed and followed by the application of intraoral medicament like zinc oxide eugenol, povidine iodine and alvogyl.(Kolokythas et al., 2010) Pain relief is considered the primary goal of treatment in case of dry socket. The composition of both Alvogyl and Zinc oxide eugenol contains eugenol acting as sedative as well as having antibacterial properties. Alvogyl also contains butamben (anesthetic) and iodoform (antimicrobial).(Bloomer, 2000). The response to questions on smoking as risk factor to alveolar osteitis and treatment of alveolar osteitis showed statistically more correct responses from the intern students.

This difference can probably be due to the more clinical and practical exposure of intern students when compared to the fourth year dental students. Alveolar osteitis, being one of the most common complications that can be encountered during dental practise needs to be well understood by all dental practitioners. This post extraction complication can be very painful interfering with the patients regular activities. Hence, it is of utmost importance that as ongoing dental practitioners, students have a clear knowledge on the etiology, mechanism, clinical features and management of dry socket. Proper knowledge on the techniques followed by the dentist is necessary to reduce traumatic extractions. The education of patients on proper healthy practices is necessary to reduce the incidence of post extraction complications. Post extraction instructions should be given carefully to the patients to reduce improper practices following extraction of the tooth.

CONCLUSION

The survey showed that both final year and intern students displayed an overall good knowledge about dry socket and its management. However, intern students showed better understanding than fourth year students which was statistically significant. It can be concluded that dental students eventually gain better insight in the subject with increasing clinical years. However, not all students were clear with the topic of interest. This emphasises the importance of the need for one on one viva and training to ensure every student is equally competent.

ACKNOWLEDGEMENTS

The authors express their sincere gratitude to all the respondents who had willingly participated in the study

Conflict of Interest: There were no conflicts of interest as defined by the authors.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-167-174

BBRC
Bioscience Biotechnology
Research Communications

Comparative Evaluation of Gingival, Periodontal and Plaque Status in Smokers and Smokeless Tobacco Users

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ABSTRACT

Tobacco is one of the most widely distributed and commonly used addictive substances. Tobacco can be consumed through the mouth in a variety of forms, varying from smoking to smokeless tobacco chewing on itself. It leads to various life threatening consequences like oral cancer, lung cancer, cardiovascular diseases. In the oral cavity, it mainly affects the periodontium giving rise to gingivitis and periodontitis leading to alveolar bone damage and tooth loss. The aim of this study is to compare the gingival, periodontal health and plaque status in smokers and smokeless tobacco users. A hospital based cross sectional study was conducted among 100 patients including 50 smokers and 50 smokeless tobacco users visiting the out patient department of a private Dental College. The data was obtained by questionnaire based history taking followed by the clinical examination of the relevant parameters. The result data was tabulated in excel and imported to SPSS for further analysis. Chi square tests were done for statistical analysis. There were 4%, 3% of smokers and smokeless tobacco users reported with high probing depth respectively. 15% of smokers and 12% of smokeless tobacco users reported with severe gingivitis. 11% of smokers and 16% of smokeless tobacco users reported with poor plaque index score. Smokers had poor gingival and periodontal health when compared to smokeless tobacco users. Smokeless tobacco users had more plaque accumulation when compared with smokers. Prevention of tobacco usage onset and support for cessation of the same could contribute to improved oral health status.

KEY WORDS: TOBACCO; SMOKING; SMOKELESS; CLINICAL; ORAL HEALTH.

INTRODUCTION

Today, around the world, tobacco is one of the most widely distributed and commonly used addictive substances(Dere et al., 2014)(Harini and Leelavathi, 2019). Tobacco is the common name of several plants belonging to the family Nicotiana. It mainly contains the highly addictive stimulant alkaloid nicotine as well as harmala alkaloids(Dere et al., 2014; Joshi and Tailor, 2016). The other chemicals found in the tobacco includes hydrogen cyanide, formaldehyde, lead, arsenic, ammonia, radioactive elements, such as uranium, Benzene, Carbon monoxide, Nitrosamines, Polycyclic aromatic hydrocarbons (PAHs) (Rani, 2003). The epidemic of tobacco use is one of the paramount threats to global health today(Petersen, 2003). Globally, around five million deaths every year are attributable to direct tobacco use, which is the largest preventable cause of death (Harsha et al., 2014)(Narain et al., 2011). In India, among people aged 30 years and over, the mortality due to tobacco use is 206 per 1, 00,000

ARTICLE INFORMATION

*Corresponding Author: leelavathi.sdc@saveetha.com
Received 4th Aug 2020 Accepted after revision 25th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/131

in men and 13 per 1, 00,000 in women with proportion of deaths attributable to tobacco reaching 12% for men and 1% for women(Mathur et al., 2008).

Tobacco is been described as an important causative factor of death worldwide and also as a preventable risk factor to human health (Health, US Department of Health & Human Services; Centers for Disease Control and Prevention; National Center for Chronic Disease Prevention & Health Promotion and Office on Smoking & Health, 2000). Tobacco is chewed, smoked, sucked, and sniffed and is the one product which is deleterious to the populaces, when it is used entirely as intended (Barbour et al., 1997). Tobacco can be consumed through the mouth in a variety of forms, varying from smoking to smokeless tobacco chewing on itself or combined with betel nut (Haas et al., 1996; Barbour et al., 1997). The few reports of tobacco smoking in different population groups report its prevalence from about 15% to over 50% among men (Ghosal et al., 1996). The common forms of tobacco smoking are cigarette, beedi, chutta and hookah, with cigarette being the most predominant form. Smoking tobacco is mostly seen in the urban population whereas in the rural areas and some parts of suburbans, people prefer smokeless tobacco(Chockalingam et al., 2013). Smokeless tobacco is used mostly in south East Asia.

In India, tobacco is smoked as a cigarette, beedi, cheroot, or in a pipe. The smokeless forms of tobacco are chewing raw tobacco leaves or pan masala, or inhaled as snuff(Giovino et al., 1995). Also one of the many smokeless tobacco forms available in India includes Gutkha, which contains areca nut, slaked lime, catechu, condiments, and powdered tobacco (Warnakulasuriya, Trivedy and Peters, 2002). As stated by the Global Adult Tobacco Survey, India, 2016–2017, the prevalence of smokeless tobacco use in India is 21.4% (Razali et al., 2005). According to the WHO study group, a smokeless tobacco user can have blood nicotine levels as high as, or even higher than, those found in tobacco smokers (Backinger, 1990). But the smoke being produced from smoking can produce more heat inside the oral cavity causing more inflammatory changes and increasing the risk when compared to that of smokeless tobacco usage (Backinger, 1990; Vineis et al., 2004). The usage of tobacco by smoking or by other forms does not have much difference in affecting the systemic condition of the user as the components are similar.
Tobacco use is a major risk factor for diseases such as cardiovascular diseases and lung cancer (Stämpfli and Anderson, 2009).

Apart from these systemic ill effects, epidemiological studies on the relationship between tobacco use and periodontal diseases have consistently shown that tobacco users are two to six times more prone to develop periodontitis than non-users (Vellappally et al., 2008) (Padavala and Leelavathi, 2019). Also it is a risk factor for oral cancer, oral mucosal lesions, periodontal disease and impaired healing after periodontal treatment, gingival recession, and coronal and root caries (Ariyawardana, Athukorala and Arulanandam, 2006)(Gautam et al., 2011; Leelavathi and Shreya, 2020). The affected site or lesion can be a white or yellow-brown color and it may develop a thickened and wrinkled appearance with increased use of the tobacco product. However, analyzing the clinical parameters of only smoking tobacco users is of limited use because they give partial details about the tobacco usage and its effects.

Thus a more accurate assessment of disease activity caused by smoking tobacco and using smokeless tobacco may assist with early intervention in patients with this disease. We have successfully completed numerous epidemiological studies for the betterment of our community(Patturaja, Leelavathi and Jayalakshmi, 2018; Murthy, Sindhu Priya Kuppusamy and Leelavathi, 2019; Shankar and Leelavathi, 2019; Sriram and Leelavathi, 2019) (Prabakar, John, Arumugham, Kumar and Sakthi, 2018a, 2018b; Prabakar, John, Arumugham, Kumar and Srisakthi, 2018; Vishnu Prasad et al., 2018; Khatri et al., 2019; Manchery et al., 2019; Shenoy, Salam and Varghese, 2019). In this study we compare the gingival and periodontal health in smokers and smokeless tobacco users.

MATERIAL AND METHODS

The present study was carried out to analyze and compare the clinical parameters of smokers and smokeless tobacco users. A hospital based cross sectional study was held among 100 patients consisting of 50 smokers and 50 smokeless tobacco users aged between 20 to 70 years. This retrospective study was conducted in the Out Patient Department of a private dental College, Chennai. Prior permission from the patients was taken for conducting the study.

Inclusion criteria: It includes all the patients aged between 20 to 70 years with the presence of at least 20 teeth. They should be periodontally untreated and free of any systemic illness.

Exclusion criteria: Chronically alcoholic patients with any systemic illness or presence of any periodontal abscess, necrotizing ulcerative gingivitis are excluded. Patients who had any previous periodontal treatment or under anti-inflammatory and antimicrobial drug therapy are also excluded from the study. Patients who had recent extractions or trauma to avoid false results are also not included in the study.

Clinical examination: Tobacco usage history was assessed according to a standardized interview and self-reported questionnaire. A detailed case history was then taken followed by a complete clinical examination. Tobacco usage was determined by the form in which it was used, frequency of usage, daily consumption (packets used daily) and how many years they have been using tobacco. The following clinical parameters were recorded. Probing depth, Gingival index and Plaque index. All of these parameters were checked with the help of Williams probe. The probing depth was determined in all the six

surfaces and was scored based on the probing depth range. The gingival health was scored as mild, moderate and severe based on the Loe and Silness index. Mild gingivitis is when there is mild inflammation with no edema, moderate gingivitis when there is moderate inflammation, redness and edema. Severe gingivitis when there is severe inflammation, marked redness and edema. Disclosing solutions were used and after rinsing the oral cavity was examined for the staining. The presence of plaque was noted and the surfaces which do not have soft accumulations at the dentogingival junction were not considered. Based on Loe's plaque index, it is scored as good when there is no or minimal plaque accumulation, fair when there is plaque accumulation in one third of tooth surface and poor when plaque accumulation is more than two third of tooth surfaces.

Data Analysis: Data tabulation was done in excel and the statistical analysis was done using the Statistical Package for the Social Sciences(SPSS). Results on categorical measurement were presented in percentage(%). Chi square test was done and the level of significance was predetermined at the probability value of P = 0.05 and any value 0.05 was considered to be statistically significant. Chi square test was done to assess the difference in the clinical parameters of smokers and smokeless tobacco users.

Table 1. Table showing the frequency in packets used in a day by the smokers. There is a higher percentage of smokers using 1 to 2 packets daily.

Frequency in packets/day	Percentage (%)	No. of patients(n)
Less than 1 packet	36%	18
1 - 2 packets daily	48%	24
More than 2 packets daily	16%	8

Table 2. Table showing the frequency in packets used in a day by the smokeless tobacco users. There is a higher percentage of smokers using 3 to 5 packets daily.

Frequency in packets/day	Percentage (%)	No. of patients(n)
1 - 2 packets daily	20%	10
3 - 5 packets daily	48%	24
6 to 10 packets daily	20%	10
More than 10 packets daily	12%	6

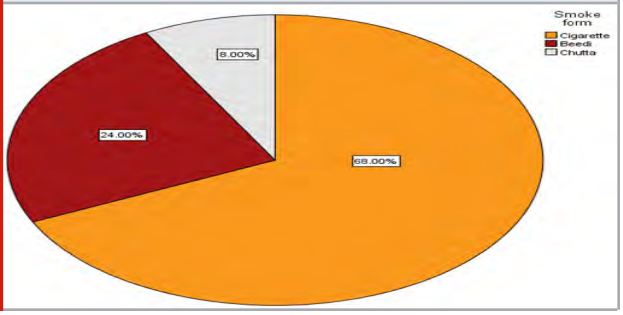
RESULTS AND DISCUSSION

This study was conducted to analyze the clinical parameters in smokers and smokeless tobacco users. Clinical parameters such as the probing depth, gingival index, plaque index were assessed for both smokers and smokeless tobacco users. Type of smoking tobacco preferred by the smokers includes 68% cigarette, 24% beedi and 8% chutta (Figure 1). Type of smokeless tobacco preferred by the reported patients includes 44% Paan, 36% Gutkha and 20 % Hans (Figure 2). The frequency in packets per day usage of smokers shows that 36% of them smoke less than a packet in a day. 48% of patients smoke one to two packets daily and the remaining 16% smoke more than 2 packets daily (Table 1). The frequency in packets per day usage of smokeless tobacco users shows that 20% of the patients use 1 to 2 packets daily, 48% of them use 3 to 5 packets and 12% of them use more than more packets daily (Table 2).

Table 3. Table showing the duration of habit in years of smokers and smokeless tobacco users. There is a higher percentage of smokers and smokeless tobacco users using it for 3 to 5 years when compared to other duration.

Duration of habit in years	Smokers	Smokeless tobacco users
Less than a year	16% (8)	12% (6)
1 - 2 years	32% (16)	36% (18)
3 - 5 years	28% (14)	28% (14)
6 - 10 years	20% (10)	16% (8)
More than 10 years	4% (2)	8% (4)

Figure 1: Pie chart showing the distribution of different smoke forms of tobacco preferred by the patients. The orange colour represents Cigarettes, red colour represents Beedi and gray colour represents Chutta. Cigarettes were the most commonly used tobacco form in the smokers when compared to the other forms.



The duration of habit among smokers shows that 16% of them have been using it in less than a year. 32% of the patients have used it between 1 to 2 years, 28% of them have been using it for 6 - 10 years and 4% of them have been using it more than 10 years. Similarly, 12% of the smokeless tobacco users have been using it in less than a year. 36% of the patients have been using it for 3 - 5 years, 28% of them have been using it for 6 to 10 years and 8% of them have been using it for more than 10 years(Table 3).Age prevalence in the tobacco using patients showed that, among the age group of 20 to 35 years, 17% smokers and 8% smokeless tobacco users have reported. In the age group of 36 to 50 years, 24% smokers and 22% smokeless tobacco users have reported. 8% of smokers and 16% of smokeless tobacco

users have reported in the age group of 51 to 65 years. 4% of smokeless tobacco users have reported above the age group of 65 years and 1% smokers have reported (Figure 3). P value is p=0.001 and hence it is statistically significant.

Figure 2: Pie chart showing the distribution of different smokeless tobacco forms used by the patients. The colour yellow represents Gutkha, green colour represents Paan and black colour represents Hans. Paan was the most commonly used tobacco form in the smokeless tobacco users when compared to the other forms.

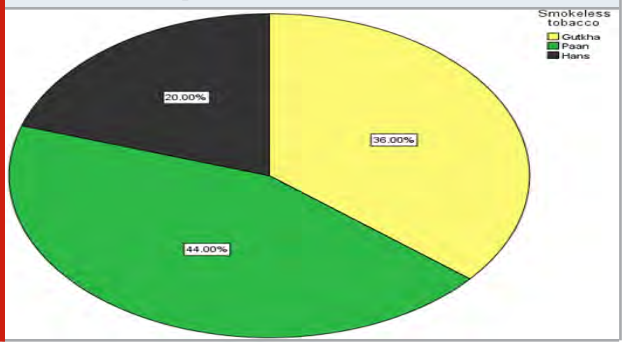
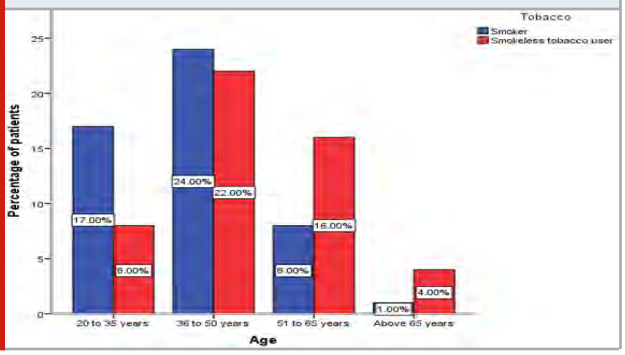


Figure 3: Bar graph showing the distribution of different age groups in the smokers and smokeless tobacco users. X axis represents the age group and the y axis represents the number of patients. The blue colour represents the smokers, red colour represents the smokeless tobacco users. Though there exists statistical significance in the age group distribution, there is no clinical difference in the age group between smokers and smokeless tobacco users. Chi square statistical test was done and the p value was found to be 0.001(p value 0.05, statistically significant).



The association of probing depth in the tobacco users show that the probing depth in the range 1 to 4mm was high among smokeless tobacco users(16%) when compared to smokers(14%). The probing depth in the range 5 to 8mm was high among smokeless tobacco users(26%) when compared to smokers(25%). Smokers have probing depth in the range of 8 to 12mm (8%) when compared to smokeless tobacco users (4%). Above 12mm probing depth, more number of smokers have reported(4%) when compared to smokeless tobacco users(3%) (Figure 4). The probability value is p=0.001 and hence it is statistically significant. The gingival index in the tobacco users shows that more number of smokers reported mild gingivitis(24%) when compared to smokeless tobacco users (22%).

Figure 4: Bar graph showing the probing depth observed in smokers and smokeless tobacco users. X axis represents the probing depth and the y axis represents the number of patients. The blue colour represents the smokers, red colour represents the smokeless tobacco users. High probing depth was seen in the smokers when compared to smokeless tobacco users suggesting that smokers have high probing depth. Chi square statistical test was done and the p value was found to be 0.001(p value 0.05, statistically significant).

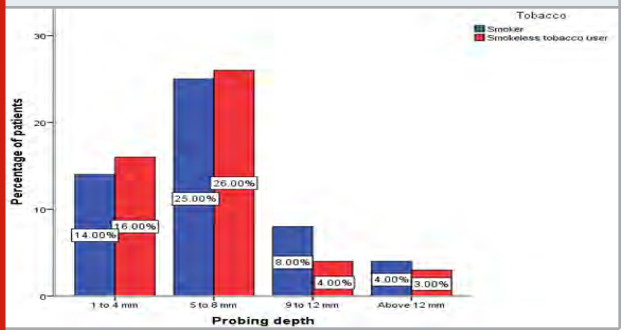
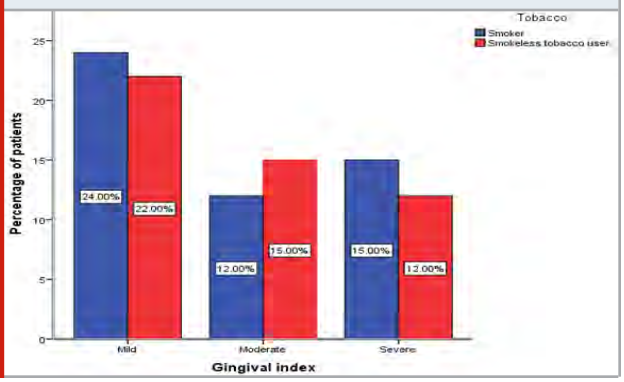


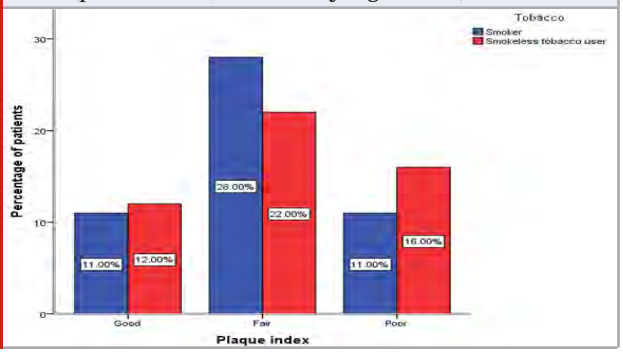
Figure 5: Bar graph showing the gingival index observed in smokers and smokeless tobacco users. X axis represents the gingival index score and the y axis represents the number of patients. The blue colour represents the smokers, red colour represents the smokeless tobacco users. Severe gingivitis based on gingival index was seen more in the smokers when compared to smokeless tobacco users suggesting that severe gingivitis was more prevalent among smokers. Chi square statistical test was done and the p value was found to be 0.027(p value 0.05, statistically significant).



Moderate gingivitis was seen more in smokeless tobacco users(15%) than the smokers(12%). Severe gingivitis was reported higher in smokers (15%) than the smokeless tobacco users(12%)(Figure 5). The probability value is p=0.027 and hence it is statistically significant. The plaque index report shows that 12% smokeless tobacco users and 11% of smokers have reported with good plaque status. More number of smokers have reported with fair plaque accumulation(28%) when compared to smokeless

tobacco users (22%). Smokeless tobacco users have more plaque accumulation(16%) when compared to smokers (11%)(Figure 6). The probability value is p=0.002 and hence it is statistically significant.

Figure 6: Bar graph showing the plaque index score observed in smokers and smokeless tobacco users. X axis represents the plaque index score and the y axis represents the number of patients. The blue colour represents the smokers, red colour represents the smokeless tobacco users. Poor plaque index was seen in the smokeless tobacco users when compared to smokers suggesting that smokeless tobacco users have high plaque accumulation. Chi square statistical test was done and the p value was found to be 0.002(p value 0.05, statistically significant).



Tobacco usage has become one of the serious public health problems due to its adverse effects on systemic and oral health (Bergström, 1990). Every year 6 million people die from tobacco related diseases. Globally, tobacco causes about 71% of lung cancer, 42% of chronic respiratory diseases and about 10% of cardiovascular disease(Critchley, 2003). Earlier studies have shown the adverse effects of tobacco on the periodontium and have proved the tobacco usage is per se a risk factor in the etiology of oral disease(Beck and Offenbacher, 2001)(Haffajee and Socransky, 2001). Out of the various components of tobacco smoke, nicotine acts on the periodontal tissues causing destruction of the supporting tissues (Anand et al., 2013). Free radicals and peroxides from the tobacco are linked with physiological phenomena such as synthesis of prostaglandins and thromboxane, and they are also involved in the pathogenesis of various diseases including atherosclerosis, carcinoma, and inflammatory processes(Stämpfli and Anderson, 2009).

In our study the most used tobacco form by the smokers is cigarette followed by beedi(Figure 1). This finding is similar to the one reported in a study in Delhi(Narayan et al., 1996). Similarly the usage of paan was higher among the reported smokeless tobacco users(Figure 2) which is in accordance with few previous studies(Niaz et al., 2017). Age has been found to be an important determinant of tobacco use in earlier studies(Singh and Ladusingh, 2014) (Jha et al., 2008). In our study, there is a higher preference among the age group of 36 to 50 years in smokers and smokeless tobacco users. This is in accordance with a study in China(Figure 3)(Li, Hsia and Yang, 2011).

The present study compared the clinical parameters of smokers and smokeless tobacco users. According to our study, the probing depth was higher in smokers (Figure 4) which is in agreement with earlier studies(Machuca et al., 2000; Weijden et al., 2001). The precise mechanism by which tobacco smoking influences the periodontal tissues remains unclear. Tobacco components can stimulate the production of proinflammatory cytokines, such as interleukin (IL)-1, IL-6, IL-8, tumor necrosis factor-α, as well as transforming growth factor-β, thereby promoting increased bone resorption and tissue destruction.

Tobacco users have reduced bleeding when compared to the general population (Kanakdande, Patil and Nayyar, 2015)(Baab and Ake Oberg, 1987). This can be attributed to the fact that tobacco users have decreased blood flow to the tissues of periodontium, which may manifest clinically as reduced bleeding on probing (Anil, 2008; Katuri, 2016). Smoking also causes immuno-inflammatory imbalances resulting in increased oxidative stress in the body. The latter hastens the inflammation process, which increases the susceptibility to infections and dental caries. In our study severe gingivitis was seen more among the smokers which is similar to the study of Haber(Haber et al., 1993)(Figure 5). Though smoking alters the vascular function, neutrophil, monocytes count, cytokines and inflammatory mediators, the gingival inflammation can be reduced with plaque removal(Haber et al., 1993; Linden and Mullally, 1994) (Lang, Cumming and Löe, 1973). It also destroys the surrounding microflora leading to decreased human immune response causing dental caries and alveolar bone damage thereby affecting periodontium. In our study, the plaque index score value shows that more number of patients reported with fair oral hygiene and slightly higher number of smokeless tobacco users reported with poor oral hygiene(Figure 6).

The rate at which plaque develops varies between individuals, and it may be deduced that the rate of development of gingival inflammation also will show variation(Ilankizhai and Leelavathi, 2018). The reasons why such differences occur has not yet been fully explained, but several factors may act indirectly and it is possible that one of these might be tobacco usage(Genco, Evans and Ellison, 1969)(Jensen et al., 1968)(Mahapatra et al., 2018)(Akhter et al., 2007; Parmar et al., 2008; Agili, Al Agili and Park, 2013). Also, it is stated that it has a stronger potential of leading to addiction compared to chewing tobacco because of its higher nicotine concentration and prolonged mean usage time(Parmar et al., 2008). This clearly states that using tobacco in any form affects the oral and systemic health. The results of the study have provided valuable data by comparing the gingival and periodontal health of smokers and smokeless tobacco users. This information would be useful for the oral health planners to create awareness among the general population regarding its adverse effects. The dental clinicians can provide proper diagnosis and management setup with these details before any specialised procedure.

CONCLUSION

Within the limits of the present study, smoking tobacco is said to have undeniably adverse effects on gingival and periodontal health status of the patients when compared to smokeless tobacco users. Similarly, the plaque index was higher among the smokeless tobacco users suggesting that smokeless tobacco users have poor plaque status. Moreover, the frequency and duration of the habit were directly associated with the above mentioned oral health related conditions. Tobacco is clearly a big burden in terms of its magnitude and use in different forms. The present research further emphasizes on the need to educate and promote awareness about tobacco products. Advising patients to quit tobacco use is a dental professional responsibility, and the dentists may take an active role in nicotine replacement counselling.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the help and support rendered by the Research Department of SIMATS for their constant assistance with the research.

Conflict of Interest: Authors declare no potential conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-175-181

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Suresmile Technology: Precision to your Smile – A Review

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ABSTRACT

Dentistry has contributed to the huge advancement of technology and innovation for the past few decades. Suresmile technology is one of the latest advanced technologies in orthodontic treatment which has been introduced since 1998 and commercially released in 2005. The latest advancements in Dentistry other than Suresmile technology (OraMetrix) are Insignia (Ormco), orthoCAD (Cadent) and iBraces (3M Unitek) It uses advanced technology such as three-dimensional (3D) imaging of the dentition, robotics, and computer-aided manufacturing and digital model technology. It has been used widely by orthodontists and it may be expanded all over the world in the future. The advantages of this technology which provides benefits to the patients especially in terms of length of treatment make the patient willing to pay greater cost just for shorter treatment time. They might feel comfortable throughout the treatment as the number of visits to the dentist can also be reduced by using Suresmile. It is important to understand the accuracy and reliability of these imaging devices. Thus, proper knowledge about this technology is at utmost essential to ensure the great and successful outcome of the orthodontic treatment. Hence, a review was done to analyze the effectiveness, efficiency, reliability, advantages and disadvantages of the sure smile technology.

KEY WORDS: CONVENTIONAL; ORASCANNER; ORAMETRIX; ORTHODONTICS; SURESMILE.

INTRODUCTION

Dentistry has contributed to the advancement of technology and innovation for the past few decades. The latest advancements in Dentistry are Suresmile technology (OraMetrix), Insignia (Ormco), orthoCAD (Cadent) and iBraces (3M Unitek) (Sachdeva et al., 2012). These technologies allow the clinicians to provide computer-driven customized care solutions at varying levels (Sachdeva et al., 2012). Suresmile technology is one of the latest advanced technologies in orthodontic treatment which has been introduced since 1998 and commercially released in 2005 (Alford et al., 2011). It was introduced by Dr. Sachdeva who is the co-founder and Chief Clinical Officer of Suresmile (Scholz and Sachdeva, 2010). In most of his publications, he stated that Suresmile technology is designed to minimize the errors during orthodontic treatment due to appliance management as well as shorten the time of the treatment.

Besides, it is also believed to provide a completely integrated, clinical solution to the extended care cycle (Sachdeva et al., 2012). Based on the study done, although

ARTICLE INFORMATION

*Corresponding Author: leelavathi.sdc@saveetha.com
Received 8th Aug 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/132

Suresmile patients may have a shorter treatment time, the quality is still maintained at its best. In an interview done between Dr. Sachdeva and Robert P, he explained that the reason behind Suresmile technology's invention is to speed up an extremely careful delivery model (Scholz and Sachdeva, 2010). Through the Suresmile system, orthodontic archwire-assisted forming equipment and orthodontic archwire bending machines have been used to bend orthodontic archwires (Jiang et al., 2019). The robot is activated and worked according to the input inserted by the dentist. Therefore, it leads to careful diagnosis and a well-designed treatment plan.

In orthodontics, three dimensional (3D) digital models are widely used for the purpose of storage, diagnosis, design of custom appliances and orthodontic treatment outcome evaluations (Scholz, 2009; Scholz and Sachdeva, 2010; Alford et al., 2011; Grauer and Proffit, 2011). The uses of various types of scanner such as structured or unstructured laser scanners, tabletop scanners, optical scanners and industrial-grade CAT scanner helps in capturing the digital representation of the 3D model (Sachdeva et al., 2012; Hayashi et al., 2013). In Suresmile technology, Suresmile OraScanner (OraMetrix, Richardson, Tex) is used to create a three-dimensional representation of the dentition. It is an optical scanner with a structured white light that can be used to scan the dentition and physical model in vivo and in vitro (Hayashi et al., 2013). Apart from that, various company has introduced another optical scanner in the marketplace with a similar function such as iTero (Align Technology, San Jose, Calif), CEREC (Sirona, Bensheim, Germany) and Lava COS (3M Unitek, St Paul, Minn) (Garg, 2008; van der Meer et al., 2012). Meanwhile, the tabletop scanner created a three-dimensional (3D) model by capturing the three dimensional (3D) images of the impressions or physical models. The advantage of this scanner is it has the ability to minimize the blind area through the auto-rotating unit (Hayashi et al., 2013).

This cutting-edge technology is a three-dimensional visualization that helps in the diagnosis of orthodontic patients, image capturing, monitoring and patient communication and also provides appliances with precision (Sachdeva, 2001). Along with OraScanner and OraScan Image Processing software, it gives a complete vision of the treatment. Apart from Suremile OraScanner, a Cone Beam Computed Tomography (CBCT) can also be used in vivo or in vitro to create a 3D model of the patients' dentition and appliances on each individual tooth (Hayashi et al., 2013). It is important to understand the accuracy and reliability of these imaging devices. These scanners might affect the accuracy and precision of the customized appliance in which the three-dimensional models of the appliance are designed based on the image captured. Thus, proper knowledge about this technology is at utmost essential to ensure the great and successful outcome of the orthodontic treatment (Hayashi et al., 2013).

Suresmile technology uses a customized archwire and a usual conventional bracket on the patient with orthodontic problems. The customized arch-wire is made up of a wire bending robot based on the orthodontist's preferences. This robotic technology is very helpful to the orthodontist in which the limitations of precision, accuracy and reliability when performing a manual and repetitive tasks at the chairside can be overcome (Scholz and Sachdeva, 2010). For example, archwire bending requires a long period of time manually. The process of Suresmile begins after the patient's dentition is scanned using OraScanner. The scan data are then used to locate the bracket on each individual tooth and construct a digital model of the patient's dentition, known as the therapeutic model (Larson, Vaubel and Grünheid, 2013). It allows for detailed treatment planning and the operator allows the tooth to move independently in three dimensions (Mah and Sachdeva, 2001). Multiple treatment scenarios can be designed by the operator based on his diagnosis and knowledge. The operator can also simulate different treatment plans until the optimal one is found (Mah and Sachdeva, 2001).

Apart from various latest technologies, there is also a lot of research that has been done that focused on the movement of teeth in orthodontic treatment to reduce the treatment time. The possible interventions for accelerating tooth movement can be classified into a surgical and no-surgical method (Gkantidis et al., 2014). The mechanisms in the movement of teeth include the physics of force application and the biological response of the dentoalveolar tissues to this force (Miles, 2017). Examples for a non-surgical method are limited orthodontic treatment, self-ligating and various bracket design, customized appliance, medication, micro-vibration, low-intensity laser, photobiomodulation (PBM), electromagnetic fields and direct electric currents (Miles, 2017).

Meanwhile, the surgical interventions are corticotomy, distraction osteogenesis, piezocision, PDL distraction and micro-osteoperforations (Miles, 2017). Recently, nanorobot might also involve in the acceleration of tooth movement which is currently under research due to the demand for shorter orthodontic treatment. Currently, patients with fixed appliance treatment, the mean duration of treatment would be 2-3 years exact or more if some circumstances occur (Dhayananth and Chajallani, 2016). Thus, it will result in various problems such as scars of orthodontic treatment, gingival inflammation and root resorption (Dhayananth and Chajallani, 2016). In orthodontics, nanorobots help in reducing the orthodontic treatment time. The periodontal tissue is directly manipulated in which it facilitates the movement and painless tooth straightening, rotating and vertical repositioning in just hours or minutes (Dhayananth and Chajallani, 2016).

The introduction of digital models into dentistry which is capable of capturing both radiographic and facial images is on the horizon. Besides, the uses of integrated software to review these different images and intraoral scans make huge changes in this industry. This kind of software is very useful in the analysis of patient, treatment

planning for orthodontic, prosthetic and surgical patient and designing and fabricating the dental restorations, prosthetic devices, dentures, temporomandibular joint (TMJ) splint, implant placement splints, surgical splints and fabrication of orthodontic appliances (Hero Breuning and Kau, 2017). The use of Suresmile (OraMetrix, Inc, Richardson, TX) or three dimensional (3D) system in orthognathic surgery has gained attention in the industry (Maron, Kuhmichel and Schreiber, 2017). Through this, the patients are able to know the possible results of the treatment before starting with the treatment.

Our extensive research expertise ranged from epidemiological studies to randomized clinical trials that have been published in reputed journals (Felicita, 2017a, 2017b, 2018; Felicita, Thirumurthi and Jain, 2017; Korath, Padmanabhan and Parameswaran, 2017; Krishnan, Pandian and Rajagopal, 2017; Charles et al., 2018; Pandian, Krishnan and Kumar, 2018; Reddy et al., 2018; Chinnasamy et al., 2019). This knowledge was instrumental for us to study the effectiveness and the efficiency between the conventional method and Suresmile technology.

Suresmile Technology

Development of Suresmile technology: The idea of Suresmile germinated from a meeting of forward-thinking experts on orthodontic and technology. They also visualized a system through customizing shape memory alloy wires. It is believed to help in improving the quality and predictability of orthodontic treatment (Claudia Şoaita, 2012). It was introduced by Dr. Sachdeva, an orthodontist and Chief Officer of the Suresmile. He came up with the idea after returning from a lecture tour in India by Professor Reggie Miethke from the Free University of Berlin. After the exposure of knowledge about the first generation of robotic archwire bending technology, he believed that there is a high possibility to develop a new model of orthodontic care delivery through mass customization. In the late 1990s, he began with only two people in Richardson, Texas and later he joined forces with a German company named OraMetrix led by Chuck Abraham (Scholz and Sachdeva, 2010). After Suresmile technology has been commercialized in near 2005, most of the orthodontic patients are willing to pay greater cost due to the shorter treatment times. Now, it has been introduced in different countries such as the United States, Canada, Australia and Germany (Scholz and Sachdeva, 2010).

OraScan Image Processing Software will show an accurate, three-dimensional representation of the dentition (Sachdeva, 2001). There are many functional components in this treatment planning software such as three-dimensional visualization, measurement, communication, decision making with simulation, bracket placement, setup and archwire design, quality and outcome assessment and Suresmile patient management (Scholz and Sachdeva, 2010). These components can be used either in a single or in a combination of various components which allows the dentist to come out with better decisions and design the targeted prescription archwire (Scholz and Sachdeva, 2010). In three-dimensional visualization utility, it allows the dentist to view the multiple projections of the arches and dentition. The advantage of this utility is it allows a simultaneous assessment of the spatial position of the tooth and its morphology accurately on how it affects the occlusal scheme of each different patient (Scholz and Sachdeva, 2010).

Besides, the tooth widths are measured along with Bolton analysis automatically. Therefore, the orthodontists can achieve a better idea and visualization of the various treatment plans for their patients which can be easily done in less than ten minutes using all these setup components. One interesting outcome of this software is the communication between orthodontists and patients. Through this, the patient could understand their own problems and thus, making them active throughout the journey with the orthodontist. The patients can make their own decision with the knowledge exposed to them through visualization and interactive simulation tools.

The two approaches in using Suresmile technology in the clinical practice include i) comprehensive system and ii) indirect bonding tray with the aligning and finishing wires (Nguyen and Jackson, 2018). During the first appointment with an orthodontist, a quick scan of dentition using OraScanner, a handheld device is taken. It is able to create an exact replica of the dentition and is relatively independent which means the picture produced is not affected by any movement, if presence (Sachdeva, 2001). Then, by using the OraScan Image Processing Software, the images were combined to produce a three-dimensional image. Through this, the clinician is able to plan for the treatment based on the parameters such as midline, occlusal plane level and arch dimension (Mah and Sachdeva, 2001). A three-dimensional digital diagnostic setup is created as the final treatment plan before proceeding with bonding.

The automatic digital bonding feature is activated after satisfactory target positions. All the data including the location and retention required by the brackets and wire are sustained in the computer and sent to the Suresmile office (Abutayyem et al., 2019). Then, the arch-wire geometry is automatically calculated in three dimensions for the bracket positions on the target arch (Sachdeva, 2001). The position of each tooth is further refined in the final phase of digital treatment planning. There may be changes in the bracket position or arch-wire geometry. Prescription wires and a blank tray is used for indirect bonding. The brackets are filled in the tray and bonded using conventional indirect bonding as it is an accurate and fast method compared to others. The orthodontist may use OraScanner during follow up appointments to observe the progress and correct the errors if any. During the finishing stage, custom wires are formed by a wire bending robot that will individualize the treatment to achieve the desired outcome (Scholz and Sachdeva, 2010).

The wire bending robot is known as the Suresmile archwire bending robot. It can automatically change into a particular shape according to the preferences. The gripping tools can be divided into two types. In the combination of force sensors, the gripping tool helps to determine over bends in order to achieve the desired shape of the archwire. In addition, the presence of a resistive heating system allows maintaining the bent shape of the archwire through heat which is supplied by the current (Jiang et al., 2015). Suresmile (OraMetrix) is one of the customized orthodontic technologies which help the orthodontist to achieve an ideal alignment, aesthetics and occlusion for their patients.

Advantages of Suresmile Technology: This technology is most preferred by orthodontists and patients because the advantages outweigh the disadvantages. Grünheid, Thorsten, et al. stated that Suresmile provides the best combination of accuracy, reproducibility, and time efficiency of measurement (Grünheid et al., 2014). The accuracy was measured by using the Bland-Altman method (Bland and Altman, 1999). Mean squared error was calculated to rank the measurement of the accuracy: mean squared error = bias2 + variance. Suresmile has the highest reproducibility in comparison with other digital models such as emodel and AnatoModel as it has the smallest mean squared error. The efficiency of the Suresmile is ranked second as it takes a longer time to complete the tooth size measurement compared to emodel.

In a study done by Kazua Hayashi et al, they had assessed the accuracy and reliability of OraScanner (OraMetrix, Inc. Richardson, TX) by comparing it with other three dimensional scanners such as VIVID910 (Konica Minolta, Tokyo, Japan) and R700 (3Shape, Copenhagen, Denmark) (Hayashi et al., 2013). The gold standard scanner, SLP250 Laser Probe (Laser Design, Detroid, Mich) was also compared. The dental casts were used in this study as it plays an important role in diagnosis and also treatment outcomes. The results showed that there were slight differences in mean value with <0.057mm in comparison to the gold standard scanner. Thus, this study suggested that OraScanner VIVID910 and R700 were accurate and can be used by the orthodontist without problems (Hayashi et al., 2013).

Orthodontists believe that the main advantage of Suresmile technology is that they have choices to use their preferred bracket system, as well as it may increase precision in the finishing stage (Alford et al., 2011). Besides, the customized wire can be created by getting information through an intra-oral scan or cone-beam computed tomography (CBCT) (Grauer and Proffit, 2011). It can be designed to be active in the anterior segment with the desired alignment and passive in the posterior segment with the ideal occlusion of the patient.

Disadvantages of Suresmile Technology: The disadvantages of Suresmile Technology includes the possibility of debonding of the bracket after archwire customization and before completion of treatment (Grauer and Proffit, 2011).

Effectiveness of Suresmile Technology to achieve predicted outcomes: The predicted outcomes of the tooth position in orthodontic patients are varied according to tooth type and dimension of movement. In Suresmile, the vertical dimension is the most effective tooth movement. Some outcomes treated with conventional fixed appliances show some deficiency in the vertical dimension. The actual treatment outcome for canine and premolars, it turned out to be positioned apically from the virtual treatment plan. In cases of incisors and molars, the actual treatment outcome tends to be positioned occlusally. In the buccolingual dimension, all teeth except for maxillary incisor and mandibular second molars; it turned out to be positioned lingually in the actual treatment plan (Larson, Vaubel and Grünheid, 2013).

Suresmile is a computer-aided appliance that helps to produce precision in arch-wire bending. However, it does not prevent the needs of auxiliary mechanics. Interarch elastic is one of the Class II mechanics and commonly used in Suresmile technology (Larson, Vaubel and Grünheid, 2013). Suresmile technology is able to solve problems if there are errors in bracket placement and variations in adhesive thickness (Mah and Sachdeva, 2001). Meanwhile, treatment planning, appropriate diagnosis depends on the capability of the orthodontist.

Suresmile vs Conventional Method-Treatment time: Length of treatment time is one of the factors which may be considered by the orthodontic patients (Skidmore et al., 2006). It is believed that shorter treatment time will help in efficiency, effectiveness and timeliness quality care (Baker, 2001). However, extended length of care may give disadvantages to the patients as well as poor quality care (Fox, 2005)). Clearly, in conventional methods, the repositioning of the brackets, altering bracket prescriptions or archwire bending contribute to the successful treatment outcomes. However, in the Suresmile method, the customized archwire is made using the input setup and prescribed to the patient (Sachdeva et al., 2012). This will lead to an earlier control of the tooth movement. Besides, with several practices, the orthodontist may also reduce the treatment time.

Sachdeva et al recently reported the comparison of treatment time between Suresmile and Conventional bracket systems. The author analyzed a total of 12,335 patients which 9,390 patients underwent Suresmile treatment and 2,945 patients with conventional treatment. All the data of the patients were recorded including treatment time, malocclusion class, patient age and patient visits. The patients with complete data were chosen for further analysis. The results approved that Suresmile technology had a greater efficiency as the treatment time in Suresmile patients were 15 months of median treatment time and conventional patients with 23 months of median treatment time with

a significant difference of 8 months median treatment time. Besides, in malocclusion class by Angle showed that there was evidence of shorter treatment time in all three classes with the mean difference of 8 and 9. For class I malocclusion, Suresmile showed a mean value of 16 months and conventional shows a mean value of 24 months.

In class II malocclusion, Suresmile showed a mean value of 14 months and conventional shows a mean value of 22 months. Lastly, in class III malocclusion, the Suresmile showed a mean value of 17 months and conventional showed a mean value of 25 months. Class II patients had a shorter median time compared to class I and class III. This may be due to only mild class II patients being involved compared to class I which may have more severe crowding. Based on age, the previous study revealed that both adolescents and adults showed a significant difference in the treatment time between Suresmile and conventional with a mean difference of 8 and 9 respectively. The mean value of Suresmile in adolescents and adults shows a mean of 16 and 17 months respectively. Besides, this study also shows that the treatment visits of the patient using Suresmile can be reduced by a median of eight months in comparison to the conventional method. Suresmile patients required only 14 visits throughout the treatment and conventional required at least 18 visits throughout treatment. Thus, this study provided evidence that the variables including malocclusion class and age in patient visits in Suresmile patients were shorter compared to conventional patients (Sachdeva et al., 2012).

In addition to that, the other treatment modalities in orthodontic patients include the requirement of extraction or any surgical procedure. A study done by Fink and Smith suggested additional months of treatment time were required. The extraction of single premolar, two premolars and four premolars results in an additional of 0.9, 1.8 and 3.6 months respectively. However, the treatment time did not exceed the conventionally treated patients (Fink and Smith, 1992).

Besides, Saxe et al recently analyzed a total of 62 patients, Suresmile [38] and conventional [24] treated patients based on pre and post-treatment study. Discrepancy index (DI) and Objective Grading System (OGS) was determined by the treatment study respectively. According to the ABO OGS scores, Suresmile showed a mean of 26.3 with a significant difference of 4.4 from conventional treatment with 30.7. Suresmile patients demonstrated an OGS score of 14.3% better than the conventional method. This suggests that better outcomes are not related to long treatment time. Meanwhile, the treatment time showed a difference of almost six months, Suresmile had a treatment time of 14.7 months with a standard deviation of 4.71 months and conventionally had a treatment time of 20.0 months with a standard deviation of 6.40 months. This suggests a decrease in mean treatment time by 36%. The level of difficulty which was measured using DI does not influence the treatment result (Saxe, Louie and Mah, 2010).

In addition, 132 non-extraction patients were studied by Alford et al which were divided into Conventional and Suresmile methods. 63 patients were treated using Conventional, meanwhile Suresmile composed 69 patients. This study showed that Suresmile has a shorter treatment time which is 15.8 months compared to 23 months in the conventional method. Cast/radiographic evaluation (CRE) is suggested as one of the effective implementations to evaluate different clinical outcomes. Since male had a higher percentage in conventional (51%) compared to Suresmile (38%), thus based on this study, male patients in the conventional method were likely to have higher CRE scores. The reasons behind this are due to the exposure towards complex occlusion and larger fractions (Alford et al., 2011).

In some circumstances, there might be an increase in treatment time due to the problem of the inaccuracy of bending arch-wire. This may result in an iatrogenic problem for the patients. Suresmile robotic devices tend to preserve superelastic properties in arch-wires which provide the best alignment of the crowns of the teeth compared to manual bent arch-wires. The conventional method is more efficient than Suresmile in terms of root angulation (Alford et al., 2011). In Suresmile, the crown is effectively tipped to the desired position, but the root is not well aligned due to some problems.

CONCLUSION

In conclusion, advancement in orthodontics such as Suresmile technology enables the orthodontist and patients to have an effective and efficient treatment outcome. The Ora Scanner by Suresmile also provides the utmost accuracy in comparison to the gold standard which allows the clinician to implement Suresmile without any doubt. It has been used widely by orthodontists and it may be expanded all over the world in the future. The advantages of this technology which provides benefits to the patients especially in terms of length of treatment make the patient willing to pay greater cost just for shorter treatment time. They might feel comfortable throughout the treatment as the number of visits to the dentist can also be reduced by using Suresmile. In the future, improvisation in Suresmile technology such as man-machine interface, more intelligent design of the software and unified interface for the choice of customized appliances could be done (Scholz and Sachdeva, 2010). Therefore, further research on Suresmile technology can be done in order to evaluate the effectiveness, reliability, accuracy and efficiency of this technology.

ACKNOWLEDGEMENTS

We thank Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University for granting the research proposal and research support.

Conflict of Interest: No conflict of interest declared by the authors.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-182-186

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E Cigarettes- Trends and Health Effects : A Review

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ABSTRACT

Electronic cigarettes also known as e-cigarettes are products that provide a nicotine-containing aerosol to users by heating a solution which is mainly made up of nicotine or flavoring agent. With rapid increase in use and popularity of e-cigarettes usage the health related adverse effects are not known to many. Evidence suggests that compared to conventional cigarettes, e-cigarettes have less adverse effects. Contrary, there were many clinical studies reporting various health effects of nicotine and tobacco products .Most of the results were based on short term outcomes , long term studies should be done regarding the usage and health effects of e-cigarettes. This review tends to review the trend and health effects of e-cigarettes based on existing literature articles.

KEY WORDS: E-CIGARETTES; HEALTH EFFECTS; TRENDS; SMOKING.

INTRODUCTION

Tobacco use in India is mainly of two forms, smoking (cigarettes ,Bidis) and smokeless forms (gutka, pan masala, Areca nuts). Tobacco has been estimated to cause premature death worldwide. (India. Ministry of Health and Family Welfare, 2007). Tobacco consists of various toxic and carcinogenic chemicals present in it, one of the main components is nicotine. Tobacco has been compulsively used nearly every culture into which tobacco has been introduced. According to WHO, in India 94 million men and 45 million women used tobacco in smoke or smokeless form (Bulletin of the World Health Organization, n.d.).

Electronic nicotine delivery systems (ENDS) are battery powered devices that provide doses of nicotine and other additives to the user in a hand held device in a vapour form also known as vape pens, e-cigars, or vaping devices . There are multiple types of ENDS including electronic cigarettes, or e-cigarettes, as well as e-hookahs, e-cigars, and e-pipes. Some of these products are disposable varieties, while others can be refilled or recharged for repeated use (Benowitz, 2011).

E-cigarettes use a metal resistance coil to heat and aerosolized mixtures such as tobacco-specific nitrosamines, aldehydes, metals, volatile organic compounds, phenolic compounds, polycyclic aromatic hydrocarbons, and tobacco alkaloids are components of e-cigarettes but at lesser concentration than conventional cigarettes (Cheng, 2014). Some studies have reported that e-cigarettes can be used as smoking cessation therapy due to lesser concentration of tobacco components (Brown et al., 2014) while other studies debate on potential harm and ill effects of tobacco (Gornall, 2015). E-cigarettes were originally marketed in 2004, known as cig-a-likes developed by China as a less dangerous alternative to conventional cigarettes (Grana et al., 2014).

ARTICLE INFORMATION

*Corresponding Author: leelavathi.sdc@saveetha.com
Received 4th Aug 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/133

Most electronic cigarettes release nicotine and other potentially toxic and irritating substances into the air thereby affecting the by -standers (Daynard, 2018). There is highest relative risk for cancer initiation due to smoking is the lungs and oral cavity .Two potential hazards related to e-cigarettes are acute toxic effects caused by accidental or intentional ingestion of e-cigarette liquids causing nausea, vomiting, headache, dizziness and physical injury caused by the e-cigarette device such as explosion of the device (Vakkalanka et al., 2014). Unlike cigarettes, scientific knowledge about alternative tobacco forms such as e-cigarettes , smokeless tobacco remains limited, and in most cases there is a lack of regulation. This review aims to update the trends and effects of e-cigarettes on health.

Trends on E-Cigarettes: E-cigarette have been an initiation for smoking habits among young adults who were non-smokes earliest (McMillen et al., 2014). A cohort study shows , 81% of youth users of electronic cigarettes reported that their starter product was flavoured compared with 61% and 46% of young and adults, respectively (Villanti et al., 2017). Studies have shown that there is increased use of e-cigarettes among U.S.population (Arrazola et al., 2015) US National Youth Tobacco Survey, over 1.6 million high school students and 500000 middle school students used electronic cigarettes in 2015 (Singh, Arrazola, et al., 2016)In the United Kingdom, adult e-cigarette use has more than tripled from 700,000 users in 2012 to 2.6 million users in 2015 (Ash, 2016). The 2015 GATS-2 estimated that the prevalence of use of e cigarettes in india was 0.02% (268,000 users) (Asma et al., n.d.). Electronic cigarette advertisements on internet sites, retail stores, movies and other media are associated with growing use among students (Singh, Agaku, et al., 2016).

Modular systems (mods), containing batteries, fillable liquid tanks, and heating coils have a comparably small allowing the use of custom-made flavors and individualized settings for temperature and wattages. (Pearson et al., 2020). Advances in technology, Juul device was introduced which resembles a USB memory stick with cartridges (pods) that are exchangeable by the user and filled with flavored e-liquids (King et al., 2018). In order to deliver nicotine to the lungs, the user inhales through a mouthpiece, and the airflow triggers a sensor that then switches on the atomizer (Eisenberg et al., 2018).

Adverse Health Effects

Oral cavity: A case report shows occurrence of lichenoid reaction in oral mucosa after using e-cigarette (Reuther et al., 2016). Exclusive tobacco consumption appears to be more likely to contribute to epithelial dysplasia in precancerous condition such as leukoplakia, erythroplakia is a hallmark for cancer development (Institute of Medicine et al., 2001). Smokers have been found to have increased number of neutrophils but decreased activity which elevates the oxidative burst thus causing tissue destruction by direct toxic effect from tobacco (Shirodaria et al., 2000); thus smoking exerts a strong untoward effect on periodontal health and is a major risk factor for periodontal disease (Okamoto et al., 2006). Smokers exhibit decreased bleeding upon probing, increased clinical loss of attachment, gingival recession and tooth mobility independent of age, gender and systemic condition (Machuca et al., 2000). Smokers respond less favourably than non-smokers to nonsurgical ,surgical periodontal therapy and they have poor wound healing capacity (Preber et al., 1995).Tobacco use may directly compromise the osseointegration of root-form dental implants causing peri-implantitis and implant failure (Wallace, 2000). Long-term smoking would significantly reduce salivary flow rate and increase oral and dental disorders associated with dry mouth, especially cervical caries, gingivitis, calculus and halitosis (Rad et al., 2010). Menthol and tobacco e-liquids present in e cigarettes may alter the enamel color altering the dental aesthetics (Pintado-Palomino et al., 2019).

Respiratory system: A clinical study reported e-cigarette use is reportedly less harmful than conventional smoking and can lead to reduced cigarette consumption with subsequent improvements in status of asthma outcomes, e-cigarette can be a valid option for asthmatic patients who cannot quit smoking by conventional method (Polosa et al., 2014). Oxidants or reactive oxygen species found in cigarette smoke generated from tars are major contributors in mediating an inflammatory state, which have been implicated in the pathogenesis of diseases, such as chronic obstructive pulmonary disease (COPD) and lung cancer (Sundar et al., 2013) .Reports on parenchymal and bronchial inflammation, lung damage and toxicity (e.g., lipoid pneumonia, hypersensitivity pneumonitis as well as impaired systemic inflammation signaling, and defense mechanisms associated with e-cigarette exposure (Reidel et al., 2018; Staudt et al., 2018). In patients with COPD, the use of e-cigarettes has been associated with more cough and phlegm, more exacerbations and possibly a more rapid decline in lung function (Bowler et al., 2017).

Cardiovascular system: Cardiovascular disease is the major cause of death among smokers (Askin et al., 2017) e-cigarette use acutely and negatively (increased) impacted vital signs, such as heart rate and blood pressure (Yan et al., 2015). E-cigarette has been associated with paroxysmal atrial fibrillation (PAF) and acute myocardial infarction in cardiovascular system (Monroy et al., 2012) e-cigarette vapor extracts were found to enhance activation (aggregation and adhesion) of platelets which is important step in progression of atherosclerosis (Hom et al., 2016). Cigarette smoking can cause coronary spasm and is a risk factor for vasospastic angina. (U. s. Department of Health and Human Services Staff, 2010). However some studies show that Electronic cigarettes deliver nicotine without combustion of tobacco and appear to pose low cardiovascular risk in short term usage (Benowitz and Burbank, 2016). E-cigarette use did not have any effect on complete blood count (Flouris et al., 2012).

Central Nervous System: E-cigarettes may also directly damage neurons and cause tremor and muscle spasms (Grana et al., 2014). As for the central nervous system, e-cigarettes may alter brain functions, which affects the mood, learning abilities, memory, and could even induce drug dependence in both humans and animals (Yuan et al., 2015). At low doses, nicotine is a weak analgesic, but at high doses, it causes tremors and seizures (Schraufnagel, 2015).

Gastrointestinal Tract: Nicotine causes peptic ulcer and gastrointestinal cancers (Chu et al., 2013). Chronic exposure of cigarette smoke induces systemic hypoxia leading to intestinal dysfunction causing Crohn's disease(Fricker et al., 2018).

Reproductive system: Exposure to nicotine in utero causes decreased birth weight, prematurity, neonatal morbidity, and mortality, including sudden infant death syndrome (Cliver et al., 1995) .Nicotine is associated with erectile dysfunction and decreased sexual arousal. (Harte and Meston, 2008). E-cigarettes have been found to have less harmful alternatives than tobacco cigarettes and are perceived as safe to use during pregnancy by pregnant women (Kahr et al., 2015).

E-Cigarettes Ban in India: The long-term health effects of e-cigarettes have not yet been documented in humans; however, the short-term negative effects causing deleterious effects on multiple biological systems have been suggested by several studies.The most powerful tools to reduce tobacco use have been increased taxes, bans on smoking in public places, and denormalizing its use. Tobacco and nicotine always possess various health related risk.In India, a proposal to ban electronic cigarettes has gained momentum and a bill has been passed to stop production, trade and transport e-cigarettes by the Union Government of India in September 2019 (Balaji, 2019).

CONCLUSION

E-cigarettes have been associated with biological effects and many health related effects in consumers . Although few studies claim it can be used as an alternative to conventional smoking, there are many studies which contradict by showing various adverse health effects. Strict rules and regulations should be enforced on usage of e-cigarettes

ACKNOWLEDGEMENTS

Nil

Conflict of Interest: None declared

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-187-191

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Comparative Evaluation of Flexural Strength Among Cad-Cam Milled and Resin Provisional Restoration- an in vitro Study

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ABSTRACT

The aim of the study was to compare the flexural strength among cad-cam milled and heat cured provisional restoration. Fixed Partial Denture (FDP) plays an important part in fixed prosthodontic treatment. Provisional restorations must satisfy biologic, esthetic, and mechanical requirements There is not a single material or method that has been found to be useful in all clinical situations, so it is important to know the properties of the material in order to know the limitations and indications/contraindications for their clinical use for extended periods of time. A total of 16 specimens are used for the study. The specimens are divided into two groups , the CAD-CAM provisional and the Conventional Heat polymerized resin provisional. The specimens are tested using Universal Testing Machine (INSTRON ELECTROPULS E3000) and a three-point loading system is used for the application of load and all the 16 specimens are subjected to the three-point bending test. Results are tabulated and one-way ANOVA analysis performed. It is noted that the highest force that is exerted on a CAD-CAM milled provisional is 358.42 MgPa and flexural strength for that force is 65.22, highest force that is exerted on heat cured provisional is 160.33 MgPa and flexural strength for that force is 30.89. A one-way ANOVA test is done and the association is found to be statistically significant with a p-value of 0.001(<0.05) for both, proving that there is a significant difference in the flexural strength between the CAD-CAM provisional restoration and heat cured provisional restoration. It can be concluded that there is a significant difference in the flexural strength between the CAD-CAM provisional restoration and heat cured provisional restoration and CAD -CAM resin group specimens exhibited higher flexural strength values followed by heat cured resin group

KEY WORDS: CAD-CAM, HEAT CURE , APICAL PROVISIONAL, RESIN, FLEXURAL STRENGTH.

ARTICLE INFORMATION

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Received 30th July 2020 Accepted after revision 23rd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/134

INTRODUCTION

Provisional Fixed Partial Dentures (FDP) plays an important part in fixed prosthodontic treatment. Provisional restorations must satisfy biologic, esthetic, and mechanical requirements such as resistance to functional loads, resistance to removal forces, and maintenance of abutment alignment (Land and Fujimoto, 1995). There is not a single material or method that has been found to be useful in all clinical scenarios, so it is important to know the properties of the material in order to know the limitations, indications/contraindications for their clinical use for extended periods of time.(Gratton and Aquilino, 2004). The majority of materials that can be used for the fabrication of provisionals can be broadly divided into two main components: (a) Methyl methacrylate resins and (b) composite resins . Traditional methyl methacrylate type resins are mono-functional low molecular weight, linear molecules that exhibit decreased strength and rigidity whereas composite resins are di-functional and capable of cross-linking with another monomer chain imparting strength and toughness to the material (Haselton, Diaz-Arnold and Vargas, 2002).

Computer-Aided Designing and Computer-Aided Manufacturing(CAD-CAM) was first used in dentistry in the 1970s. CAD-CAM (CC) has now become a well-accepted technology in most modern dental laboratories and for some enterprising clinicians at the chair-side (van Noort, 2012).

Heat polymerized acrylic resin is stronger, has greater stability, and is more resistant to polymer breakdown than auto polymerized resin . It also has the advantages of color stability, maintenance of surface finish, and resistance to wear (Binkley and Thomas Irvin, 1987). Provisional restorations fabricated from heat-processed acrylic resin can function satisfactorily for extended periods of time (Madhav, Digholkar and Palaskar, 2016). Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about the Comparison of flexural strength among cad-cam milled and heat cured provisional restoration. The aim of this study is to evaluate the flexural strength among heat polymerized resin provisional and the CAD CAM resin provisional restoration.

MATERIAL AND METHODS

A total of 16 specimens are used for the study. The specimens are divided into two groups, the CAD-CAM provisional restoration and the Conventional Heat polymerized resin provisional restoration.

Preparation of Specimens

Conventional heat polymerized resin specimens: To fabricate the exact size and shape of the specimens, the bridge designing is done using the CAD (3-shape software) technology. Then for the fabrication of heat polymerized resin the design is converted into pattern resin using CAM technology. These pattern resin specimens are invested in conventional flasks and the heat polymerized PMMA specimens are fabricated using the compression molding technique (Fig 1).

Figure 1: Heat polymerized resin provisional restoration

CAD-CAM provisional specimens: The bridge design done for the fabrication of heat polymerized resin is used for the milling of CAD-CAM provisionals. The design is transferred to a milling machine(mesi-icore, Germany) containing the PMMA banks that mill the CAD CAM provisional restoration (Fig 2).

Figure 2: CAD-CAM milled resin provisional restoration

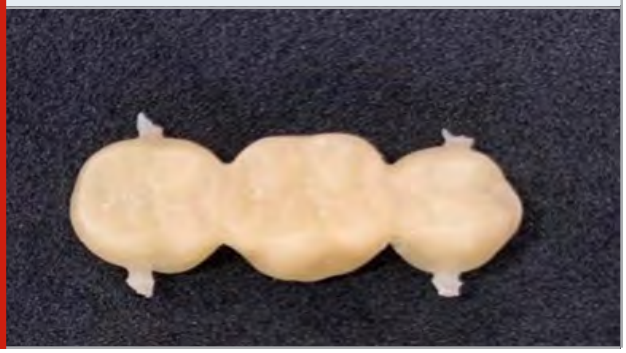
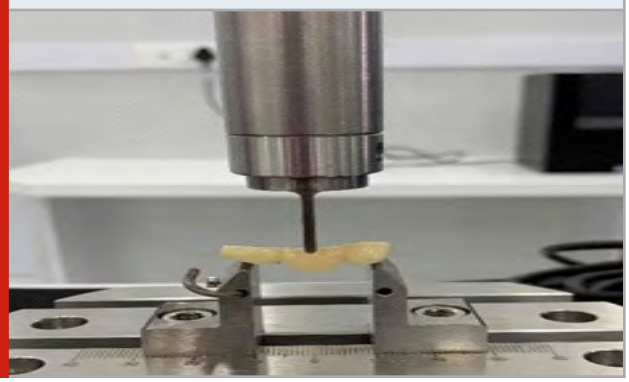


Figure 3: Application of load using Universal Testing Machine



Testing of Specimens

Flexural strength determination: A Universal Testing Machine (INSTRON ELECTROPULS E3000) is utilized for this study and a three-point loading system is used for the application of load and all the 16 specimens of the two groups are subjected to the three-point bending test (fig 3). The loading is continued till fracture occurred and the breaking load is noted. These breaking load values are converted to flexural strength. The flexural strength values are recorded in MegaPascals (MPa) by the software provided by the machine.

Statistical analysis: The flexural strength is recorded for each specimen. This raw data of the values obtained are tabulated in excel following the tabulation the data is imported into spss and a one way ANOVA test is carried out to compare the values.

RESULT AND DISCUSSION

The highest force that is exerted on a CAD-CAM milled provisional is 358.42 MgPa and flexural strength for that force is 65.22, highest force that is exerted on heat cured provisional is 160.33 MgPa and flexural strength for that force is 30.89. A one-way ANOVA test is done and the association is found to be statistically significant with a p-value of 0.001(<0.05), proving that there is a significant difference in the flexural strength between the CAD-CAM provisional restoration and heat cured provisional restoration.

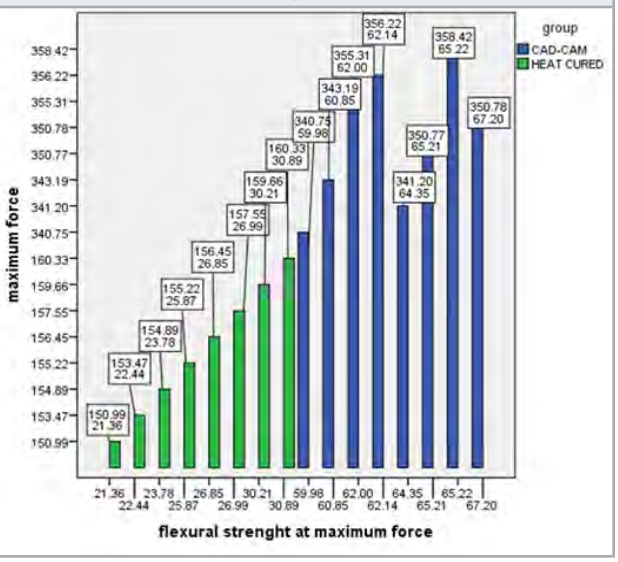
Provisional fixed dental prostheses (FDPs) are an integral part of fixed prosthodontics and dental implantology. The provisional FDPs must satisfy the requirements of pulpal protection, periodontal health, occlusal compatibility, maintaining tooth position, protection against fracture, resistance to functional loads, resistance to removal forces, maintaining inter-abutment alignment, be easily contourable, color stable, and have sufficient translucency (Madhav, Digholkar and Palaskar, 2016). The prognosis of a fixed restoration depends on the quality of this interim restoration (Kachhara et al., no date).

Conventionally, various methods and materials have been introduced to provide a provisional restoration that is esthetic, easy to fabricate, most importantly having a high strength and hardness. These materials for the fabrication of single and multiple unit provisional restorations are mostly resin based. They differ with regard to the method of polymerization, filler composition, and monomer type (Donaldson, 2012).

If the provisional FDPs are expected to function for extended periods of time or when additional therapy is required before completion of definitive treatment viz. during the prosthetic phase of dental implants and reconstructive procedures, while evaluation of a change in vertical dimension, for orthodontic stabilization, in case of assessing the results of periodontal and endodontic therapies and in cases of bruxism, the improved mechanical properties play an important role (Binkley and Thomas Irvin, 1987) (Sen, Göller and Issever, 2002) (Hamza et al., 2006).

A study reviewed CAD-CAM systems used in dentistry and proposed its use for provisionalization. Manufacturing under industrial conditions permits high-density polymer-based restorations which offer favourable mechanical behaviour and biocompatibility (Rekow, 2006). These CAD-CAM restorations also reduce the chair side time of the patient (Güth et al., 2012) Thus CAD-CAM approach is becoming more popular for the fabrication of tooth-colored indirect restorations (Rocca et al., 2010). In the study conducted by Shruti et al CAD - CAM resin group specimens exhibited highest flexural strength values followed by heat cured resin group which is consistent with this study.

Graph 1: shows the comparison of the flexural strength of the types provisional restorations at the maximum forces (X-axis represents the flexural strength at maximum force , Y-axis represents the maximum force exerted) where blue represents the CAD-CAM milled provisionals and green represents heat cured provisionals. It was noted that the highest force that was exerted on a CAD-CAM milled provisional was 358.42 MgPa and flexural strength for that force was 65.22, highest force that was exerted on heat cured provisional was 160.33 MgPa and flexural strength for that force was 30.89. A one-way ANOVA test was done and the association was found to be statistically significant with a p-value of 0.001(<0.05) for both, proving that there is a significant difference in the flexural strength between the CAD-CAM provisional restoration and heat cured provisional restoration.



According to a study concluded by Edelhoff et al the high-density polymers based on highly cross-linked resins are manufactured in an industrial process, thus, exhibiting superior qualities in case of the CAD-CAM acrylic resin blanks (Edelhoff et al., 2012). These findings are similar to the research conducted by Alt et al. who investigated the influence of fabrication method, storage condition, and use of different materials, on the fracture

strength of provisional 3-unit FDPs using CC technologies and resin-based blanks cured under optimal conditions (Alt et al., 2011). The conventional heat activated specimens are made by the same operator according to the manufacturers' instructions, but the samples are prepared at different time intervals. Therefore, operator related variations and absence of cross-linking in the conventional heat activated resin could have led to lesser flexural strength values in these specimens when compared to the CAD-CAM resin specimens (Yanikoglu et al., 2014). Moreover, the improved fit of the milled CAD/CAM provisional lowers the risk of bacterial contamination of the tooth and prevents damage to the pulp from excessive temperature changes (Karaokutan, Sayin and Kara, 2015) (Renne et al., 2015).

CONCLUSION

Within the limitations of this in vitro study, and on the basis of the results obtained, it can be concluded that CAD -CAM resin group specimens exhibited higher flexural strength values compared by heat cured resin group. Since the CAD-CAM milled Provisionals exhibited greater flexural strength it can be used in cases where Provisionals have to be worn for a long period of time as it won't fracture under the load. CAD- CAM milled Provisionals also have lesser chair side time fabrication .

Conflict of Interest: The author would like to declare there was no conflict of interest

ACKNOWLEDGEMENTS

I would like to thank my esteemed institution for providing me with the opportunity to do this study and would also like to thank my guide for her expert advice and encouragement which helped me with the completion of this study.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-192-195

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Incidence and morphometric analysis of Metoptic Canal and Warwick's Foramen in South Indian Skulls

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ABSTRACT

The human orbit is related to the cranial cavity through several canals and some of which can be found in every human orbit such as the optic canal and the superior orbital fissure and there are some which cannot be found in every orbit such as the Met-optic Canal and the Warwick's Foramen. Minor canals have often been a nuisance to surgeons as they often have an artery or a vein passing through them and hence are known to have caused severe bleeding making the surgeon's job all the more harder. In this study, we find the incidence of these minor canals and we take the morphometric measurements to three structures in South Indian skulls. It was found that on average, it appeared on both the right and the left orbits and its average distance was found and the results were compared that of other studies. In conclusion, the prior knowledge of these canals will undoubtedly give surgeons an advantage while performing such procedures.

KEY WORDS: METOPTIC CANAL, WARWICK'S FORAMEN, ORBIT, MINOR ORBITAL CANAL.

INTRODUCTION

The human orbit is a pyramid shaped cavity that is situated on either side of the root of the nose. The orbit itself resembles a 4 sided pyramid with the apex at the posterior end and the base of the orbit opening into the face. It is related to the greater wing of sphenoid and the lesser wing of sphenoid, zygomatic bone, maxillary, sphenoidal and frontal sinuses It's related to the cranial cavity by both major and minor canals. Major canals connecting the orbit to the cranial cavity include the optic canal and the superior orbital fissure. These canals are also known as major canals because they are found in every human orbit, while on the other hand minor canals do not appear in every human orbit and hence they are not documented as frequently as major canals (Diamond, 1991). Two such structures which are focused on in this study are the Metoptic canal and Warwick's Foramen.

The Metoptic canal is found between the Superior Orbital Fissure and the Optic Canal, such structures that are a result of variations to the optic canal are rare(Choudhry R et al, 1988) while the optic canal is usually round in shape (Radoievitch and Jovanovic, 1960). The contents passing through the canal include the ophthalmic artery and the ophthalmic nerve (R, 1951). The formation of the met optic canal is because of a difference in the pattern of ossification. It is a defect that occurs during the process of ossification that sometimes ossifies in the shape of a keyhole (R, 1951).

While this generally does not cause an issue because within a few months, generally 2 months, after birth, the ossification processes result in the keyhole shaped canal becoming a more recognisable round shape, these

ARTICLE INFORMATION

*Corresponding Author: yuvarajbabu@saveetha.com
Received 4th Aug 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/135*

structures are known to have helped with childbirth (Rogith Kannan and Thenmozhi, 2017) even though there have been cases where the canals were closing at about 6 years of age. But sometimes, the ophthalmic vessels descend to the bottom of the keyhole and the bone ossifies around the artery. Thus resulting in the formation of the Met-optic canal (Lang, 1977). Other than the ophthalmic artery, some minor vessels have been documented to be passing through this canal.

Warwick's Foramen on the other hand are far more rare, hence they are rarely accounted for. Which means that we have not had sufficient evidence for the development of the Foramen. It is located in the cranial cavity, between the Superior Orbital Fissure and the Foramen Rotundum (Bisaria et al., 1996). It has not been studied enough, but it has been hypothesized that the Inferior Orbital Vein passes through it. The rarity of its occurrence was evident some studies finding the occurrence to be less than 1% (Bertelli, 2014).

Previously our department has published extensive research on various aspects of dentistry (Begum et al, 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese et al., 2019), this vast research experience has inspired us to research about the incidence and the morphological analysis of Met-optic Canal and Warwick's Foramen. This study was chosen because of the fact that these structures are not commonly found and thus have caused surgeons problems of excessive bleeding during procedures involving the human orbit or the cranial cavity. The very knowledge of the presence of these structures would help surgeons deal with the issue effectively. The aim of this study was to determine the incidence of Metoptic Canal and Warwick's Foramen and perform its morphometric measurements in South Indian skulls.

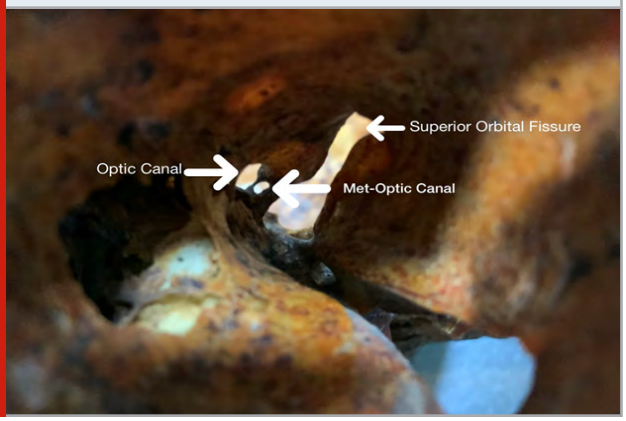
MATERIAL AND METHODS

36 unsexed adult human skulls were obtained from the Department of Anatomy, Saveetha Dental College, out of which 4 were discarded due to damage. All the 32 skulls obtained were of the South Indian origin and were all cranial cavity specimens. They were observed for the incidence of the Metoptic canal and Warwick's Foramen. If they were present, their morphometric analysis was taken.

Table 1. Distance of 4 metoptic canals from anatomical landmarks in orbit

S. No	Presence of Met-Optic canal	Distance from Fronto-Zygomatic Suture	Distance from Supraorbital Notch	Distance from Whitnall's Tubercle
1	Right	4.8cm	4.4cm	4.6cm
2	Left	6.5cm	6cm	5.4cm
3	Right	5.7cm	5.7cm	5.4cm
4	Right	4.8cm	5cm	4.6cm
	Average	5.45cm	5.27cm	5cm

Figure 1: White arrows indicates the Metoptic canal, Optic Canal and the Superior Orbital Fissure in the Left orbit



For the Metoptic canal, the distances were measured from the base of the metoptic canal to the following structures

- Whitnall's Tubercle
- Frontozygomatic Suture
- Supraorbital notch

These structures were chosen because of the ease of access to these structures with the measuring instruments at hand. The instruments used were a thick wire which was used for the measurement of the distance and a syringe which helped in anchoring the wire to the bone. One of the skulls observed had an optic canal in the shape of a keyhole, which further strengthens the theory of the formation of the metoptic canal.

RESULTS AND DISCUSSION

32 skulls were examined, totalling up to 64 orbits, of these there were only 4 orbits that had incidences of the metoptic canal, 3 were found on the right orbit and 1 was found on the left and Warwick's Foramen was not found in any of the orbits.

In this study, there were only 4 metoptic canals found out of a total of 64 orbits examined. Fig. 1 shows a Metoptic Canal found in one of the skulls, while it is unusual for a canal to be as big as it is shown. Three of which were found on the right and the remaining 1 was found on the left. In total, that sums up to 7.8% of all the cranial cavities examined had a met-optic canal. Another fact to be noted is that of all the skulls that were found to have Met-optic canals, all were found to be unilateral. In addition to that, Warwick's Foramen was not found in any of the 64 orbits examined. This lack of formation of the Warwick's Foramen could be indicative of the fact that this foramen does not ossify in the South Indian skull as there were no prior records or studies that have observed this.

Issues pertaining to accessibility and the lack of advanced means of measurement, we had to use simpler means of measurement which was the aforementioned thick piece of wire inserted into the syringe that was used as a measuring tool, there were measures taken to ensure the accuracy of the results such as not using the same wire twice and rechecking the length twice. The Warwick's Foramen found in the cranial cavity is consistent with the findings of Bertelli who found Warewick's Foramen in just 0.74% out of 2566 orbits and less so with Arzus Hizay's findings of 9.7% out of 92 skulls. Even the incidence of Met-optic canal is closer to the findings of Bertelli Ethan to Arzu Hizay (Hizay et al., 2019). The study by K.K. Bisaria, found that the side of incidence of the Warwick's Foramen and in turn minor canals were not dependent on sex and this was supported by my findings (Bisaria et al., 1996).

CONCLUSION

This study shows Metoptic Canal was present in 7.8% of skulls examined,. This study was chosen because of the fact that Metoptic canal and Warwick's Foramen are not commonly found in the orbit and can cause problems of excessive bleeding during surgical procedures involving the human orbit or the cranial cavity.

ACKNOWLEDGEMENTS

We acknowledge the Department of Anatomy, Saveetha Dental College for allowing us to use the bones from their collection for this study.

Conflict of Interest: The authors reported the conflict of interest while performing this study to be nil.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-196-200

BBRC
Bioscience Biotechnology
Research Communications

Comparison of Hb and PCV Values in Manual Methods – A Prospective Study

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ABSTRACT

Hemoglobin iron-containing metalloprotein expressed in red for all vertebrate blood cells (erythrocytes), as well as some invertebrate tissues. A healthy person has 12 to 20 grams of hemoglobin in every 100 milliliters of blood. Hematocrit is a blood test measuring the percentage concentration of red blood cells (RBC) in the blood. The measurement will depend on the number and size of cells in red bloods. It is part of the complete results of a person's blood count, along with hemoglobin concentration, white blood cell count, and platelet count. The volume of packed cells (PCV) is a measure of the proportion of blood formed by cells. The value is expressed as one percentage or fraction of blood cells. For example, a 40 per cent PCV means that in 100 milliliters of blood there are 40 milliliters of cells. This study is to compare the Hb and PCV values derived from direct manual and automated methods. Nowadays PCV values are estimated through automated methods. If there are any electrical supply problems, low budget labs, unavailability of the wintrobe's tube, in a practical college set up we have sahli's haemoglobinometer , with this we can be able to calculate the PCV valve. But our results show that the automated PCV values are higher than the manual calculated PCV values and the automated methods are more accurate to follow. Also we found that the manual calculated PCV method is not a better alternative for Automated PCV method.

KEY WORDS: HEMOGLOBIN, PACKED CELL VOLUME (PCV), MANUAL METHOD , AUTOMATED METHOD.

INTRODUCTION

Blood is a body fluid found in humans and nearly all the animals that carries nutrients and oxygen into the body's cells and carries the metabolic waste products away from the cells. Blood is made up of plasma and multiple cells in vertebrates-red blood cells , white blood cells , and platelets(Cooper, 2016). Hemoglobin is an element that produces oxygen in the red blood cells.Hemoglobin molecule consists of four subunits of globular protein of which each subunit consists of a protein chain that is closely associated with the non-protein heme component. The part of the heme consisting of the iron the oxygen binds to the oxygen binding capacity of hemoglobin is 1.34ml O2 per gram (Green, 2016). Therefore haemoglobin plays an important function in transport.

A healthy person consists of between 12 and 20 grams of haemoglobin in every 100 ml of blood(Ajibola, 2012). PCV also known as haematocrit is nothing more than the percentage amount of red blood cells in the blood, measured as part of a blood examination. This is usually 40.75 percent for men-50.3 percent, for women-44.3

ARTICLE INFORMATION

*Corresponding Author: brundha.sdc@saveetha.com
Received 3rd Aug 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/136*

percent. It is considered as part of the complete blood count results of an ind(Callan et al., 1992)ividual, along with the concentration of haemoglobin, the count of white blood cells and platelet counts. The definition of hematocrit (hemato from the Greek haima = blood; critter from the Greek krinein = to separate) is the ratio of the volume of packed red blood cells to the total blood volume and is therefore often referred to as the volume of packed cells or PCV(Callan et al., 1992; Institute and National Cancer Institute, 2020).

A haematocrit examination of a blood can be a point of reference for its oxygen delivery capability(Greilich et al., 2000). Too high or too low levels of haematocrit may cause blood disease, dehydration or other medical conditions. Laboratory diagnosis of anaemia is based on the haemoglobin (Hb) concentration, the number of red blood cells and the haematocrit of packed cell volume (PCV) values(Hou et al., 2020). Anaemia is most easily and accurately calculated by calculating PCV percent using the haematocrit process, whereas the determination of Hb concentration provides precise information on the type of anaemia that has been found to be easy to calculate and can be done in most rural areas where Hb concentration determination methods are not available and rough estimates are made using observed PCV values, which is a much simpler and cheaper approach(Dahil, 2019). Hematocrit (PCV) values are widely used in rural African human medicine because they are simpler and cheaper to perform using manual techniques(Lokwani, 2013).

Estimating hemoglobin in the blood is widely recommended in different physiological and pathological conditions and as both diagnostic and prognostic test particularly in case of suspected anemia that can be caused by different factors(Nayak, Rai and Gupta, 2011). Hemoglobin measurement is now performed in several laboratories using Automatic Hematology Analyzers but also in many other laboratories using Sahli 's Method a.k.a(Organisation mondiale de la santé et al., 2003; Nayak, Rai and Gupta, 2011). Acid Hematin Method, Cyanmethemoglobin Method (CMG) a.k.a Drabkin 's Method widely used to evaluate the concentration of hemoglobin in the blood of patients(Chung et al., 2020). The theory of the Sahli method or acid hematin method is very simple that the hemoglobin present in RBCs is converted into acid hematin, which is a dark brown colored substance, when the blood is added to N/10 Hydrochloric acid (HCl)(Kawthalkar, 2012).The color of the shaped acid hematin complex corresponds to the concentration of hemoglobin in the blood and is matched to the norm which is a reference brown glass supplied in the Sahli 's apparatus by diluting with N/10 hydrochloric acid or distilled water until the acid hematin complex color matches the norm colour(Sood, 1985).

The role of technology in hemoglobin testing has led to the advancement of groundbreaking tools and hemoglobin concentration quantification techniques in patients(Whitehead et al., 2019) . For example, the use of an automated hemoglobin analyzer has allowed fast, accurate and reliable results in the field of hematology. An automated hematology or hemoglobin analyser is widely used to have high throughputs to analyze a range of red and white blood cells as well as blood sample levels of hematocrites and hemoglobins(Barbhuiya et al., 2020). Modern analyzers give a higher accuracy performance compared to manual methods, at a fraction of the cost. An automated analyzer's initial cost is high and routine maintenance, and the laboratory staff needed for the system will increase costs(Whitehead et al., 2019; Barbhuiya et al., 2020). In addition, suitable climate conditions are needed, making it an unacceptable choice for non-laboratory environments such as test sites for mobile blood donors and field-based anemia screening projects(P et al., 2012; Whitehead et al., 2019; Barbhuiya et al., 2020). The aim of the study is to compare the Hb and PCV values in manual methods.

MATERIAL AND METHODS

20 fresh blood samples were collected to estimate the Hemoglobin level and PCV value for performing both direct and automated methods. The Hemoglobin level was estimated in a manual method using Sahli's haemoglobinometer, where Hydrochloric acid converts hemoglobin to acid hematin, which is then diluted until the color of the solution matches that of the comparator block. The PCV value can be calculated in both manual and automated methods, but a direct manual method is also available. That is the Wintrobe's PCV method.The Wintrobe method is performed similarly except that the Wintrobe tube is smaller in diameter than the Westergren tube and only 100 mm long. EDTA anticoagulated blood without extra diluent is drawn into the tube and the rate of red blood cells decrease after 1 hour is measured in millimetres. PCV is calculated manually and in automation by multiplying 3 with Hemoglobin value
Equipments required for Sahli's method:

1. Peripheral blood collection
2. Sahli's haemoglobinometer comparator
3. Sahli's haemoglobinometer tube
4. Sahli's pipette or haemoglobin pipette
5. Glass dropper
6. Glass rod for stirring.

Figure 1: EDTA vacutanier blood collection tube

Sahli's method:

Peripheral blood collection: Peripheral Blood samples were collected in EDTA tube (Figure 1) from randomly 20

patients who were taking their routine blood examination at the Clinical Laboratory in Saveetha Dental Hospital in Chennai, after obtaining the consent from the respective individuals. Approval was given by the ethical committee for working on research involving humans in Saveetha Institute of Medical and Technical Sciences (SIMATS). The criterion for selecting the sample was the clinical request for Haemoglobin and Complete blood count. No restriction was made for age, sex, or clinical history of each patient under clinic care. All the procedures were carried out in the clinical laboratory of Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences.

Method to calculate Hb using sahli's acid hematin method by using sahli's hemoglobinometer :

1. Place N/10 HCl into the Hb tube upto 2 grams. The main principle of adding N/10 HCl is for the conversion of Hb to acid hematin which is brown in colour.
2. The peripheral blood sample collected has to be taken using sahli's pipette or haemoglobin pipette upto 20 microliter.
3. Now add the blood sample to the acid solution.
4. The prepared solution has to be stirred using a stirrer.
5. Allow to stand for 10 minutes.
6. Distilled water has to be added drop by drop till the solution matches to brown glass standard.
7. Take the reading of the lower meniscus from the graduated tube in grams.

The PCV value obtained manually by3 times of Hemoglobin with the standard calculation
(3X Hemoglobin value).(Gessese et al. 2020)

RESULTS AND DISCUSSION

As the results obtained from the automated method and calculated method (Table 1), PCV values were compared statistically by using Independent t test and the results of that shows a significant difference between the two methods. The automated value is higher than the calculated PCV value(Table 2). The difference was statistically significant.(P value <0.05)(Table 3). From our results, it shows that calculated PCV value cannot be used as an alternative for the automated method. As the recent advances showed, the automated values are more standardised than the manual methods by rectifying the manual and instrumental errors.

Hemoglobin is the protein molecule in red blood cells that brings oxygen from the lungs to the tissues of the body, and returns carbon dioxide to the lungs from the tissues(Callan et al., 1992). Hemoglobin is composed of four associated protein molecules (globulin chains) (Barbhuiya et al., 2020). Normal range of Hb for men is 13.5- 17.5 grams per deciliter and for women it is 12.0-15.5 grams per deciliter (Ajibola, 2012). Depending on your age and gender a normal hemoglobin level is 11 to 18 grams per deciliter (g / dL)(Chung et al., 2020). Yet a healthy range is from 7 to 8 g / dL. Your physician will only use enough blood to achieve this amount. Most patients with a blood transfusion level of between 7 and 10 g / dL do not need to(Callan et al., 1992).

Table 1. Shows Patients' hemoglobin value(Sahli's method), PCV values both automated and calculated methods

SAMPLES	HB VALUE (G%)	PCV VALUE (AUTOMATED)	PCV VALUE (CALCULATED)
1.	16	44	48
2.	14	44	42
3.	17	37	51
4.	8	31	24
5.	10.6	54	31.8
6.	12	39	36
7.	10.6	40	31.8
8.	11.8	54	35.4
9.	11.4	50	34.2
10.	9.6	43	28.8
11.	12	40	36
12.	5	25	21
13.	7.8	25	23.4
14.	12.4	45	37.2
15.	6.2	40	18.6
16.	4.2	22	12.6
17.	12.2	46	36.6
18.	8.2	39	24.6
19.	11	54	33
20.	8	40	24

Packed cell volume (PCV) is the calculation of the volume ratio occupied by the red cells to the volume of whole blood in a capillary, venous, or arterial blood sample(Kamat, 2011). After appropriate centrifugation, the ratio is measured 6,10 and expressed as a decimal fraction. PCV was directly determined by inserting the blood sample in the Automated Hematology Analyzer (KX-21N sysmex, USA)(Kamat, 2011; Geetha, 2017). The automated analyzer for sysmex hematology can be run on its own or connected to a filmmaking and staining unit for blood(Chandrasekar, 2012).

Sahli's haemoglobinometer is a tool used to assess the amount of hemoglobin in the blood(Alstead, 1940). In action the Swiss scientist H invented a hemoglobinometer in 1902. This is based on a calculation of the color of the blood being examined, which is treated with hydrochloric acid, with normal colour(Quinn, 1987). A hemoglobinometer is an instrument used by spectrophotometric analysis to assess the hemoglobin content in the blood. Portable hemoglobinometers provide simple and convenient measurement which is particularly useful in areas where there are no clinical laboratories(Quinn, 1987; Verma, 1999). The basic principle of sahli's haemoglobinometer is that the blood is mixed with N/10 HCl which results in the conversion

of Hb to brown-colored acid hematin. The solution is filtered until the comparator box matches its color with the brown colored glass. The Hb concentration is read straight away. This is an acid hematin process – a simple, obsolete procedure for semi-quantifying concentration of haemoglobin in the blood, in which dilute HCl causes a change in brown color compared to tinted glass levels(Bell and Mcnaught, 1944).

Table 2. Shows the sample distribution and mean and standard deviation of the PCV in both automated and calculated values. The mean PCV value in automated is higher than the PCV value calculated from the manual hemoglobin value.

Group Statistics

	PCV	N	Mean	Std. Deviation	Std. Error Mean
Percentage	PCV automated value	20	40.6000	9.31552	2.08301
	PCV calculated	20	31.5000	9.60691	2.14817

Table 3. Show the values of Independent t test. PCV value obtained through Automated analyser is higher than the calculated PCV value. The difference is also significant statistically. [t= 3.041 and P value 0.004 (<0.05)].

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Percentage	Equal variances assumed	.116	.735	3.041	38	.004	9.10000	2.99225	3.04250	15.15750
	Equal variances not assumed			3.041	37.964	.004	9.10000	2.99225	3.04231	15.15769

Suppose, low budget labs, problems in electrical supply, unavailability of the wintrobe's tube, in a practical college set up we have sahli's haemoglobinometer, with this we are able to calculate PCV value(Bell and Mcnaught, 1944). But sahli's haemoglobinometer also has various disadvantages like acid hematin can not be converted to sulfhemoglobin, methemoglobin, and carboxyhemoglobin. Additionally, fetal hemoglobin is not converted to acid hematin, and so this procedure is not appropriate for young babies(Hall, 1909).

CONCLUSION

From this study we conclude that the automated PCV values are higher than the manual calculated PCV values and the automated methods are more accurate to follow. Also we found that the manual calculated PCV method is not a better alternative for Atomated PCV method.

ACKNOWLEDGEMENTS

The authors are thankful to Saveetha Dental college for providing a platform to express our knowledge.

Conflict of Interest: None to declare.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-201-208

BBRC
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Expectation About Complete Dentures Among Patients –A Questionnaire Based Study

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ABSTRACT

The main function of the stomatognathic system is to provide support for mastication, aesthetic appearance and assist phonetics. If there occurs loss of teeth due to pathologic or physiologic reason there would be loss of all these properties. Therefore the replacement of lost teeth by artificial prosthetic means play a major role in the oral as well as general health of patients as they help them both to meet the physiological and psychological needs.The aim of this study was to analyze the various parameters of expectation among patients and the dentures delivered to them. A questionnaire-based survey consisting of 15 questions was circulated.100 participants who were undergoing/underwent complete denture treatment were included in the study. Responses were tabulated and Chi-square analysis was performed using SPSS software version. The results showed that there is a difference in the expectation of the treatment among various groups which needs to be considered prior to treatment planning. P value was found to be <0.05 indicating a statistically significant difference in the expectations regarding the outcome, the difficulties faced during the treatment, opinion regarding the expenses, and willingness towards treatment among the patients of different age categories.Within the limitation of study it can be said that the patients included in this study were provided treatment based on their expectations and they were satisfied with this holistic approach.Further such studies to be done on different geographic locations and different populations to have a clear conclusion about the expectations. Such considerations can enhance good oral hygiene and positive psychological effects on patients towards oral habits.

KEY WORDS: COMPLETE DENTURE; TREATMENT; EXPECTATIONS; PATIENTS; OUTCOMES.

ARTICLE INFORMATION

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Received 5th Aug 2020 Accepted after revision 23rd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/137

INTRODUCTION

The main function of the stomatognathic system is to provide support for mastication, aesthetic appearance and assist phonetics. If there occur, loss of teeth due to pathologic or physiologic reason there would be loss of all these properties(Allen and McMillan, 2003). There will also be loss of alveolar bone which might reduce the vertical dimensions of face (Felton, 2009). Therefore the replacement of loss teeth by artificial prosthetic means play a major role in the oral as well as general health of patients as they help them to meet both the physiological and psychological needs(Douglass, Shih and Ostry, 2002).

The number of patients undergoing complete denture treatment has been increased about 10% in the past decade. There has been varied ideologies among patients regarding the treatment as there are different treatment protocols that are customizable by the dental health care provider based on the needs of the patients. The quantity of the treatment cannot be a justification for the success of this treatment. The successful outcome requires the quality of work, the demands and the expectations of the patient and the satisfaction of the patient towards the treatment delivered (Jonkman, Waas and Kalk, 1995; Muller, Heath and Ott, 2002; Carlsson and Omar, 2010).

There have been a lot of literature statements regarding the expectations and outcomes. Several researchers have undertaken statistics across the globe in different time periods and studies have shown results similar to those quoted in literature, however there have been certain differences in all these cases which need to be addressed (Smith and McCord, 2004).The expectations and outcome should not always be related with esthetics,comfort,associated pain,irritation,occlusion etc. Also it should account for the time taken for the procedure,cost and necessity. All these parameters should be considered for estimating overall satisfaction among the patients (Laird, 1987; Fenlon, Sherriff and Newton, 2007). Patients do think complete dentures as a complete replacement of natural teeth by artificial means where they are specific in customization. The requirement is not unique for all people of both the gender nor do their expectations. Thus it is important for the dentist to have a clear perception and evaluation of each patient before starting a complete denture treatment (Kemnitzer, 1956; Krausch-Hofmann et al., 2018).

There have been a lot of advancements in this procedure but the outcomes were not that pleased by patients.There has been certain complaints regarding time,cost,fit,maintenance in these procedures(Soni, Kumar and Shukla, 2016). In countries like India with the increasing demand for this treatment it is a prime responsibility for a dental professional to ensure that the treatment has been done at a satisfactory level for the patient. The results were not pleasing especially due to financial constraints and the dentist not being able to prioritize the patient requirements.Such kinds of remarks were stated in many literature. Hence the treatment modality should take into consideration all the factors influencing the outcome which includes systemic health, financial status, perception towards treatment apart from local factors (Kalk and Baat, 1990; Bhat, D. and Malli, 2014). Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to analyze the various parameters of expectation among patients and the dentures delivered to them.

Table 1. Questionnaire

Section I
Are you willing to attend this survey? Are you willing to use these data for educational and research purposes? Can you declare that all the responses were true to your knowledge?
Section II
Name Age/Gender
Section III
Have you completed the treatment course entirely? What is your expectation regarding complete denture treatment? What is your opinion regarding the expenses for the treatment? Any previous experience of the procedure? Were you willing for the treatment or you have been convinced for the treatment? What do you consider the major difficulty faced during the course of treatment? Do you feel difficulties in wearing the dentures that were delivered? Do you feel any difficulties in maintaining the dentures? Are you satisfied with the treatment provided? Would you recommend people regarding the need for this treatment?

MATERIAL AND METHODS

Study type and setting: This is a questionnaire based study and data were collected by reviewing the response of participants. Participants who were treated / undergoing complete denture treatment in Saveetha Dental College and Hospitals were included and others were excluded. The total sample size was 100 which accounted for 66 male and 34 female patients. A set of 15 questions were prepared. The questionnaire consists

of III sections which includes the patient's consent to participate, followed by their general details (Name/Age /Gender) and the final section includes the expectations and difficulties faced and the satisfaction towards the outcome. The individual questions of each section are represented in Table-1.

Sampling and verification: All data were obtained and are approved by the Institutional Ethical Committee and cross-verified by 2 reviewers. Subjective sampling was done. The external and internal validity were applicable.

Data analysis: All data retrieved were compiled in an excel sheet and imported to SPSS by IBM for statistical analysis. Chi-square statistical analysis was performed and the independent variables include age and gender and dependent variables include their responses for each question respectively.

Figure 1: Pie Chart representing the age category of the participants. 46 participants were of the group 50-60 years(Green) followed by 40 participants below 50 years(Blue), 9 participants between 60-70 years(Grey) and 5 participants of the age group 70-80(Violet).

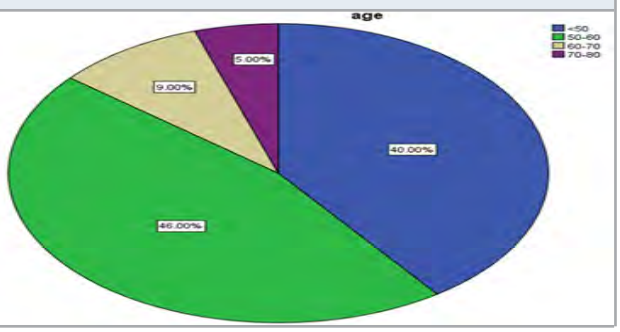
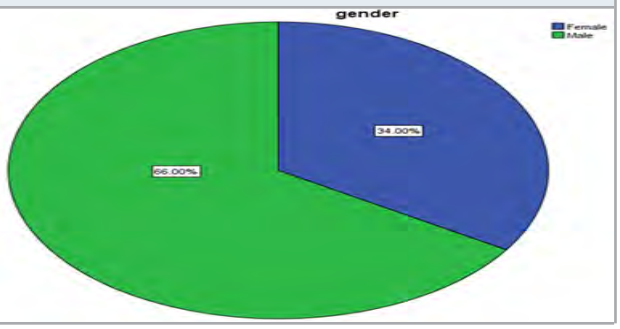


Figure 2: Pie Chart representing the gender of the participants. The total study population included 100 participants of which 66 were males(Green) and 34 were females (Blue).



RESULTS AND DISCUSSION

From Figure-1 representing the age group of the participants it can be seen that 46% of participants were between the age 50-60 followed by 40 % of them being <50 years of age. Irrespective of the age group it can be seen that 66% majority of the participants were males which is shown in Figure-2. This is in consensus with other studies stating that geriartic dentistry has been showing male predilection for replacement of missing teeth than their counterpart(Widbom, Soderfeldt and Kronstrom, 2005). It can be seen from Figure-3 that in the age categories <50 and 50-60 around 70 % of the participants had completed their treatment course.

Figure 3: Pie chart representing the patients undergone complete treatment protocol, where 84% of the population had completed the treatment(Green) whereas 16% of them were still undergoing treatment.(Blue-No).

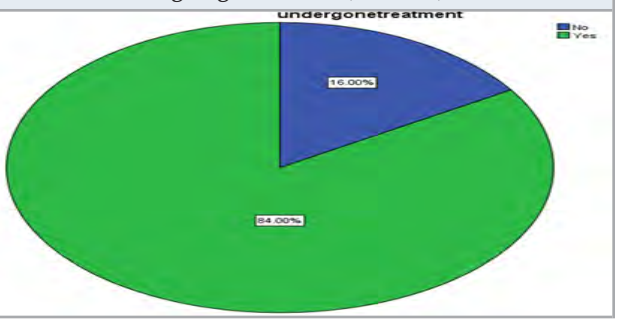
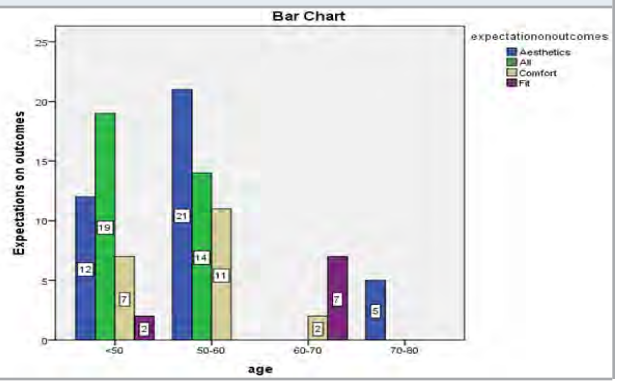


Figure 4: Bar graph representing the association between age group of patients and their expectations regarding treatment outcome, where X-axis represents the age categories(<50, 50-60, 60-70, 70-80), Y axis represents number of responses regarding expectations of treatment outcome (Blue-Aesthetics, Green- All, Grey- Comfort, Violet- Fit). Chi square test was performed and there was found to be a statistically significant association as p value was found to be 0.001 i.e p<0.05. Hence proving the majority of patients in the age group 50-60 years preferred aesthetics as the major expectation than other criterias.



From Figure-4 it can be stated that around 60% of participants in the age group <50 were expecting an outcome consisting of proper aesthetic value, functional fit and comfortability. Whereas the majority in the age group around 50-60 stated that aesthetics were their major concern which was in correlation with the expectation among patients > 70 years old . Interestingly the majority of the participants of age group 60-70 picked up that proper fitting dentures as their major expectations. This shows that there are multiple parameters to be considered before treatment as it might

have an impact towards treatment. Also from Figure-5 it can be stated that majority of the participants around 80% in the age categories above 50 were considering this treatment as a cheaper one whereas the age category < 50 felt it as a comparatively costlier treatment.This shows that the socioeconomic status and other factors do have an impact in health care (McCunniff et al., 2017; Turgut Cankaya, Yurdakos and Gokalp Kalabay, 2020).

Figure 5: Bar graph representing the association between age group of patients and their feedback towards expense of treatment, where X-axis represents the age categories(<50, 50-60, 60-70, 70-80), Y axis represents number of responses on feedback towards expense of treatment (Blue-Cheap, Green- Costly). Chi square test was performed and there was found to be a statistically significant association as p value was found to be 0.002 i.e p<0.05. Hence proving that the majority of participants in the age category 50-60 years considered the treatment to be cheaper than others.

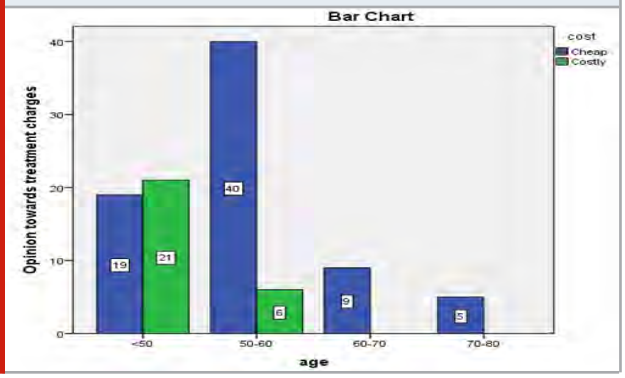
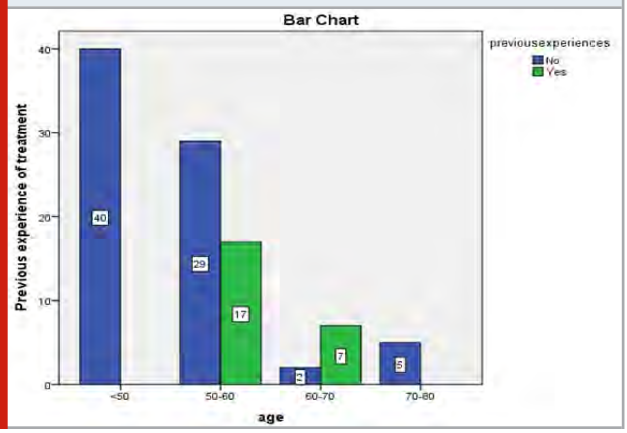


Figure 6: Bar graph representing the association between age groups of patients and their feedback towards previous experience, where X-axis represents the age categories(<50, 50-60, 60-70, 70-80), Y axis represents number of responses on feedback towards previous experience (Blue-No, Green- Yes). Chi square test was performed and there was found to be a statistically significant association as p value was found to be 0.012 i.e p<0.05.Hence proving that majority of participants of the age group 50-60 years had a previous experience with treatment than others.



Previous experiences of any treatment has a significant relationship towards the patients mentality.It might have a positive approach to support or may possess a threat. But in case of a treatment preferred for the first time, the patients are not aware of what would be the possible outcome and hence there needs a convincing approach by the dental practitioner to deliver the treatment. This is represented in Figure-6 & Figure-7.

Figure 7: Bar graph representing the association between age group of patients and their feedback towards willingness, where X-axis represents the age categories(<50, 50-60, 60-70, 70-80), Y axis represents number of responses on feedback towards willingness (Blue-Convinced, Green-Willing). Chi square test was performed and there was found to be a statistically significant association as p value was found to be 0.022 i.e p<0.05. Hence proving that majority of participants of age category 50-60 were convinced for the treatment than others.

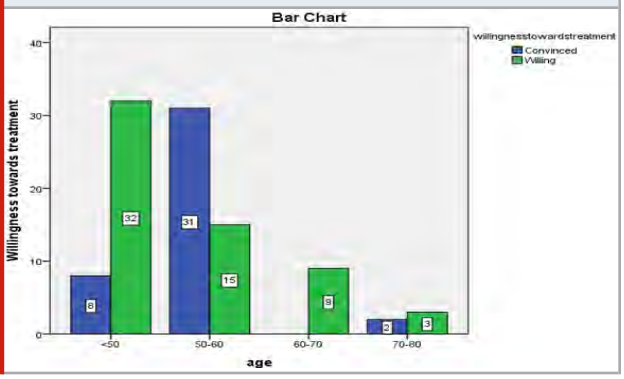
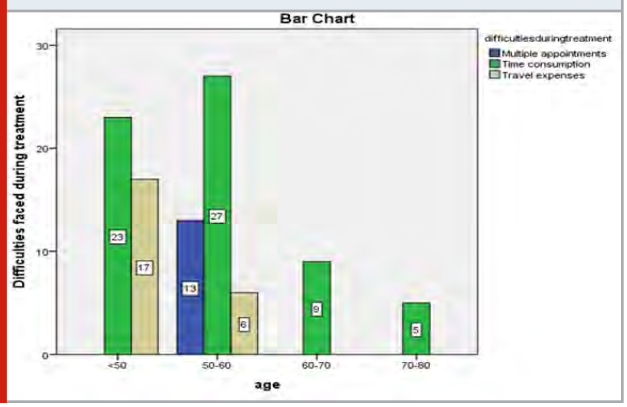


Figure 8: Bar graph representing the association between age group of patients and their feedback towards difficulty faced during treatment, where X-axis represents the age categories(<50, 50-60, 60-70, 70-80), Y axis represents number of responses on feedback towards difficulty faced during treatment (Blue-Multiple appointments, Green- Time, Grey-Travel expenses). Chi square test was performed and there was found to be a statistically significant association as p value was found to be 0.003 i.e p<0.05.Hence proving that majority of participants of the age category 50-60 years had considered time consumption was the major difficulty faced during the treatment than others.



All these parameters were based on their expectations. There are other factors too that play a significant and equally important role in the success of treatment. Those include the difficulties during the treatment, post treatment difficulties with the delivered dentures including the adaptability,maintenance etc. From Figure-8 it can be said that the vast majority around 80% of the total participants indicated that major difficulty faced during the treatments was the prolonged operative time in the dental chair. Around 90 % of the participants had no difficulty regarding the fitting or maintenance of the delivered dentures in almost all the age categories which is represented in the Figure-9 & Figure-10.

Figure 9: Bar graph representing the association between age group of patients and their feedback towards difficulty faced during wearing of dentures, where X-axis represents the age categories(<50, 50-60, 60-70, 70-80), Y axis represents number of responses on feedback towards difficulty faced during wearing of dentures (Blue-No, Green-Yes). Chi square test was performed and there was no statistically significant association as p value was found to be 0.23 i.e p>0.05. However, the majority of participants in the age category 50-60 years had no difficulty in wearing dentures.

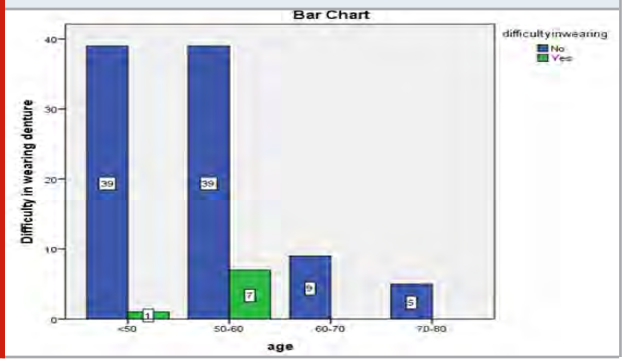


Figure-10: Bar graph representing the association between age group of patients and their feedback towards difficulty faced during maintaining of dentures, where X-axis represents the age categories(<50, 50-60, 60-70, 70-80), Y axis represents number of responses on feedback towards difficulty faced during maintaining of dentures (Blue-No, Green-Yes). Chi square test was performed and there was no statistically significant association as p value was found to be 0.23 i.e p>0.05. However, the majority of participants in the age category 50-60 years had no difficulty in maintaining dentures.

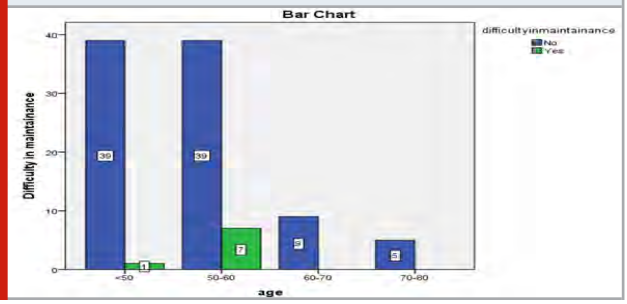
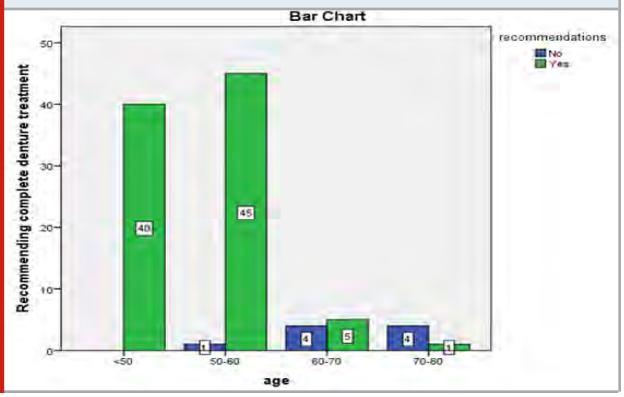


Figure 11: Bar graph representing the association between age group of patients and their feedback towards satisfaction of treatment, where X-axis represents the age categories(<50, 50-60, 60-70, 70-80), Y axis represents number of responses on feedback towards satisfaction of treatment (Blue-No, Green-Yes). Chi square test was performed and there was no statistically significant association as p value was found to be 0.13 i.e p>0.05. However majority of the patients in the age group 50-60 years were satisfied with the outcome of the treatment.

Figure 12: Bar graph representing the association between age group of patients and their feedback regarding recommendations for the treatment, where X-axis represents the age categories(<50, 50-60, 60-70, 70-80), Y axis represents number of responses on feedback towards recommendations for the treatment (Blue-No, Green-Yes). Chi square test was performed and there was no statistically significant association as p value was found to be 0.13 i.e p>0.05. However, majority of participants of the age category 50-60 years were ready to recommend the treatment than others.



Despite various difficulties encountered like the multiple appointments, travel expenses and being convinced for treatment, it can be seen that around 85 % of participants were satisfied with the overall outcome and were met with their expectations (Figure-11). This patient satisfaction is not only a part of work ethic but also plays a major role in the promotion of geriartic health care among the general public as many were ready to recommend the need of complete denture treatment to their close vicinity, this is represented in Figure-12.

It has been emphasised that patient satisfaction is the key for maintaining good oral health.Various factors have been controlling these satisfaction,irrespective of gender and age. Every patient has a prime requirement of good fitting denture which serves at its best for masticatory and other functions(Assunção et al., 2009; Chowdhary, Singh and Mishra, 2019; Duraisamy et al., 2019).

In most cases there has been very little attention given to psychological expectation on dentures (Zarb, 2013; Bakar, 2015). Difficulties in accepting dentures is multifactorial which includes compromisation of proper function,phonetics,aesthetics etc(Zou and Zhan, 2015). But it does not halt with these factors alone. As discussed in this topic it includes other non specific factors. One of the major factors influencing treatment is the socioeconomic status which plays a vital role in deciding the treatment plan and meeting the demands.

The dentist should make the patient aware and adjust to the circumstances accordingly. It is the duty of the dental practitioner to avoid over expectations and prioritize the demands and needs in providing prosthetic care(Singh and Saini, 2016; Awadalkreem et al., 2020). Similar study were conducted under different researchers and several factors came out of basic necessities of patients towards complete denture(Bellini et al., 2009; Gaspar et al., 2013; Siqueira et al., 2013; Silva et al., 2014)(Yamaga, Sato and Minakuchi, 2013; Soeda et al., 2017).

Many other extra factors like the difficulties during the course of treatment, opinion on the expenses towards treatment, willingness towards treatment were also considered in this study which were not found in other studies(Perea et al., 2013; Madhuri et al., 2014; Karmacharya, Saha and Kumari, 2017; Yamaga et al., 2019). The limitations of this study includes certain factors like systemic health of the patients, occupation and location, gender based association of expectations etc are not included in this study. All these parameters can be included in future studies to get an holistic approach.

CONCLUSION

Within the limitations of this study, it is evident that expectation of patients about dentures is an important aspect in treatment of completely edentulous patients. This aspect is least considered among many dental practitioners whereas the patients in this study had been considered their various demands and expectations and thus the patients were happy regarding the outcome. Further such studies to be done on different geographic locations and different populations to have a clear conclusion about the expectations. Such considerations can enhance good oral hygiene and positive psychological effects on patients towards oral habits.

ACKNOWLEDGMENTS

I would like to thank our Director sir for giving me an opportunity to do this research work and also to my guide and mentor.

Conflict of Interest: None Declared

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-209-214

BBRC
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Effects of Weekly Module Based Learning in Pathology – A Questionnaire Based Study

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ABSTRACT

Module is a unit of work in a course of guidance that is for all intents and purposes independent. It is a strategy for instructing that depends on building up abilities and knowledge in discrete units. The aim of this survey is to find the effects of weekly module based learning in pathology. A questionnaire containing fifteen questions were circulated among 90 students, out of which 75 students of Saveetha dental college, studying second year attended the survey. The results were collected and analysed statistically using SPSS software. The significance, advantages and disadvantages of the weekly module based learning system as said by the respondents were noted. 66.7% of the participants prefered weekly module based learning in pathology over the conventional learning methods. 53.3% of the respondents find weekly module based learning system as a better method of studying. A comparison between the student's opinion on better learning methods and if it allows easier follow up to the subjects before the exam and if it provides better correlation between subjects was made through Chi square analysis. There was a significant difference as p-value was 0.000 in both. From this survey, it is evident that the students prefer the weekly module based learning over other conventional methods of learning.

KEY WORDS: WEEKLY MODULE BASED LEARNING, PATHOLOGY.

INTRODUCTION

Learning is the way toward gaining new, or altering existing, information, practices, aptitudes, qualities, or inclinations (Gross, 2015). Some learning is prompt, stirred by a solitary occasion (for example being scorched by a hot stove), however much aptitude and information gathers from recurrent encounters. The progressions initiated by learning regularly endure forever, and it is difficult to recognise learned material that is by all accounts "lost" from that which can't be recovered (Hood et al., 2015). Learning may happen intentionally or without consciously being aware. The capacity to learn is present in people, animals and a few machines; there is likewise proof for some sort of learning in specific plants (Kingsland, 2018).

Active learning happens when an individual assumes responsibility for his/her learning experience. Since understanding data is the key part of learning, it is significant for students to perceive what they comprehend and what they don't. Thus, they can screen their very own mastery of subjects. Dynamic learning urges students to have an inside exchange in which they verbalize understandings (Bransford et al., 2006). Active learning draws in learners in two angles – getting things done

ARTICLE INFORMATION

*Corresponding Author: brundha.sdc@saveetha.com
Received 29th July 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/138

and considering the things they are doing (Renkl et al., 2002).

The methodologies for instructing can be extensively characterised into educator focused and students focused. In an instructor focused way to deal with learning, educators are the primary position figure in this model. Students are seen as "unfilled vessels" whose essential job is to inactively get data (by means of talks and direct guidance) with the ultimate objective of testing and evaluation. In this method , instructing and evaluation are seen as two separate parameters . Students' learning is estimated through intently scored tests and evaluations.

In Student-Centered Approach to Learning, while educators are the power figure in this model, instructors and students assume a similarly dynamic job in the learning procedure. The instructor's essential job is to mentor and encourage students learning and generally understanding of material. Students learning is estimated through both formal and casual types of appraisal, including bunch ventures, understudy portfolios, and class investment. Educating and investigation associated; understudy learning is endlessly estimated during instructor guidance (Deng and Yu, 2014).

Module goals help us to thoroughly consider and certainly depict what is needed for students to learn in every module. Similarly as with any plan venture, it is significant, when planning a course, to begin with a reasonable thought of the course's objectives and the results you need to accomplish. Module-based ideas are helpful to learners since they can fill in as a sort of agenda that explains what they should know and have the option to do in the wake of finishing each piece of the course. These targets are likewise helpful from a curricular and methodical point of view (and for program evaluation) since they outline explicitly how the course will meet the methodical learning objectives it is proposed to attain (Anderson, Krathwohl and Bloom, 2001).

Module is a unit of work in a course of guidance that is for all intents and purposes independent and a strategy for instructing that depends on the building up abilities and knowledge in discrete units. "Module is a short unit of instruction dealing with a conception unit of subject matter" – Russel (1974) (Aqazade, 2009). Modular approach is an independent way of managing one explicit subject in a helpful structure, with the goal that the student can finish it at his or her own pace freely or in little groups . It is organized to such an extent that the student can recognize the goal , select material and technique and assess his very own achievement (Adibnia, 2010).

The essential components of module based learning are rationale - a sketch of the outline of the module and clarification of why the students should learn it, objectives - expressed in performance terms about the outcome of the module, Entry test - to determine if the learner has the required skills to start the module and to find how much knowledge he/ she has about the subject that is going to be taught, Multimedia materials - a wide range of media like pictures and videos are used to actively involve the learner's senses, Learning activities like presentations, drills, demonstrations, problems solving and simulation are useful in increasing the interest of the students and caters the student's needs. Self test is also one of the requirements as it provides a chance to check one's own progress. Another requirement is a post test which is basically an examination to check if the goal of the module has been reached (Joyce, Kalhun and Hapkins, 2009).

Advantages of module based learning are that studying becomes more effective and impactful. Instead of normal marks and grades, it provides a system of evaluation. Learner's can study without interference from normal works and responsibilities. Modules can be taught for either once use , small or big groups. Modules are adaptable with the goal that execution can be made by an assortment of patterns. It's more relevant to mature learners and enables the learners to have an authority or command over his learning.

Disadvantages include that module based learning requires smart classrooms, and that modules are economical in their use. Moreover this type of learning is appropriate mainly for mature students (Oberhuemer and Ulich, 1997). To sum it up, module based learning is more efficient, latest and more technology based learning method in the current educational field.

MATERIAL AND METHODS

This is a questionnaire based survey in which a set of fifteen questions were distributed through an online survey platform called Surveyplanet. The survey was attended by second year students of Saveetha dental college. The questionnaire contained questions enquiring about the advantages and disadvantages of weekly module based learning and preferences of the students on the methodologies of learning. The questionnaire was distributed online to about 90 students wherein 75 students attended the survey. The ratings of weekly module based learning by the participants is also recorded. Results were obtained and analysed using proper statistical methods with the help of SPSS software and thus the preference of learning methods and the opinions on weekly module based learning of the students is studied. Chi square test was used and Pearson correlation analysis was used to assess the correlation between the variables. The results were considered to be of statistical significance if $p < 0.05$.

RESULT AND DISCUSSION

As the weekly module based learning system is solely focused on completing the entire portion in a week, the students were asked how they felt about completion of the portions in a week. 46.7% felt it to be manageable, 34.7% of the students felt that completing the whole portion in a week felt hectic while the remaining 18.7%

of the students felt completion of the whole portion of the subject in a week as an easy task (Figure 1). Then the students were asked if they felt weekly module based learning is better than the conventional method of learning. 66.7% responded yes and 33.3% responded no (Figure 2). An article by EZF Liu, CH Lin et al., shows similar results claiming weekly module based learning to be better than the conventional method of learning among Taiwanese students (Liu and Lin, 2010).

Figure 1: Pie Chart showing students' view on completion of the whole portion in a week. 18.67% respondents feel completion of whole portions in a week is easy (blue), 46.67% manageable (red) and 34.67% hectic (green).

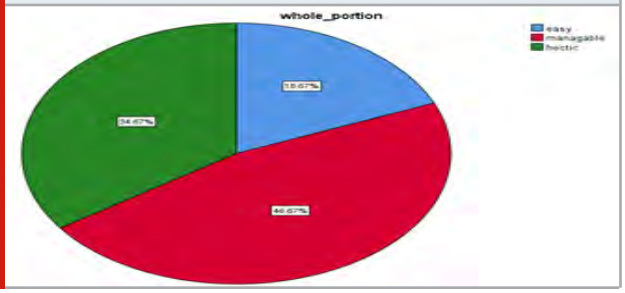


Figure 2 : Pie Chart showing students' opinion on better methods of studying. 66.67% of the respondents said that module based learning is better than the conventional method of learning (blue) and 33.33% said conventional method is better (red).

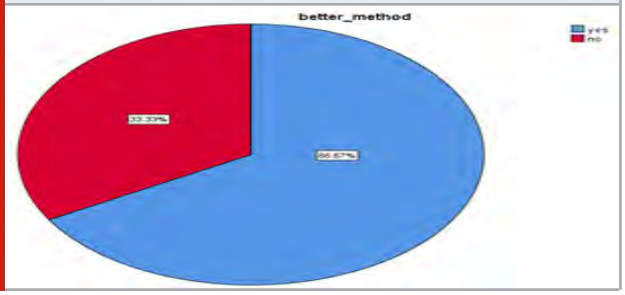
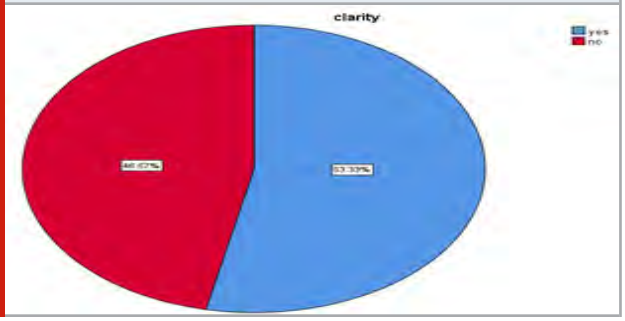


Figure 3: Pie Chart showing students' opinion on if module based learning allows more clarity. 53.33% respondents reported it allows more clarity (blue) and 46.67% does not (red).



Then the participants were asked if this weekly module based system provides much more clarity than the conventional system of learning. 53.3% of the participants find weekly module based learning to be more clearer and precise with clarity. 46.7% of them find conventional learning methods to provide more clarity (Figure 3). A study by Z Kallar, et al., supports this concept as it is stated that module based learning provides a better clarity and insight into the subject (Kalmár, Szepesvári and Larincz, 1998). 65.3% of the participants find that weekly module based learning grants more time to concentrate on a particular subject than in conventional method while the minority of 34.7% felt otherwise (Figure 4).

Figure 4: Pie Chart showing students' opinion on if module based systems allows more time to concentrate on a particular subject. 65.33% of the respondents felt it allows more time to concentrate (blue) and 34.67% did not (red).

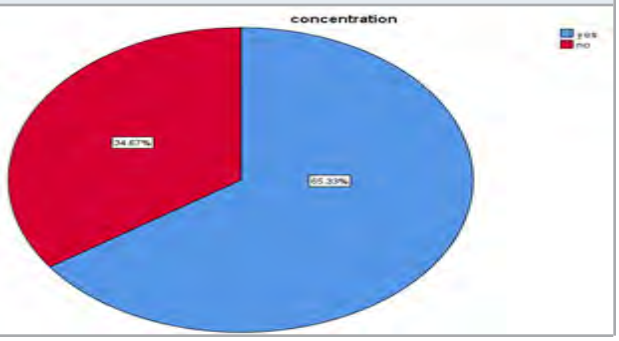
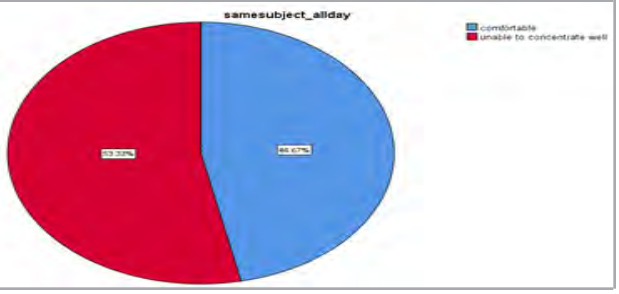


Figure 5: Pie Chart showing students' opinion on studying the same subject all day. 46.67% respondents felt comfortable (blue) and 53.33% students were unable to concentrate well (red).



The students were then asked their opinion on studying the same subject all day. It was found that 55.3% of the students were unable to concentrate on the same subject for an extended period of time while 46.7% of the survey attendees were comfortable with studying the subject for a long duration (Figure 5). A predominant of 66.7% students believe weekly module based learning provides easier correlation to the subject. 33.3% of the students however do not share the opinion (Figure 6). It is stated in an article by SY Hwang that module based study setting allows a good correlation between subjects, when done in the right order (Hwang and Chang, 2000).

The weekly module based learning enables students to complete the portions in a short period of time which eventually allows more revisions and recollections. The

next question directed towards the students was based on this. They were asked if they could follow up easily with the subject. A majority of the participants, that is 53.3% found that module based learning method allows easier follow up while 46.7% thought otherwise (Figure 7). 57.3% of the participants felt that they would be able to study the whole portion if the subject is completely finished. 42.7% of the participants however do not think they would be able to study the whole portion if the subject is completely finished (Figure 8).

Figure 6: Pie Chart showing students' opinion on if it allows easier correlation between subjects. 66.67% students responded yes (blue) and 33.33% responded no (red).

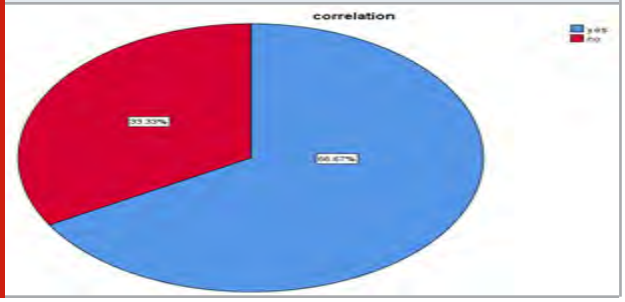


Figure 7 : Pie Chart showing students' view on if it allows easier follow up. 53.33% respondents feel it allows easier follow up (blue) and 46.67% felt it does not allow easier follow up (red).

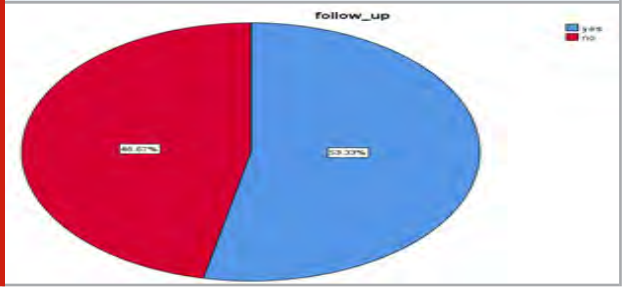
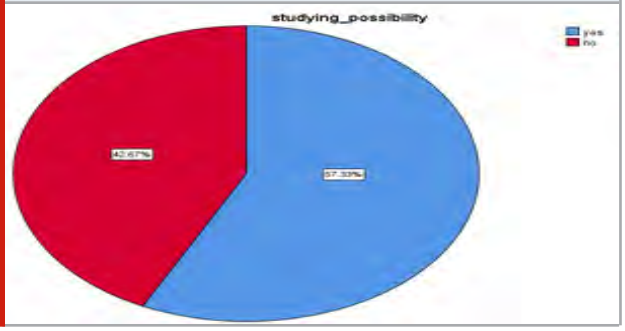


Figure 8 : Pie Chart showing students' possibility to study the whole portion before the exam. 57.33% felt they could (blue) and 42.76% felt they couldn't (red).



Nowadays, there are a variety of options in the method of learning. In various places, different methods of teaching techniques are used. Some among them are adult learning, interactive lectures and symposium. It was seen in the survey that 17.3% preferred adult learning methods, 68% were fond of interactive lectures and 14.7% preferred symposium type of learning (Figure 9). When asked to choose between panel discussion, module based learning and integrated learning, it was found that 34.7% preferred panel discussion learning, 30.7% preferred module based learning and 34.7% seemed to prefer integrated learning (Figure 10). In contrast to this, integrated learning was the most preferred learning method in the survey conducted by Dowson M and McInerney DM (Dowson and McInerney, 2004).

Figure 9: Pie Chart showing students' preferred methods of learning. 17.33% prefer adult learning (blue), 68% prefer interactive lectures (red) 14.67% prefer symposium (green).

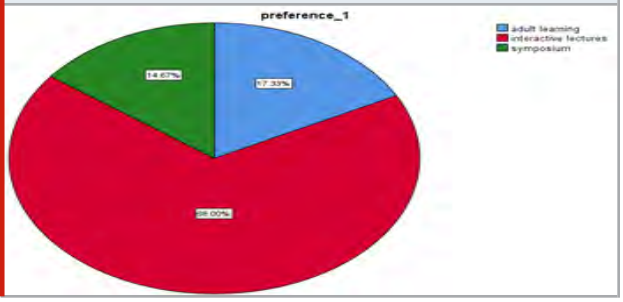


Figure 10: Pie Chart showing students' other preferred methods of learning. 34.67% students prefer panel discussion (blue), 30.67% prefer module based learning (red) and 34.67% prefer integrated learning (green).

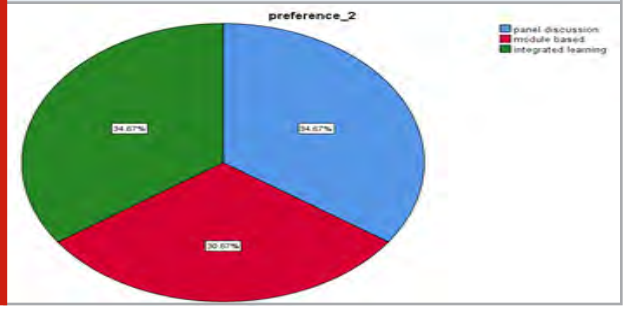
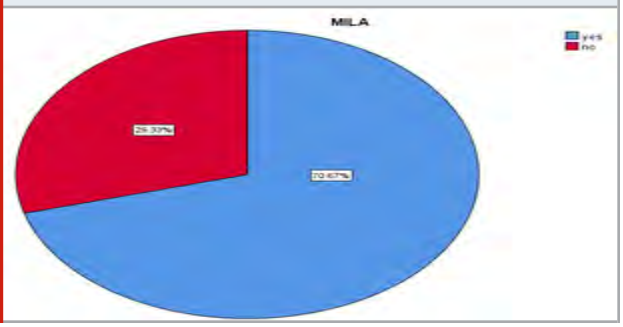


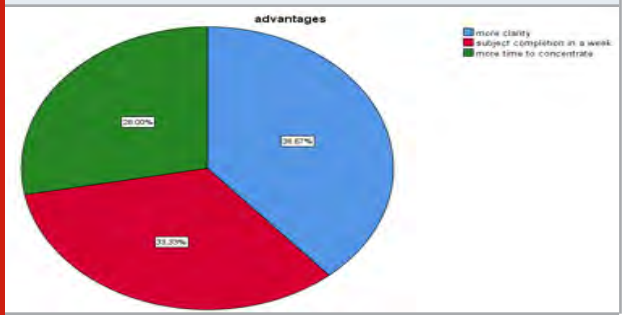
Figure 11: Pie Chart showing students' aAwareness on MILA technique. 70.67% are aware (blue) and 29.33% are not aware (red).



MILA is one of the best learning methods. MILA stands for Multiple Interactive Learning Algorithm in which six segments are present with two hour lectures. 71.8% of the

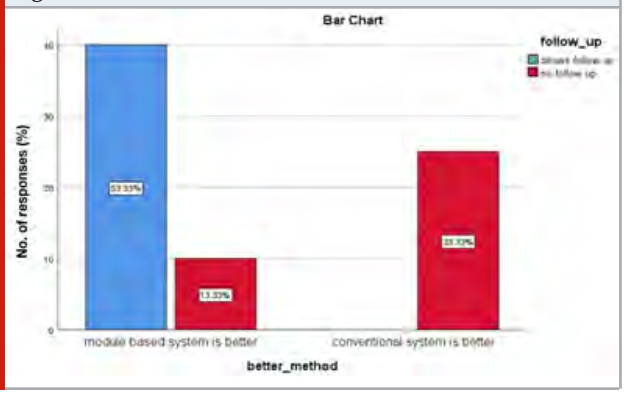
participants were aware about this system while 28.2% were not aware (Figure 11). Module based learning has many advantages. When asked about it, 38.7% found that this system allows more clarity on the subject, 33.3% felt completion of the whole subject in a week as a boon and 28% felt the most advantageous factor in this system is that it allows to concentrate on one subject at a time (Figure 12).

Figure 12: Pie Chart showing students' view on advantages in module based technique. 38.67% chose it allows more clarity (blue), 33.33% chose completion of whole portions in a week (red) and 28% chose it allows more time to concentrate (green).



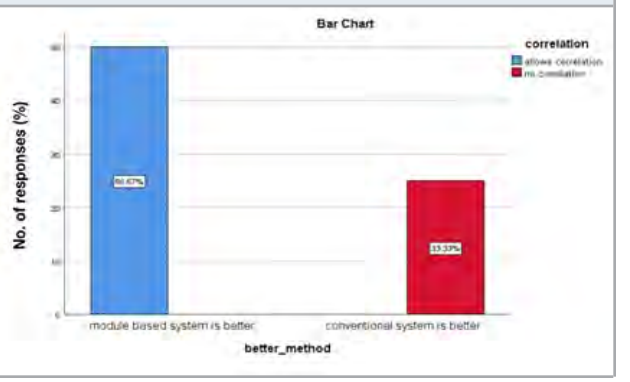
A comparison between the student's opinion on better learning methods and if it allows easier follow up to the subjects before the exam was made through Chi square analysis (Figure 13). There was a significant difference as p-value was 0.000. The Chi square analysis for comparison between better learning methods and if it allows easier correlation between subjects was made (Figure 14). There was a significant difference as p-value was 0.000.

Figure 13: The bar graph represents the comparison of responses by students of Pathology on if the module based system allows easier follow up of the portions before exam. X axis represents the better learning system and Y axis represents percentage of participants' response to easier follow up. This graph shows that respondents who chose module based systems are better, predominantly said it allows easier follow up. This is statistically significant. Chi square test, p-value = 0.000 (<0.05), hence statistically significant.



As said in the article "The Impact of Active and Context-Based Learning in Introductory Chemistry Courses: An Early Evaluation of the Modular Approach" by Joshua P. Gutwill that the students in the modular learning system outperformed the control group on conceptual problems in chemistry, similarly the students of General Pathology also showed positive outcomes on weekly module based learning in the survey they attended as they found weekly module based learning to be beneficial. It is also established that weekly module based learning provides more clarity and time to concentrate on a particular subject (Gutwill-Wise, 2001).

Figure 14: The bar graph represents the comparison of responses by students of Pathology on if the module based system allows easier correlation between subjects. X axis represents the better learning system and Y axis represents percentage of participants' response to easier correlation. This graph shows that all respondents who chose module based systems are better, said it allows better correlation between subjects. This is statistically significant. Chi square test, p-value = 0.000 (<0.05), hence statistically significant.



The paper by Prince MJ, Felder RM characterises every strategy, features shared commonalities and explicit contrasts, and audits inquiry about the adequacy of the techniques. While the quality of the proof shifts starting with one technique then onto the next, inductive strategies are reliably seen as at least equivalent to, and done more effectively than, conventional deductive techniques for accomplishing a wide scope of learning results (Prince and Felder, 2006).

CONCLUSION

From this survey, it is evident that the students prefer the weekly module based learning over other conventional methods of learning as it helps them better to understand and remember the concepts, allows easier recollection of the subject and provides more time to concentrate on the same subject. It also provides a long duration to concentrate on a particular subject along with accommodating easier correlation between the subjects.

ACKNOWLEDGEMENTS

M.Rithanya contributed to the execution of the work, data collection and drafting of the manuscript. Dr.M.P.Brundha contributed to the concept, design of the study, validation of the data collection, revision and proofreading of the article.

Conflict of Interest: None to declare

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-215-219

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Xanthine Oxidase Inhibitory Effect of Alternanthera *sessilis*

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ABSTRACT

Alternanthera sessilis is one of the useful medicinal plants which is also used in diet by many people of Asia and other regions. This plant has shown many therapeutic uses such as anti- inflammatory, anti-diarrhoeal, antimicrobial, antioxidant and also hepatoprotective activities. Xanthine oxidase is a flavoprotein enzyme whose high activity will lead to excessive production of uric acid which will then get accumulated in muscles and joints leading to a diseased condition called gout. The present study was aimed to assess the xanthine oxidase inhibitory effect on *Alternanthera sessilis* leaf extract and to screen the phytochemical constituents in it. Ethanolic extract of *Alternanthera sessilis* leaves was used for the study. Phytochemical screening and the inhibitory activity of this plant extract were analysed. The result showed the potent xanthine oxidase inhibitory effect of the plant in a concentration dependent manner. The phytochemical screening also revealed that the extract is rich in alkaloids, terpenoids, flavonoids, phlobatannins and carbohydrates. The study showed that the ethanolic extract of *Alternanthera sessilis* showed potent in vitro xanthine oxidase inhibitory activity and is rich in the presence of phytochemical constituents. Further detailed studies have to be done to elucidate the underlying mechanism of its activity and to develop it as a drug for the treatment for gout.

KEY WORDS: ALTERNANTHERA SESSILIS; XANTHINE OXIDASE; PHYTOCHEMICAL SCREENING; GOUT.

ARTICLE INFORMATION

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Received 5th Aug 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/139

INTRODUCTION

Xanthine oxidase is a flavoprotein enzyme which helps in catalyzing purine which undergoes oxidative hydroxylation reaction at the molybdenum center (Borges, Fernandes and Roleira, 2002). In human tissues, xanthine oxidase is predominantly present in the liver and small intestine (Elion, Kovensky and Hitchings, 1966). Inhibition of xanthine oxidase can cure various diseases most importantly gout. It is the enzyme which converts hypoxanthine to xanthine and then to Uric acid (Morgan, 1926). Gout is the most widespread form of inflammatory arthritis which is associated with affecting the life of people. Increase in uric acid level in serum or their accumulation in joints is the common development of gout (Ferraz Filha et al., 2006). The initial symptoms of gout takes place all of a sudden and rapid which occurs especially during the night time. First affected part of the body is the big toe where the uric acid is accumulated which becomes red and swollen, the veins dilate and the skin appears bruised (Roddy and Doherty, 2010).

Allopurinol is a well-known inhibitor of xanthine oxidase, and is used for the testament of gout. The metabolic deposition of allopurinol was determined in many living beings such as dogs, mites and human beings. Allopurinol, a substrate which also acts as an inhibitor of xanthine oxidase, converted to alloxanthine, a metabolite. Alloxanthine accumulation with allopurinol during the prolonged therapy contributes in controlling hyperuricemia. Allopurinol is a synthetic drug and it has many side effects such as fever, sore throat etc. and hence many efforts are being made to find natural remedies for out and other hyperuricemic diseases (Busso and So, 2010).

Alternanthera sessilis (*A. sessilis*) is an aquatic plant which can be observed or seen in marshy areas and wetlands especially in Bangladesh. This plant is used as a medicine in folklore. They were especially used to treat wounds and pain. In different parts of India it is used in curing different diseases. They used to treat ulcers, treat gonorrhoea, low sperm count, fevers, dyspepsia, liver and spleen diseases. In Tamil Nadu, it is used in the treatment of headache,
hepatitis and asthma (Hossain et al., 2014)

Taxonomical classification:(Taxon, Red and List, 2015)
Kingdom: Plantae
Phylum:Angiosperms
Class: Eudicots
Order: Caryophyllales
Family: Amaranthaceae
Sub-family: Gomphrenoideae
Genus: Alternanthera
Species: sessilis

It is a perennial herb with prostrate stems, which is ascending and roots often have nodes. Flowers in sessile spikes, bracts and bracteoles. They are highly branched and their height differs with the humidity level. In flooded areas it is seen floating with several meters in height (Grubben and Denton, 2004). Alternanthera sessilis has anti-viral, anti-fungal, anti-microbial, anti-inflammatory and much more properties (Kumar et al., 2014). This plant contains 2, 4- methylenecycloartanol and cyclohexanol, choline, oleanolic acid. Consumption of this plant gives a cooling effect to the eyes, relieves floating abdomen and liver diseases. It is also an antidote for snake bites and scorpion stings. the dried plant is used as blood purifier and cures skin diseases (Walter, Merish and Tamizhamuthu, 2014).Although other therapeutic properties of *A. sessilis* were reported, studies to evaluate the xanthine oxidase inhibitory effect of A.sessilis is scarce. The aim of this study focuses on the above lacunae, that is xanthine oxidase inhibitory effect of Alternanthera sessilis.

MATERIAL AND METHODS

2.1 Preparation of *A. sessilis* extract: Ethanolic extract of A.sessilis was prepared. Dried leaf powder of A.sessilis was extracted using ethanol. This extract was kept for one day and then filtered. The extract thus prepared was dried and used for assessing the xanthine oxidase inhibitory activity.

2.2. In vitro xanthine oxidase inhibitory effect of *A. sessilis*: In vitro xanthine oxidase inhibitory effect of A.sessilis was assessed as per the method of (Nguyen et al., 2004) and (Umamaheswari et al., 2007). Briefly the assay mixture consisted of 1ml of extract (0.1 to 0.5 g/ml) 2.9 ml of phosphate buffer (pH 7.5) and 0.1 ml of xanthine oxidase enzyme solution (0.1 unit / ml in phosphate buffer, pH 7.5), which was prepared immediately before use. After preincubation at 25degree Celsius for 15 mins, the reaction was initiated by the addition of 2ml of substrate solution (150M xanthine in the same buffer). The assay mixture was incubated at 25 degree Celsius for 30 minutes. The reaction was then stopped by addition of 1ml of 1N hydrochloric acid and the absorbance was measured at 290nm using UV spectrometer. Allopurinol (0.1 to 0.5 mg/ml), a known inhibitor of xanthine oxidase was used as the positive control. One unit of xanthine oxidase is defined as the amount of enzyme required to produce 1mmol of uric acid/min at 25 degrees. Xanthine oxidase inhibitory activity was expressed at the percentage inhibition of xanthine oxidase in the above assay system calculated as percentage of inhibition as follows

$$\% \text{ of inhibition} = Ac - At/Ac \times 100$$

Ac is the absorbance of control reaction and At is the absorbance of test reaction. The assay was done in triplicate for each concentration. Allopurinol (0.1 to 0.5 microgram/ ml) was used as standard.

3. Phytochemical screening:
2.3.1. Test for phlobatannins: 1ml of A.sessilis extract is added to 1ml of HCl and boiled. Formation of red colour indicated the presence of phlobatannins

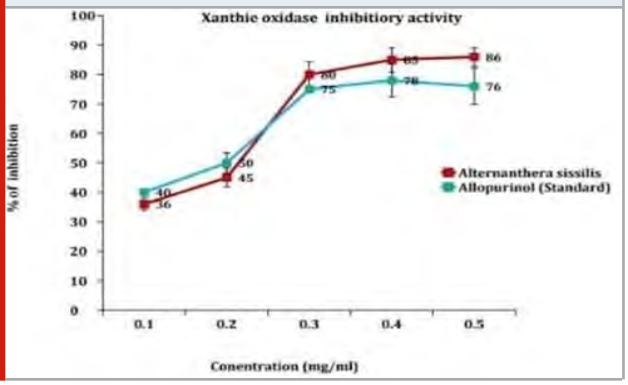
2.3.2. Test for carbohydrates

a. Fehling's test: 1ml of the extract is added to 3ml of Fehling's a and b solution and kept in a boiling water bath for 3mins. The reddish-brown precipitate formation indicates the presence of carbohydrate.

b. Benedict's test: 1ml of extract is added to 3ml of Benedict's solution and kept in a boiling water bath for 3 minutes. Red green and brown colour might be seen which indicates the presence of carbohydrates.

2.3.3. Test for flavonoids: 1ml of extract is added to 1ml of 3% liquid ammonia. Yellow coloured solution formed, confirms the presence of flavonoids.

Figure 1: Xanthine oxidase inhibitory activity of A.sessilis leaf extract. Allopurinol used as standard. Each bar represents the mean±SEM of 3 independent observations. P value <0.05 is considered to be significant.



2.3.4. Test for alkaloids: 1ml of extract is added to 5% HCl solution and the formation creamish pale yellow solution is observed which confirms the presence of alkaloids.

2.3.5. Test for terpenoids: 1ml of extract with addition of 3ml of chloroform and 2ml of 5% conc. Sulphuric acid. This indicates the formation of a red colour solution confirms the presence of terpenoids.

4 Statistical Analysis: The data were subjected to the statistical analysis using one-way analysis of variance (ANOVA) and Duncan's multiple range test to assess the significance of individual variation between the groups. In Duncan's test, the significance was considered at the level of $p< 0.05$.

RESULT AND DISCUSSION

Xanthine oxidase inhibitory effect of the ethanolic extract of A.sessilis was done at different concentrations (Figure 1). The effect of the extract was compared to that of the standard drug allopurinol. Extract of A.sessilis showed lesser effect than the standard drug at lower concentrations. But as the concentration increases the activity of the extract was found to be better than the standard drug allopurinol (Figure I). Xanthine oxidase is an important biological source of oxygen-derived free radicals which contribute to oxidative damage to living tissues involved in many pathological processes including inflammation, atherosclerosis, cancer, aging and gout (Chiang, Lo and Lu, 1994). The elevation of oxidative stress has been reported in gouty patients (Urano et al., 2002).

Table 1. Phytochemical screening of A.sessilis leaf extract

Phytochemical	Observation	Inference
1.Test for phlobatannins: 1ml sample and 1ml HCL	Formation of red colour	++
2. Test for carbohydrates: a.Fehling's test: 1ml sample and 3ml fehling's A & B solution. 3min boiling water bath. b.Benedict's test: 1ml of sample is mixed with benedict's reagent. 3 min boiling water bath	Red brownish precipitate Red, green, brown colour may be seen	+++ +++
3. Test for flavonoids: 1ml of sample and 1ml of 3% liquid ammonia is added	Yellow colour solution will be formed	++
4. Test for alkaloids: 1ml sample and 1ml of 5% HCL is added	Creamish pale yellow colour will be seen	+++
5. Test for terpenoids: 1ml of sample and 3ml of chloroform and 2ml of 5% conc. Sulphuric acid was added	Red colour solution is confirmed	++

The bioactive compounds having the xanthine oxidase inhibitory effect will help to reduce inflammation and hyperuricemia. Although allopurinol has been successfully used to reduce uric acid level, it is still not the right drug for the treatment of acute gouty arthritis (Dubchak and Falasca, 2010). Allopurinol generates superoxide and can develop undesirable symptoms in persons that are allergic to allopurinol (Mohamed Isa, Ablat and Mohamad, 2018). Since our extract is from natural origin and will not have any side effects, this plant can be used for the development of drug against gout, as it possesses significant inhibition towards xanthine oxidase.

Phyto constituents are the natural bioactive compounds found in plants. Phytochemicals are basically divided into two groups, i.e. primary and secondary constituents; according to their functions in plant metabolism. Primary constituents comprise common sugars, amino acid, proteins and chlorophyll while secondary constituents consist of alkaloids, terpenoid, steroids and flavonoids, so on. (Thilagavathi et al., 2015). The presence of phytochemicals shows the bioactive activities in the plants and has antioxidant activities. Flavonoids act as health components. Alkaloids are present and they involve medicinal uses (Aiyegoro and Okoh, 2010). Our study showed that A.sessilis extract leaf extract is abundant in carbohydrates and alkaloids moderately rich in phlobatannins, flavonoids and terpenoids (Table 1). All biological activities of herbal medicine are attributed to the presence of phytochemicals in it. The presence of these phytochemicals might be also the underlying reason for the inhibition of xanthine oxidase activity.

CONCLUSION

To conclude, the present study revealed that *A. sessilis* leaf extract is effective in inhibiting the xanthine oxidase enzyme activity in vitro and is rich in phytochemical components. The phytochemical constituents in the extract might have contributed to the beneficial effect of this extract.

ACKNOWLEDGEMENTS

This research was done under the supervision of the Department of Research of Saveetha Dental College and Hospitals. We sincerely show gratitude to the corresponding guides who provided insight and expertise that greatly assisted the research.

Conflicts of Interest: None declared

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-220-223

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Xanthine Oxidase Inhibitory Effect of *Solanum torvum* (An in Vitro Study)

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ABSTRACT

Solanum torvum has been used therapeutically for centuries. Pharmacological studies indicate that the stem and root of *S.torvum* have anti-tumor, anti-bacterial, anti-viral, anti-inflammatory and other medicinally important effects. It is also used to treat fever, wounds and tooth decay. Gout, a disease resulting from increased uric acid accumulation in joints and muscles and due to increased activities of xanthine oxidase enzyme in nucleotide metabolism. Xanthine oxidase converts xanthine to hypoxanthine and further to uric acid. The present study is focused on evaluating the in vitro xanthine oxidase inhibitory (XOI) activity of *S. torum* fruit extract and to screen the phytochemical constituent present in it. Ethanolic extract of *S.torvum* (EST) was prepared and xanthine oxidase inhibitory activity was assessed by using Allopurinol as the standard drug. The phytochemical screening of the extract was also done. The results showed that the fruit extract possessed XOI activity in a concentration dependent manner. Also after phytochemical screening showed that EST is rich in phlobatannins, carbohydrates, flavonoids, terpenoids and alkaloids. Thus the study concluded that *S.torvum* possessed potent in vitro XOI activity.

KEY WORDS: XANTHINE OXIDASE; GOUT; SOLANUM TORVUM; PHYTOCHEMICAL SCREENING.

INTRODUCTION

Xanthine Oxidase (XO) is a highly versatile flavoprotein enzyme, ubiquitous among species (from bacteria to human) and within various tissues of mammals (Borges, Fernandes and Roleira, 2002). It is also found in milk. XO is a homodimer with a molecular mass of 290kDa. It belongs to the molybdenum-protein family containing one molybdenum, one of the flavin adenine dinucleotides (FAD) and two iron sulfur (2Fe-2S) center of Ferredoxin type in each of its two independent subunits. It has two substrate binding sites (Kostis et al., 2015). XO is a key enzyme playing a role in hyperuricemia, catalyzing the oxidation of hypoxanthine to xanthine and then to uric acid in nucleotide metabolism (Unno, Sugimoto and Kakuda, 2004). Excess or increased activities of XO leads to excessive production of uric acid which gets accumulated in tissues and results in a diseased condition called Gout and Rheumatoid Arthritis (Sreejith et al., 2013).

ARTICLE INFORMATION

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Received 2nd Aug 2020 Accepted after revision 23rd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/140

Inhibition of XO decreases uric acid levels and results in an anti-hyperuricemic effect (Borges, Fernandes and Roleira, 2002). Allopurinol, first synthesized as a potential anticancer agent, is nowadays clinically useful as a xanthine oxidase inhibitor used in the treatment of gout. XO serum levels are significantly increased in various pathological stages like hepatitis, inflammation, ischemia-reperfusion, carcinogenesis and ageing (Borges, Fernandes and Roleira, 2002). However, Allopurinol being a chemical has many side effects such as fever, sore throat and allergic reactions. There have been many studies conducted for discovering various xanthine oxidase inhibitors which could be used in treatment of gout and related diseases without any side effects.

Numerous studies have been conducted regarding the XOI activity of plants and plant products. Flacourtia sepiaria was traditionally used as an antidote for snake poisoning, rheumatoid arthritis, gout and kidney diseases. The XOI activity of its methanol extract was found to be significant when compared with standard Allopurinol (Sreejith et al., 2013). Phenolic substances like anthocyanins and polyphenols present in berries of several cultivars of Ribes, Rubus and vaccinium genera had certain inhibitory activity towards XO (Costantino, Albasini and Rastelli, 1992). Erythrina stricta, an evergreen tree, is very effective in treatment of gout due to its XOI activity (Umamaheswari et al., 2009). Ursolic acid also has good hypouricemic activity and therefore has high potential to be used for treatment of gout and hyperuricemia related diseases (Abu-Gharbieh et al., 2018).

S.torvum is a small solanaceous shrub. The plant is found in tropical Africa, Asia, South America. Anciently, it was used in Cameroonian folk medicine for treatment of fever, wounds and tooth decay (Ndebia, Kamgang and Nkeh-ChungagAnye, 2006). The other names of S.torvum include devil's fig, prickly nightshade, shoo-shoo bush, wild eggplant and pea eggplant. It is bushy, spiny and erect. The berries grow in clusters of tiny green spheres which resemble green peas when ripe and later become yellow to brown (Ve et al., 2018). Its taxonomic classification is as follows (Jaiswal, 2012):

Kingdom: Plantae
Division: Magnoliophyta
Class : Magnoliopsida
Order : Solanales
Family : Solanaceae
Genus : Solanum L.
Species : torvum

Among its major chemical constituents are steroids, steroid saponins, steroid alkaloids and phenols (Yousaf, Wang and Baydoun, 2013). It is used in the treatment of coughs and liver diseases. Solanum torvum is used to reduce body heat and strengthen the body. It has good antibacterial activity (Kannan et al., 2012). Many pharmacological studies revealed that this plant exhibits antioxidant activity, cardiovascular, immunomodulatory and nephroprotective activity supporting its traditional uses (Jaiswal, 2012). Aqueous extract from dried fruits of Solanum torvum reduces blood pressure. It also has anti-ulcer properties owing to presence of flavonoids, sterols and triterpenes. It is antiviral, analgesic as well as anti-inflammatory (Agrawal, Bajpei and Patil, 2010). Hence our present study is to assess the inhibitory activity of *S. torvum* on xanthine oxidase in an in vitro model.

MATERIAL AND METHODS

2.1 *S.torvum* fruit extract (EST) preparation: Ethanolic extract of S.torvum was prepared. The fruits were collected, washed and dried thoroughly. Then 30 grams of fruit was weighed out and ground with ethanol. This mixture was kept for one day and then filtered. The extract thus prepared (EST) was dried and used for assessing the XOI activity.

2.2 In vitro XOI activity of *S. torvum* fruit extract: In vitro XOI activity of EST was assessed as per the method of (Nguyen et al., 2004) and (Umamaheswari et al., 2007) . Briefly, the assay mixture consisted of 1ml of the EST (0.1 to 0.5 g/ml), 2.9 ml of phosphate buffer (pH 7.5) and 0.1 ml of xanthine oxidase enzyme solution (0.1 units/ml in Phosphate buffer, pH 7.5), which was prepared immediately before use. After preincubation at 25^0 for 15 min, the reaction was initiated by the addition of 2ml of substrate solution (150 M xanthine in the same buffer). The assay mixture was incubated at 25^0 for 30min. The reaction was then stopped by the addition of 1ml of 1N hydrochloric acid and the absorbance was measured at 290 nm using a UV spectrophotometer. Allopurinol (0.1 to 0.5 mg/ml), a known inhibitor of XO, was used as the positive control. One unit of XO is defined as the amount of enzyme required to produce 1 mmol of uric acid/min at 25^0. XOI activity was expressed as the percentage inhibition of XO in the above assay system calculated as percentage of inhibition as follows

$$\% \text{ of inhibition} = [(Ac-At)/Ac] \times 100$$

Where Ac is the absorbance of control reaction and At is the absorbance of test reaction. The assay was done in triplicate for each concentration. Allopurinol (0.1 to 0.5 µg/ml) was used as standard.

2.3 Phytochemical Screening test

2.3.1. Test for phlobatannin: 1ml of the EST was treated with 1ml of 1% HCl and boiled for 10 mins. The formation of red color precipitate indicates the presence of phlobatannin.

2.3.2. Test for Carbohydrates

a) Fehling's test: 1ml of the extract was boiled with 1ml of Fehling's A and B for 3min. The formation of brown or red precipitate indicating the presence of carbohydrates (reducing sugar).

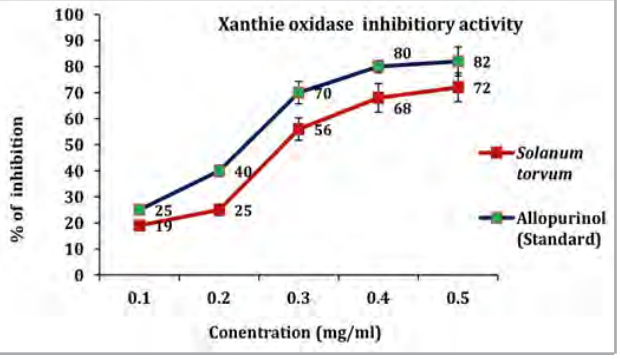
b) Benedict's test: 1ml of the extract was boiled along with 1ml of Benedict's solution. Red, brown or green color precipitate indicates the presence of carbohydrates (reducing sugar).

2.3.3. Test for Flavonoids: Few drops of 1% liquid ammonia were taken in a test tube and along with it. 1ml of the extract was added. The formation of yellow color indicates the presence of flavonoids.

2.3.4. Test for Alkaloids: 2ml of extract was mixed with 2ml of HCl. Then 6 drops of HCN was added and further 2 drops of picric acid was added. The formation of a creamish pale yellow precipitate indicates the presence of Alkaloids.

2.3.5. Test for Terpenoids: 2ml of extract along with 2ml of chloroform and 3ml of con. H2SO4 was added. The formation of red precipitate indicates the presence of terpenoids.

Figure 1: Xanthine oxidase inhibitory activity of Solanum torvum. Allopurinol: Was used as a standard drug. Each Bar Represents Mean± SEM of 3 independent observations. p<0.05 is considered to be statistically significant.



2.4 Statistical Analysis: The data was subjected to statistical analysis using one-way analysis of variance (ANOVA) and Duncan's multiple range test to assess the significance of individual variations between the groups. In Duncan's test, significance was considered at the level of $p<0.05$.

RESULTS AND DISCUSSION

Natural products provide a vast pool of XO inhibitors that can possibly be developed into clinical products. At present, the potential of developing successful natural products for the management of XO-related diseases is still largely unexplored (Hudaib et al., 2011). Uricosuric drugs which increase the urinary excretion of uric acid, or XO inhibitors which block the terminal step in uric acid biosynthesis, can lower the plasma uric acid concentration, and are generally employed for the treatment of gout (Schlesinger, Dalbeth and Perez-Ruiz, 2009). S.torvum fruit extract was found to have significant XOI activity in a concentration dependent manner (Figure 1). With increasing concentration of EST, the percentage inhibition of xanthine oxidase was also increased, showing its efficacy in a concentration dependent manner. When its XOI activity was compared to that of standard, Allopurinol, the activity was found to be slightly lesser. However, allopurinol causes many side effects such as hepatitis, nephropathy, and allergic reactions (Fagugli et al., 2008). The graph (Figure 1) shows that the activity of allopurinol is high when compared to that of the extract. The XOI activity of the extract could decrease the accumulation of uric acid and its deposition which is the key process in the development of gout.

Table 1. Phytochemical screening of EST

Experiment	Observation	Result	Inference
Test for Phlobatannins:	Red colored complex formed	+++	Presence of Phlobatannins
Fehling's Test:	Reddish brown color formed	+++	Presence of Carbohydrates
Benedict's Test:	Red, brown or green color formed	+++	Presence of Carbohydrates
Test for Flavonoids:	Creamish yellow color formed	++	Presence of Flavonoids
Test for Alkaloids:	Red color formed	+++	Presence of Alkaloids
Test for Terpenoids:	Red color formed	+++	Presence of Terpenoids

Phytochemicals are a powerful group of compounds, belonging to secondary metabolites of plants and including a diverse range of chemical entities such as polyphenols, flavonoids, steroidal saponins, organosulfur compounds, and vitamins (Forni et al., 2019). Most phytochemicals, components of food, beverages, and herbal products are often reported in literature as "nutraceutical", emphasizing their health promoting properties, including the prevention and treatment of pathologies like cancer, cardiovascular diseases, neural disorders, and Alzheimer's disease (Winter et al., 2017). The phytochemical analysis of EST showed that the extract is found to be rich in phlobatannins, carbohydrates, alkaloids, terpenoids and flavonoids, which attribute to its biochemical activities and properties. These secondary metabolites have been documented to possess an array of pharmacological properties attributable to their ability to interfere with multiple signalling cascades that are critical to heterogeneous metabolic diseases (Ramawat, Dass and Mathur, 2009; Forni et al., 2019). The occurrence of these

phytochemicals might have contributed to the beneficial effects of this extract.

CONCLUSION

To conclude the extract showed potent XOI activity and is rich in many phytochemicals. This study provides a platform for the further analysis of the extract in detail about the antigout activity. Detailed in vivo studies are needed for development of this plant fruit as a drug for the treatment of gout.

ACKNOWLEDGEMENTS

This research was done under the supervision of the Department of Research of Saveetha Dental College and Hospitals. We sincerely show gratitude to the corresponding guides who provided insight and expertise that greatly assisted the research.

Conflicts of Interest: None declared

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8)2020 Pp-224-228

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Comparative Evaluation of Wear Resistance Among Cad-Cam and Resin Interim Restoration - an in Vitro Study

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ABSTRACT

The most commonly used material in dentistry is Poly methyl methacrylate (PMMA) which has excellent properties like physical and mechanical properties but this material is rarely used in pure form as it has relatively poor wear resistance and heat resistance. The ideal properties of fixed partial denture (FPD) base material should have superior surface texture and mechanical properties. The wear resistance of heat cure provisional and CAD-CAM provisional vary greatly based on their properties. The aim of this study was to comparatively evaluate the wear resistance in heat cure provisional and cad-cam provisional fixed partial denture. Eight samples each of heat cure provisional and CAD-CAM milled FPD are prepared. The samples are then run for 8 hours in a brushing simulator with a toothpaste to check for its wear resistance .The pre test and post test measurement of its wear resistance is done using laser scan. The wear resistance is more for the CAD-CAM provisional FPD as compared to the heat cure provisional FPD. Pre treatment and post treatment cuspal thickness shows a vast difference in heat cure provisional. However the pre treatment and post treatment cuspal thickness reduction is minimal in CAD CAM provisional FPD. CAD CAM provisional FPD showed better wear resistance than heat cured provisional FPD. Hence CAD CAM prosthesis should be preferred over the heat cured FPD.

KEY WORDS: WEAR RESISTANCE, HEAT CURE PROVISIONAL, CAD-CAM PROVISIONAL.

ARTICLE INFORMATION

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Received 4th Aug 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/141

INTRODUCTION

The success of the restoration in fixed prosthodontics depends on three main factors that are biological factors, mechanical factors, and aesthetic factors. Different materials have been tried in restoring the missing tooth. The choice of the material selection depends on the esthetics, available interocclusal space, number of missing teeth, cost and the status of the abutment tooth (Baba, 2016).

Ideally FPD (fixed partial denture) base material should have superior surface texture and mechanical properties. In 1936 Walter Wright introduced acrylic resin material called polymethylmethacrylate (PMMA) to the market (Keyf, Uzun and Mutlu, 2003; Baba, 2016). This material became one of the most popularly used denture base materials due to its ease of handling and manipulation of the material, it is less toxic, has good aesthetic results, shows adequate strength, easily repaired, the stability in the oral cavity was better when compared with other materials, low solubility, reasonable cost, and low water absorption (Kim and Watts, 2004). However, the mechanical properties of PMMA have been considered inadequate (Vallittu, 1993, 1999). Among the common drawbacks of PMMA are dimensional changes, susceptibility to fracture, residual monomers, and increased risk of denture-associated infections (Vallittu, Ruyter and Ekstrand, 1998). In addition to this the possibility of surface and subsurface voids, which can not only jeopardize the mechanical properties of the processed denture but also compromise esthetic and hygienic results (Hazelton et al., 1995; Vallittu, Ruyter and Ekstrand, 1998).

Surface characteristics of acrylic dentures such as roughness, hardness, and wettability have been reported to be key players in denture-associated stomatitis (John et al., 2015). Surface roughness has been described as irregularities that characterizes a surface and has its influence on wetting, quality of adhesion, and brightness of that surface. Rough surfaces generally tend to induce halitosis and are considered more vulnerable to discoloration than smooth surfaces, thereby reducing patient esthetics and comfort (Cardoso et al., 2008).

As microbial adhesion and colonization usually occur on non shedding surfaces (Lewinstein et al., 2003), dental prostheses need to have smooth surfaces to minimize the retention of plaque and microorganisms (Vallittu, Ruyter and Ekstrand, 1998; Cardoso et al., 2008). To decrease the accumulation and colonization of microorganisms, the surface roughness of dental prostheses should not exceed a threshold of 0.2 µm (Scotti, Mascellani and Forniti, 1997; Cai et al., 2011; Ayman, 2017). Studies reported that a 0.2 µm roughness threshold can be achieved by common laboratory and chairside finishing and polishing procedures.Therefore, adequate finishing and polishing of dental prostheses, including dentures, are mandatory to minimize prosthesis surface roughness (Scotti, Mascellani and Forniti, 1997).[16]

Computer-aided design/computer-aided manufacturing (CAD/CAM) techniques haveexpanded recently to embrace the fabrication of complete dentures, record bases, immediate dentures, and implant-supported overdentures in two clinical appointments. As CAD/CAM dentures are milled from pre-polymerized PMMA billets that are polymerized under high temperatures and pressure values, CAD/CAM dentures are reported to be less porous, and consequently, less likely to harbor virulent microorganisms such as Candida albicans, which will be less able to adhere to the surface of digital dentures (Ruyter, Nilner and Moller, 1987; Wassell et al., 2002; Diaz-Arnold et al., 2008).

The material of choice for the fixed restoration in compromised abutments and in immediate implant loading is the polymer resin. Polymethyl methacrylate (PMMA) is the most commonly used polymer as a removable prosthetic restorative material due to its excellent physical and mechanical properties. Due to its poor wear resistance and heat resistance, it is not used as a permanent fixed restorative material (Demir et al., 2006; Cai et al., 2011).

In polymer tribology, wear mechanism includes abrasive, adhesive and fatigue wear. Abrasive wear is a material loss phenomenon due to movement of hard particles on the friction surface. Adhesive wear, it is the adhesion and tearing micro materials during friction. Fatigue wear is the peeling of material under repeated action of high compressive stress (Gu et al., 2019).

Heat treatment is considered as one of the most effective ways to improve the mechanical properties of polymer materials (Ovsianikov et al., 2011; Gu et al., 2019). Heat cured PMMA resin is the most widely used material for removable prosthesis. This material is mainly used due to its physical, chemical properties, easy to process and reasonable cost. However, there are few disadvantages like release of residual methyl methacrylate (MMA) which affects the dimensional stability of the material (Baba, 2016; Ayman, 2017).

Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about Comparison of wear resistance of CAD CAM provisional and heat cure provisional.

MATERIAL AND METHODS

Sampling: A total of 16 samples, Eight Samples of heat cure provisional restoration (Figure 1) and eight samples of CAD-CAM milled provisional restoration (Figure 2)

are fabricated. Tooth brushing simulator Toothbrush simulator is a device used to evaluate the wear resistance. In this device, commercially available toothbrushes with medium graded bristles were used. The specimens are fixed in the device and the toothbrush is positioned so that it can simulate brushing. The specimens are fixed in the tooth brush simulator and the brushing simulation is done for the period of 24hrs (Figure 3).

Figure 1: Heat cure provisional sample

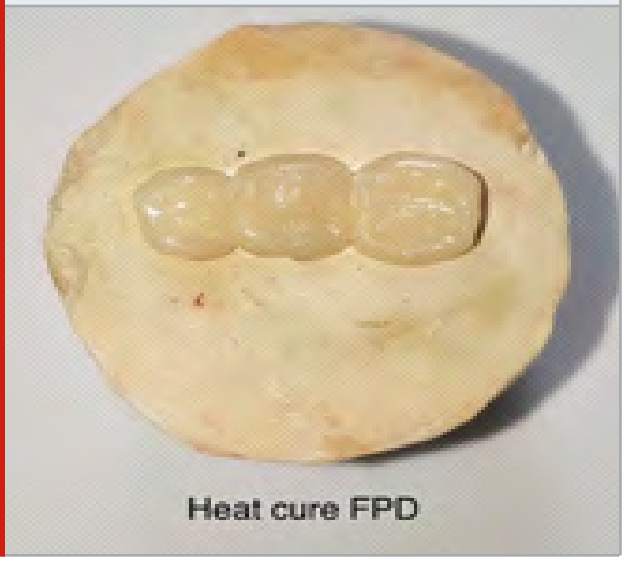


Figure 2: CAD-CAM provisional samples

Figure 3: Toothbrush simulator with samples.

The results are tabulated in excel, Statistical analysis was done using SPSS and one way ANOVA test performed. Statistical analysis done by exporting the data to SPSS for data checking. Data sorted and then represented in frequencies. Descriptive results are presented on tables and graphs.

RESULT AND DISCUSSION

The wear resistance is less for the Heat cure provisional FPD as compared to the CAD CAM provisional FPD which has more wear resistance. Pre-treatment and post-treatment cuspal thickness shows a vast difference in heat cure provisional as seen in Graph 1. However the pre-treatment and post-treatment cuspal thickness reduction is minimal in cad cam provisional FPD as seen in Graph 2.

Figure 4: Pre treatment and post treatment images of heat cure provisional FPD showing the wear resistance.

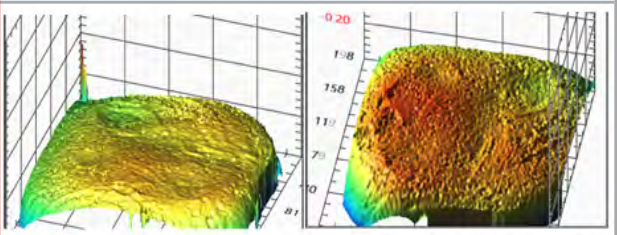
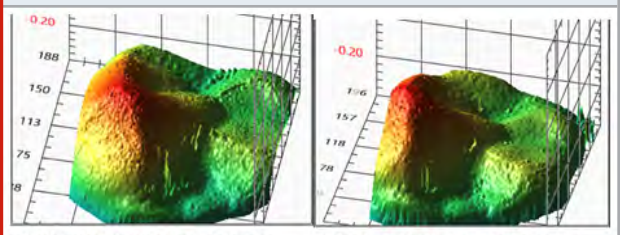


Figure 5: Pre treatment and post treatment images of CAD-CAM provisional FPD showing the wear resistance.

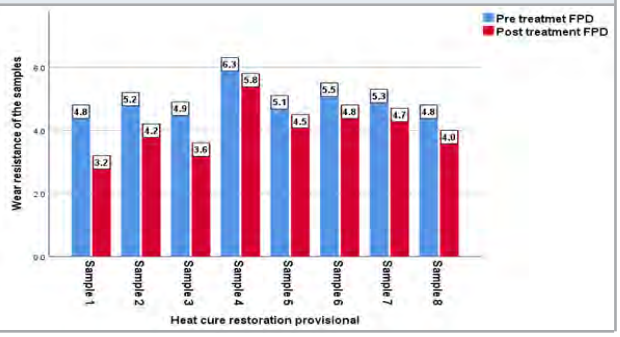


Dental wear is a complex process that is influenced by numerous factors and depends on physiological and pathological mechanisms (Mörmann et al., 2013). Resistance to occlusal wear is an important consideration for the clinical success of oral prosthetic restorations. The wear of the restorative material should match with the wear of natural enamel. Wear of restorative material can cause abnormal loading on the occlusal surface and possibly loss of occlusal vertical dimensions, which can lead to problems, such as temporomandibular joint disorders, masticatory muscle fatigue, changes in mandibular movement path, and esthetic problems (Lambrechts et al., 1989; Mörmann et al., 2013).

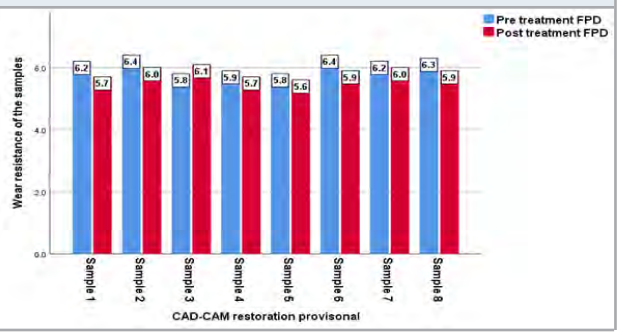
To evaluate the wear resistance, several tests have been tried; rotating sliding wear test, two body wear test, three body wear test, and tooth brush simulator. Clinically, although most restorative material or tooth loss may be due to direct contact between teeth, between teeth and

restorative materials, or between restorative materials, these losses can also be caused by other factors, such as abrasion or erosion (Lim et al., 2002).

Graph 1: This graph shows association between Heat cure provisional restoration and wear resistance where blue color indicates Pretreatment FPD and red color indicates Post treatment FPD. The X axis represents the Heat cure restoration provisional samples and the Y axis represents the wear resistance of the samples. The wear resistance is less in heat cure provisional. One way ANOVA test done, P < 0.001 for Heat cure provisional restoration indicating statistically significant.



Graph 2: This graph shows association between CAD-CAM restoration provisional and wear resistance where blue color indicates Pretreatment FPD and red color indicates Post treatment FPD. The X axis represents the CAD-CAM restoration provisional samples and the Y axis represents the wear resistance of the samples. Wear resistance is more in CAD-CAM provisional restoration.



In immediate loading of implant prosthesis and in compromised abutment conditions, the material choice for the fixed restoration is PMMA resin. This PMMA resin should withstand wear for minimum 6 months till permanent restorations are replaced. In this study the wear resistance is tested using the tooth brush simulator for 24 hrs. The abrasion wear for a restoration can be 5 minutes per day during brushing. Thus this study shows the abrasion wear value for 9 months. When compared with conventional heat cured acrylic resin, the CDA-CAM resin restoration has better abrasion wear resistance.

CONCLUSION

CAD-CAM milled PMMA resin has more abrasive wear resistance than the Conventional heat cured acrylic resin. This can due to the less polymerization shrinkage, less residual monomer content, less manual error. The above study concludes that the CAD-CAM milled resin restoration is preferred than conventional heat cured restoration as long term provisional restoration.

ACKNOWLEDGEMENTS

The study was supported by Saveetha Dental College & Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai.

Conflict of Interest: There are no conflicts of interest as declared by the authors.

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-229-232

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In Vitro Xanthine Oxidase Inhibitory Potentials of Garlic Oil

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ABSTRACT

Gout is a disorder that is caused due to the accumulation of uric acid crystals in the joints and various tissues of the body. Xanthine oxidase inhibitors are one of the important ways for controlling gout. Garlic (Allium sativum) is a member of the Liliaceae family.Garlic oil is rich in organosulfides compounds. Garlic and its derivatives have less side effects which resulted in the upcoming of medicine for various diseases .The therapeutic properties of garlic oil are reduction in the risk factors of cardiovascular disease, antioxidant effect, antimicrobial effect. Garlic oil is a useful compound in treatment of arthritis, toothache, chronic cough, constipation, parasitic infestation. The aim of the present study is to screen the phytochemical constituents and to assess the in vitro xanthine oxidase inhibitory potential of garlic oil. The oil was purchased online from DEVES HERBES. Invitro activity was assessed by using allopurinol as standard and phytochemical screening was done using standard phytochemical procedures. The result showed that garlic oil has xanthine oxidase inhibitory potential, the activity increases with increases in concentration. The phytochemical analysis showed that garlic oil is rich in alkaloids, and has moderate amounts of carbohydrates, terpenoids, flavonoids, and phlobatannin. This study shows potent oxidase inhibitory activity and presence of phytochemical constituents in garlic oil. This oil can be suggested for the treatment of gout if further detailed in vivo confirmatory studies are done.

KEY WORDS: ALLOPURINOL; XANTHINE OXIDASE; INHIBITORS; GARLIC OIL; GOUT.

ARTICLE INFORMATION

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Received 30th July 2020 Accepted after revision 20th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/142

INTRODUCTION

Gout distinguished itself in the history of Homo sapiens since time immemorial (Ragab, Elshahaly and Bardin, 2017). Excess of urate in the body will cause gout which will lead to the accumulation of crystals of monosodium urate in various tissues. Hereditary disorders of uric acid secretion and purine metabolism are the main causes of gout (Meltzler, 2014). Accumulation of crystals are mainly found around the joints (Ragab, Elshahaly and Bardin, 2017). Asymptomatic hyperuricemia, acute gouty arthritis, inter critical gout, chronic tophaceous gout are the four clinical stages of gout. The major risk factors for the developing gout is serum uric acid level (SUA) (Schlesinger, 2004). Gout is predominantly found in males in olden days but they now gout has been increased in females particularly after menopause (Nuki and Simkin, 2006). When compared to the other Asian populations Tamilians have a higher level of uric acid (Talbott, 1958; Paul and James, 2017).

Xanthine oxidase is a versatile enzyme, ubiquitous among species i.e. bacteria to man and they are found in various types of tissues in mammals. It belongs to a group of enzymes known as molybdenum iron-Sulphur flavin hydrolases. Compared to uricosuric and anti-inflammatory agents, xanthine oxidase inhibitors have less side effects (Nuki and Simkin, 2006; Umamaheswari et al., 2007). Catalyzing oxidation of hypoxanthine to xanthine and xanthine to uric acid are the major functions of xanthine oxidase. But overproduction of uric acid will lead to hyperuricemia which will further lead to gout. Excess of uric acid can be controlled by xanthine oxidase inhibitors which is used in therapeutics (Unno, Sugimoto and Kakuda, 2004; Nuki and Simkin, 2006).

Allopurinol is the important drug used for the treatment of gout (Pacher, Nivorozhkin and Szabó, 2006). Uric acid production and serum uric acid rate are decreased by allopurinol (Saag et al., 2017). Gout patients who use allopurinol for treatment have improvement in their glomerular functions (Gibson et al., 1982). In addition to the xanthine oxidase inhibitory effect, allopurinol is also involved in preventing reperfusion during ischemia. (Manning, Coltart and Hearse, 1984). Allopurinol the xanthine Oxidase inhibitor is the only drug which is used for prevention of gout (Umamaheswari et al., 2007). But it has a few side effects that affects some portion of the population which will lead to gastrointestinal upset,skin rashes, liver dysfunction etc. (Sathisha et al., 2011).

Garlic (Allium sativum) is a member of the Liliaceae family and is an important spice that is used all over the world (Raghu, Lu and Sheen, 2012). Use of garlic in modern medicine is widespread in the world (Banerjee and Maulik, 2002). Garlic oil is rich in organo sulphur compounds like alliin, trace elements (zinc, magnesium, copper, selenium and iodine), protein content, dietary fibre, tocopherols, ascorbic acid and polyphenols (Raghu, Lu and Sheen, 2012). Organophosphate compounds are the vital substance that are extracted from garlic oil (Arifah et al., 2020). Garlic and its derivatives have less side effects which resulted in the development of medicine for various diseases (Davis, 2004). Garlic oil is used in treatment of arthritis, toothache, chronic cough, constipation, parasitic infestation, snake and insect bites, gynecologic diseases, etc. The therapeutic properties of garlic oil are reduction in the risk factors of cardiovascular disease, antioxidant effect, antimicrobial effect, reduction of cancer risk, enhancement of detoxification of foreign compounds (Bayan, Koulivand and Gorji, 2014). Therefore, the aim of the present study is to assess the in vitro xanthine oxidase inhibitory potential of garlic oil to check whether it can be used for the treatment of gout.

MATERIALS AND METHODS

Garlic oil was purchased from DEVES HERBES.

2.1. In vitro xanthine oxidase inhibitory activity: In vitro xanthine oxidase inhibitory of garlic oil was assessed as per the method of (Nguyen et al., 2004)(Umamaheswari et al., 2007). Briefly, the assay mixture consisted of 1 ml of the garlic oil (0.1 to 0.5g/ml), 2.9 ml of phosphate buffer (pH 7.5) and 0.1 ml of xanthine oxidase enzyme solution (0.1 units/ml in phosphate buffer, pH 7.5), which was prepared immediately before use. After preincubation at 25 °C for 15 min, the reaction was initiated by the addition of 2 ml of the substrate solution (150 M xanthine in the same buffer). The assay mixture was incubated at 25^{0}C for 30 min. The reaction was then stopped by the addition of 1 ml of 1N hydrochloric acid and the absorbance was measured at 290 nm using a UV spectrophotometer. Allopurinol (0.1 to 0.5mg/ml), a known inhibitor of XO, was used as the positive control. One unit of XO is defined as the amount of enzyme required to produce 1 mmol of uric acid/min at 25 ^{0}C. XOI activity was expressed as the percentage inhibition of XO in the above assay system calculated as percentage of inhibition as follows.

$$\% \text{ of inhibition} = (Ac-At) / Ac \times 100$$

where Ac is the absorbance of control reaction and At is the absorbance of test reaction. The assay was done in triplicate for each concentration. Allopurinol (0.1 to 0.5 µg/ml) was used as standard.

2.2. Phytochemical screening test

2.2.1. Test for phlobatannins: 2 ml of oil and 1 ml of conjugated HCl. The formation of the red colour complex indicates the presence of phlobatannin.

2.2.2. Test for carbohydrates: a) Fehling's test - 1 ml of sample is mixed with Fehling's solution a and b and boiling it for 3 minutes, reddish brown colour will be formed which indicates the presence of carbohydrates
b) Benedict's test -1ml of sample is mixed with 2 ml benedict's reagent. The formation of red, green or brown colour will indicate the presence of carbohydrate

2.2.3.Test for flavonoids: 1 ml of sample mixed with 2 ml of liquid ammonia solution. The formation of creamish

yellow colour indicates the presence of flavonoids.

2.2.4. Test for alkaloids: 1 ml of sample mixed with 1 ml of concentrated HCL and 6 drops of hexane and 3 drops of picric acid. The formation of creamish pale yellow proves the presence of alkaloids.

2.2.5. Test for terpenoids: To 2ml of sample, 1 ml of chloroform, 3 ml of conc H2SO4 were added. The formation of red colour represents the presence of terpenoids.

Figure 1: Xanthine oxidase inhibitory activity of garlic oil. Allopurinol used as standard. Each bar represents the mean±SEM of 3 independent observations. P value <0.05 is considered to be significant.

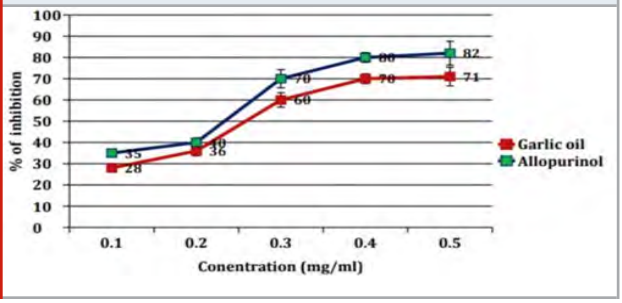

Table 1. Phytochemical screening of garlic oil

Phytochemical constituents	Results
Phlobatannins	(+)
Carbohydrates	(+)
Flavonoids	(+)
Alkaloids	(++)
Terpenoids	(+)

2.3. Statistical analysis: The data were subjected to statistical analysis using one way analysis variance (ANOVA) and Duncan's multiple range test to assess the significance of individual variations between the groups. In Duncan's test, significance was considered at the level of $p<0.05$.

RESULTS AND DISCUSSION

The results showed that garlic oil has inhibited the activity of xanthine oxidase and the activity increases with increase in concentration (Figure 1). The inhibitory activity of the oil was compared to the standard drug allopurinol. The results revealed that the inhibitory activity of garlic oil is less when compared to the standard drug. In clinical practice allopurinol was the most frequently used drug to treat hyperuricemia (Nuki and Simkin, 2006). Xanthine oxidase inhibitors which cause inhibition in the synthesis of uric acid, are effective in reducing the plasma and urinary urate levels which helps to reduce the development of tophaceous deposits (Nuki and Simkin, 2006). The allopurinol has a short life span in plasma. Patients who consume allopurinol continuously have decreased renal functions (Pacher, Nivorozhkin and Szabó, 2006). In order to reduce the side effects of the standard drug allopurinol, a drug of natural origin can be an alternative. Thus garlic oil which is a natural product that acts as an inhibitor can be used to reduce hyperuricemia.

The biologically active components pave way for the scientists and researchers to find more medicine. The phytochemical analysis showed that the oil is rich in alkaloids. The carbohydrates, flavonoids, terpenoids, phlobatannin and carbohydrates are found in moderate levels (Table 1). Phytochemicals, plant-derived non-nutritive compounds, are one of the many different types of the dietary factors which play an important role in various functions of the animal body (Abbas et al., 2015). The protective effects of these phytochemicals were found in many human diseases and ailments. (Barnes, 2001). A large number of natural compounds present in food materials have been reported to possess antioxidant properties (Abbas et al., 2015). the significant biological actions such as subduing oxidative stress, protection from degenerative disease, and reducing risk of cardiovascular disease could be attributed to their intrinsic antioxidant capabilities. Hence the presence of these phytochemicals might be the underlying reason for the protective effects of garlic oil including the xanthine oxidase inhibitory potential.

CONCLUSION

This study shows the potent inhibitory effect of garlic oil against xanthine oxidase enzyme whose hyperactivity is the reason behind the development of gout. Hence if detailed in vivo studies are conducted in this oil in this aspect, this oil can be used for the development of drugs to treat gout.

ACKNOWLEDGEMENTS

This research was done under the supervision of the Department of Research of Saveetha Dental College and Hospitals. We sincerely show gratitude to the corresponding guides who provided insight and expertise that greatly assisted the research.

Conflicts of Interest: None declared

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-233-238

BBRC
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Prevalence of Gingival Pigmentation and its Psychological Effect on Chennai Population

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ABSTRACT

Esthetic concerns are increasing among individuals and gingival esthetics have an integral part in the patient's smile. Gingival pigmentation can affect the patients psychologically and their social interaction. The aim of study was to assess the prevalence of gingival pigmentation and psychological behaviour among patients. This study included 150 patients in a dental hospital. Pre tested questionnaire was distributed among the patients with gingival pigmentation. Data was tabulated and results were obtained. Descriptive and chi square statistics were performed. In our study , out of 150 patients , 62% were under 18-25 years and 38% were 26-35 years. 43.3% were males and 56.7% were females. 81.3% were aware of the gingival pigmentation and 25.3% felt uncomfortable with their esthetics while smiling. 19.3% of the study population were willing to undergo treatment for pigmentation while 87.3% were not affected with social interactions. There was a statistically significant association of patients' awareness about gingival pigmentation among different age and gender ($p<0.05$).Within the limitations of the present study, younger adults had more esthetic concern when compared to adolescents. Males were more willing to undergo treatment when compared to females.

KEY WORDS: GINGIVAL PIGMENTATION;ESTHETICS;MELANIN;PSYCHOLOGICAL;SOCIAL INTERACTION.

INTRODUCTION

Gingival hyperpigmentation is the partial or complete darkening of gingiva in contrast to the coral pink colour of normal gingiva. The excessive melanin deposition in the basal and suprabasal cell layers of the epithelium leads to hyperpigmentation of gingiva . (Goswami et al., no date; Hatch, 2005). Melanocytes are dendritic cells of neuroectodermal origin. They work independent of the surrounding epithelial cells and behave as unicellular exocrine glands, converting tyrosine to melanin protein (melanin), which is transferred to keratinocytes by way of melanosomes. Thus, the melanin is deposited in the basal layer of the oral epithelium. (Esen et al., 2004; Arikan and Gürkan, 2007)

Pigmentation is caused by the physiological process such as melanin, melanoid, carotene, oxyhemoglobin, reduced hemoglobin, bilirubin and iron and/or pathological diseases, and conditions. Melanin pigmentation occurs when melanoblasts produce melanin granules. And environmental risk factors such as forms of tobacco have an essential role in the gingival hyperpigmentation. The colour of the gingiva is influenced by ethnicity and age. (Alasmari, 2018)

Light brown to black pigmentation is considered as physiologic in healthy colored-skinned individuals,

ARTICLE INFORMATION

*Corresponding Author: kaarthikeyan@saveetha.com
Received 26th July 2020 Accepted after revision 21th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/143

whereas the same oral pigmentation in Caucasians is considered as abnormal. Individual's genetics play a vital role in the development of gingival pigmentation. The physical, chemical, and hormonal factors are responsible for the intensity of pigmentation.(Peeran et al., 2014) Hyperpigmentation is also associated with various disorders such as Albright syndrome, malignant melanoma, PeutzJeghers syndrome, trauma, hemochromatosis, chronic pulmonary disease, HIV, smoking and use of antimalarial drugs, oral contraceptives (Hatch, 2005) There are various indices for classification of gingival pigmentation and pigmented lesions among individuals.(Shahna et al., 2019).Based on the severity of the pigmentation , the treatment modalities change accordingly.

Pigmentation of gingiva creates a psychological impact on the patients and is considered to be unaesthetic by patients (Alasmari, 2018). The hyperpigmentation of the gingiva on the labial aspect of anterior teeth has become an important component of general esthetics. (Peeran et al., 2014). A beautiful smile surely enhances the individual's self-confidence. The harmony of smile and esthetics is generally attributable to the shape, colour, and position of the teeth in conjunction with the gingival tissue. Gingival health and appearance are essential components for an attractive smile and depigmentation of the unsightly pigmented gingiva is the need for a pleasant and confident smile. (Grover et al., 2014; Sedeh, Badihi and Esfahaniyan, 2014)

Gingival pigmentation though not a major complication, yet it greatly affects the facial appearance. They might affect the individual psychologically and interfere with their interactions with the peers. Nowadays younger generations are greatly influenced by facial appearance and they are cautious about their esthetic concern and presentation of themselves in the society. Previously we have worked on plenty of topics in periodontology (Ramesh, Ravi and Kaarthikeyan, 2017; Ravi et al., 2017; Arjunkumar, 2018; Jain and Nazar, 2018; Kavarthapu and Thamaraiselvan, 2018; Ramamurthy and Mg, 2018; Ramesh et al., 2018, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Kaarthikeyan, Jayakumar and Sivakumar, 2019; Kavarthapu and Malaiappan, 2019; Murthykumar, Arjunkumar and Jayaseelan, 2019; Vijayashree Priyadharsini, 2019). Now we are planning to assess the prevalence of gingival pigmentation and psychological behaviour among patients in Chennai.

Table 1. The frequency and percentage distribution of patients responses about gingival pigmentation and its influence on their psychological behaviour.

Questions	Responses	Frequency	Percentage
AGE	18-25	93	62
	26-30	57	38
GENDER	MALE	65	43.3
	FEMALE	85	56.7
ARE YOU AWARE OF GINGIVAL PIGMENTATION	YES	122	81.3
IN YOUR GUMS	NO	28	18.7
DID YOU NOTICE PIGMENTATION IN YOUR GUMS	YES	117	78
	NO	33	22
DO YOU FEEL UNCOMFORTABLE TO SMILE	YES	38	25.3
	NO	112	74.7
DO YOU FEEL THIS PIGMENTATION LIMITS	19	12.7	
YOUR INTERACTION WITH OTHERS	YES		
	NO	131	87.3
HAVE YOUR PEERS NOTICED YOUR PIGMENTATION	0 YES	0	
	NO	150	100
DOES THIS NEGATIVELY AFFECT YOUR CONFIDENCE	YES	44	29.3
	NO	106	70.7
ARE YOU WILLING TO UNDERGO ANY TREATMENT FOR YOUR PIGMENTATION	29 YES	19.3	
	NO	121	80.7
ARE YOU AWARE THAT EVEN AFTER TREATMENT , THERE IS CHANCES OF RECURRENCE FOR GINGIVAL PIGMENTATION	YES	17	11.3
	NO	133	88.7

MATERIAL AND METHODS

The study was done among the patients with gingival pigmentation of the Chennai population. Institutional review board approval was obtained for this survey based analysis. 2 reviewers [Primary investigator & guide] were involved in this study. The sample size of 150 participants of age group 18-35 years , both males and females were selected by a simple random sampling method. Patients with gingival pigmentation were assessed based on Peeran et al(Peeran et al., 2014) .Randomisation [for all variables] was followed to minimise the bias. Pre tested questionnaires where the internal validity was the homogenisation and replication of experiment. Cross verification with existing studies was the external validity of this study. The set of questionnaires which includes gender, questions on gingival pigmentation and their psychological behaviour were circulated among the participants through an questionnaire.The results were collected and tabulated . Then the results were exported for statistical analysis to SPSS statistical software. Both descriptive (frequency of the responses) and inferential statistics (Chi - square tests) were done and the results were presented in the forms of graphs.

RESULTS AND DISCUSSION

In the present study, out of 150 patients, 62% were under 18-25 years and 38% were under 26-35 years. Out of 150 patients with gingival pigmentation, 43.33% were males and 56.67% were females [Table 1]. On assessing the percentage of patients aware about gingival pigmentation, 81.33% were aware of gingival pigmentation while 18.67% were not aware about gingival pigmentation. When asked by patients about their pigmentation, 78% have noticed their pigmentation while 22% have not noticed their pigmentation. On analysing the patient's response whether gingival pigmentation affected their smile, 74.67% were not uncomfortable to smile while 25.33% felt uncomfortable while smiling [Table 1].

On assessing the percentage of patients with gingival pigmentation and their interaction with others, 87.33% did not have any limitation while interacting with others while 12.67% had limited interaction. When asked about the percentage of patients responses about their confidence ,70.67% of patients confidence was not affected while 29.33% of patients confidence was affected [Table 1]. On assessing the percentage of patients willingness to undergo treatment for gingival pigmentation, 19.33% were willing to undergo treatment for gingival pigmentation while 80.67% were not willing to undergo treatment. [Table 1]

On statistical analysing, the association between the awareness of gingival pigmentation among different age groups, 54% under 18-25 years and 27.33% under 26-35 years were aware about gingival pigmentation. There was a statistically significant association between the gingival pigmentation among different age groups ,p value=0.000. [Figure 1] On statistically analysing the association between patients' comfort to smile among different age groups, 25.33% under 18-25 years felt uncomfortable while smiling due to gingival pigmentation. There was a statistically significant association between patients' comfort to smile among different age groups, p value=0.000 [Figure 2]. On statistically analysing the association between patients' confidence among different age groups, 29.33 % under 18-25 years felt gingival pigmentation affected the confidence. There was a statistically significant association between patients' confidence among different age groups, p value=0.000 [Figure 3].

Figure 1: Bar graph shows the association of awareness of gingival pigmentation among different age groups. X axis - age in years ; Y axis - number of patients. 54% under 18-25 years (blue) and 27.33% under 26-35 years (blue) were aware about gingival pigmentation. There was a statistically significant association found. (Pearson chi square =5.355a , p value=0.021)

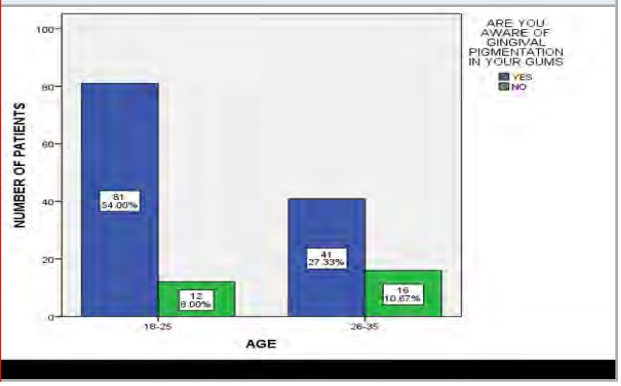
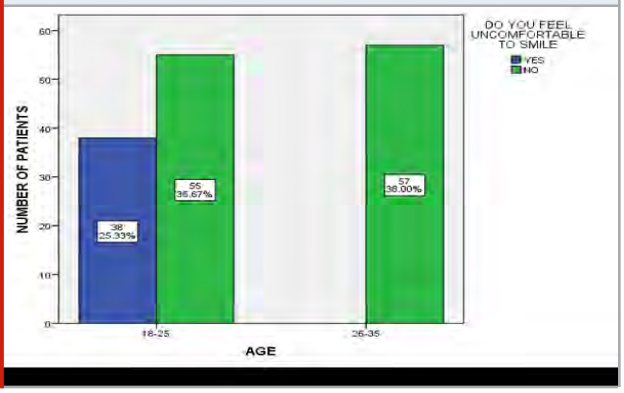


Figure 2: Bar graph shows the association between patients' smile and different age groups. X axis - age in years ; Y axis - number of patients. 25.33% under 18-25 years (blue) felt uncomfortable while smiling due to gingival pigmentation. There was a statistically significant association found. (Pearson chi square =31.192a , p value=0.000)



On statistically analysing the association between patients' awareness about their gingival pigmentation among gender, 29.33 % under 18-25 years felt gingival pigmentation affected the confidence, 40.67% of males and 37.33% of females were about their gingival pigmentation. There was a statistically significant

association between patients' awareness about their gingival pigmentation among gender, p value=0.000 [Figure 4]. On statistically analysing the association between patients' interaction with others among gender, 12.67% of females felt gingival pigmentation limited their interaction with others. There was a statistically significant association between patients' interaction with others among gender , p value=0.000 [Figure 5]. On statistically analysing the association between patients' willingness to undergo treatment among gender, 10.67 % of males and 8.67% of females were willing to undergo treatment for gingival pigmentation. There was no statistically significant association between patients' willingness for treatment among gender , p value=0.152 [Figure 6].

Figure 3: Bar graph shows the association between patients' confidence and different age groups. X axis - age in years ; Y axis - number of patients. 29.33% under 18-25 years (blue) felt gingival pigmentation affected their confidence. There was a statistically significant association found. (Pearson chi square =38.162a , p value=0.000)

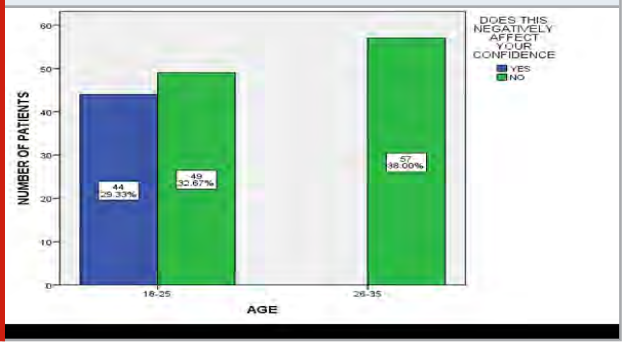


Figure 4: Bar graph shows the association between patients' awareness about their gingival pigmentation among gender. X axis -gender (males / females); Y axis - number of patients. 40.67% of males (blue) and 37.33% females were aware about their gingival pigmentation. There was a statistically significant association found. (Pearson chi square =16.785a , p value=0.000)

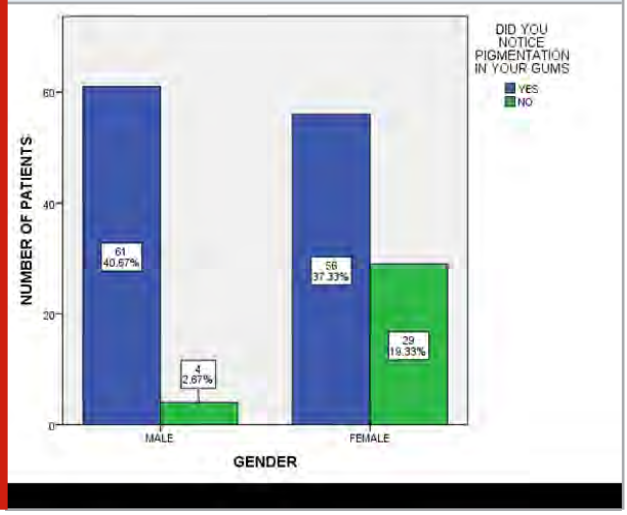


Figure 5: Bar graph shows the association between patients' interaction with others among gender. X axis -gender (males / females); Y axis - number of patients. 12.67% females felt gingival pigmentation limited their interaction with others. There was a statistically significant association found. (Pearson chi square =16.637a , p value=0.000)

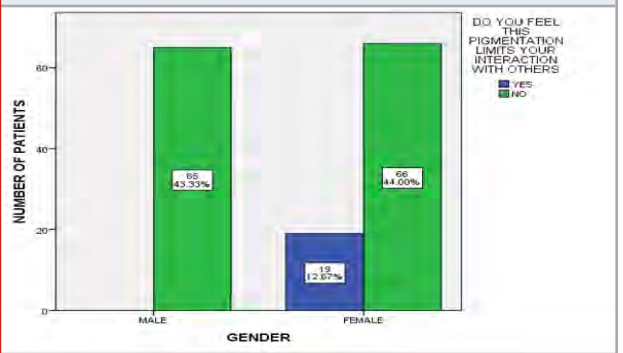
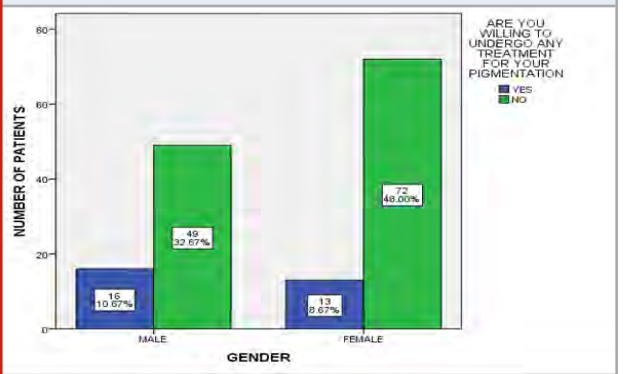


Figure 6: Bar graph shows the association between patients' willingness to undergo treatment for gingival pigmentation among gender. X axis -gender (males / females); Y axis - number of patients. 10.67% of males (blue) and 8.67% of females (blue) were willing to undergo treatment for gingival pigmentation. There was no statistically significant association found. (Pearson chi square =2.052a , p value=0.152)



In our study, gingival pigmentation was in a higher prevalence among 18-25 years patients and was seen in a higher prevalence among females. Previous study has shown a gingival pigmentation among 18-35 years and a higher prevalence among males than females (Balaji, Manikandan and Ramsundar, no date). Studies done by Rakhewar et al and Ponnaiyan et al , there was no gender predilection among patients with gingival pigmentation. (Ponnaiyan, Anusha and Gomathy, 2013; Rakhewar, Patil and Thorat, 2016)Our findings are in contrast with the previous study. The possible reason would be due to the ethnicity and variation in geographic location. In our study, a higher prevalence of patients were aware about gingival pigmentation and have noticed the pigmentation in their gingiva. Study done by Grover has shown patients were aware about their

gingival pigmentation and requested treatment for the same.(Grover et al., 2014).

In our study, younger adults under age 18-25 years responded that gingival pigmentation limited their interaction with peers and also lack of confidence. Previous study was conducted among 18-23 years students which showed that 59.3% were concerned about their gingival pigmentation while 75% of them considered dark coloured gingiva as unattractive.(Goswami et al., no date) In our study, females felt uncomfortable to smile and also felt that gingival pigmentation limited their interaction with others. While males and females were aware about gingival pigmentation but males were more willing for the treatment than females.

In our study about 19.3% were willing to undergo treatment. Study done by Goswami et al showed 54.7% of the study population were willing to undergo treatment for gingival pigmentation.(Goswami et al., no date). Our findings are in contrast with the previous study. The possible reasons would be that they are fine with their appearance or they are being cultural or they are in a financial deficit to undergo procedures. The limitation of the study would be that it was a survey conducted among patients with gingival pigmentations. Few of the respondents would not have not felt encouraged to provide accurate, honest answers. There are chances for the patients of not feeling comfortable providing answers that present themselves unknown. The sample size of the study was smaller which could define the generalised population. And so multicentric surveys can be conducted on a larger population.

CONCLUSION

Within the limitations of the present study, 81.3% were aware of the gingival pigmentation and 25.3% felt uncomfortable with their esthetics while smiling. 19.3% of the study population were willing to undergo treatment for pigmentation while 87.3% were not affected with social interactions. Younger adults had more esthetic concern when compared to adolescents. Males were more willing to undergo treatment when compared to females.

Authors Contribution: Prashaanthi.N contributed acquisition of data, analysis, literature collection and also in drafting the article and revising it critically for important intellectual content. Karthikeyan .G contributed in conception, the study design, interpretation of data, formatting, manuscript preparation, supervision and guidance.

ACKNOWLEDGEMENTS

We take pleasure to acknowledge our University for granting permission to utilize the patient records for data collection

Conflict of Interest: The authors declare that there is no conflict of interest

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-239-243

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Biocompatibility of Polylactic Acid as a Bone Substitute: An In vitro Study

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ABSTRACT

Biocompatibility is defined as the ability of the bone material to perform appropriate host response in specific applications. Different bone substitutes can be used. These bone substitutes are derived from biological products as well as the synthetic products. The biological products are derived from the demineralized bone matrix, hydroxyapatite, growth factors and the synthetic products are derived from tri-calcium phosphate ceramics, or polymer based substitutes. This study aims at the biocompatibility of poly lactic acid which can be used as a bone substitute. The L929 Fibroblast cell lines were used for assessing the biocompatibility. The cell lines are maintained in a humidified atmosphere at 37degree C. Cell viability is assessed using MTT assay and the cell growth is assessed using the BrDu cell proliferation assay. The readings are done in ELISA readers at 570nm and 450nm respectively. The results are statistically analyzed by ANOVA. Even in the minimum concentration, 89.4% of the cells are viable and in the maximum concentration 100.7% of the cells are viable. The cell growth increased as the concentrations of the PLA increased. The in vitro biocompatibility of PLA exhibited satisfying biological security with favorable cell adhesion, spreading and proliferation.

KEY WORDS: PLA, BIOCOMPATIBILITY, ASSAY, L929 FIBROBLAST CELL LINES, CYTOTOXICITY.

INTRODUCTION

The applications of poly lactic acid (PLA), poly glycolic acid and their copolymers is used currently in several practices. The applications of these as bone replacement devices which are the bone plates, bone screws, pins and nails and also as scaffolds for soft and hard tissue replacement is carried out widely. Poly lactic acid degrades into lactic acid and glycolic acid. (Athanasiou, Niederauer and Agrawal, 1996) When these biomaterials degrade, they result in mass loss and eventually lead to loss of strength and its stiffness. Biomaterials or the bone substitutes have features such as physico-chemical and biological properties and they are suitable to fabricate scaffolds for tissue engineering. These biomaterials or bone substitutes are classified as natural and synthetic polymers. The most commonly used biomaterials for fabricating three-dimensional scaffolds in applications

ARTICLE INFORMATION

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Received 27th July 2020 Accepted after revision 23rd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/144

such as orthopaedic practices and tissue engineering are the PLA and PGA as well as PLGA copolymers. (Gentile et al., 2014).

Bone defect-related infections are quite common in clinics, especially in open bone fracture and trauma, which affects the bone union and are normally regarded as contraindications for bone substitutes. Repairing these bone related infections and deficiencies of bone are necessary and important in clinical treatment. It is difficult to select an appropriate bone substitute to serve as the bone regeneration material, which should be drug-loaded and sustained ability and high ossification bioactivity. (Lian et al., 2013) For clinical bone transplantations, tissue –engineering techniques based on the delivery of the cells to the defect through the use of three dimensional scaffold and biomaterials are to be studied. Three-dimensional scaffolds used are made of polymers and in the earlier study it is shown that the superficial gas foaming of PLA polymers can be used to obtain the porous structures with controlled parameters particularly important for bone tissue engineering. (Montjovent et al., 2005) The polymers used in these bone engineering have thermoset elastomeric properties. According to previous studies, the polymers used exhibit low elasticity and bone resorption.(Wang et al., 2019).

Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about.

Therefore, this study aims at evaluating the biocompatibility of polylactic acid which can be used as a bone substitute.

MATERIAL AND METHODS

Chemicals: The chemicals used for testing the biocompatibility of polylactic acid are 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide), 10% fetal bovine serum (FBS), 100 units/ml of penicillin, dimethyl sulfoxide (DMSO), human fibroblast cell lines (primary culture), Eagle's minimum essential medium (EMEM), kanamycin, chondroitin sulphate and phosphate-buffered saline.

Polylactic acid (PLA) Preparation: The PLA (50 g) is then melt-blended at 190 °C with a screw speed of 120 rpm for 4 min and then cut into samples of 25×25mm for further introduction into the cell lines. The sterilization process is carried out before and after the PLA preparation. (Marcos et al., 2019)

Maintenance of cell lines: L929 fibroblast cell lines are used for this study and it is obtained from NCCS Pune. The L929 Cells are allowed to culture in a atmosphere that is humidified at 37 °C in the DMEM medium along with 10% fetal bovine serum, L–glutamine ,1% penicillin (100 U/ml), and streptomycin (100 µg/ml) in a chamber with 95% air. Followed by this, the cells are detached from one another with 0.25% EDTA Trypsin. This process of neutralization of the Trypsin is achieved by DMEM containing 10% FBS and PSGF. The cell lines are mechanically separated using a pipette. There are 96-well plastic culture plates filled with 200µl of medium containing in each well. The culture plates are incubated at 37°C in a humidified atmosphere. The incubation chamber had 5% CO2 and 95% air and it continued for 24 h to allow attachment of the cells to the culture plates.

Cell viability by MTT assay: For cell viability test, L929 fibroblast cell lines are cultured in 96-well tissue culture plates. The microplates filled with 100 µl of cells with a density of 1×105 as negative control. The cell lines are allowed to adhere for 24 hours, and the DMEM growth medium of 800 µl is withdrawn using micropipette. This single layer of cells are washed twice with MEM without FBS for removing the dead cells and excess FBS. 1ml of MEM medium (without FBS) containing different dilutions of polylactic acid (1.0,2.5, 5.0 and 7.5mg/ml) are added in respective culture wells; the incubation is carried out for 72hrs. Then 100 µl of MTT (5 mg/ml in PBS) are added to each well, and the cell lines are incubated for a further 6 7 hrs in 5% CO2 incubator. After removal of the medium, 1ml of DMSO medium is added to each well and tested.

The supernatant is removed and 50 µl of propanol is added and the plates are gently shaken to solubilize the formed formazan. The MTT media enters the cells and passes into the mitochondria of the cell where it is reduced to an insoluble, coloured (dark purple) formazan product. The plates are placed on an orbital shaker for 15 min and the absorbance is read on an enzyme-linked immunosorbent assay (ELISA) (MINDRAY90) reader at 570 nm. Each test is carried out thrice and the IC50 of the test samples as the percentage survival of the cells are calculated. (Gutiérrez-Prieto et al., 2019)

Invitro Bromodeoxyuridine (BrDu) cell proliferation assay: The 10 mM stock solution of BrdU assay is prepared by dissolving 3 mg of BrdU in 1 mL of water. Then, the 10 mM BrdU stock solution is diluted into a cell culture medium which forms a 10 µM BrdU of labeling solution. About L929 cell density (2x105cells/well) in 100 µl medium is plated in 96-well plate and incubated with respective test substance Polylactic acid (1.0-7.5mg/ml). This is followed by incubation for 72 hrs. Add prepared 10 µl of 10mM BrdU solution into each well. Place the cells inside the incubator for 24 hrs. Centrifuge the culture plate at 300xg for 10 min, and then remove the media.

Add 100 µl of the fixing solution, to each well. This is carried out at room temperature for 30 min. After the solution is removed, add 100 µl/well of prepared 1X detection antibody solution, which is placed at room temperature for 1 hour. The solution is discarded and the culture plates are washed 3 times with 1X Wash Buffer. The 100 µl/well of prepared 1X HRP-conjugated secondary antibody solution is added and incubated at room temperature for 30 min. Then 100 µl TMB substrate is added and then incubated for 30 min at room temperature. Then 100 µl stop solution is added and absorbance read at 450 nm. (Simon et al., 2002)

Statistical analysis: Statistical analysis done by SPSS and significance are determined by one-way analysis of variance (ANOVA) and post hoc least-significant difference test. The p values less than 0.05 are considered significant.

RESULTS AND DISCUSSION

Table 1. This table represents the cytotoxicity testing conducted by MTT assay. Values are expressed as Mean ± SEM (n=3); *P<0.05, statistically significant as compared with Negative control. aP<0.05, statistically significant as compared with positive control. Other groups are showing no cytotoxicity as compared with standards.

S.No	Treatment	Conc (mg/ml)	Mean ± SEM
1	L929 untreated cells	-	0.519± 0.05
2	Polylactic acid	1.0	0.464 ± 0.0*
3	PA	2.5	0.470 ± 0.02
4	PA	5.0	0.501 ± 0.04
5	PA	7.5	0.523 ± 0.05
6	Chondroitin sulphate	5.0	0.533 ± 0.05

Biomaterials or bone substitutes are the materials used for medical purposes, and these materials interact with the complex biological living systems. Bone substitutes can take any form and result in complex system interactions. It can be used in the course of any therapeutic procedures or diagnostic procedures, in human or veterinary medicine. As reported previously, the need for appropriate materials as bone substitute to repair and reconstruct bone defects due to trauma or any disease began in the early 20th century. Different materials are available as bone substitutes at present. In a study conducted previously for the use of ceramics as implant materials, it has stated that the biocompatibility and osteoconductive properties provide ceramics with sufficient qualities and it can be used as implant materials for different applications throughout the body. (Bongio et al., 2010)

According to previous studies, polylactic acid (PLA) or polylactide is a thermoplastic material and biodegradable aliphatic polyester which is derived from naturally occurring organic acid(lactic acid) as well as other synthetic substances. Due to its biocompatibility and complete biodegradability, PLA based polymeric materials are ideal for the preparation of various polymeric devices used for different applications. PLA constitutes three dimensional scaffolds that stimulate the cells and tissues for its proliferation and osteogenic differentiation in bone tissue engineering.

Figure 1: The graph represents the percentage of cell viability after 72hrs. Values are expressed as Mean ± SEM (n=3); *P<0.05, statistically significant as compared with Negative control. aP<0.05, statistically significant as compared with positive control. Other groups are showing no cytotoxicity as compared with standards.

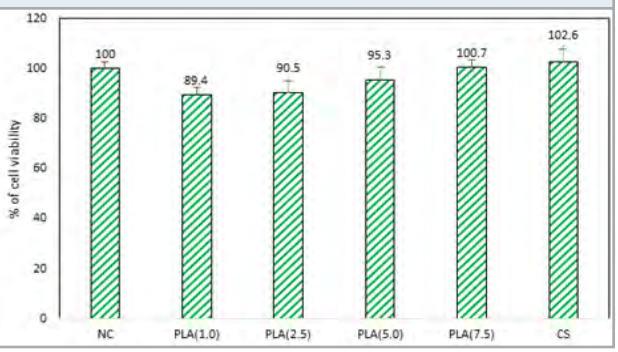
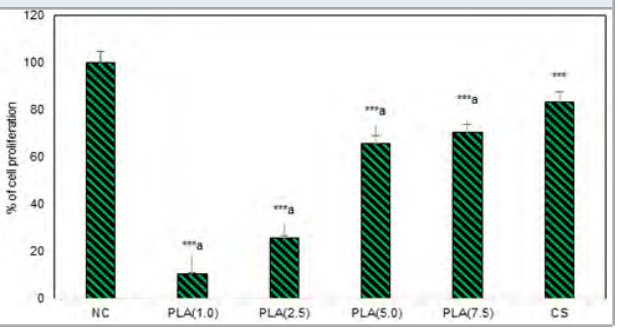


Figure 2: The graph represents the percentage of cell proliferation (BrDu assay) after 72hrs. Values are expressed as Mean ± SEM (n=3); ***p<0.001, statistically significant as compared with Negative control. ap<0.05, statistically significant as compared with positive control.



Study conducted on the biocompatibility and osteogenesis of poly (ortho ester) compared with polylactic acid revealed that osteogenic and osteo quantum indices were lower in composites of PLA. The lower osteogenic index is explained by unabsorbed carriers, which results in higher wet weight of the recovered implants. (Solheim et al., 2000) A study focused on investigating the effects of different percentage inclusions of the same PG composition on the properties of the composite foams. Addition of ceramics or glass particles to polymer matrices should improve its mechanical properties, provided that there is good adhesion between the two phases. (Georgiou et al., 2007) In a study conducted for the biological activity of PLA, the cell proliferation of hMSCs cells was significantly comparable between the composite and the polymer control which does not

contain ceramic. The expression of ALP was higher on the composite materials. (Danoux et al., 2014) When tissue implantation is done, the PLA polymer is coated by phagocytic cells and a fibrous capsule, which denotes a foreign body reaction. (Silva et al., 2018).

Scaffolds containing higher PLA or PLGA can be used as bone substitute materials, and those with lower PLA or PLGA contents can be used for cell culture. (Cui et al., 2005) Earlier studies were also based on the FDM technique. They reported successfully that the PLA discs can be manufactured from these biomaterial poly lactic acids based on this FDM technique. But these techniques did not alter the biocompatibility of PLA and it remained as the safest material. The studies conducted with the human fetal osteoblasts showed no cell inhibiting effects and toxicity. These osteoblasts when allowed for growth on PLA showed reduced growth than the polystyrene. (Wurm et al., 2017) (Lanao et al., 2013) Studies conducted based on 3D printed PLA scaffolds had excellent osteogenic potentials and biodegradation. They showed no inflammatory reactions. Therefore, it was reported that these 3D PLA have very important applications in bone tissue engineering. It can be used as grafts in reconstructive surgery. (Zhang et al., 2016)

CONCLUSION

Since polylactic acid [PLA] has shown good cell viability and cell proliferation, it can be considered as the safest and biocompatible material which can be used as a bone substitute. Hence, bone defects continue as a critical problem in surgery and many studies are being conducted to find the alternative techniques for bone substitutes. In accordance with the earlier studies conducted, it is concluded that though the improvement on these bone substitutes is conducted through research, human bone grafts persist to be the most effective bone substitutes to replace bone loss. (Ruhé et al., 2005) (Campana et al., 2014) 3D printed bone scaffold using the PLA material can replace the other types of bone grafts since the form and shape can be predetermined before the surgery.

ACKNOWLEDGEMENTS

This study was supported by Bright Care Research Centre Pvt Ltd, Chennai-600 014, TamilNadu, India. This study was supported by Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai.

Conflict of Interest: There were no conflicts of interest as declared by the authors.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-244-249

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Awareness on Essential Qualities of Teamwork Among College Students - A Survey

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ABSTRACT

Teamwork is a group of members exploring new ideas and moving together towards the same goal. Skills of teamwork can be acquired through experiences. The effective team knows how to use and make the organization in an effective manner. An effective team consists of good leadership, enhanced communication, common goals, motivation and varying useful skills. The aim of the study is to create awareness on the essential qualities of teamwork among college students. Self administrated questionnaire was designed and distributed through an online survey planet link. The Study population included 100 college students belonging to the age group of 18 to 24 years. The participants were explained about the purpose of the study in detail. The questions were carefully studied and the corresponding answers were marked by the participants. The data were collected and statistically analysed. From the data it was reported that most of the participants were interested in engaging in teamwork. Teamwork skills should be taught in colleges which help the individual to work efficiently in their workplaces. Individuals may take time to develop teamwork skills but they should not neglect it. They should continuously learn, practice and pursue teamwork skills. Teamwork enhances the fundamental skills of an individual. It is valuable for college students because it enhances communication skills, leadership skills and it helps in self growth. It fosters friendship, trust and loyalty. Finally teamwork motivates our skills and empowers us.

KEY WORDS: FUNDAMENTAL SKILLS; PRACTICE; MOTIVATION; TEAMWORK, ONLINE SURVEY.

INTRODUCTION

Teamwork is defined as a group of members working together in an effective way for a successful intended result. Teamwork is important from school students to military and aviation (Putranto and Woods, 2016) . Teamwork is a cooperative process that allows ordinary people to achieve extraordinary results. It can also be defined that in the team a group of members walk towards a common goal developing cooperative skills and mutual relationships (Beigi and Shirmohammadi, 2012) . There are some para metres which contribute to the team work. Individuals engaged in teamwork have good interaction with teammates, expect good quality, keep the team on track, good social skills, and have relevant knowledge and abilities (Pineda and Lerner, 2006). Leadership plays a great role for good teamwork. If leadership and teamwork go hands in hands they may bring forth the positive outcome. As teamwork helps in real life challenges there is a necessity to concentrate on the developing teamwork skills (Hunziker et al., 2011).

ARTICLE INFORMATION

*Corresponding Author: vishnupriya@saveetha.com
Received 6th Aug 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/145*

In multi-disciplinary fields like a medicine, teamwork is much more important. The major problem to be observed is the attitude and character, which vary for different individuals and the team work will be running along with that. The positive attitude depends on positive outcomes (Firth-Cozens, 2001). There are two types of knowledge in teamwork. They are task-work knowledge and teamwork knowledge. So the educators and managers should be good enough to form the team with these types of knowledge (Guchait, Lei and Tews, 2016). The ability of an individual to work in a team in their respective workplaces should be taught in universities. Strategies like assigning a reasonable workload, using peer evaluations and allowing students on group projects which improves students teamwork experiences (Pfaff and Huddleston, 2003). It may take time for an individual to transit from self work to teamwork, it may take much time but it should not be neglected (Moe, Dingsøyr and Dybå, 2010). Active listening, increased cooperation and more discussions are seen only in teamwork (Hazzan and Dubinsky, 2010) .

Other studies were done in an unselected population whereas present study focuses on the South Indian population especially college students. Most of the studies did not focus on the importance of creating awareness about teamwork and did not concentrate on the effectiveness of essential teamwork in the future. Previous studies on Cancer biology, nano materials, herbal products (Ponnulakshmi et al., 2019) (Chen et al., 2019) (Surapaneni and Jainu, 2014) (Wu et al., 2019) (Ke et al., 2019; Ma et al., 2019) have motivated me to pursue this current research which is useful to our community. The aim of the study is to create awareness on essential teamwork and to highlight the factors like trust, leadership and performance which is associated with teamwork.

MATERIAL AND METHODS

Self administered questionnaires were designed based on the attitude and knowledge of the participants. The questions were circulated to the age group of 18 to 24 years and circulated among 100 undergraduate college students. It was circulated using the Survey Planet link and a list of output variables were included. A statistical test was done using a software SPSS. Statistical test used descriptive analysis and frequency percentage. Descriptive variables like age, year of study, gender and explanatory variables like personality trait, knowledge, attitude and practice were also included. Each output variable was collected as ordinal data and the collected data were represented as pie charts. Exclusion criteria of the study were participants not willing to participate and medically compromised participants. Some of the inclusion criteria was participants above 18 years of age, college students and participants who can understand and fill the questionnaire.

RESULTS AND DISCUSSION

The present Study was conducted among college students including both male and female. It was good to know that most of the college students are aware of teamwork. 89.11 % of the population responded that a positive attitude is important for good team work (Figure 1.1). 79.21% of the population had a view that common goals are seen in each and every individual who is the part of team work (Figure 1.2). 76.24 % of the population reported that interdependence is a part of teamwork (Figure 1.3).

Figure 1.1: Pie chart showing percentage distribution of positive attitude helps for developing good teamwork. 89.11% of the participants reported yes (blue) and 10.89% of them reported no (red).

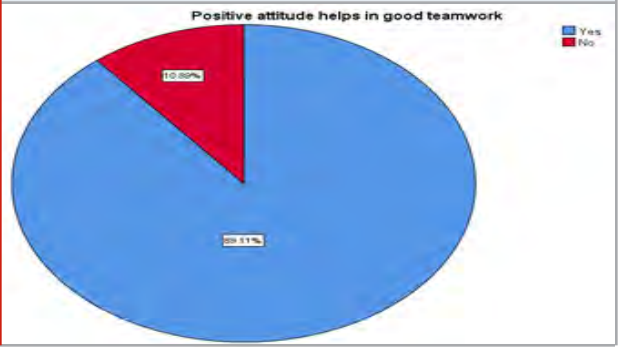


Figure 1.2 Pie chart showing the percentage distribution of common goals improves teamwork. 79.21 % reported yes (blue) and 20.79% of them reported no (red).

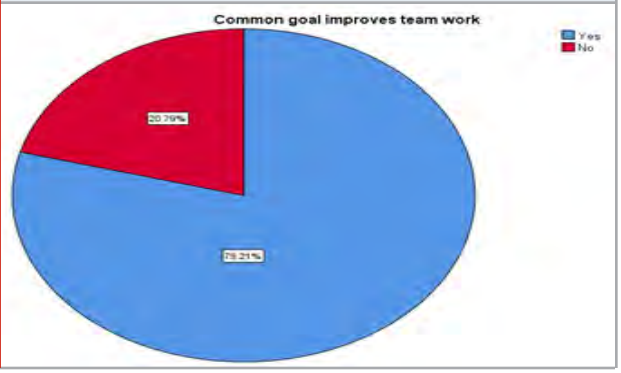
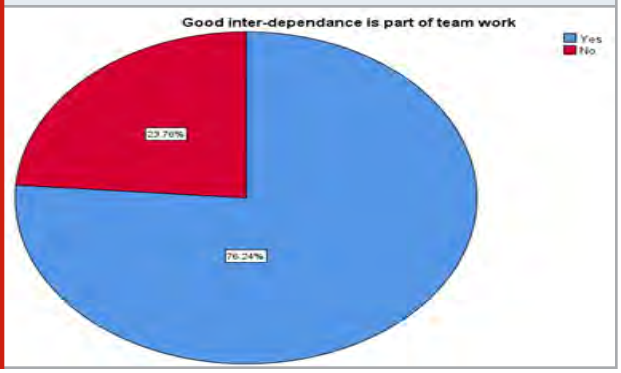


Figure 1.3 Pie chart showing percentage distribution of good interdependence is a part of teamwork. 76.24% of the population reported yes (blue) and 23.76% of them reported no (red).



83.17% of the respondents responded that teamwork was more successful rather than individual work (figure 1.4). 75.25% of them had an idea that teamwork was more important in colleges than other sectors (figure 1.5). 79.21 % of the population reported that motivation is important in teamwork for achieving their goals (figure 1.6). 65.35 % of the population reported that friendship and trust is seen more in teamwork which is the best quality for good and effective teamwork (figure 1.7). 72.28 % of the population reported that probability of conflict is more in team work when compared to individual work (figure 1.8). 81.19% of the participants reported that teamwork gives satisfaction than individual work (figure 9).

Figure 1.4: Pie chart showing percentage distribution of teamwork is more successful than individual work. 83.17% of the population reported yes (blue) and 16.83% of them reported no (red).

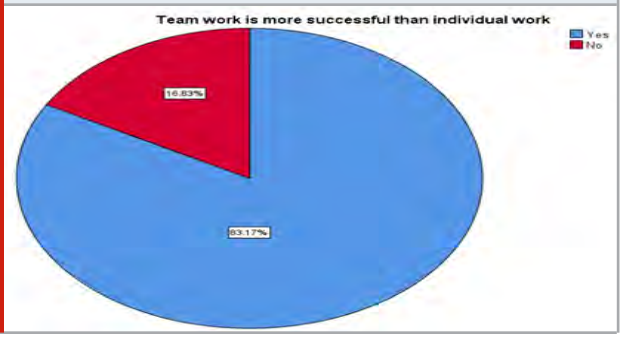


Figure 1.5: Pie chart showing percentage distribution of teamwork is important in colleges. 75.25% of the population reported yes (blue) and 24.75% of them reported no (red).

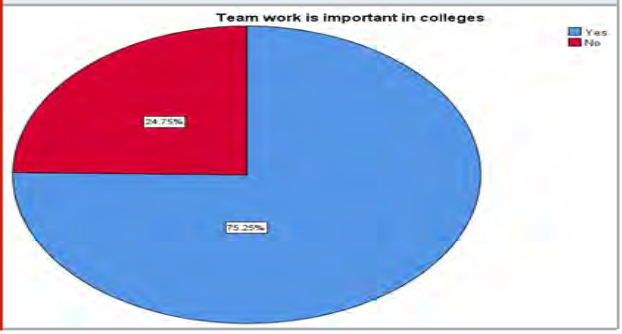


Figure 1.6: Pie chart showing percentage distribution of motivation is important in teamwork. 79.21% of the population reported yes (blue) and 20.79% of them reported no (red).

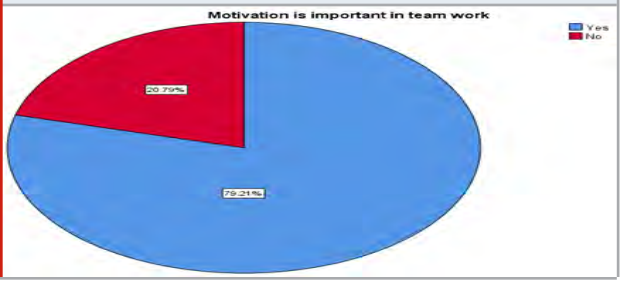


Figure 1.7: Pie chart showing percentage distribution of teamwork enhances friendship and trust. 65.35% of the population reported yes (blue) and 34.65% of them reported no (red).

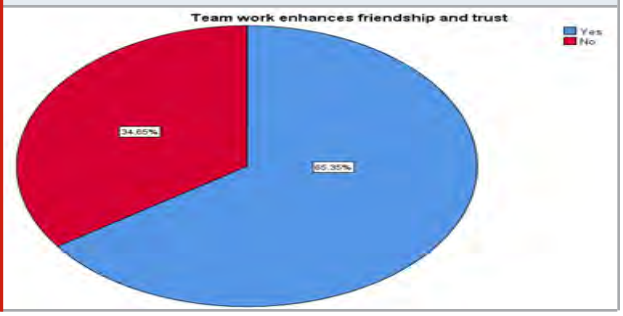


Figure 1.8: Pie chart showing percentage distribution of probability of conflict is more in teamwork. 72.28% of the population reported yes (blue) and 27.72% of the population reported no (red).

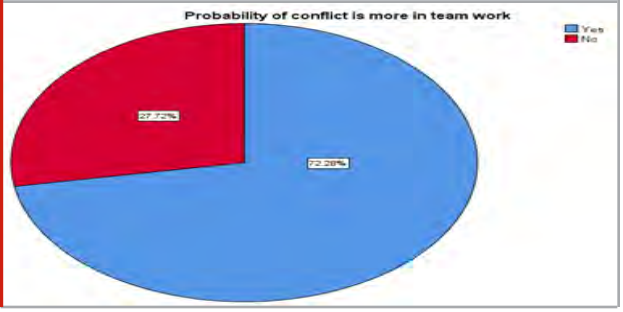
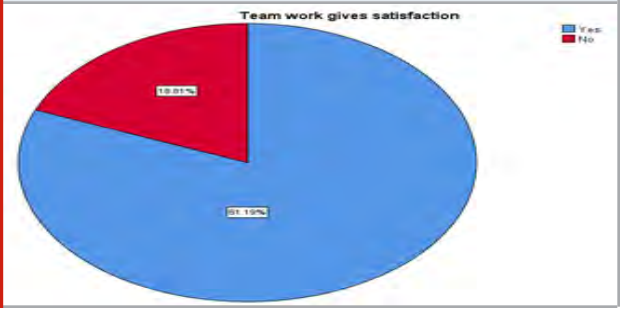


Figure 1.9: Pie chart showing percentage distribution of teamwork gives satisfaction than individual work. 81.19% of the population reported yes (blue) and 18.81% of the population reported no (red).



When the participants were enquired about the essential qualities of teamwork 67.33 % of the population reported that teamwork offers different perspectives (figure 1.10). It was good to know that 72.28 % of the population assumed that teamwork improves unity (figure1.11). 73.27 % of the population reported that teamwork improves self confidence and self awareness (figure 1.12). 71.29% of the participants reported that teamwork gives opportunity for learning (figure 1.13). 74.26% of the population said that flexibility is more important for good teamwork (figure 1.14). 71.29 % of the participants had a view that teamwork produces a variety of skills which can be used later in workplaces

and teamwork skills help to face the real life time challenges (figure 1.15).

Figure 1.10: Pie chart showing percentage distribution of teamwork offers different perspectives for an individual. 67.33% of the population reported yes (blue) and 32.67% of the population reported no (red).

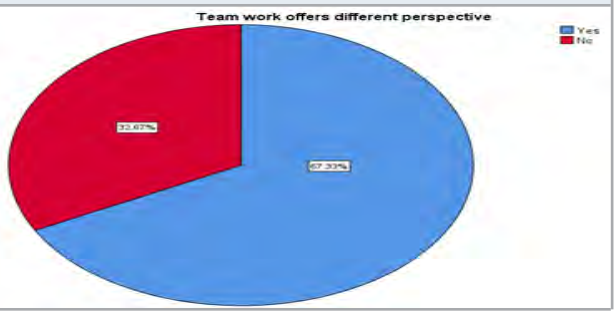


Figure 1.11: Pie chart showing percentage distribution of teamwork motivates unity rather than individual work. 72.28% of the population reported yes (blue) and 27.72% of the population reported no (red).

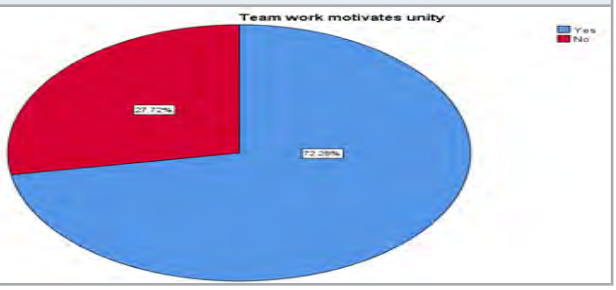


Figure 1.12: Pie chart showing percentage distribution of teamwork improves self confidence. 73.27% of the population reported yes (blue) and 26.73% of the population reported no (red).

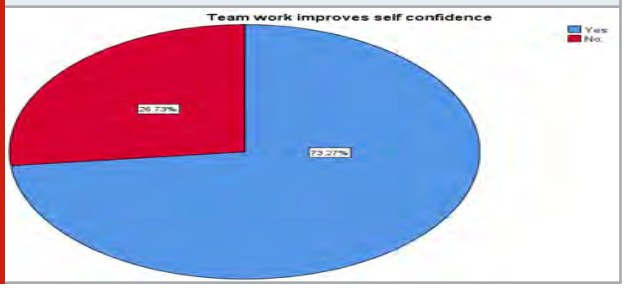


Figure 1.13: Pie chart showing percentage distribution of teamwork provides learning opportunities. 71.29% of the population reported yes (blue) and 28.71% of the population reported no (red).

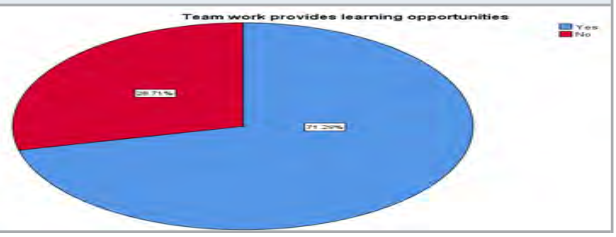


Figure 1.14: Pie chart showing percentage distribution of flexibility is important in teamwork. 74.26% of the population reported yes (blue) and 25.74% of the population reported no (red).

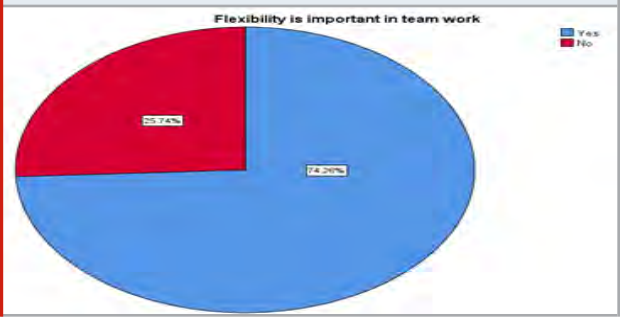
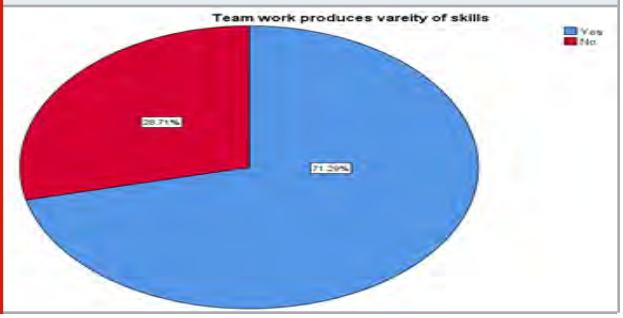


Figure 1.15: Pie chart showing percentage distribution of teamwork produces variety of skills. 71.29% of the population reported yes (blue) and 28.71% of the population reported no (red).



62.38% of the population responded that adaptability is an important parameter for teamwork to achieve their common goals (figure 1.16). 69.31 % of the population responded that teamwork helps the individual to focus on their personal growth (figure 1.17). 72.28% of the population responded that comfortability is good enough in a potential teamwork (figure 1.18). 81.19 % of the respondents responded that equal participation is not seen in teamwork which is a major drawback seen in teamwork (figure 1.19). When the participants were enquired about the most required skills for perpetual teamwork, 28.71% of the population responded that trust is the important quality that is required for achieving a successful team and to keep the team on track (Figure 1.20).

Figure 1.16: Pie chart showing percentage distribution of adaptability is important in teamwork. 62.38% of the population reported yes (blue) and 37.62% of the population reported no (red).

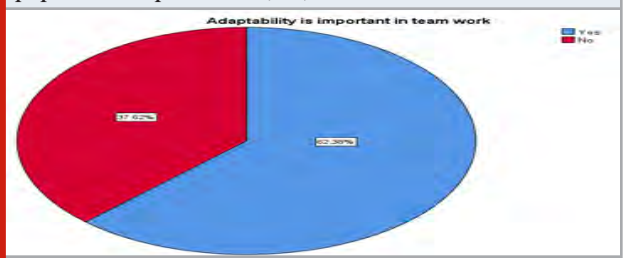


Figure 1.17: Pie chart showing percentage distribution of teamwork helps in personal growth. 69.31% of the population reported yes (blue) and 30.69% of the population reported no (red).

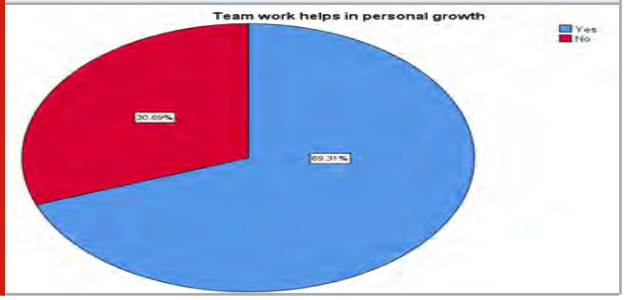


Figure 1.18: Pie chart showing percentage distribution of teamwork produces comfortability. 72.28% of the population reported yes (blue) and 27.72% of the population reported no (red).

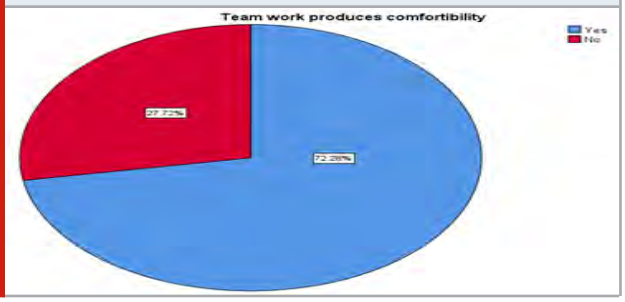
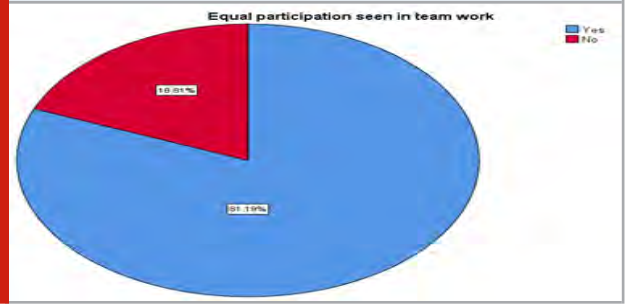
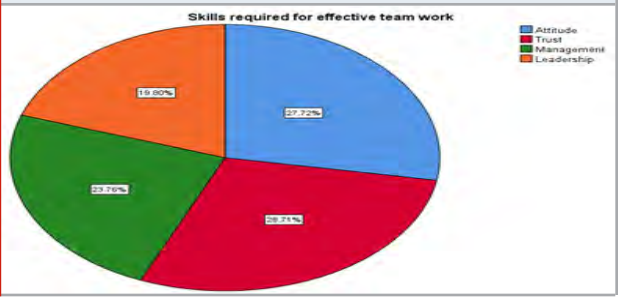


Figure 1.19: Pie chart showing percentage distribution of equal participation is seen in teamwork. 81.19% of the population reported yes (blue) and 18.81% of the population reported no (red).



Gilbert in his study reported that positive attitude and virtuous practises were the necessary criteria for effective team work . Present study also reported that a positive attitude is an encouraging factor for better teamwork (Gilbert and Ronald Gilbert, 1985) . Randall S. Hansen in his study stated that knowledge is not always required in teamwork but it is one of the most important parameters for better teamwork compared to the present study; it also stated that knowledge is an important parameter to sail the team (Hansen, 2006). Martine Hass in her study reported that there are more obstacles in teamwork. To solve that lots of effort should be done. Leader of a team should make an ordinary person an extraordinary person and help them to solve the problem. The present study also stated that leadership is an important quality for better teamwork (Haas and Mortensen, 2016) . Some of the previous studies proposed that humans are more likely to do Individual work rather than doing teamwork.

Figure 1.20: Pie chart showing percentage distribution of skills required for effective teamwork. 28.71% of the population reported trust as an important skill (red), 27.72% of the population reported attitude as an important skill (blue), 23.76% of the them reported management as an important skill (green) and 19.80% of the population reported leadership as an essential quality (orange).



They think that teamwork consists of lots of work and it requires a lot of effort. When comparing the previous study and present study more than half the population responded that they have more desire to work as a team (Riebe, Girardi and Whitsed, 2016). Some of the previous study also reported that being a leader for a team is a personal and individual ability of a person. If the person wanted to be a leader and govern the whole team he must be the person with more courage. When comparing both the studies the previous study told that it is important and more enough to have courage alons for leaders to work but the present study employs that courage is an essential parameter for each and everyone in the team (Barak, Maymon and Harel, 1999). There were some limitations that should be noted in the study. The limitations of the study were less sample size, homogeneous population, response bias and survey fatigue. And it is noteworthy to mention the future scope of the present study. Teamwork is a life skill. Encouraging teamwork in a college helps the students to express their ideas and opinions confidently in their work places.

CONCLUSION

If you want to walk fast, walk alone ; if you want to walk far walk with a team'. Working with a team helps to find a solution even for the biggest problems. It empowers your communication skills, leadership quality , it enhances friendship and trust. It is important for every individual to develop their teamwork skills . In teamwork the work of an individual is valued and successful results can be obtained. Teamwork is important among college students because it teaches communication skills, social skills and it motivates the students to listen to their leaders and coaches.

ACKNOWLEDGEMENTS

We thank Saveetha Dental College for providing us the support to conduct the study.

Conflict of Interest: Nil

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-250-255

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Association of Salivary Superoxide Dismutase and Nitric Oxide Levels in Patients With Smoking

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ABSTRACT

Saliva is the first fluid exposed during smoking and its antioxidant system plays an important role in anti-cancer potential. Aim of the study is to determine the influence of smoking on superoxide dismutase (SOD) enzyme and nitric oxide (NO) levels in saliva among smokers and non-smokers. 20 samples were taken among which 10 samples were of smokers and 10 samples were of non smokers. Collected unstimulated saliva samples were measured for levels of SOD and NO using spectrophotometric analysis. Levels of SOD were decreased in case of smokers (Mean =4.95, Standard error of mean= 0.0.558) when compared to non smokers (Mean= 8.17, Standard error of mean = 0.851)hence statistically significant (p=0.018). Levels of NO were elevated in case of smokers (Mean = 3.24, Standard error of mean = 0.672) when compared to non smokers (Mean= 1.97, Standard error of mean = 0.404) hence statistically significant (p=0.032). Also, it was found that level of SOD decreased and NO increased as number of cigarette sticks and years of smoking increased which is statistically significant ($p<0.05$). Within the limits of the study, it is seen that there is a highly significant increase in NO and decrease in SOD in smokers when compared to non smokers. Also there is significant increase in level of NO and decrease in level of SOD as number of cigarettes and years of smoking increased.

KEY WORDS: NITRIC OXIDE, ORAL LESIONS, PATHOGENESIS, SALIVA, SUPEROXIDE DISMUTASE, TOBACCO.

INTRODUCTION

Smoking is a harmful habit that causes adverse effects on oral health and plays a most important role in cancer development (Golusinska-Kardach et al., 2015). Despite frequent notice of irreversible consequences of smoking in public media and by other forms of advertising, smoking habits are growing dramatically in both developed and developing countries. Based on available statistics, even in previous years, almost one-third of the population over age 30 years are smokers (Zenzes, 2000). Smoking leads to changes in immune reaction and total antioxidant capacity. Smoking, through dysfunction of antioxidant systems, plays an important role in the pathogenesis of inflammatory diseases (Toker et al., 2012).

Saliva is the first fluid that is exposed to smoking and its antioxidant system plays an important role in anti-cancer potential.It has been confirmed that there is a direct relationship between oxidative stress and pathologic conditions or diseases. Assessment of the elements effective in oxidative stress on the body's fluids, such as saliva, could be beneficial for monitoring progression and treatment of some diseases (Rodgman and Perfetti, 2013). Tobacco smoking produces large amounts of reactive oxygen species (ROS), which have an influence on normal

ARTICLE INFORMATION

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Received 29th July 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/146

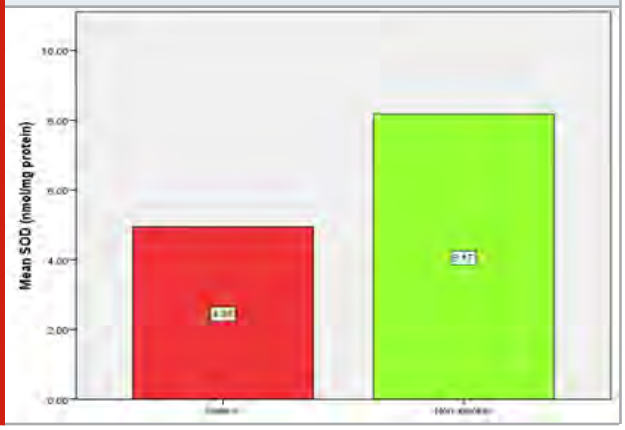
cellular function and causes changes in the inflammation markers (U. s. Department of Health and Human Services Staff, 2010) . Oxidative stress, which is produced through serious imbalance between the generation of reactive oxygen species and antioxidant protection, is effective in the pathogenesis of inflammatory conditions.

Reactive oxygen species (ROS) are chemically reactive molecules containing oxygen. Oxygen is a highly reactive atom that is capable of becoming part of potentially damaging molecules commonly called "free radicals (Mayne, 2003). The addition of one electron to di-oxygen forms the superoxide anion radical (O2 •). All free radicals are capable of reacting with membrane lipids, nucleic acids, proteins and enzymes, and other small molecules, resulting in cellular damage.

Table 1. Shows mean value of superoxide dismutase levels in smokers and non-smokers. SOD level is increased in non smokers when compared to smokers (Paired t test, p = 0.018)

Superoxide Dismutase (nmol/mg protein)	Mean	Standard error of mean	Paired t-test
Smokers	4.95	0.558	p value = 0.018
Non Smokers	8.17	0.851	

Figure 1: Bar graphs depicts the mean salivary superoxide dismutase levels in smokers and non smokers. X axis denotes smokers and non smokers and Y axis denotes the mean SOD levels (nmol/mg protein). It is seen that SOD level is increased in non smokers when compared to smokers (Paired t test, p =0.018)



Superoxide Dismutase (SOD) catalyzes the conversion of superoxide radicals into hydrogen peroxide and molecular oxygen. SOD plays a critical role in the defense of cells against the toxic effects of oxygen radicals (Simic and Karel, 2013). It competes with nitric oxide (NO) for superoxide anions, which react with NO to form peroxynitrite, which is potential enough to cause DNA damage. Decrease in protective systems of antioxidants due to tobacco smoking may be a cause of many pathological conditions such as cardiovascular and respiratory disorders and even potentially malignant disorders. Assessment of antioxidant markers may be relevant in the evaluation of risks of such pathologic conditions and associated oxidative stress induced by smoking (Bolzán, Bianchi and Bianchi, 1997).

Nitric oxide (NO), a free radical, is synthesised from the amino acid L-arginine by the enzyme nitric oxide synthase (NOS). Nitric oxide, a signalling molecule, acts as a 'double-edged sword' affecting numerous physiological and pathological processes (Crowell et al., 2003). Low nitric oxide levels are associated with homeostatic actions such as immune functions, blood flow, platelet aggregation, neurotransmission, and memory, whereas excess nitric oxide production is involved in inflammatory and immunological disorders, pain, neurological diseases, atherosclerosis, and cancer. It also plays an important role in the occurrence and progression of tumours, involving mechanisms such as DNA damage, inducing tumour angiogenesis and promoting tumour invasion and metastasis by reacting with other free radicals to form peroxynitrite which causes DNA damage (Alcaraz and Guilln, 2002).

Our recent research portfolio slides numerous articles in reputed journals (Santosh R. Patil et al., 2018; S. R. Patil et al., 2018; Subramaniam and Muthukrishnan, 2019; Vadivel et al., 2019; Patil et al., 2020). Based on this experience we planned to pursue evaluation of superoxide dismutase and nitric oxide levels in smokers and non smokers.

MATERIAL AND METHODS

Study setting: It is a case control study, conducted in Saveetha Dental College from November 2019 to January 2020. Approval was obtained from the Institutional Ethical Committee (IEC), Saveetha Dental College. Two examiners were included in the study. Study population consisted of patients belonging to the 30-70 years age group. Smokers were grouped into three groups based on the usage of cigarette sticks per day as 1-5 sticks, 6-10 sticks and greater than 10 sticks per day. Based on the years of smoking, they were grouped into three groups- 1-5 years, 6-10 years and greater than 10 years.

Inclusion and Exclusion Criteria: Patients who smoke 1 and more cigarettes per day for 1 year and more than that were included in the study. Patients with systemic diseases were excluded.

Collection of samples: Total of 20 samples among which case group 10 samples were collected from smokers and control group 10 samples were collected from non-smokers. Unstimulated saliva samples were collected from the patients using sterile uricol containers. The collected saliva samples were measured for levels of superoxide dismutase enzymes and nitric oxide using spectrophotometric analysis as per standard method.

Assay of Superoxide dismutase (SOD)

Procedure: To 0.5 ml ml of saliva 0.25 ml of ethanol and 1.25 ml of chloroform was added, kept in a mechanical shaker for 15 min and centrifuged at 20000xg for 15min. To 0.5 ml of the supernatant, 2.0 ml of 0.1 M Tris-HCl buffer pH 8.2; 1.5 ml of distilled water and 0.5 ml of pyrogallol were added. Change in optical density at 0, 1 and 3 min was read at 420 nm in a spectrophotometer. Control tubes containing 0.5 ml of distilled water were also treated in a similar manner against a buffer blank. The enzyme activity is expressed as Units/mg protein. One enzyme unit corresponds to the amount of enzyme required to bring about 50% inhibition of pyrogallol auto-oxidation.

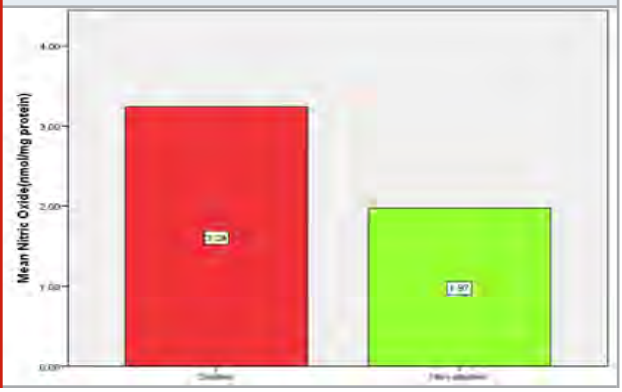
Assay of Nitric oxide (NO)

Procedure: Briefly, 500 µl of salivary was added to 100 µl of Gries's reagent, the reaction mixture was incubated for about 5–10 min at room temperature and protected from light. Then colour was developed and measured at 540 nm in the microplate reader according to the protocol. The results were calculated according to standard curves obtained for standard sodium nitrite (5 - 25 µM), in the same buffer as used for preparation of homogenate using the absorbance measured. The concentration of nitrites as a measure of NO in the examined sample was calculated and expressed in nmoles/mg protein.

Table 2. Shows mean value of nitric oxide levels in smokers and non-smokers. Nitric oxide level is increased in smokers when compared to non smokers (Paired t test, p =0.032)

Nitric Oxide (nmol/mg protein)	Mean	Standard error of mean	Paired t-test
Smokers	3.24	0.672	p value =0.032
Non Smokers	1.97	0.404	

Figure 2: Bar graph depicts the mean Nitric oxide levels in smokers and non smokers. X axis denotes smokers and non smokers and Y axis denotes the mean NO levels (nmol/mg protein).It is seen that Nitric oxide level is increased in smokers when compared to non smokers (Paired t test, p =0.032)



Statistical Analysis: The statistical analysis was performed using the Statistical package for Social Sciences version (SPSS) 20. Differences in mean values between groups were analysed using students' t-test, while association studies were performed using the Pearson's Chi square Test. Values were deemed significant if $p < 0.05$.

RESULTS AND DISCUSSION

Total of 20 patients, out of which 10 smokers and 10 non-smokers were included in the study.In relation to mean salivary superoxide dismutase levels in smokers and non smokers it was seen that SOD level is increased in non smokers when compared to smokers ,Paired t test, p =0.018 (p<0.05), hence statistically significant [Figure 1 and Table 1]. In relation to mean Nitric oxide levels in smokers and non smokers it was seen that Nitric oxide level is increased in smokers when compared to non smokers, Paired t test, p =0.032 (p<0.05), hence statistically significant [Figure 2 and Table 2].

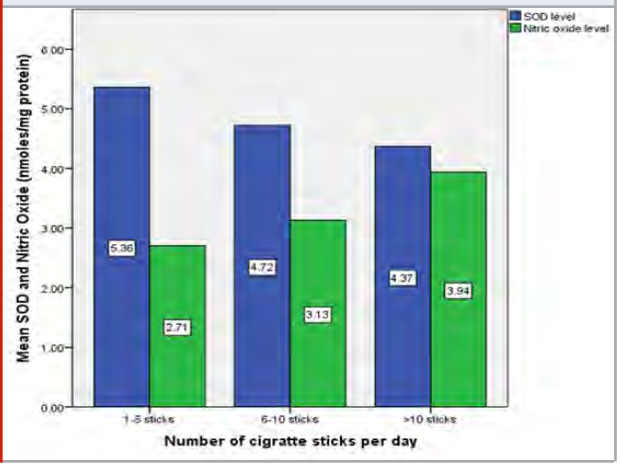
Table 3. Shows association between number of cigarette sticks used per day and mean value of Superoxide Dismutase and Nitric Oxide levels. It is seen that as the usage of cigarette sticks increases salivary SOD level decreases which is statistically significant. (Pearson chi square=8.838, p value=0.042) and NO level increases which is statistically significant. (Pearson chi square=4.330, p value=0.001)

Number of cigarette sticks per day	Mean Superoxide Dismutase (nmol/mg protein)	Mean Nitric Oxide (nmol p value = 0.001/mg protein)
1-5 sticks	5.36	2.71
6-10 sticks	4.72	3.13
>10 sticks	4.37	3.52
Statistical Test	Chi square= 8.838 p value = 0.042	Chi square= 4.330 p value = 0.001

In relation to association between number of cigarette sticks used per day and mean value of superoxide dismutase levels it was seen that as the usage of cigarette sticks increases salivary SOD level decreases which is statistically significant. Pearson chi square=8.838, p value=0.042 (p<0.05) and NO level increases which is statistically significant. Pearson chi square=4.330, p value=0.001(p<0.05) [Figure 3 and Table 3].

In relation to association between number of years of smoking and mean value of superoxide dismutase levels it was seen that as the years of smoking increases salivary SOD level decreases which is statistically significant. Pearson chi square=7.453, p value=0.035 (p<0.05) and NO level increases which is statistically significant. Pearson chi square=5.845, p value=0.001 (p<0.05) [Figure 4 and Table 4].

Figure 3: Bar graph shows association between number of cigarettes used per day and mean value of SOD and NO . X axis denotes number of cigarettes used/day and Y axis denotes mean SOD and NO (nmol/mg protein). As usage of cigarettes increases salivary SOD level decreases which is statistically significant. (Pearson chi square=8.838, p =0.042) and NO level increases which is statistically significant. (Pearson chi square=4.330, p =0.001)



Cigarette smoking has been implicated as a significant risk factor for the establishment and progression of several diseases. Cigarette smoke is a complex mixture of chemical compounds, containing many free radicals and oxidants and may be associated with lower antioxidant concentrations, increased oxidative stress and damage as well as an increased risk of several chronic diseases.

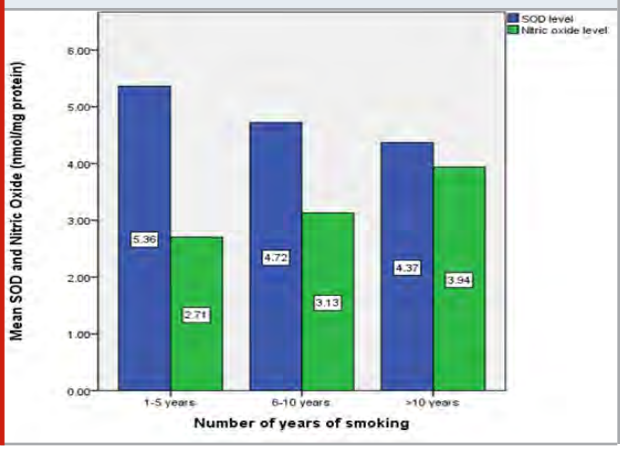
In relation to our study, the mean level of salivary superoxide dismutase level in smokers and non smokers, it was found that level of SOD was significantly increased in smokers which was in line with the study by Mahapatra et al (Mahapatra et al., 2008) and Tavilani et al (Tavilani et al., 2012). The reason behind this is in case of smoking, oxidative stress is created within the cells which leads to production of numerous reactive oxygen species. The reactive oxygen species are dangerous to cells, as they may cause DNA damage. So this is prevented by the action of salivary superoxide dismutase which is an antioxidant that converts reactive oxygen species to hydrogen peroxide which is further degraded to harmless products like water and oxygen. So this defence potential of superoxide dismutase is very important in preventing DNA damage which might lead to tumour progression.

So usually SOD levels are normal in people without smoking habit. In case of smoking this defence potential of SOD is decreased and hence might lead to premalignant conditions and further to tumour progression. However contradictory studies by Zahraei et al (Zahraei et al., 2005), where he observed that no significant difference were observed in SOD levels between smokers and non smokers. The probable reason could be differing sample size, geographic location and differing antioxidant potential of the subjects involved in the study. Also in relation to our study, the number of cigarette sticks used per day and years of smoking it was seen that as these factors increased the level of SOD was decreased significantly, stating that the defence potential of SOD was decreased in case of chronic smokers. This was in line with the study by Kocyigit et al(Kocyigit, Erel and Gur, 2001). Therefore, The decreased level of SOD in smokers indicates the protective role of this antioxidant is decreased and hence the determination of this biomarker would contribute to early diagnosis and prevention of premalignant condition.

Table 4. Shows association between number of years of smoking and mean value of Superoxide Dismutase and Nitric Oxide levels . It is seen that as the years of smoking increases salivary SOD level decreases which is statistically significant. (Pearson chi square=7.453, p value=0.035) and NO level increases which is statistically significant. (Pearson chi square=5.845, p value=0.001).

Number of years of smoking	Mean Superoxide dismutase (nmol/mg protein)	Mean Nitric Oxide (nmol/mg protein)
1-5 years	5.36	2.71
6-10 years	4.72	3.13
>10 years	4.37	3.94
Statistical Test	Chi square = 7.453 p value = 0.035	Chi square = 5.845 p value = 0.001

Figure 4: Bar graph shows association between number of years of smoking and mean value of SOD and NO. X axis denotes number of years of smoking and Y axis denotes mean SOD and NO (nmol/mg protein). As years of smoking increases SOD level decreases which is statistically significant. (Pearson chi square=7.453, p=0.035) and NO level increases which is statistically significant. (Pearson chi square=5.845, p =0.001).



In relation to our study, the mean level of nitric oxide in smokers and non-smokers it was seen that the level of nitric oxide was increased in case of smokers. This

was in line with the study by Sunitha et al (Sunitha and Shanmugam, 2006) and . The reason being in case of smoking , there is an inflammatory reaction which occurs in the cells of oral mucosa which stimulates the T lymphocytes and macrophages to induce enzyme nitric oxide synthase which produces nitric oxide. This nitric oxide reacts with other free radicals to form a carcinogenic component peroxynitrite which induces DNA damage which further leads to tumour progression. So in case of non-smokers there is no inflammatory reaction occuring, and hence there is no much release of nitric oxide. However contradictory findings were seen in a study by Patel(Patel et al., 2009), where the level of NO was increased in case of smokers when compared to non smokers but was not statistically significant.

The reason could be differing sample size, geographic location and immune potential of the subjects involved in the study. Also in relation to our study, the number of cigarette sticks used per day and number of years of smoking it was seen that as these factors increased the level of NO increased significantly. The reason for this could be as the frequency of smoking increases, there would be increased inflammatory reaction occuring resulting in the increased release of NO causing DNA damage. In healthy people the release of NO in response to inflammatory reaction is combated by the release of antioxidants like SOD which decreases the NO level, thus preventing DNA damage. This was in line with the study by Ohashi et al(Ohashi, Iwase and Nagumo, 1999). Therefore, increased levels of Nitric oxide in smokers indicate that NO have a pathophysiological role in occurrence of oral lesion caused due to smoking. So the determination of this biomarker would contribute to early diagnosis and prevention of premalignant conditions.

The limitations of the study are small sample size, examiner's subjectivity. The future scope of this study is to do intensive research with large sample size and also saliva is the first fluid that is exposed during smoking and its antioxidant system plays an important role in anti-cancer potential. So saliva is one which is easily accessible for research purposes and determination of these biomarkers in saliva would contribute to early diagnosis and prevention of premalignant conditions.

CONCLUSION

Within the limits of the study, it is seen that there is a highly significant increase in the nitric oxide levels and decrease in the superoxide dismutase enzyme level in smokers when compared to that of non smokers. Also there is a significant increase in the level of NO and decrease in the level of SOD as the number of cigarette sticks and years of smoking increased. Estimation of salivary nitric oxide levels and superoxide dismutase levels is a simple, non invasive procedure and could be analysed to suggest the role of these biomarkers in the pathogenesis of oral lesions.

ACKNOWLEDGEMENTS

I wish to express my deep sense of gratitude and professional thanks to my research guide Dr. Sreedevi, Senior Lecturer, Department of Oral Medicine and Radiology, Saveetha Dental College and my college management for their keen interest, inspiring guidance , constant encouragement with my work during all stages to complete this study.

Author's Contribution: First author Vaishali.S performed data collection, analysis and interpretation and wrote the manuscript. Second author Sreedevi Dharman contributed to conception, study design, analysis, interpretation and critically revised the manuscript. All the authors have discussed the results and contributed to the final manuscript.

Conflict of Interest: None

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-256-260

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Antimicrobial Property of the Newly Formulated Health Drink Against Common Oral Pathogen, *Streptococcus mutans*

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ABSTRACT

An important property that is necessary in a health drink is to have good antimicrobial property. This is a first of its kind health drink that focuses primarily on oral health. The aim of the present study was to estimate the antimicrobial activity of a newly formulated health drink. The various components were weighed out and grinded to fine homogeneous powder.The sample health drink powder was prepared by weighing out 10g of whole black pepper, 18g of almonds, 15g of raisins, 10g of dried and powdered mango peel and fruit along with about 1g of turmeric powder. The same was then assessed against Streptococcus mutans by incorporating it in different dilutions in nutrient agar and incubating the same. It was observed that there was reduction in the growth with increase in concentration. The final growth cultures were compared with the positive and negative controls to estimate the efficacy of the health drink. When colonies were counted it was observed that there was a significant reduction in colonies between 200ml of the extract and 1000ml of the extract. This was a very significant finding as the usage of the health drink would in turn potentially decrease the microbial load in the oral cavity. Within the limits of the present study the formulated health drink proves to have a very good antibacterial activity against common oral pathogens and the discussion also proves the efficacy of the same against systemic pathogens as well. Further studies would lead to the introduction of a superior health drink in the market which would help the entire human race.

KEY WORDS: NEWLY FORMULATED HEALTH DRINK, ANTIMICROBIAL, ORAL HEALTH DRINK, HERBAL SUPPLEMENT.

ARTICLE INFORMATION

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Received 27th July 2020 Accepted after revision 20th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/147

INTRODUCTION

Dental caries, otherwise known as tooth decay, is one of the most prevalent chronic diseases of people worldwide; individuals are susceptible to this disease throughout their lifetime. Dental caries forms through a complex interaction over time between acid-producing bacteria and fermentable carbohydrate, and many host factors including teeth and saliva. The disease develops in both the crowns and roots of teeth, and it can arise in early childhood as an aggressive tooth decay that affects the primary teeth of infants and toddlers. There is no particular health drink that focuses on oral health, various focus on systemic health.

Initially the constituents of tea were studied as it is one of the most drinks that are consumed in the population. and the effect of each compound was observed. Literature evidence showed that the major component of tea was Polyphonic compounds. Among the polyphonic compounds the major compounds were flavonoids. Within flavonoids the major one was tannins (Glade, 2000). When Tannins undergo oxidation produced theaflavins and thearubigins which were responsible for the dark colour and robust flavour of tea. Other major flavonoids that were present were Catechin, epicatechin, epicatechin gallate, gallocatchin, epigallocatechin gallate (EGCG) (Knop et al., 2015). EGCG is present in higher levels in green tea in comparison with that of normal tea. EGCG is the component that is majorly responsible for the health benefits from green tea. It is correlated for the anticancerous property (Havsteen, 2002). The compound aids in weight loss etc.

Amino acids that are present in tea are majorly responsible peculiar umami taste of tea. Out of which the major amino acid present is L-Theanine. L- theanine is a compound that is responsible for that feeling of relaxation that one acquired when they drink tea. It also promotes brain activity. The enzymes that are present in tea include polyphenol oxidase and peroxidase which are responsible for the browning of tea leaves (Feng, 2006). Heat inhibits these enzymes that is why the green tea leaves remain green even after the entire process. They contain the pigments, chlorophyll m, carotenoids and xanthophylls. Carbohydrates in the drink account for about 11% which is for the sweetness. It contains methylxanthines such as caffeine which is a stimulant, theobromine and theophylline.

An important property that is necessary in a health drink is to have good Antimicrobial property. This would inturn result is alarming health benefits. Many health drinks are available in the commercial market, but none focus on oral health. The field has grown vastly yet many side effects exist from various health drinks. Thus the study was designed to create a health drink and to asses the Antimicrobial aspect of the same before leading to further investigations. The aim of the present study was to evaluate the antimicrobial property of the newly formulated health drink against common oral pathogen, Streptococcus mutans.

MATERIAL AND METHODS

The various components that were taken as part of the health drink are:
1) Turmeric
2) Black pepper
3) Mango peel and fruit
4) Raisins
5) Almonds.

It was ensured that none of the components were present along with preservatives or other colouring agents as it would affect the results of the present study and would ultimately result in the failure of the hypothesis. The various components were weighed out and titrated with precision using a mixer grinder to a fine homogenous powder. Mango peel and Mango fruit were sun dried for a period of 10 days to remove the water content, this would help in the shelf life of the product as well. The sample powder was prepared by weighing out 10g of whole black pepper, 18g of Almonds, 15g of Raisins, 10g of dried and powdered mango peel and fruit along with about 1g of Turmeric powder. The above said weight of different substances was obtained through various attempts of trial and error. The health drink was constituted in accordance with a previous study where the nutritional value was assessed (Gayathri and Others, 2018)

Once the health drink was constituted, it was diluted with saline in different concentrations such as 200ml, 400ml, 800ml,1000ml. The Antimicrobial property was assessed against Streptococcus mutans. Nutrient Agar was incorporated with different dilutions of the health drink and incubated with colonies of Streptococcus mutans colonies, and incubated for a period of 24 Hrs at 37 degrees Celsius. Once the incubation period was completed the culture plates were observed. The colonies were graded and further analysis is performed and the results are obtained.

RESULTS AND DISCUSSION

In the present study where the growth of the organism was assessed in the presence of the health drink at varied concentrations, it was observed that there was reduction in the growth with increase in concentration. The final growth cultures were compared with the positive and negative controls (Fig 1, Fig 2) to estimate the efficacy of the health drink. When colonies were counted it was observed that there was a significant reduction in colonies between 200ml of the extract and 1000ml of the extract (Fig 3, Fig 4) . This was a very significant finding as the usage of the health drink would inturn potentially decrease the microbial load in the oral cavity. In order to understand the exact reason for the Antimicrobial activity of the particular health drink it is important to understand each of the elements that have been used in the health drink.

The first component that was included was turmeric. Turmeric has been used through ages in various forms of medicine to treat various ailments (Prasad and Aggarwal,

2011). When the oral cavity is being considered it has been found efficacious against various diseases such as periodontitis (Kandwal, Mamgain and Mamgain, 2015) and even in delaying the process of radiation induced mucositis in patients undergoing radiation therapy for head and neck cancers (Kandwal, Mamgain and Mamgain, 2015; David, Ruban David and Timple Shree, 2019). When the aspect of dental caries is considered, the main component of turmeric that is attributed to the activity against Streptococcus mutans is curcumin in turmeric (Song et al., 2012) as it prevents the adherence of S. Mutans to the surface of the tooth and to extracellular matrix. The first step that is involved in the formation of biofilm is bacterial adhesion and thus intervention at this stage would prevent the further development of the disease. This explains the need for turmeric in the present health drink and the reason for its Antimicrobial property in the present study can be attributed to the same.

Figure 1: Figure shows positive control with inoculation of agar with S.mutans

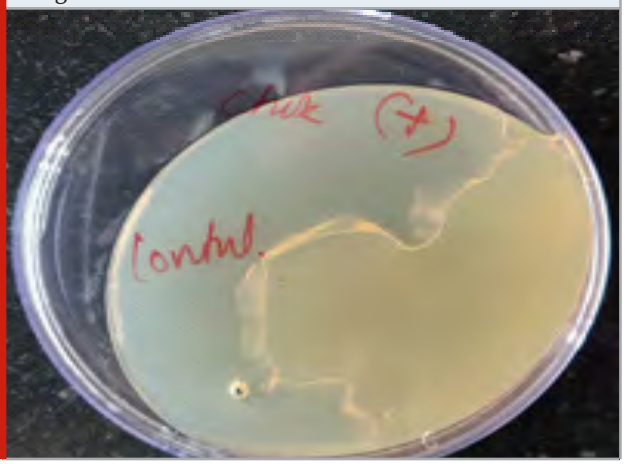


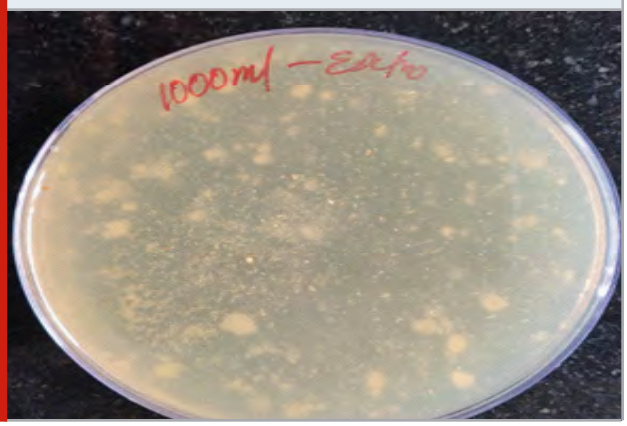
Figure 2: Figure shows negative control with inoculation of agar with saline.

The next constituent of the health drink was black pepper. Black pepper has been attributed to various health benefits in the past including its immunomodulatory and anti cancerous properties (Majdalawieh and Carr, 2010). It has also been attributed to increase the pharmacokinetic action of certain drugs that are administered orally and are metabolised in the liver (Han, 2011). In the present study pepper has been added due to the additive property of an element that has been present in pepper known as piperine . In a study conducted by Shoba et al (Shoba et al., 1998)where the absorption of curcumin was observed in rats, it was observed that when administered in combination with piperine, the absorption rates were enhanced. Thus the addition of the same would improve the overall benefit of the health drink as well. In a study conducted by Sidarta et al (Sidarta, 2013) where pepper was tested against Streptococcus mutans it was observed to have good Antimicrobial property which is in acceptance with the findings from the present study. Thus this could also be attributed to the Antimicrobial activity of the present health drink.

The next three components that were added were mango

Figure 3: Figure shows result after incubation for 24 hours with formulated health drink with 200ml dilution.

Figure 4: Figure shows result after incubation for 24 hours with formulated health drink with 1000ml dilution.



peel and mango fruit. This component was not added in the intention to attribute to the Antimicrobial property but rather for the reason of the flavonoids that are present in the mango peel and also for their dietary Fiber content which would in turn help the community (Ajila and Prasada, 2013). But surprisingly the peel of mango has also been attributed to antibacterial properties in a study conducted by Abdullah (Abdullah, 2011) . However the antibacterial property against a bacilli like streptococcus mutans was found rather less, thus it may or may not

have contributed to the antibacterial property in the present study. But there are various other health benefits from the same and a health drink is ideally expected to satisfy all of them and not only the antibacterial property, thus the presence of the same is justified in the present health drink.

Following mango peel, the next component that was added was raisins. This is another component that was not solely added for the purpose of its Antimicrobial property but primarily for its high concentration of fluoride (Lopez and Navia, 1988)which would provide beneficial to oral health. In a study conducted by J. Fausto Rivera Cruz et al (Lopez and Navia, 1988; Clarkson and McLoughlin, 2000) it is observed that components such as oleanolic acid and butelinic acid that are present in raisins are found to be efficacious against Streptococcus mutans which is the primary oral pathogen. Thus this can also be attributed to the Antimicrobial activity of the present health drink and the presence of the same is also justified by fluoride content. Through literature it has also been reported that the same has good antibacterial activity against various other organisms such as E.coli (Greenberg, Newmann and Howell, 2005) which are notorious to cause Urinary tract infections. In a study conducted by Ramasamy Thangavelu Narendhirakannan et al (Narendhirakannan et al., 2012) where the Antimicrobial activity of various Indian herbs was assessed in rats it was observed that raisins showed a significant reduction in bacterial colonies of various species such as K. Pneumoniae and E.Faecalis. Thus the health drink would have very good systemic benefits as well.

The last component that was added in the composition is almonds, since oral health is one of the primary focuses of the formulation of the present health drink it was to be ensured that the carbohydrate concentration was kept as minimal as possible (Gayathri and Others, 2018). The sole rationale behind the addition of almonds lied in the presence of L-theanine which would inturn provide the consumer with a relaxing feeling. This is a first of its kind study where the formulation of a health drink with oral health as a priority, the usage of all these components in combination has not been reported in literature. This invitro analysis paves way for further invivo analysis to improve the health drink and bring about a positive outcome on the society with the introduction of the same. There might be certain variations between invitro and invivo analysis and hence the same has to be performed to conclude with certainty the superiority of the current health drink.

CONCLUSION

Within the limits of the present study the formulated health drink proves to have a very good antibacterial activity against common oral pathogens and the discussion also proves the efficacy of the same against systemic pathogens as well. Further studies would help further development of the health drink and introduction for consumer usage which would benefit the entire human race, one drink at a time.

ACKNOWLEDGEMENTS

We sincerely thank Saveetha Dental College for rendering full support for my study.

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-261-265

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Incidence of Mb2 in Maxillary Second Molars- A Cbct Analysis

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ABSTRACT

The second mesiobuccal canal in mesiobuccal roots in maxillary molars is common. Failure on the location of these canals is associated with a high rate of unsuccessful treatments of maxillary molars. Therefore, the aim of the present study was to assess the incidence of MB2 in maxillary second molars. About 50 CBCT were obtained from the radiology department of Saveetha Dental College. Only 5 maxillary second molars presented with MB2 out of the 100 reports taken in the study (5.0%). The incidence of MB2 in 17 was about (3.0%) and (2.0%) in 27; p=0.646 (>0.05) statistically not significant. When a root canal treatment fails, the clinician faces the challenge to make a decision that better solves the issue. Thorough knowledge is essential prior to initiation of endodontic therapy. The endodontist must accept the possibilities of extra canals for better management and a successful treatment outcome. Higher rate in the maxillary first molars when compared to the second molars. Previous studies demonstrated variations in classical triangular shaped access in maxillary molars might help the location of root canals.

KEY WORDS: MB2, INCIDENCE RATES, MAXILLARY SECOND MOLARS.

INTRODUCTION

Anatomical complexities impose limitations to the preparation of the root canal resulting in unsuccessful treatment. Such complexities are of great importance, especially in the maxillary molars (Christie, Peikoff and Fogel, 1991)(Fogel and Cunha, 2017)). These teeth present a great variety in the number of main canals located in many treatments. Particularly in the mesiobuccal roots, very often a canal might not be located such as the mesiolingual canal of the mesiobuccal root, mesiopalatal canal, or MB2 of the mesiobuccal root (Kulid and Peters, 1990). Knowledge of the morphology of the canal system, therefore is extremely important prior to planning an endodontic treatment , as its success relies on the location of all of the canals that can then be disinfected, shaped, and filled (Filho et al., 2009). In the past the periapical radiographs were the only tool to aid in the location of canals, currently the cone-beam computed tomography (CBCT) has become an important tool in this step.

CBCT is a 3D radio-graphic image that promotes images with more sensitivity and real anatomy (Nikoloudaki, Kontogiannis and Kerezoudis, 2015) . In addition, CBCT scans allow visualization of the images in axial, sagittal, and coronal views, aiding the detection of extra canals, anatomic variations, root resorptions and pathologies that might affect the hard tissues (Estrela et al., 2015)

ARTICLE INFORMATION

*Corresponding Author: Kanjaneyulu.sdc@saveetha.com
Received 8th Aug 2020 Accepted after revision 19th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/148

(Estrela et al., 2008). Undoubtedly, the dental operating microscopes with ultrasonic tips are considered the most helpful devices to locate extra canals (Coelhodecarvalho and Zuolo, 2000). Moreover, experience of the operator, along with the time employed in the search of MB2 canals along with certain specific tools is helpful in the clinical success of root canal location (Stropko, 1999).

The main aim of any endodontic treatment is to provide thorough mechanical and chemical cleansing of the pulp cavity and its complete obturation with an inert filling material ((Vertucci, 1984). One of the major failures in endodontic treatment is when treating maxillary molars is the inability to locate, debride, and fill the frequently present second mesiobuccal canal. Ingle stated that the frequent cause of endodontic failure is apical percolation and subsequent diffusion stasis into the root canal (Gerstein, 1983). Virtually all dentists thought that the mesiobuccal root (MBR) of maxillary molars are usually present with only one canal (Weine et al., 1969).

Concerning that, many papers have been published regarding the types of canal systems present in that root and their percentage. However, few studies have dealt exclusively with the canal configurations in the mesiobuccal roots of the maxillary second molar, possibly because of the assumption that the root is very similar to that of the maxillary first molar. Weine categorised four different types of configurations as follows: type I single canal from pulp chamber to apex; type II two canals leaving the chamber but merging shorter at the apex to form a single canal; type III two separate canals leaving the chamber and exiting the root in separate foramina; and type IV one canal leaving the chamber, but dividing short of the apex into two separate and distinct canals with separate foramina (Weine et al., 1969; Cohn, 2004).

The mesiobuccal root of the maxillary molars presents a flattening in the mesiodistal direction leading to the presence of a second canal in this root. The location of MB2 canal is paramount for the success of treatment in maxillary molars. Several clinical steps might assist the provider to locate the canal including the recognition of pulp chamber floor, magnification, ultrasonic tips, and dying, thereby enhancing the outcomes. However, its use is paramount for location of extra canals, including MB2 canals in the maxillary molars. Diamond coated tips can be used for the removal of dentin shelves located over the MB2 canals (Lambrianidis, 2017). A previous study showed that troughing the pulp chamber floor up to 2 mm from the palatal to the mesiobuccal canal is helpful in locating the MB2 canals (Parker et al., 2017). During irrigation procedures with sodium hypochlorite, the clinician is able to observe bubble formation. These bubbles might indicate the possible location of the root canal entrance. While the location of the MB2 canals is a challenging situation, the preparation of these canals is not less difficult.

We have numerous highly cited publications on well designed clinical trials and lab studies (Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019; Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019). This has provided the right platforms for us to pursue the current study. Our aim is to assess the incidence of MB2 in maxillary second molars in the current study by means of a literature review, followed by observed clinical cases, the importance of the location of mesiobuccal canals in the maxillary second molars.

MATERIAL AND METHODS

In the current study, a total of 50 CBCT scan reports were collected from the Radiology department of Saveetha Dental College, Chennai. The CBCT scans were analysed for the incidence of MB2 in the mesiobuccal roots of the maxillary second molars. Dependent variables in the study were the maxillary second molars, number of MB2 in each mesiobuccal root. Independent variables were the name, age, gender of the study samples. The data collected were cross verified by another examiner. The collected results were entered in Microsoft excel. And the data analysis was done using SPSS software version 20.0. Statistics used for analysis in the study were descriptive statistics and comparison of variables were done using chi square test where $p<0.05$, which is statistically significant.

RESULT AND DISCUSSION

The operator must look for the additional canals prior to any treatment (Orafi and Hammad, 2017). It is important for the clinician to have a strong conviction about the MB2 system in all maxillary molars. In conjunction with dental operating microscopes, rhomboid access and the use of specific instruments and other aids can occasionally be used to enhance the visualization of MB2 systems (Seidberg et al., 1973). It is of great interest to note that the studies utilizing microscopes have reported a significantly higher percentage of MB2 canal system occurrences than the other studies. To treat maxillary second molars efficiently, an understanding of the morphology of the mesiobuccal canal system is most mandatory. Initially the canal in the MBR is the shape of a kidney bean. With continued deposition of secondary dentin, the isthmus between the poles becomes narrow and eventually may even close resulting in two canals. It will eventually close off leaving a small space, which makes it more difficult to locate. Therefore, depending on the age of the tooth, the MBR may have a variety of configurations (Bhuyan et al., 2014) .

Out of which 100 maxillary second molars which were reviewed for the incidence of MB2. Only 5 maxillary second molars presented with MB2 out of the overall 100

reports taken in the present study (Figure 1). Thereby, the incidence of MB2 in maxillary second molars was found to be 5.0% (Figure 2). The incidence of MB2 in 17 was about (3.0%) and (2.0%) in 27. Whereas, (47.0%) was absent in 17and (48.0%) was absent in 27 (Figure 3) p=0.646 (>0.05) statistically not significant. Reis et al, pointed to age as a factor that impacts the visualization of MB2 canals (Reis et al., 2013). In that study, patients of 20 to 30 years had their canals visual-ized in 90.7% of the cases, while patients with ages ranging from 60 to 70 years had their canals visible in 81.9% of the cases. Another study assessed root canal morphology using CBCT scans pointed out that full crown coverage is another factor that can prevent the location of MB2 canals (Studebaker et al., 2018).

Figure 1: CBCT image depicting the incidence of MB2 in the maxillary second molars 17 (A) (B) and 27(C) taken in the present study.

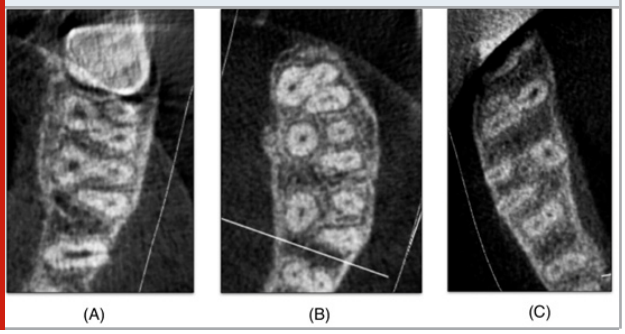
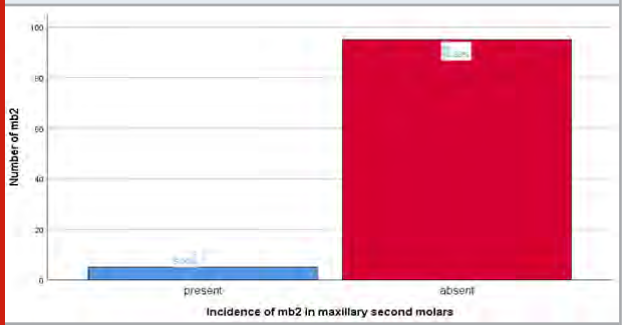
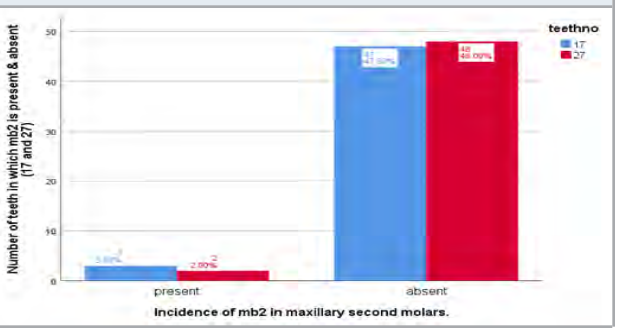


Figure 2: Bar chart depicting the incidence of MB2 in the maxillary second molars. From the results of this graph it is evident that only in 5% of the cases MB2 canal was present (blue) in the maxillary second molars. And in 95% of the cases MB2 canal was absent (red).



Medication is another factor that impacts root canal location. A variety of methods have been introduced to the study canal configurations, investigations from 1972 to 1984 reported the occurrence of two canals in the MBR of the maxillary second molar were found in the range between 12% to 38% (Vertucci, 1984). Kulild and Peters found that 14 to 32 teeth (43.8%) had two canals in the mesiobuccal root of the maxillary second molar, when files were placed in the orifices and examined radio graphically (Kulid and Peters, 1990). The number of two canals increased to 25 to 32 (78.2%) when the orifices were countersunk with a bur before files were placed into the canals. Finally, 30 of the 32 teeth (93.7%) had two canals when the roots were sectioned horizontally and examined histologically (Eskoz and Weine, 1995).

Figure 3: Bar chart depicting the association between the incidence of MB2 canal in maxillary second molars and the teeth number. Blue denotes 17 and red denotes 27. The incidence of MB2 in 17 was about (3.0%) and (2.0%) in 27. Whereas, (47.0%) was absent in 17 and (48.0%) was absent in 27. Pearson's Chi Square test value= 0.211; df=1; p=0.646 (>0.05) statistically not significant.



Several methods have been respirated to help locate the extra canals. Foremost a modification of the access preparation to a rhomboidal shape for the maxillary molars as compared to the classical triangular outline ((Versiani, Basrani and Sousa-Neto, 2018). This provides better visibility and accessibility. Thorough probing of the fissure or the groove between the main canal was previously proposed in order to locate the orifice of another canal. This fissure or groove must be deepened to remove any projections that might conceal the opening of canals. A troughing process must be accomplished with burs or ultrasonic instruments if the MB2 orifice is not easily identified. The MB2 orifice are usually found mesial to an imaginary line between the MB1 and palatal orifices, and commonly, about 2-3 mm palatal to the MB1 orifice.

The MB2 canal can be challenging to locate most of the time. However, the MB2 canal often has a marked mesial inclination apical to its orifice in the coronal 1 to 3 mm, so when an attempt is made to instrument the MB2, the tip of file catches against the mesial wall of canal, further preventing apical progress. Since the MB2 canal is smaller and usually more calcified than MB1, the problem is exacerbated. After locating MB2, inclining the dental or ultrasonic handpiece to the distal, as far as the access preparation permit or allows the first few millimeters of this overlying roof of calcified tissue to be safely removed. After this refinement of access cavity preparation, a more desired straight line access can be achieved. To facilitate location and instrumentation of the MB2 canal, the access has to be rhomboidal in shape to allow the management of the MB2 canal (Stropko, 1999).

CONCLUSION

From the present study about 5.0% was the incidence

rate of MB2 in the maxillary second molars. It can be concluded that the proper location and treatment of MB2 canals are essential for the success of treatment of the maxillary molars. The clinician should be able to locate and manage the cases in primary treatments and also choose the best option when the initial treatment fails. Besides the anatomy, use of dental operating microscopes, and management of CBCT images must be the minimum competencies of a competent endodontist.

ACKNOWLEDGEMENTS

I would sincerely thank my guide, Department of Conservative Dentistry and Endodontics, Radiology department Saveetha Dental College and Hospitals, Saveetha institute Medical and Technical Sciences (SIMATS), Saveetha University for helping me complete the research work.

Conflict of Interest: The authors declare that there were no conflicts of interest in the present study.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-266-271

BBRC
Bioscience Biotechnology
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Assessment of Age and Gender Distribution of Patients Having Cervical Abrasion and the Treatment of Choice for Abraded Teeth

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ABSTRACT

As the age of people increases, they are subject to non-carious lesions,which are current issue of concern for dentists regarding the diagnosis and planning treatment for the same.Noncarious cervical lesions have become an important factor, when long term health of dentition is concerned. They can lead to tooth sensitivity, plaque retention, high incidence of caries.Management of cervical abrasions include counselling regarding proper brushing technique and dental treatments such as composite restorations. The main aim of this study is to determine the gender and age group which is highly affected by cervical abrasions and to determine the most opted treatment of choice for cervical abrasions. About 1800 case sheets diagnosed with cervical abrasions, between June 2019 and March-2020 were retrieved from the electronic database . Collected data were entered into the Excel sheet and was analysed using SPSS analysis. Results showed that cervical abrasions were more prevalent among age group 41-50 years (30.83%) and among males (69.54%). Direct composite restorations were more commonly done for treatment of cervical abrasions (84.38%). In conclusion, cervical abrasions were more common among the age group 41-50 years and direct composite restoration was more commonly done for treatment of cervical abrasions.

KEY WORDS: ABRASION, GIC, CERVICAL, TOOTH WEAR, COMPOSITE, NON CARIOUS .

INTRODUCTION

Tooth surface loss is an irreversible, multifactorial, non carious, physiologic, pathologic, or functional loss of dental hard tissues and has been a topic of concern among dental professionals. It is a multifactorial process involving destruction of enamel and dentin which can lead to harmful changes to teeth and affects the quality of life among people (M. K. Al-Omiri, P. J. Lamey, and T. Clifford, 2006),(Al-Zarea, 2012). There are three main, or widely recognized, aetiologies of tooth wear, namely, erosion, attrition, abrasion and abfraction (Lee and Stephan Eakle, 1984),(Bartlett, 2005), among which, abrasion is the most common etiological factor for development of tooth wear. Abrasion is described as mechanical wear of hard tissues of dentition without involving tooth-to-tooth contact and it is commonly presented in the cervical region of teeth. Cervical abrasion

ARTICLE INFORMATION

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Received 27th July 2020 Accepted after revision 21th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

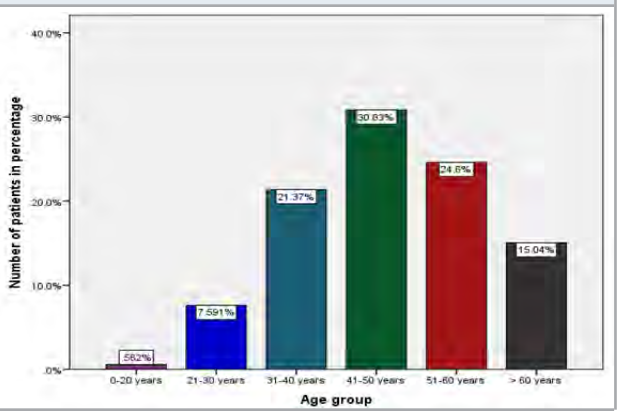
NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/149

is more often associated with improper brushing habits, combined with nature of toothbrush used, such as frequent or forceful tooth brushing, faulty or vigorous techniques, filament stiffness or design, dominant hand dexterity, or abrasive dentifrices, which result in wear of enamel and dentin in cervical region of the teeth (Bartlett and Shah, 2006). Other causes of cervical abrasions include abnormal habits such as rubbing of foreign material over the cervical region,exposure to workplaces that involves working with sand (Litonjua et al., 2003),(Turner and Missirlian, 1984).

Treatment of cervical abrasions involves the following steps: identification of etiology , diagnosis, removal of that etiological factor and, if necessary, restoration. Abrasion can also occur as a result of overzealous tooth brushing, improper use of dental floss and toothpicks, or detrimental oral habits. On clinical examination, cervical abrasions are presented as cavities with polished surfaces,not necessarily accompanied by pain in the region. In case of abrasion caused by improper brushing techniques, the enamel wear is more different than the dentin which erodes, following the path made by the toothbrush (Grippo, Simring and Schreiner, 2004). Many methods for management of cervical abrasions are present which include providing counselling regarding proper brushing technique, use of appropriate dentifrice and correction of any abnormal habit related to the cause of cervical abrasion to patients and restoration.

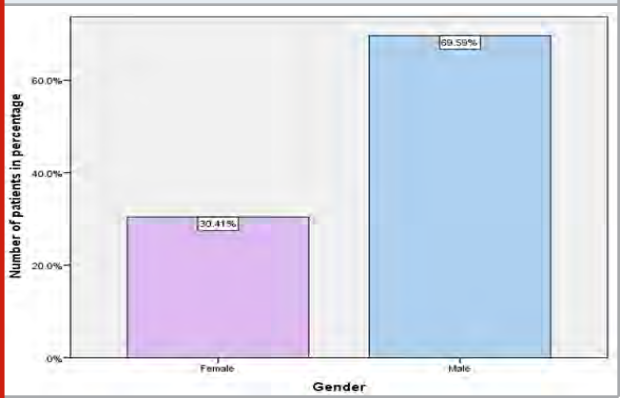
Figure 1: Graph represents distribution of age with the number of patients in percentage. The X axis represents the age groups and Y axis represents the number of patients in percentage , purple colour represents 0-20 years, navy blue colour represents 21-30 years, dark blue represents 31-40 years,green colour represents 41-50 years, red colour represents 51-60 years and black colour represents > 60 years. Graph inferred that cervical abrasions were more prevalent among the age group between 41-50 years (30.83%)



Restorative treatment options,which are minimally invasive and aesthetically pleasing, are accepted as the treatment of choice. Restorative treatment is considered, if the structural integrity of teeth is compromised, the exposed dentin is hypersensitive and if the defect is esthetically unacceptable to the patient (Lussi et al., 2009). Many studies have shown that better restorative materials with improved properties are preferred over restorative materials such as amalgam in the modern day restoration of abrasions. Glass ionomer cements , resin-modified GICs, GIC/RMGIC liner base laminated with a resin composite, and resin composites in combination with a dentin bonding agent, are all restorative options which are considered for management of cervical abrasions (Kuroe et al., 2001),(Meraner, 2006),(Ichim et al., 2007) .

We have numerous highly cited publications on well designed clinical trials and lab studies (Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019; Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019). This has provided the right platforms for us to pursue the current study. Our main aim is to determine which gender and age group is highly affected by cervical abrasions and the treatment of choice for the management of cervical abrasions.

Figure 2: Graph represents the distribution of gender with the number of patients in percentage. The X axis represents the gender and Y axis represents the number of patients in percentage.On analysis it can be seen that pink colour represents females and blue colour represents males.From this bar graph, it can be inferred that cervical abrasions were more prevalent among the males (69.54%) than females (30.41%).



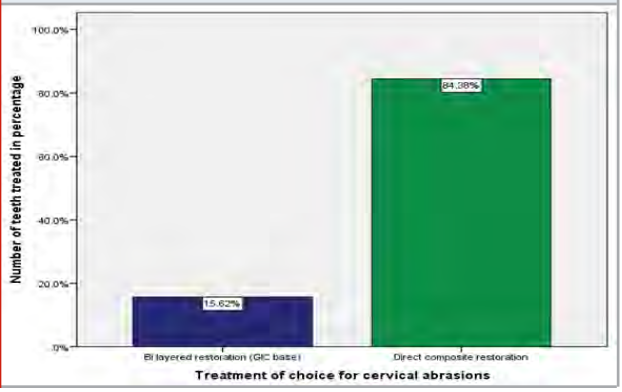
MATERIAL AND METHODS

The study was set in University setting and Institutional Ethics Committee approval was obtained (ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320). 86000 patient case records were obtained and out of which 1800 case sheets of patients who underwent treatment for cervical abrasions between June 2019-March 2020 were retrieved from Saveetha Dental college. The

collected data regarding treatment was into 2 groups: Bi-layered restorations (GIC base and composite) and Direct composite restorations. The data was analysed by 2 reviewers - the primary researcher and department faculty.

The inclusion criteria were patients who were given Bi-layered restorations and direct composite restorations and exclusion criteria were restorations done due to presence of carious lesion. The variables recorded were age,gender and treatment or material of choice for cervical abrasion. Data collection was done by entering data into Microsoft Excel and then transferred into statistical package for Social Sciences (SPSS) software. The independent variables present in the study were age and sex. The dependent variables were treatment for cervical abrasions. The type of analysis used for this study was correlation and association. The internal validity of the study was established as the data was collected from a verifiable and standardised database. The external validity is established as the data is from a clinical setup which is duplicatable.

Figure 3: Graph represents the distribution of treatment of choice for cervical abrasions with the number of teeth treated in percentage. The X axis represents the treatment of choice and Y axis represents the number of teeth in percentage , whereas blue colour represents the bilayered restorations (Gic base + Composite restoration) and green colour represents direct composite restorations. Graph infers that direct composite restorations were more commonly preferred treatment for cervical abrasions (84.38%) than bilayered restorations.



RESULTS AND DISCUSSION

The data obtained were plotted in the form of bar charts and was analysed. In this study, it was observed that cervical abrasions were more prevalent among the age group 41-50 years (30.84%) among the study population and males were more commonly affected by cervical abrasions (69.54%). Direct composite restorations were more commonly done for management of cervical abrasions (84.38 %) and was more commonly done among males (59.26%) and patients of age group 41-50 years (26.44%). Fig.I shows distribution of age among study population and cervical abrasions were more prevalent among age group 41-50 years (30.89%). Fig.II shows that cervical abrasions were more prevalent among males (69.54%) and Fig.III shows that direct composite restorations were more commonly done for management of cervical abrasions (84.38%). Fig.IV shows that direct composite restorations were more commonly done among age group 41-50 years (26.44%) and Fig.V shows that males underwent more direct composite restorations than females for cervical abrasions (59.26 %).

Figure 4: Graph represents the association between age and treatment of choice for cervical abrasions. X axis represents the age and Y axis represents the number of cases .Blue colour represents the bilayered restorations and green colour represents direct composite restorations. Graph Infers that among all age groups, direct composite restorations were more commonly done. Chi-square test was done and association was found to be not statistically significant. Pearson's Chi-square value : 6.985, p value : 0.22 (>0.05).

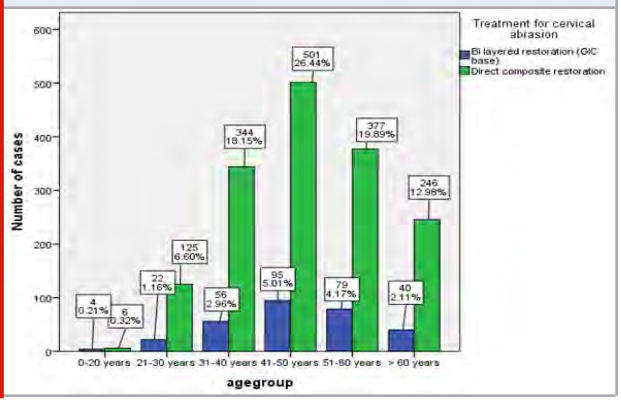
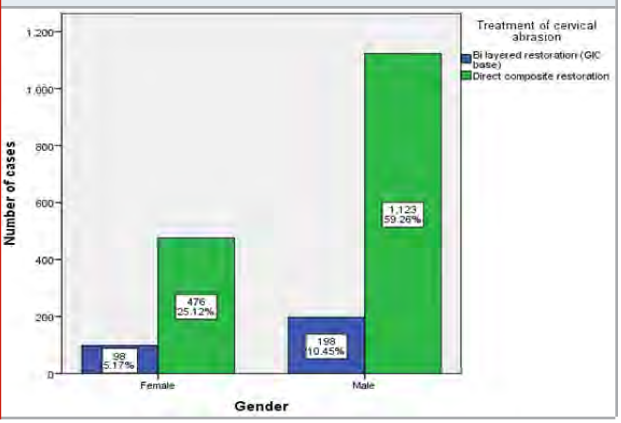


Figure 5: Graph represents association between gender and treatment of choice for cervical abrasions. The X axis represents the gender and Y axis represents the number of cases. Blue colour represents bilayered restorations and green colour represents composite restorations. Graph infers that direct composite restorations were more commonly done among males (59.26%). Chi-square test was done and association was found to be not statistically significant. (Pearson's Chi-square value : 1.319, p value : 0.25 (>0.05)



Cervical abrasions can be caused due to excessive toothbrush force, dentifrice abrasion, abfraction, erosive tooth wear or a combination of these factors. Although it's not necessary to provide restorations for cervical abrasions, patients often seek treatment to help improve esthetics. The method of restoration and the material selected for restoration of cervical abrasions depends on etiology and the nature of the cervical abrasion. Materials with a low elastic modulus that will accommodate tooth flexure, such as microfilled, nanohybrid or nanofilled composite resin, GIC or RMGIC , are often chosen for restoration of cervical abrasion (Ahmed SN, 2017). In this study, it was observed that cervical abrasions were more prevalent among age group 41-50 years (30.83%). This finding was found to be similar to the findings of study by Ahmad.H et al.,(Ahmad H, 2009) and Ketterl W et. al., (Ketterl, 1983), where cervical abrasions were found to be more common among the older population between 41-80.

Table 1. Chi square test table showing p values for association between age and treatment of choice for cervical abrasion and association between gender and treatment of choice for cervical abrasions.From this table, it can be inferred that association between age and treatment of choice for cervical abrasions and association between gender and treatment of choice for cervical abrasions were found to be not significant.

Parameter	p value	Significance	Inference
Age vs Treatment for cervical abrasion	0.22	> 0.05	Not significant
Gender vs Treatment for cervical abrasion	0.25	> 0.05	Not significant

This can be attributed to the fact that older populations are more susceptible to developing gingival recession and bone loss, with more root surface and cementum exposure, increasing the risk of cervical lesions. This was contradictory to the findings by Mujeeb F et al.,(Mujeeb F, Soomro ZA, Rashid S, Hosein T., 2015) where it was seen that among patients upto 60 years and above there was a decrease in incidence of cervical abrasions. This can be attributed to the fact that most patients above 55 years have their teeth extracted rather than treated in Pakistan, and hence the incidence of cervical abrasions among the older population was low. Males were found to be more commonly affected by cervical abrasions (69.58%) , which was found to be in agreement with findings of studies by Ahmad.H et al.,(Ahmad H, 2009) and Cunha-Cruz et al.,(Cunha-Cruz et al., 2010) where males were found to be affected by cervical abrasions more than females.

In this study, it was observed that direct composite restorations were found to be the most commonly provided treatment for cervical abrasions (84.38%). Many studies have shown that resin composite restoration was an excellent choice for management of cervical abrasions (Vandewalle KS, 1997),(Peumans et al., 2007). Properties of resin composite such as having acceptable esthetic outcome, its minimally invasive nature and its biocompatibility makes it an excellent choice for restoration of cervical abrasions(Mehta et al., 2012),(Mehta, Francis and Banerji, 2016) .This was found to be in contradiction to studies by Adeleke et al.,(Adeleke and Oginni, 2012), Franco E.B et al.,(Franco et al., 2006) and Tyas M J et al.,(Tyas, 1995) , where bi layered restorations (GIC base) were recommended for management of cervical abrasions. This can be attributed to the fact that GIC cement exhibits properties such as: biocompatibility, adhesion to calcified substrates (especially in cases of dentin sclerosis where traditional adhesion may underperform), elastic modulus similar to the dentin, good marginal adaptability and good retention qualities , and was considered to be superior to that of composite restorations.(Nasim et al., 2018).

CONCLUSION

Within the limitations of this study, it shows cervical abrasions were more prevalent among the age group of 41-50 years (30.83%) and Males were found to be more commonly affected by cervical abrasions (69.58%). It also showed that direct composite restorations such as microfilled or nanofilled composites was the treatment of choice for cervical abrasions followed by bilayered restoration for deeper cavities.

ACKNOWLEDGEMENTS

We the authors of the manuscript, would like to thank and acknowledge Saveetha Dental College for providing us access to use the retrospective data for the study.

Author Contributions: The authors have contributed to study design ,data collection, analysis of data,tabulation of results, manuscript typing and formatting. and critical reviewing.

Conflict of Interest: This research project is self funded and is not sponsored or aided by any third party.There is no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-272-278

BBRC
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Research Communications

Awareness on Organ and Body Donation Among Dental and Medical Students

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ABSTRACT

Cadaveric donation comprises body donation, organ donation that is, taking out organs (heart, lungs, kidneys, liver, pancreas) from brain dead people, as well as tissue donation, meaning taking tissues (skin, corneas, tendons, bone) from brain dead as well as heart dead people.In a broader sense, however, pathologists are involved in cadaveric tissue donation as well as taking tissues from cadavers for diagnostic procedures within the framework of the autopsy (fluids, organs, tissue samples), and to gather material for research and training students and pathology residents (tissues, organs). For cadaveric tissue donation, different ethical and practical issues must be considered, which we will try to review in this paper from the perspective of the pathologist. It is possible to donate your body to medical science after your death. To make the arrangements, contact the anatomical institute of one of the universities in India , as this is a separate process to organ or tissue donor registration. The aim of the study is to evaluate the knowledge and awareness of organ donation. Analytic, longitudinal and quantitative study, conducted in 5 Medical/Dental College in Natal/RN, between November 2019 and January 2020. Survey has been conducted among dental and medical students 105 responses have been received from 5 medical and dental colleges. Regarding the donation structure, there were deficiencies of physical resources (temperature control), materials (mobile radiology) , human resources (nurse technicians) and lack of adequate records and care protocols. In the process of donation, the biggest problems were related to the evaluation stages, brain death diagnosis, maintenance and documentation, with greater proportion of care for the non-donor. 85.4% of the respondents were aware of Organ donation whereas 14.6% of the study population were not aware about organ donation. The primary outcome was intention to donate. Taking a donor card after the interview was a secondary behavioral outcome.

KEY WORDS: BRAIN DEATH, CADAVERIC TISSUE, DONATION, GRAFT REJECTION, TRANSPLANTATION.

ARTICLE INFORMATION

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Received 5th Aug 2020 Accepted after revision 22nd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/150

INTRODUCTION

Organ transplantation is the most favored treatment methodology for patients with end-stage organ malady. The need for organ transplantation is higher than the necessity(Allen and Stillwater, no date; Ganikos, no date; Sarti, 1999; Ahlert and Sträter, 2020) For the transplantation program to be fruitful, mindfulness with respect to organ donation is required and individuals must have an inspirational disposition toward giving organs(Magotra, 2014; Bashir, 2017; Kumar, Kanvinde and Thomas, 2018; Akbulut et al., 2020). While patients with end stage renal disease can be treated by other renal replacement therapies, kidney transplantation is widely recognized as the best cure for both quality of life and cost effectiveness(Organ Donation and Transplantation: Awareness and Roles of Healthcare Professionals—A Systematic Literature Review, 2018; Alan and Kurt, 2019; Ismail, Lim and Mahadevan, 2020).

In fact, Kidney transplantation is considered to be the most frequent transplants to be carried out globally(Ponticelli, 2007; Gulec, 2011; Orlando, Remuzzi and Williams, 2017). The acquisition of organs for transplantation includes the removal of organs from the bodies of the dead(Petechuk, 2006; Tsoulfas, 2018; Krucińska et al., 2020). This removal must meet legal criteria, including the death and consent concepts. Although organ transplantation was initially limited to the transplantation of vital organs, today medical and surgical processes have been developed to allow the transplantation of a number of organs that not only allow longer lifespans, but also improve the quality of life of the patient.

Organ donation includes heart, pancreas, lung, liver, cornea, kidney, trachea, skin transplants. Owing to the lack of organs, heart transplants are one of the most important and least conducted organ transplant operations, although only few are done annually. Even the lung transplants still remain uncommon owing to shortage of donors. For cases of chronic liver disease, the unhealthful liver of the patient is removed and replaced by either a part of the liver from a living donor, such as a friend, or a whole healthy liver from a deceased donor(Fan, Chiu and Hui, 2011; 'Liver Transplantation', 2016; Ponziani et al., 2020; Rinehardt et al., 2020). End-stage liver disease, particularly cirrhosis of the liver due to alcohol abuse, is the most common reason for liver organ transplant surgery(Bhamidimarri, 2014; Busuttil and Klintmalm, 2015; Humar and Tevar, 2018).

Kidney and pancreas double transplant is the most common transplant in case of pancreas replacement. Type 1 diabetes causing kidney failure is one of the major reasons for this type of transplant. In this case, the kidney is obtained from a healthy living donor whereas the pancreas is obtained from the deceased donor(Toledo-Pereyra, 2012; Troppmann, 2020). Scarring from eye infections such as keratitis or herpes, and other eye diseases such as keratoconus where the shape of the cornea is distorted are some reasons for corneal transplantation(Mannis, 2004; Singh and Tripathy, 2016). Renal disease affects the large group of population today.

The kidney is an integral part of the human system , that helps to flush out blood toxins and maintain an electrolyte equilibrium that allows the body to function naturally. Organ transplants require psychological, financial, mental as well as physical preparation. It is very much essential to cultivate patients with a positive attitude and awareness about their state of health('Organ Transplants and Ethics', 1992; Schwartz, 2005; Al-Khafaji, 2017). Usually the transplantation is carried out with the help of certain drugs to prevent graft rejection. As the major problem of the transplantation seems to be graft rejection, the body's immune system automatically rejects the foreign tissue. Some of the immunosuppressant drugs are being used to prevent such types of rejections (Busker, 1988; Critchley and Fildes, 2012; Afzali, Lechler and Lombardi, 2015).

Although the quality of life for a patient after a successful organ transplant operation is increased, they continue to take many steps on a regular basis, often including a lifestyle adjustment. In addition to a prescription regimen, patients may need to monitor their activities, so higher or lower physical exercise rates can be recommended based on their doctor's recommendation. Some people are interested in cadaver donation as they come up with an agreement provided by the organisations(Boscolo-Berto et al., 2020; Hutchinson et al., 2020). Here in accordance with anyone's interest, cadaver donation is acceptable with terms and conditions.

Written and witnessed consent for anatomical examination has to be given prior to death under the Human Tissue Act 2004(Copeman, 2006; Patwardhan and Kulkarni, 2011; Siripurapu and Vijay Kumar Sharma, 2018). Body donations are highly valuable for many purposes that include anatomical examinations, research purpose, education and training. The aim of the study is to evaluate the knowledge and awareness on organ and body donation among medical and dental students. Previously we have done so many bioinformatics studies(Sekar et al., 2019; Johnson et al., 2020), morphological and morphometric studies(Choudhari and Thenmozhi, 2016; Hafeez and Thenmozhi, 2016; Kannan and Thenmozhi, 2016; Keerthana and Thenmozhi, 2016; Krishna, Nivesh Krishna and Yuvaraj Babu, 2016; Pratha, Ashwatha Pratha and Thenmozhi, 2016; Subashri and Thenmozhi, 2016; Nandhini et al., 2018), in vivo animal experimental studies(Seppan et al., 2018) and other survey analysis and Review analysis(Samuel and Thenmozhi, 2015; Sriram, Thenmozhi and Yuvaraj, 2015; Thejeswar and Thenmozhi, 2015; Menon and Thenmozhi, 2016) led us to conduct awareness study over the past 5 years. The idea for this survey stemmed from the current interest in our community. This study is to evaluate and cross the knowledge and awareness among the adult population. Study primarily focuses on the purpose and principles of lockdown.

MATERIAL AND METHODS

The study was done on medical and dental students. The subjects were taken from medical and dental schools in Chennai. A total of 105 students were requested to participate in the study. The subjects' age limit were considered to be from 17 years to 30 years where it comprised both male and female participants. The questionnaire had 13 items in it which was designed in such a way to evaluate the awareness and attitude towards organ and body donation. Assessment of the subject's awareness and attitude towards organ and body donation included the questions relating the basic knowledge and procedures of organ donation. The subjects were requested to respond to each item in the specific format given at the end of each item. All the participants were allowed to choose one of the given three to four choices for each item in the questionnaire. The datas were collected,tabulated and represented as pie charts.

RESULTS AND DISCUSSION

In this study 105 students from various institutions were allowed to participate in this study. 85.4% of the respondents were aware of Organ donation whereas 14.6% of the study population were not aware about organ donation [Figure 1]. 64.7% of the respondents thought organ donation is legal and ethical but, remaining 35.3% of the study population felt it is illegal [Figure 2]. 82.7% felt it is possible to donate body to medical science after death whereas 17.3% felt body donation to medical science is not practicable [Figure 3]. 68% of the students were aware of organ transplantation whereas the remaining 32% of them were not sure about organ transplantation [Figure 4]. 74% of the respondents felt there is demand for organ transplantation process in India whereas 26% of them felt there are sufficient organ transplantation has been done everyday [Figure 5]. 64.7% of the respondents were aware of the term embalming whereas 35.3% were not aware of the term embalming [Figure 6]. 81.6% thought increasing awareness levels regarding brain death would improve organ donation [Figure 7].

Figure 1: Pie chart representing percentage distribution of awareness of organ donation where Purple colour represents "Yes" and blue colour "No". Majority of them were aware about organ donation.

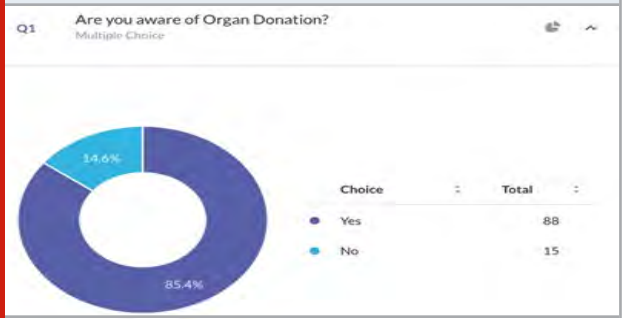


Figure 2: Pie chart representing percentage of distribution of awareness about ethical and legal issues in organ donation, where Purple colour represents "Yes" and blue colour represents "No". Majority of them were aware about the ethical and legal issues.

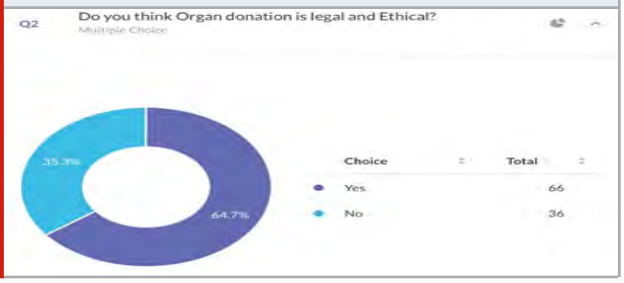


Figure 3: Pie chart representing percentage distribution of role of body donation in medical field, where Purple represents "Yes", blue colour represents "No". Majority of them were aware of body donation in the medical field.

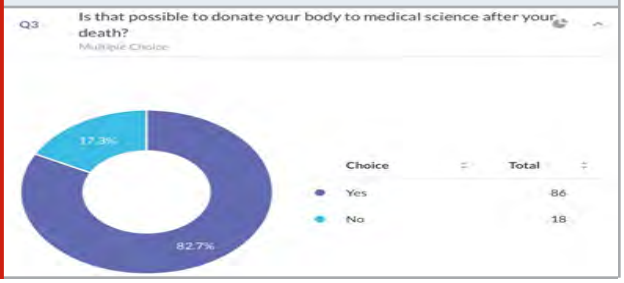


Figure 4: Pie chart representing the percentage distribution of awareness on organ transplantation where, purple colour represents "Yes", blue colour represents "No". Majority of them were aware about organ donation.

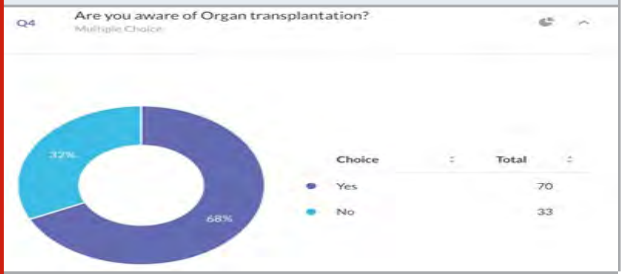


Figure 5: Pie chart representing the percentage distribution of awareness about demand in organ transplantation, where purple colour denotes "Yes" and blue colour denotes "No". Majority of them were aware of organ transplantation.

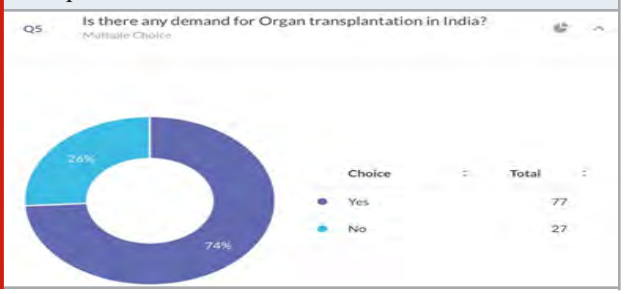


Figure 6: Pie chart representing the percentage distribution of awareness of term embalming, where purple colour denotes "Yes" and blue colour represents "No". Majority of them were aware of term embalming.

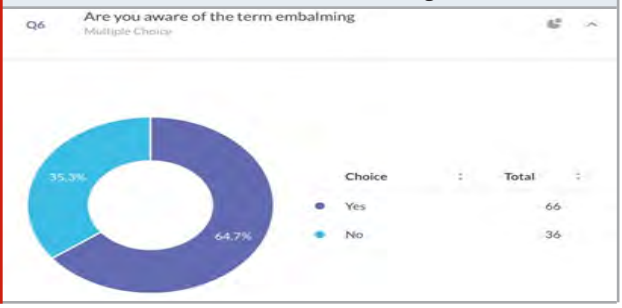


Figure 7: Pie chart representing the percentage distribution of awareness levels regarding brain death in organ donation, where purple colour represents "Yes" and blue colour represents "No". Majority of them were aware about brain death in organ donation.

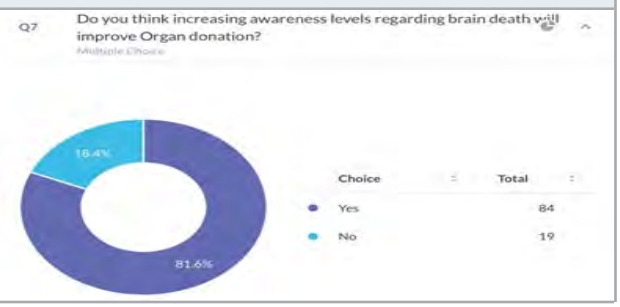
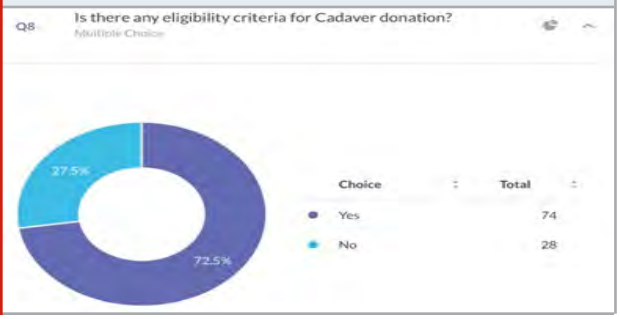


Figure 8: Pie chart representing the percentage distribution of knowledge on eligibility criteria in organ donation, where purple colour represents "Yes", blue colour represents "No". Majority of them were aware of eligibility criteria in organ donation.



72.5% felt there is an eligibility criteria for cadaver donation whereas 27.5% of the respondents denied the statement [Figure 8]. 68.3% of the respondents felt that embalming procedure is done through arteries, 19.2% of the respondents felt that embalming is done through vein, 12.5% of the remaining participants felt embalming is done through nerves [Figure 9]. 61.4% of them were aware of the procedures done in embalming whereas 38.6% of them were not aware of the procedures done in embalming [Figure 10]. 72.5% of the students thought graft rejection would be the major drawback in organ transplantation whereas 27.5% thought graft rejection would not be the major drawback in organ transplantation [Figure 11]. 61.5% of them felt organ donation has been made to save someone's life. 29.8% of them felt that organ donation is done to make money, 8.7% of the remaining population considered organ donation as out of compassion [Figure 12].

Figure 9: Pie chart representing the percentage distribution of awareness about embalming conduction technique, where purple colour represents "Artery", blue colour represents "Vein" and green colour represents "Nerve". of them were aware that the artery was used during the procedure of embalming.

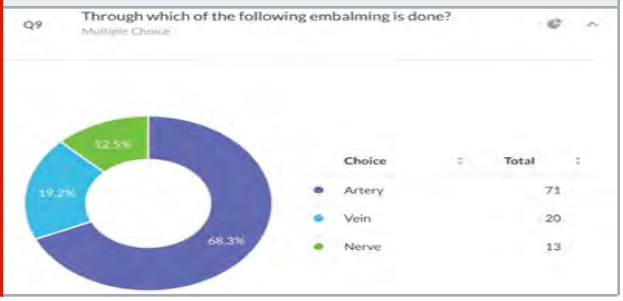


Figure 10: Pie chart representing the percentage distribution of awareness of procedures in embalming, where purple colour represents "Yes" and blue colour represents "No". Majority of them were aware of procedures in embalming.

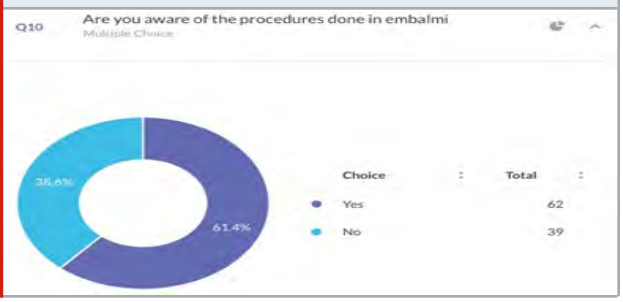


Figure 11: Pie chart representing the percentage distribution of awareness of graft rejection in organ transplantation where, purple colour represents "Yes" and blue colour represents "No". Majority of them were aware of graft rejection in organ transplantation.

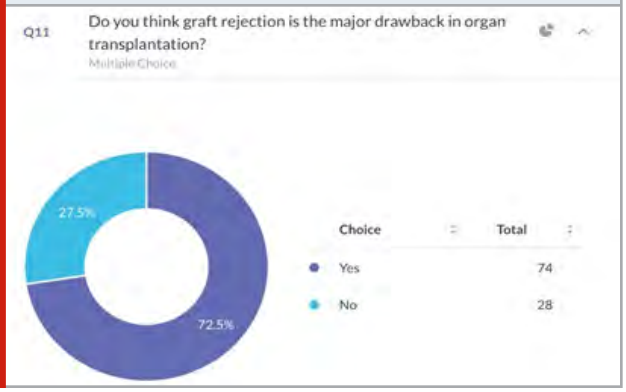


Figure 12: Pie chart representing the percentage distribution of awareness on reasons for organ donation, where purple colour represents "To save someone's life", blue colour represents "For Money", green colour represents "Out of compassion". Majority of them felt the reason for organ transplantation would be saving someone's life.

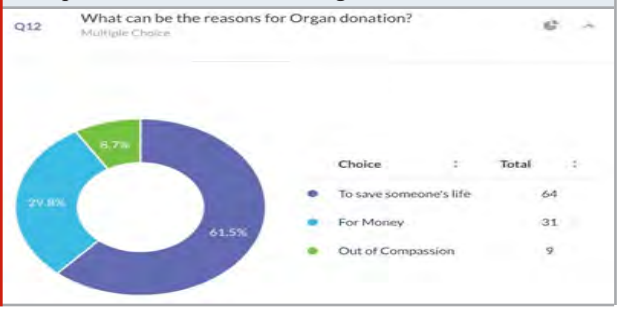
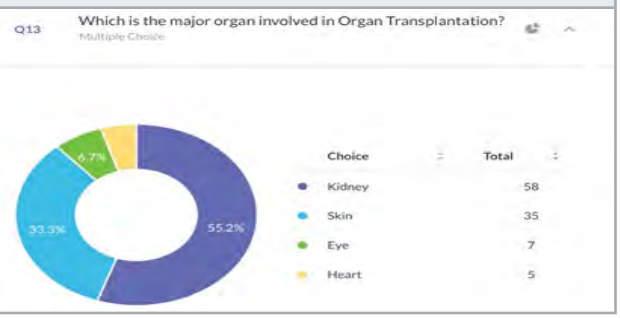


Figure 13: Pie chart representing the percentage distribution of awareness of major organs involved in organ transplantation where, purple colour represents "kidney", blue colour represents "skin", green colour represents "eye", yellow colour represents "heart". Majority of them were aware that the kidney would be the major organ that takes part in organ transplantation.



55.2% of the study population believed that kidney would be the major organ involved in organ transplantation, 33.3% of the respondents felt skin would be the major organ involved in organ transplantation, 6.7% of the remaining population felt that eye would be the major organ involved in organ transplantation [Figure 13]. From the above results we came to know that the dental and medical students have the awareness about organ transplantation and their importance. The study carried out by Priyadarshini B et al the incidence of awareness regarding eye donation was reported to be 50% and another study has reported much more than 72%.

The study which is carried out in Hubli city of Karnataka the incidence of awareness regarding eye donation was reported to be 96%. However the difference was the age of the respondents. While the average age of the respondents in the study carried out by Priyadarshini B was 55years(Priyadarshini et al., 2003), the similar study carried out by Nekar in Hubli was an awareness study among college students aged between 18-26years old by this study they came to know that the awareness level greater in a younger age(Nekar et al., 2012) .In the present study 59% those who were aware of eye donation were below the age of 30 years.

CONCLUSION

Most of the students these days were aware of organ and body donation and they show a responsible attitude towards these procedures. But, there exist a circle of students who were not aware of organ and body donation. Even the certain group of medical and dental students don't have basic knowledge about organ and body donation and they have a lethargic attitude of gaining some knowledge about the topic. It is therefore essential to give importance to organ and body donation and this could be successfully done by incorporating these topics in curriculum.

ACKNOWLEDGEMENTS

With Sincere gratitude, we acknowledge the staff members of the department of Anatomy and Saveetha dental college and study participants for their extended support towards the completion of research.

Conflict of interest: declared as none.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-279-282

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Research Communications

Determination of Stature from Hand Length and Hand Breadth-An Anthropometric Study

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ABSTRACT

Stature is a measure of natural height of a person. Stature determination is important in order to monitor the growth and health of a person. Measurement of height and weight is very important in examining the child's health. But when it comes to a person with disabilities or with any physical anomalies it becomes difficult to measure the exact stature of a person. Archaeologists who study the human past using remains find it is very difficult to determine the stature accurately. The aim of the study is to determine the stature from hand length and hand breadth. A group of 100 individuals were selected 50 males and 50 females who were healthy and without any deformities. Their height, left and right hand length (from wrist to tip of middle finger), left and right hand breadth (maximum breadth) were measured. The mean height, hand length and hand breadth were calculated and a regression equation was made and the correlation between hand length,and breadth with height was analysed. The regression equation was made based on the height, hand length and hand breadth. There was no significant difference between right hand dimension and left hand dimension. So the correlation was made for right hand dimensions and stature. Regression formula was used to determine the stature from hand length and breadth. The study concluded that hand dimensions can be used to determine the stature.

KEY WORDS: STATURE; HAND LENGTH; HAND BREADTH.

INTRODUCTION

Identification is the most important characteristic of a study. Identification plays an important role in knowing more about a particular object or a person. Identification of body parts can help the people of the forensic department in identifying the unknown bodies during accidents or natural calamities (Choudhary, Lakshman and Thenmozhi, 2019). Paramount importance to forensic experts and anthropologists is the estimation of stature (Subashri and Thenmozhi, 2016). Comparing other parameters, estimation of stature is an important parameter in medico legal examinations and anthropological studies (Vijeta and Kapoor, 2012). Determination of stature from dismembered body parts can play a vital role for identification of a person and it is considered as one of the main parameters of personal identification (Varu et al., 2015).

ARTICLE INFORMATION

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Received 28th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/151

Among the various parameters of identification, individual's stature is an inherent characteristic, the estimate of which is considered to be important in those cases where only fragmentary or mutilated remains of an unknown person are recovered (Dikshit et al., 2005). The relationship of dimensions between the segments of the body and the whole body has been the focus of anthropologists, scientists, and anatomists for many years (Ibrahim et al., 2018). Body proportions and the dimensions of various body segments, including the long bones of the limbs and the bones of the foot and hand have been used to estimate stature in previous articles which have been the pioneer for determining stature from various dimensions of our body (Pungle and Code, no date). Due to strong influence of genetic and environmental factors on the height of the individual, homogeneity of the study population is vital in formulating the regression equations (Geetha and Swathi, 2015).

Regression equation is an equation formed to estimate the relationship between height (dependent variable) and hand dimensions (independent variable). Regression equation was formed to determine the stature from hand dimensions. Stature determination also differs with age, sex and race. Each race requires its own formula for stature estimation as variations that exist in one population cannot be entirely applicable to other populations (Krishna, Nivesh Krishna and Yuvaraj Babu, 2016). Many previous morphometric studies (Keerthana and Thenmozhi, 2016), (Choudhari and Thenmozhi, 2016), (Kannan and Thenmozhi, 2016) and studies in determining stature from different dimensions were done that led us to conduct a study to determine stature from hand length and hand breadth both in males and females using a regression formula.

MATERIAL AND METHODS

A cross-sectional descriptive study was carried out randomly on 100 right-handed normal healthy adults between the age group of 17 to 20 years. The research population included 50 males and 50 females as a study population. Four measurements of different hand dimensions (right hand length, right hand breadth, left hand length and left hand breadth) were taken from each participant. Participants those with poorly defined wrist creases, physical acquired or congenital deformities, injuries, fractures, amputations or history of surgical intervention of the hands were excluded from the study. The stature of the people was measured first. They were asked to stand on the base of the standard stadiometer with their heels separated.The individuals were made to stand straight such that their whole body lies on the same axis.

The headpiece was kept over the individual's head and then the total height of a person in their standing position was measured. The length and breadth of the hand were measured using a centimetre scale.The hand length was measured from the proximal crease of the wrist to the tip of the middle finger when the hand was held straight and stretched. The hand breadth was measured from the most remote points on the heads of the 1st and 5th metacarpal bones. The regression equation was formed and correlation was made to determine the stature from hand dimensions.

Figure 1: Represents the correlation between height and hand length in males. X axis represents the hand length of males and Y axis represents the height of males. The regression equation was found to be y = -0.12616X + 170.97594 which is a negative correlation.

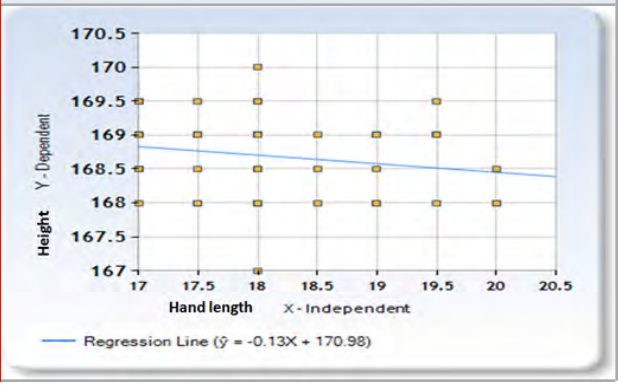
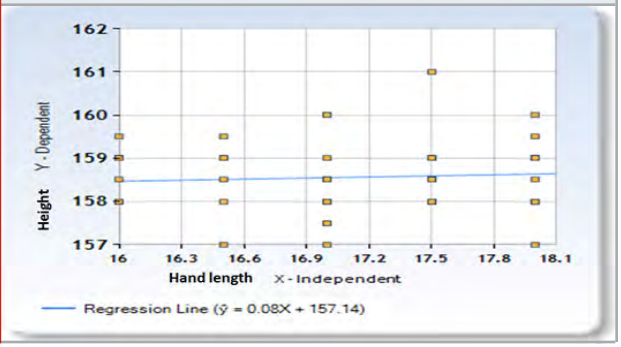


Figure 2: Represents the correlation between height and hand length in females. X axis represents the hand length of females and Y axis represents the height of females. The regression equation was found to be y = 0.08297X + 157.1396, which is a positive correlation.



RESULTS AND DISCUSSION

The stature of each of the participants is measured and the mean stature of males is 168.69cm and of females is 158.56cm. Both right and left hand dimensions of the participants were measured but there were no significant differences between right and left hand dimensions so only right hand dimensions were used to analyse the correlation between hand dimensions and stature. The mean hand length of males is 18.12cm and of females is 17.12cm. The mean hand breadth of males is 8.69cm and of females is 7.96cm. The correlation between hand length and breadth with stature was done using a regression equation. The regression equation of height on hand length for males is y= -0.12616X + 170.97594 (Figure 1) and for females is y = 0.08297X + 157.1396 (Figure 2). The regression equation of height

on hand breadth for males is x = 0.22118X + 166.76791 (Figure 3) and for females is x = 0.10985X + 157.68561 (Figure 4) to determine the stature from hand length and hand breadth.

Figure 3: Represents the correlation between height and hand breadth in males. X axis represents the hand length of males and Y axis represents the height of males. The regression equation was found to be y = 0.22118X + 166.76791, which is a positive correlation.

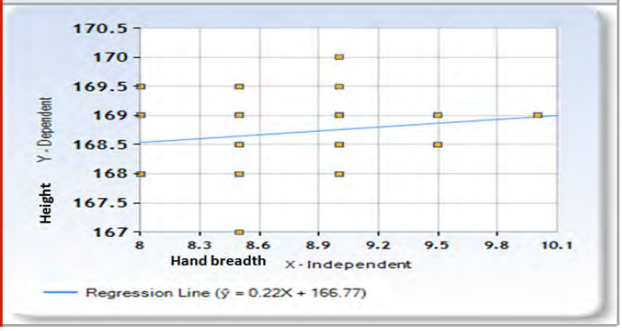
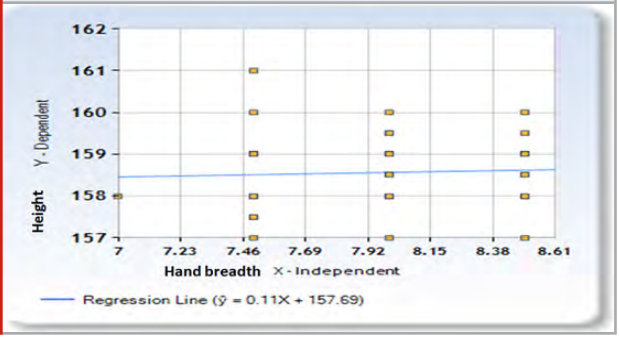


Figure 4: Represents the correlation between height and hand breadth in females. X axis represents the hand length of females and Y axis represents the height of females. The regression equation was found to be y = 0.10985X + 157.68561, which is a positive correlation.



In the present study a regression equation was formed to determine the stature. Previous studies were done to determine stature from hand dimensions in specific populations like the Bengalee population where they concluded that hand dimensions can be used to determine stature . This study portrays the determination in a specific population(Pal et al., 2016). In the study done by Prithviraj Karak et al a regression formula was formed to determine stature from tibial length and a good correlation was found which was highly statistically significant(Anirban, Arindam and Prithviraj, 2013). Previous studies were also done to determine the stature from foot length which also showed a good correlation and was statistically significant(Jakhar, Pal and Paliwal, 2010). In previous studies done in kashmiri population a positive correlation was found between hand length and stature(Khan et al., 2017) but in present study a negative correlation was found between stature and hand length in males which was not significant.

Previous studies were also done on determining the stature from long bones and showed a positive correlation which is very helpful in medico legal investigation (Arora and Khan, 2018). The present study does not involve any bones instead stature was only determined by the morphological dimensions. Previous studies which calculated stature from hand dimensions showed hand length more correlated to the stature (Patel, Parekh and Patel, 2014) but in the present study hand length in males showed a negative correlation while hand breadth had positive correlation with stature in both males and females.

The main limitation of the study is that it is done only with 100 individuals . the study population is less and it included only students of a certain age group. In future extensive study on determining the stature from hand dimensions can be done for various age groups and can be analysed more accurately. More extensive studies with varied populations will help in the field of research and forensic in identification.

CONCLUSION

Various studies have been done to determine stature from various dimensions. The present study concludes that hand dimensions can be used to determine the stature with accuracy and it can be used in various fields for identification. This study shows a regression formula to determine the stature from hand length and hand breadth in both males and females but hand breadth showed more correlation to stature than hand length. This may vary according to the type of population included in the study. Further extensive studies with different populations may establish an accurate formula to determine stature from hand length and breadth.

ACKNOWLEDGEMENTS

The author would like to thank the study participants for their participation and kind cooperation throughout the study

Conflict of Interest: The author declared that there was no conflict of interest in the present study .

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No 8 2020 Pp-283-287

BBRC
Bioscience Biotechnology
Research Communications

Morphometric Analysis of Radial Head and its Clinical Implications

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ABSTRACT

Radius is the bone of the forearm that is present on the lateral side.The head of the radius is a fundamental element for physiology and prosthetic stability of the elbow. Fracture of radial head constitutes about ⅓rd of all elbow fractures. Now this is becoming more common because of pre existing comorbidities like osteoporosis. The aim of the study is to morphometrically analyse radial heads along with its clinical importance. For the study about 32 dry radius bone of unknown sex [right 16 and left 16] were collected from department of anatomy, saveetha dental college. Bones damaged or deformed are discarded from the purpose of the study. Anteroposterior diameter, transverse diameter, medial height and lateral height of radial head were measured using vernier callipers. The mean and standard deviation of these parameters were noted. The mean value of anteroposterior diameter of radial head for right is about 1.89mm[SD=0.169] and for left is 1.91mm[SD=0.177]. The mean value of the transverse diameter of the radial head for the right side is 1.86mm[SD=0.161] and the left side is 1.87mm[SD=0.187]. The mean value of medial height of radial head for right is 0.92mm[SD=0.090] and left is 0.82mm[SD=0.187]. The mean value of lateral height of radial head for right is 0.84mm[SD=0.293] and left is 0.73mm[SD=0.113]. Education of size and shape of radial head is essential in prosthesis and surgeries. This study concludes that both the right and left side of the radial head in all the parameters shows almost similar mean and standard deviation values. But this slight variation makes huge differences in anatomical orientations . Our study results are critical in making the radials anatomically and biomechanically suitable prosthesis.

KEY WORDS: FRACTURES, PROSTHESIS, ANTEROPOSTERIOR DIAMETER, TRANSVERSE DIAMETER, MEDIAL AND LATERAL HEIGHT.

ARTICLE INFORMATION

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Received 4th Aug 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/152

INTRODUCTION

Morphometry refers to a quantitative analysis of any structure,which includes both shape and size (Parés-Casanova, 2017). It is basically measuring external shape and structure.Radius is the bone of the forearm, consisting of proximal end, distal end, shaft and tuberosity (SingH and SingH, 2019). Radial bone is important because it forms elbow and wrist joints.The radial head is disk shaped, concavity forming articulations and it is medially thicker present above radial tuberosity.The proximal end is approximately cylindrical shaped and articulates with elbow and radioulnar joints. The distal end is about quadrilateral shaped and consists of the articular surface for ulna, scaphoid and lunate bones.

About 2-6% of the fracture occurs mostly in proximal ,distal end and neck of radius (Rayna et al., 2018). Radial head fractures represents the most common elbow fracture.They occur when axial load is applied on forearm, making radial head hit the humeral capitellum .Fractures that occurs more commonly Essex Lopresti fracture, Radial shaft fracture, Distal shaft fracture, Galeazzi fracture, Colles fracture,Barton's fracture (Al-Imam, 2016). The radius is ossified at three centres (shaft,two ends of the radius),which starts at the 8th week of intrauterine life.

Radial shortening,increased radial inclination ,dorsal angulations may cause major modification in elbow and wrist joints (Koslowsky et al., 2007). For animals with four legs the radius is the lower forelimb 's largest load-bearing bone. The function is similar in most terrestrial tetrapods but in some mammals (such as horses) it may be fused with the ulna and decreased or modified in animals with flippers or vestigial forelimbs (Romer and Parsons, 1977). Not only human pelvic bone is used for sex determination but also human radius shows some significance in sex discrimination (Mathivadani, Babu and Mohanraj, 2018). Previously our team had conducted numerous original studies (Pratha and Thenmozhi, 2016)-(Krishna and Babu, 2016) experimental studies (Seppan et al., 2018) and questionnaire based studies (Sriram, Yuvaraj and Others, 2015) over the past 5 years. Now the present study centred towards measuring the morphometric parameters and morphology of radial head and its clinical implications as it is necessary.

MATERIAL AND METHODS

The materials for this study contains 32 dry human radius of unknown sex collected from the department of anatomy, saveetha dental college.

LIMITATIONS:

- Incomplete ossified bone
- broken bone
- fractured bone / bone with any abnormalities.

Total of 32 bones in which 16 and left 16 were used and the following parameters were measured using manual vernier calliper.The parameters are anteroposterior diameter of radial head,transverse diameter,medial length and lateral length of radial head.

Anteroposterior Diameter: Distance between the anterior most point to the posterior point in the radial head.

Transverse Diameter: Distance between the medial border to the lateral in the radial head.

Medial Height: It is distance between radial lip ,neck and junction of medial surface.

Lateral Height: Distance between radial lip, neck and junction of lateral surface.

Figure 1: Represents the anteroposterior diameter of the radial head.

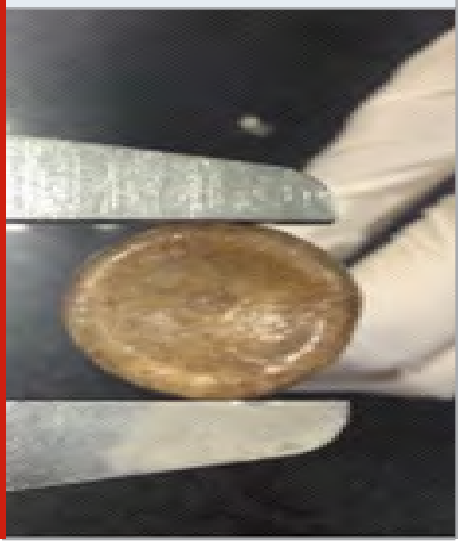
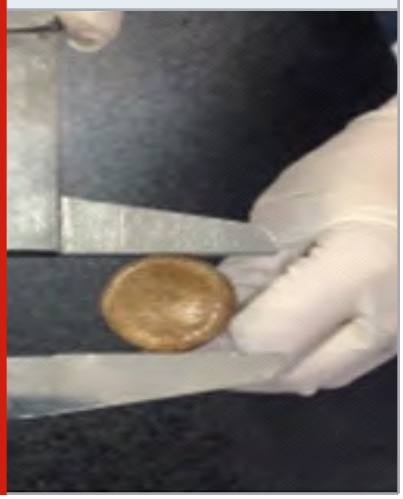


Figure 2: Represents the transverse diameter of the radial head.



RESULTS AND DISCUSSION

Radius is a bone present in the lateral side of the forearm. Radial head forms two joint surfaces namely radioulnar and radiocapitellar joints. operative procedures of

deformed radial head fractures fixed with plates and screws,when radial head is completely unreconstructable (Mishra et al., 2016) .Knowledge of size and shape of radial head is very necessary for radial head prosthetic procedures.

Figure 3: Represents the lateral height of the radial head.

Figure 4: Represents the medial height of the radial head.

Archana Singh et al , found that mean and standard deviation of Anteroposterior diameter of radial diameter of right is about 20.442.45 and for left is about 20.59 2.16 ,which shows slight variations only. Chandni Gupta et al, found that Transverse diameter of the radial head for right is about 1.890.21 and for left 1.82 0.21, which also shows very slight variations between right and left values (Gupta et al., 2015). A Brite sangaya rayna et al , found that the mean values of medial height for both right and left is about 0.6 and the mean for lateral height for right is about 0.32 and for left is 0.30 .medial surface of head is more thicker than lateral surface. Suraj ethiraj et al., found that the mean values of medial height and lateral height is about 0.91cm and 0.73 cm (Ethiraj, Jyothi and Shetty, 2019).

Figure 5: Bar graph represents the mean value of anteroposterior diameter of radial head. X axis represents the side of the radius bone and Y axis represents the mean value of anteroposterior diameter of radial head in mm. Red(Right) and Blue(Left). The mean value of anteroposterior diameter of the radial head of the left bone is more than the right bone.

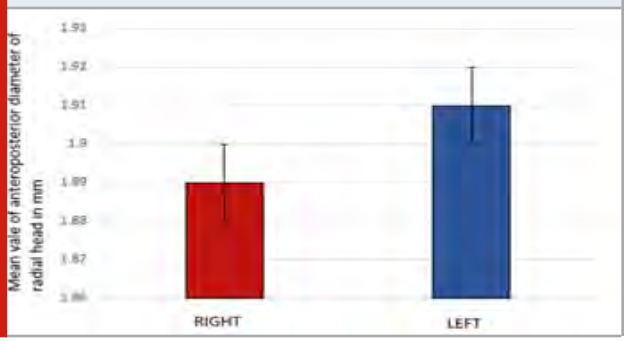
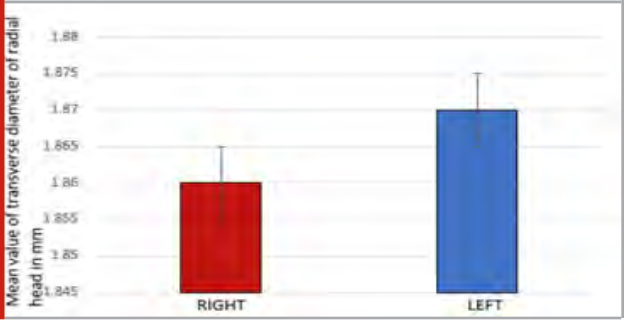


Figure 6: Bar graph represents the mean value of transverse diameter of radial head.X axis represents the side of the radius bone and Y axis represents the mean value of transverse diameter of radial head in mm. Red(Right) and Blue(Left). The mean value of transverse diameter of the radial head of the left bone is more than the right bone.



Soorya sridhar et al., found that mean and standard deviations values for anteroposterior diameter is about 19.27mm, 1.79 for right and 18.74mm, 2.71for left side (Sridhar et al., 2015). Muna Kadel et al., found that the mean values of lateral and medial height is 0.76cm and 0.91 cm respectively and also mean values for anteroposterior diameter and transverse diameter is about 2.09cm and 2.02cm (Kadel and Thapa, 2020). In our study, the results were based on readings obtained from original bone. But in some studies morphometric studies were done by using computer tomography images with two and three dimensional resonance (Mahaisavariya et al., 2004).

Figure 7: Bar graph represents the mean value of medial height of radial head.X axis represents the side of the radius bone and Y axis represents the mean value of medial height of radial head in mm. Red(Right) and Blue(Left). The mean value of the medial height diameter of the radial head of the left bone is more than the right bone.

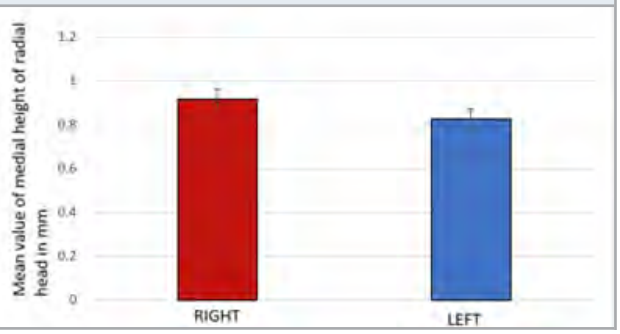
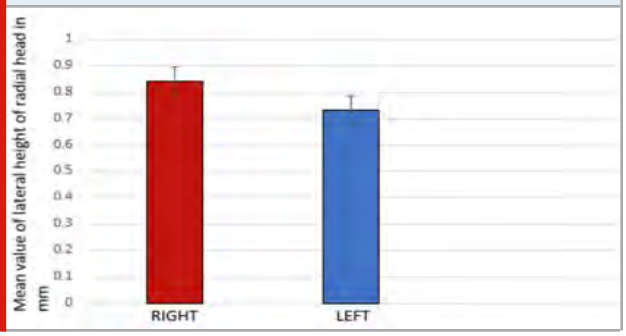


Figure 8: Bar graph represents the mean value of lateral height of radial head.X axis represents the side of the radius bone and Y axis represents the mean value of lateral height of radial head in mm. Red (Right) and Blue(Left). The mean value of the lateral height diameter of the radial head of the left bone is more than the right bone.



CONCLUSION

In our study, we analysed the morphometric parameters of head of radius. From the results, it was evident that there is no much difference between right and left dimension among all the selected parameters. More sample size may help to find out precise findings. Knowledge about slight variations in these parameters is also very important. Because the radial head involves articulation with the humerus and ulnar bone to form the elbow joint.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the help and support rendered by the Department of Anatomy and the Management of Saveetha Dental College and Hospitals for their constant assistance with the research.

Conflict of Interest: None declared.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-288-293

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Assessment of Biohostability of Clear Plastic and Metal Wire Retainers Used In Orthodontic Patients- An in Vitro Study

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ABSTRACT

To assess the biohostability of clear plastic and metal wire retainers used in orthodontic treatment which is done in vitro method. In this study, 2 groups of retainers were tested. Group 1 is Clear plastic retainers and group 2 is metal retainers. In each group 5 retainers, pieces were taken and the test is done along with controls. Metal wire retainers and clear plastic retainers are sterilized in an autoclave. In a conical flask 50ml of artificial saliva is taken and 1g of glucose was added and it is sterilized. To this 100 µl of S.mutans suspension was added. The sterilized artificial saliva with S. mutants was added to 2 test tubes. The retainers are taken in separate test tubes in which it contains 5 clear plastic retainers with 1ml of artificial saliva in each and another test tube contains 5 metal wire retainers with 1ml of artificial saliva and it is incubated for 24 hours. After 24 hours the retainers were rinsed with sterile normal saline and each retainer is placed separately in a sterilized cuvette containing 0.5ml of sterile saline. The cuvette is agitated turncoat the bacteria attached to it. Then a standard quantity was pipetted out onto a solid culture media and incubated at 37°C. After the incubation, the plates were checked for their growth. Then the total colony-forming units were enumerated and the values were tabulated. It was observed that biohostability of clear plastic is comparatively less and the mean value graph obtained based on the bacterial growth is comparatively less in clear plastic whereas in metal wire retainers it's five times more than that of clear plastic. This was in the ratio of 1:5 ratio. Clear plastic has only the mean value of range 123.8 whereas the metal wire retainer has the mean value of range 669 which is five times more than that of clear plastic retainer. In this study, we can conclude that clear plastic retainer is comparatively less prone to bacterial colonization, whereas the metal wire retainer was more prone to bacteria colonization and the biohostability is high. As found in this study, the usage of clear plastic will help in maintaining better oral hygiene and for better aesthetics.

KEY WORDS: MALOCCLUSION , PLASTIC RETAINER, METAL WIRE RETAINER, BACTERIA.

ARTICLE INFORMATION

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Received 7th Aug 2020 Accepted after revision 23rd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/153

INTRODUCTION

Malocclusion is a condition in which there is a deflection from the normal relation to the teeth to other teeth in the same arch or to the teeth in the opposing arch. Although malocclusion is itself neither a disease nor a life-threatening condition, there has been long marked demand for orthodontic treatment of malocclusion, placing a considerable role in dentistry(Bayat et al., 2016). The main indication for orthodontic treatment is of aesthetic value and general dental health. The main aim of orthodontic treatment is to eliminate functional problems(Harrison, 2011). Morphological stability is one of the important goals after orthodontic treatment from the patient's point of view. Relapse tendency for the teeth to return towards their pretreatment positions is more common without application of retainers(Yousif, 2014). Retention procedures are considered necessary to maintain the corrected positions of teeth(Valiathan and Hughes, 2010).

The main factors related to orthodontic retention failures are hereditary influences, disrespect to biological limits of dental movement and the use of removable and fixed retainers(Gunay and Oz, 2018). There are different types of retainers, fixed retainers and removable retainers. Fixed retainers are thin metal wire of less diameter run along the lingual or palatal surface of the teeth, which is bonded to teeth in certain places by cement and the removable retainer is a combo of metal wire and acrylic material that is inserted in and around the tooth it is instructed only if no movement is detected(Baka and Akın, 2017).

Permanent damage to tooth enamel can occur if the teeth and retainer are not kept clean. Areas on the enamel surface may begin to lose minerals leaving the unsightly white spots, leading to other problems like gingivitis development and leading to other severe problems. A large ratio of the disease can be prevented by practising proper oral hygiene techniques by providing oral health-related education thus improving oral attitude. For example, proper brushing is essential for cleaning teeth and gums effectively(Nene, 2014). Insufficient cleaning will lead to microbe's growth in retainers. The mostly found microbes are candida and staphylococcus that may include MRSA strains. Once the biofilms are formed in the retainer it's quite difficult to remove that biofilm which shows resistance to antimicrobials and difficult to clear(Chugh et al., 2019). The survival rate of retainers was reported over 12 to 24 months. In terms of retainer material, one study found metal wire fixed retainer and esthetic retainers made up of plastic have no difference in survival rate (Patel, Naini and Gill, 2013). The previous study has found that the thickness of wire is directly related to the thermoplastic fixed retainers and the number of teeth bonded(Littlewood et al., 2016).

Staphylococcus aureus is most commonly found on the retainers and tends to cause bloodstream infections which can lead to serious other infections(Ashwin and Muralidharan, 2015). So, it's important to maintain good oral hygiene. Acinetobacter baumanni, a critical pathogen least commonly found in oral cavities, tend to cause opportunistic infections. Although reports on A. baumannii as a dental pathogen is minimal, the propensity of the pathogen to evolve with a drug-resistant armour underscores the need for more research on this pathogen and its role in oral infections(Girija et al., 2019). A study suggested that herbal mouthwash plays an important role in maintaining good oral prophylaxis which leads to the extended survival rate of retainers(Selvakumar and Np, 2017). Patients undergoing orthodontic procedure have a common bacterial presence of spirochetes because they can easily undergo rapid multiplication and cause severe bacterial infection((Website, no date).

Enterococcus faecalis, the predominant human enterococcus is the main cause for varies oral infections such as caries, peri-implantitis, endodontic failure, periodontitis and leads to severe other infections and by good maintenance of oral hygiene the colonisation of bacteria can be reduced (Marickar, Geetha and Neelakantan, 2014). Orange peel oil has a good antibacterial activity against the streptococcus mutans which is the major reason for causing caries and other infections(Vaishali and Geetha, 2018). Laurus nobilis L. essential oils are able to inhibit oral S. aureus strains with important antibiofilm efficacy(M, Geetha and Thangavelu, 2019). It could have a promising role in the prevention of oral diseases.A.baumannii may be present in oral biofilms, which may act as a reservoir for pneumonia and chronic obstructive pulmonary disease. Subgingival colonization by A. baumannii increases the risk of refractory periodontitis(Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018).

Acinetobacter was considered an opportunistic agent of low pathogenicity and number of virulence factors have been described that make it possible to survive in the hospital setting and the ability to cause disease, particularly in debilitated patients(Girija, Jayaseelan and Arumugam, 2018).m6Ais useful in preventing various oral infections and maintains the normal flora of oral cavity(Paramasivam, Vijayashree Priyadharsini and Raghunandhakumar, 2020).A.baumannii a nosocomial pathogen enter into oral cavity in association with other oral pathogens it tends to cause aggressive periodontitis(Priyadharsini et al., 2018).A study suggested that Silicon analysis of genotype G1-G4 can be used as candidates for developing novel therapeutic drugs against oral pathogens(Smiline, Vijayashree and Paramasivam, 2018). An article suggested that Acacia nilotica has a good antibacterial effect and can be used for maintaining good oral hygiene(Shahzan et al., 2019).

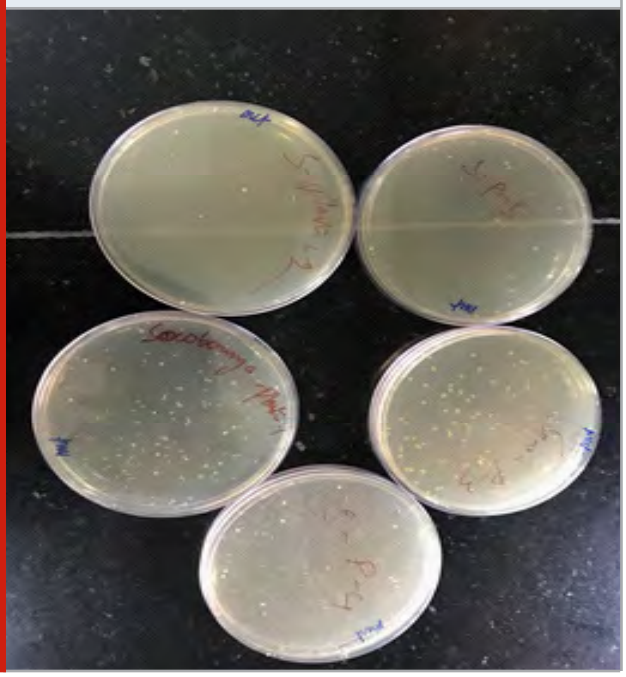
MATERIAL AND METHODS

In this study 2 groups of retainers were tested. Group 1 is Clear plastic retainers and the group 2 is metal retainers. The retainers were cut into small pieces of uniform length of 1 cm In each group 5 retainers pieces were taken and the test was done along with controls. Clear plastic and metal wire retainers are packed in such a way that it

withstands high temperature to undergo the autoclave process. Metal wire retainers and clear plastic retainers are sterilized in autoclave. In the autoclave process the metal wire and clear plastic retainers are subjected to 15 lbs pressure for 30 minutes.

In a conical flask 50ml of artificial saliva is taken and 1g of glucose was added and it is sterilized by autoclaving. To this 100 µl of S.mutans suspension was added. I ml of the sterilized artificial saliva with S. mutans was added to 2 test tubes. The retainers are taken in separate test tubes in which it contains 5 clear plastic retainers with 1ml of artificial saliva. After placing the retainers the tubes were incubated at 37°C for 24 hours. After 24 hours the retainers were rinsed with sterile normal saline and each retainer is placed separately in a sterilized cuvette containing 0.5ml of sterile saline. Cuvette is agitated to uncoat the bacteria attached to it. Then a standard quantity of 10µl was pipetted out onto a solid culture media and incubated at 37°C.The solid culture medium chosen for the study is Nutrient agar (Himedia). Nutrient agar is a general purpose nutrient medium used for the cultivation of microbes supporting growth of many non-fastidious organisms. Nutrient agar can grow the variety of bacteria and contains many nutrients needed for the bacterial growth. After the incubation the plates were checked for their growth. Then the total colony forming units were enumerated and the values were tabulated.

Figure 1: Plastic wire retainer



RESULTS AND DISCUSSION

After 24 hours of incubation the bacteria formed in the Nutrient agar was counted and the mean value was obtained which was counted manually. After 24 hours the mean value of bacteria present in the clear plastic is 144 CFU, whereas in the metal the mean CFU value was 669 which was comparatively high, though same temperature and same ph is provided for both clear plastic and metal retainers, metal wire is more prone to bacteria attachment and the more bacteria is formed in metal retainers. Biohostibility ratio was 1: 5 in Clear plastic and metal wire retainers. The control group were kept there will be no bacterial growth because Streptococcus mutans were not inoculated. The control group was used for the reference to differentiate after each process and the changes in the samples taken for the easy comparison.

Figure 2: Metal wire retainer

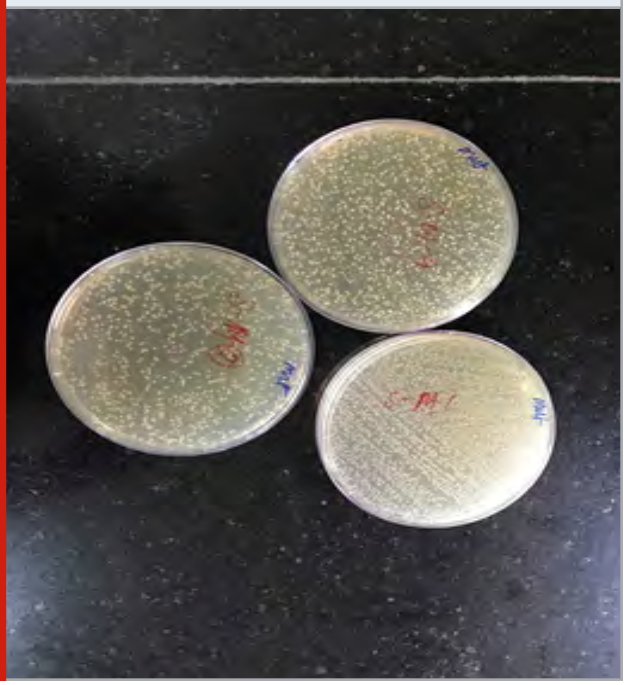


Table 1. The table depicts the mean value of the colony forming bacteria.

	Plastic retainer	Metal wire retainer
No.Of.Colony forming Bacteria present	619	3348
Mean Value	123.8	669

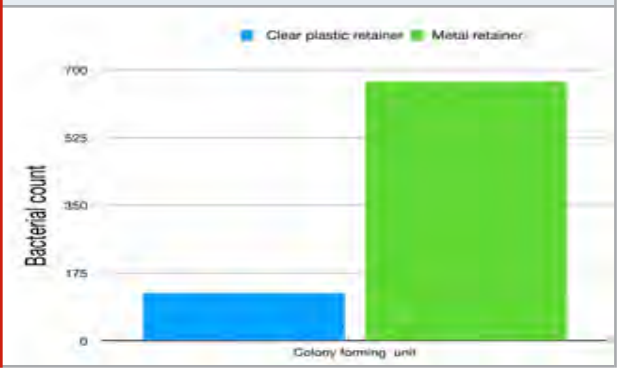
Plate shows the colony forming bacteria in the plastic and metal wire retainer after 24hrs of incubation (fig1&2).

From the above mentioned table, the mean value of the plastic retainer was 123.8 whereas metal retainer was 669 which was nearly five times of the plastic retainer value.

From the above mentioned graph we can see that there is wide variation in the mean value of the bacterial attachment and colonization. Clear plastic has a mean value of 123.8 whereas the metal wire retainer has the mean value of 669 which is five times more than that

of clear plastic retainer. The wide variation in the graph is due to that metal wire retainers attach to the bacteria easily and if not properly cleaned, counter tops the appliance can lead to colony forming of bacteria and leads to many bacterial diseases. But incase of clear plastic retainer bacteria is not as much as attached to the plastic surface so the adherence of the bacteria is less and the number of bacteria growing in the clear plastic retainer is comparatively less than the metal retainer.

Figure 3: The graph depicts the mean value graph of the colony forming unit of the bacteria in clear plastic and metal wire retainers



From the previous study, it was said that clear plastic retainer's survival rate was reported less than the metal wire(Wiegand and Kanzow, 2020).Moreover metal wire retainers have more growth of S.mutans because it is normally present in oral cavities and this facultative anaerobes grow more in the metal retainers than in the clear plastic.Clearly, the biohostability of metal wire retainers is comparatively more due to the environment and the pH variation in the oral cavity(Scribante et al., 2011). So, to reduce the bacteria growth in the metal retainer's usage of antibacterial toothpaste which will reduce the viability and the adhering of. Bacteria in the tooth surface (Thickett and Power, 2010).Mostly commonly toothpaste containing sodium lauryl sulphate and stannous fluoride or triclosan will increase the ph of oral biofilms and decrease the viability of bacteria(Wessel et al., 2014).oil containing mouth rinses remove the bacteria from the oral cavity through bacterial adhesion to the hydrophobic oil(Bedran et al., 2014).

Though the clear plastic retainer has more advantages associated, one of the main criteria is it has a very good aesthetic compared to metal wire retainer. Though the Biohostibility plays a vital role in harboring the bacteria on their surface, maintaining a good oral hygiene is pivotal in extracting maximum benefit in using a prosthetic material. Most of the better results are associated with periodontal health of the patients and how the patients maintain the oral health(Nalçacı et al., 2014). The main failure associated with metal wire retainer is not only the bacterial growth other reasons include such as poor aesthetics and the duration of follow up. Though clear plastic also needs to be followed up, its comparatively less follow up required than the metal wire retainer(Levrini et al., 2015).

Though clear plastic has many advantages associated the major drawback is survival rate it is approximately 12 -24 months which is comparatively less than the metal wire retainer(Salehi, Najafı and Roeinpeikar, 2013).The use of clear plastic is much more convenient than the metal wire retainer because metal wire requires more oral hygiene or else poor hygiene will lead to mass growth of bacteria. Comparatively bonded retainers will have more better results than the removable retainers in both clear plastic and metal wire retainers(Dietrich et al., 2015). But the major disadvantage associated with the bonded retainer is depends on the periodontal health patients so for the people with weak periodontal ligament it directly affect the outcome of treatment, so it's very important to consider the periodontal health of the Patients.

CONCLUSION

According to this study it can be concluded that clear plastic retainer is comparatively less prone to bacteria attachment, whereas the metal wire retainer was more prone to bacteria attachment and the Biohostibility is high. So, maintaining a good oral hygiene and usage of oil mouth rinses and toothpaste containing sodium lauryl sulphate will decrease the viability and the adherence of the bacteria. So the usage of clear plastic will help in getting better results and for the better aesthetics and the main criteria associated is the usage of clear plastic retainer will help preventing the deterioration of oral health.

Conflict of Interest: Nil

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-294-300

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Knowledge, Attitude and Practice on Mouth Mirrors Used for Endodontic Procedures Among Dental Students-A Questionnaire Survey

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ABSTRACT

Oral hygiene and health is vital and important for an individual for better quality of life.There are various methods to treat dental caries however proper diagnosis is required for any disease on treatment. Mouth mirror being a vital tool for proper diagnosis, the proper knowledge, awareness and the usage of it is essentially required. This study aims to assess the knowledge, attitude and practice on mouth mirrors used for endodontic procedures among dental students. A questionnaire based study was conducted online using a survey planet link. 100 participants took part in the survey who were undergraduate or postgraduate dental students. A total of 30 questions were asked and the questions were based on their knowledge, attitude and practice of mouth mirrors used in endodontic procedures. Based on the responses from the participants, results were analysed and tabulated systematically. Data was analysed by descriptive statistics and chi-square tests using SPSS. 51% of participants stated that they were aware of the parts of a dental mirror. 61% of the participants stated that it was difficult to do endodontic procedures using mouth mirrors. 60% of the participants were aware that the front surface is the best mirror for avoiding double images. 53% of the participants found it difficult to clear fog and debris from mouth mirrors during endodontic treatment.76% of the participants found the survey to be useful.This study produced satisfactory results yet more awareness on the proper selection and usage of the dental mirror is required

KEY WORDS: ARMAMENTARIUM, ENDODONTICS, FIELD OF VIEW, INDIRECT VISION, MOUTH MIRRORS.

INTRODUCTION

Oral hygiene and health is vital and important for an individual for better quality of life. Disease and health problems are rapidly increasing in India mainly in the oral and dental health. Tooth decay also known as dental caries is a multifactorial disease which is most common in Indian population.(Selwitz, Ismail and Pitts, 2007; Anwar, 2018) Each and every person is susceptible to tooth decay or dental caries throughout their lifetime.(Ozdemir, 2014) Maintaining oral health is mainly done by the individual and partly by the dentist but both play a vital role in maintaining better hygiene. Frequent visit to a dentist is one of the main responsibilities of an individual and proper diagnosis and treatment are the fundamental goals of a dentist. There are various methods to treat dental caries however proper diagnosis is required for any disease on treatment.

ARTICLE INFORMATION

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Received 28th July 2020 Accepted after revision 25th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/154

Proper armamentarium plays a major role in diagnosis, one such armamentarium is the mouth mirror otherwise known as dental mirror which is the most basic and vital armamentarium for proper diagnosis. It is a handy tool, small in size, consisting of a metal bar as a handle and a metal plate for holding the mirror.(Rubinstein, 1997) The use and the functions of a mouth mirror is versatile. It is used for illumination, indirect vision, retractions of soft tissues such as the tongue, lips, buccal mucosa of the cheek, used for checking mobility, percussion of teeth and functions as such.(Rieuwpassa et al., 2016) The mouth mirrors are also available in various sizes and types according to the usage and function. Mouth mirror being a vital tool for proper diagnosis, the proper knowledge, awareness and the usage of it is essentially required.

We have numerous highly cited publications on well designed clinical trials and lab studies (Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019; Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019). This has provided the right platforms for us to pursue the current study. This study aims to assess the knowledge, attitude and practise on mouth mirrors used for endodontic procedures among dental practitioners.

MATERIAL AND METHODS

A questionnaire based study was conducted online using a survey planet link. The study was approved by the institutional review board. 100 participants who gave consent to furnish the questionnaire took part in the survey. The participants who undertook the survey were undergraduate and postgraduate dental students. A total of 30 questions were asked and the questions were based on their knowledge, attitude and practice of mouth mirrors used in endodontic procedures. Based on the responses from the participants, results were analysed and tabulated systematically. Descriptive statistics and Chi square tests were used to analyse the data.

Table 1. Distribution of the answers given by the participants to the questions based on the knowledge of mouth mirrors used in endodontic procedures.

QUESTIONS	ANSWER DISTRIBUTION
1.Are you aware of the parts of a dental mirror?	
A.Yes	49%
B. No	51%
2.Are you aware that there are various types of dental mirror based on the surface of the mirror used ?	
A.Yes	61%
B. No	39%
3.Are you aware that the dental mirrors are classified based on the various types of function and usage ?	
A. Yes	63%
B. No	37%
4.Are you aware that the dental mirrors are classified based on the various sizes available?	
A. Yes	64%
B. No	36%
5.Are you aware that the self cleansing mirror\mirror with suction is the best mirror for preventing fog and debris during restorative procedure?	
A. Yes	76%
B. No	24%
6.Are you aware that mirrors with magnification help in better identification of access openings during endodontic treatment ?	
A. Yes	79%
B. No	21%

RESULTS AND DISCUSSION

From the results obtained from the questionnaire based survey on the knowledge attitude and practice on mouth mirrors used for endodontic procedures it is found that 40% of the participants were of the 3rd year of study, where they were just introduced to the clinical environment followed by 22% final year students

followed by interns 14%. [Figure:1] It is important to realise that introducing a dental mirror at the early stage of the preclinical studies is very essential in coping with the efficiency and usage of the tool for proper situations. (Kunovich, Rosenblum and Beck, 1987) It was found that mouth mirrors were used 3+times a day by 47% followed by 28 % who used 1-3 times per day. It is evident that the dental mirror is one of the most used tools in dentistry which is very significant in diagnosis. (Díaz et al., 2001) [Table:3]

Table 2. Distribution of the answers given by the participants to the questions based on the attitude of mouth mirrors used in endodontic procedures.

QUESTIONS	ANSWER DISTRIBUTION
1.Do you believe different dental procedures require a different type of mouth mirror ?	
A.Yes	58%
B.No	42%
2.For what do you think the mouth mirrors are mostly used ?	
A. Illumination	34%
B. Accessibility	25%
C. Retraction	20%
D. All of the above	21%
3.Do you think the quality /type of mouth mirror affects the proper diagnosis?	
A.Yes	49%
B. No	51%
4.Do you find it difficult to clear fog /debris from the mouth mirror during endodontic treatment?	
A. Yes	53%
B. No	47%
5.How much do you think Illumination matters in a successful dental treatment?	
A. Must Needed	56%
B. Moderately Required	29%
C. Not Needed	15%
6.Did you find the survey to be useful?	
A. Yes	76%
B. No	24%

Interestingly 51 % of them answered that they were not aware about the parts of a dental mirror. The parts of the dental mirror are as follows:The head, The Handle. It is to be noted that though a majority used dental instruments, the basic and simple knowledge about its parts were not aware by almost half of the respondents. (Dimashkieh, 2002)[Table:1] There are various purposes of dental mirrors such as illumination, indirect vision, retraction. When asked about the most used function 34% reported illumination. Illumination is one of the most required characteristics in endodontics followed by 25% using it to gain access. 20 % use it for retraction and the remaining 21% of them used it for all of the above functions.(Chalmers et al., 2005)[Table:2] The various types of surfaces which are used in the manufacturing of a dental mirror for various functions are concave surface, front surface, back surface and double sided mirror.(Rubinstein, 2005) 61% were aware that there were various types of mouth mirrors based on the surface of the mirror . [Table:1]

28% of the study population accepted that they prefer backs surface mirror for endodontic procedures however front surface mirror is the most acceptable as it avoids double images which were found to be preferred by only 18% of the participants.[Table :3] This indicates the lack of knowledge and improper practice of a mirror during a dental procedure.(Kim and Baek, 2004) The various types of dental mirrors concave surface, front surface, back surface and double sided mirror, rhodium coated mirrors, disposable mirrors, mirrors with LED, self cleansing mirror. 63% were aware that dentals mirrors are classified based on the various types and functions.[Table:1] This illustrates the proper knowledge of the various types of mirrors available among the respondents. Based on the types of mirror which the participants were well aware of are as of the order, it goes by rhodium coated 25.1%, plastic disposable mirrors 19.3 % self cleansing mirror reference) 18.9%, led mirror 13.2%, double sided mirror 6.6%.(Surathu and Nasim, 2015).

Mostly the mirrors had a fixed handle length where the size of the head alone changed subjectively. The available

sizes are 01, 02, 03, 04, 05,the most common are size 04, 05. 64% of the participants were aware that dental mirrors were as of various sizes.[Table:1] When asked about the preference of mirrors size 45% reported they didn't prefer any specific size and 28%responded that they do prefer followed by 27 % who might prefer at times.(Knight and Guenzel, 1994)[Table:3].

Table 3. Distribution of the answers given by the participants to the questions based on the practice of mouth mirrors used in endodontic procedures.

QUESTIONS	ANSWER DISTRIBUTION
1.How often do you use a mouth mirror ?	
A. 1-3 Times a day	47%
B. 3+Times a day	28%
C. Nil	25%
2.Which type of mirror do you prefer for endodontic procedures?	
A. Front surface mirror	18%
B. Back surface mirror	28%
C. Concave surface mirror	32%
D. Plane surface mirror	22%
3.Do you have any preference in the size of a dental mirror ?	
A. Yes	28%
B. No	45%
C. Yes, occasionally	27%
4.Do you use a mouth mirror for indirect vision while handling maxillary teeth ?	
A. Yes,at all times	44%
B. Few times,occasionally	39%
C. No,Not at all	17%
5.How do you manage fog /debris in the mouth mirror during endodontic treatment?	
A. Wiping the mirror with cotton	40%
B. Using 3 way syringe	28%
C. By spraying a layer of water over the mirror during the treatment	32%

The association of the graduation level and the surface of mouth mirror showed that concave surface mirror is the most preferred mirror among the undergraduates (30%) and plane surface is the most preferred among postgraduate students (4%). The association between the year of study and the preferred mouth mirror surface had no significant difference.p =.259 [Figure:6].

44% reported that they use mouth mirrors for handling maxillary teeth at all times followed by 39% occasionally. [Table:3] 58% of the participants believe different dental procedures require different types of mouth mirror [Figure:4], contradictingly 51% of the participants didn't agree that dental mirror affects the proper diagnosis. No matter how much a practitioner is well experienced in diagnosing, proper armamentarium is essential, so this is debatable.[Table:2]

There are various hurdles which has to be overcome while using a dental mirrors such as double images, fogging and difficulties as such, 53 % complained that they had difficulty in clearing the fog during treatment[Table:2], To overcome this 40% reported that they'll use cotton to wipe the fog followed by 32% who would spray a layer of water over the mirror prior to the treatment.[Table:3] 76% of the participants were aware that self cleansing mirror with suction is better to avoid fogging.(Willis and Kincheloe, 1983; Neumann, 1988)[Table:1].

Figure 1: Bar graph depicting the frequency distribution of the participants based on the year of study. X axis represents the year of study and Y axis represents the frequency of the respective year of study in percentage. Majority 40% of the participants were of the 3rd year of study where they were just introduced to the clinical environment followed by 22% final year undegraduate students.

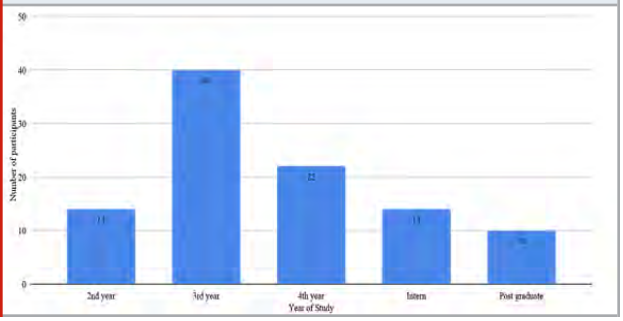
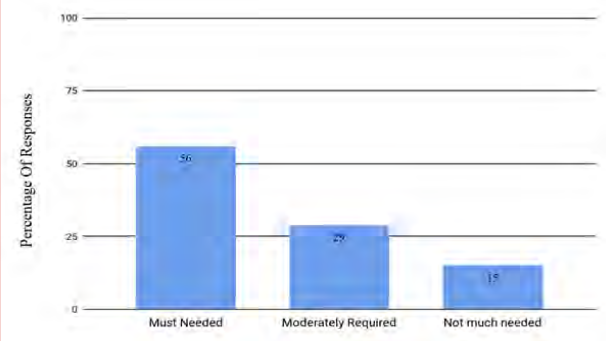


Figure 2: Bar graph representing the responses of the study population regarding the importance of illumination in a dental treatment. X axis represents the choice of response and Y axis represents the percentage of response in the corresponding choice. Majority of the participants (56%) felt that illumination is 'must needed' in a dental treatment followed by (29%) who felt it is moderately required and (15%) who felt it is not much needed.



Accessibility, visibility and illumination are few of the main requirements to complete a dental procedure. 61% were not aware that LED with illumination is best

for endodontic procedures for better illumination and visibility.[Table:1] 79% were aware that mirrors with magnification help in identifying the canals.[Table:2] 56 % answered that illumination is very vital in any dental treatment at all time followed by 29 % of the respondents who answered it is moderately required.[Figure:2](Willis, Scheetz and Kincheloe, 1987; Mital et al., 2014).

When questions were asked about the usage of dental mouth mirrors, 36% of the participants preferred disposable mouth mirrors for diagnostic purposes. It is evident that sterilisation of dental mirrors only will remove all the organisms. [Figure:4] However when questioned about sterilisation after usage 44% responded they'll sterilise it by autoclaving after every use followed by 32 % who used only sterillium when required. (Ganavadiya et al., 2014)[Table:3].

Figure 3: Bar graph representing the responses of the study population regarding their belief regarding the usage of different types of mouth mirror for different procedures.X axis represents the choice of response and Y axis represents the percentage of response in the corresponding choice. Majority of the participants (58%) felt that different types of mouth mirror is required for different procedures followed by (36%) who felt it is not needed.

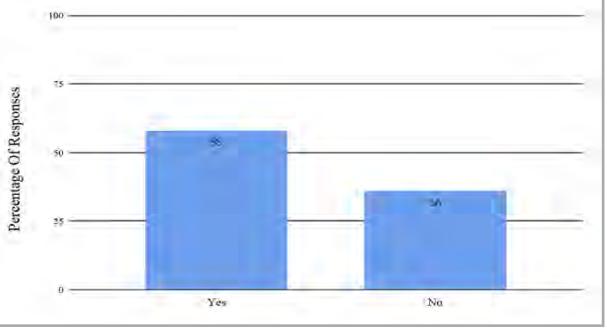


Figure 4: Bar graph representing the responses of the study population regarding their preference of different types of mouth mirrors. X axis represents the different types of mouth mirrors and Y axis represents the percentage of response in the corresponding choice. Majority of the participants (36%) preferred disposable mouth mirror followed by stainless steel mouth mirror (25%), Mirror with LED (21%), Back surface mirror (12%) and the least preferred type of mirror was rhodium coated mirror (6%)

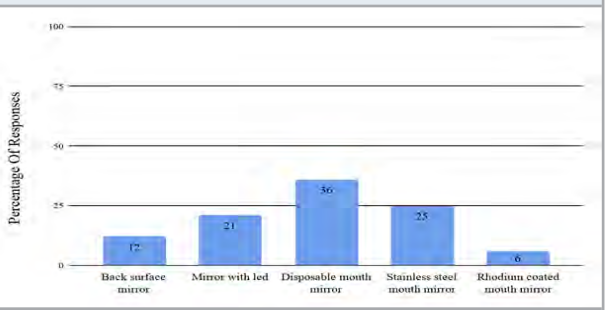


Figure 5: Bar graph representing the responses of the study population regarding their choice to opt for a better mouth mirror after this survey. X axis represents the choice of response and Y axis represents the percentage of response in the corresponding choice. Majority of the participants (65%) agreed that they will invest in a good quality mouth mirror followed by (35%) who felt it is not needed.

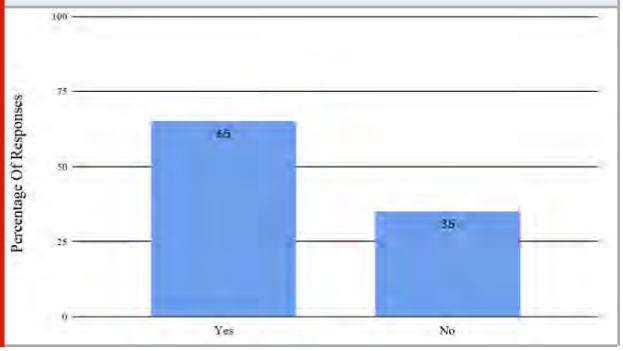
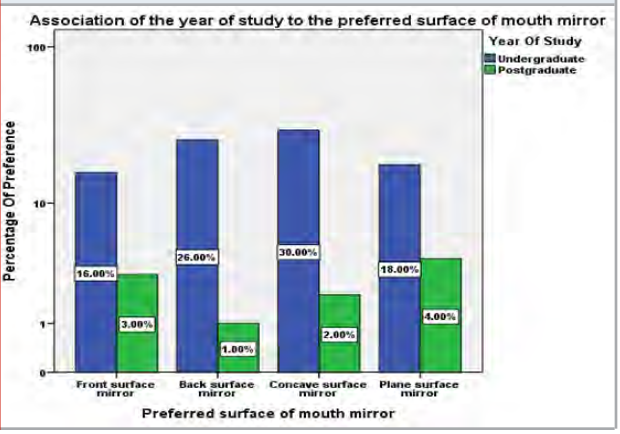


Figure 6: Bar graph depicting the association between the graduation level and the preferred mouth mirror surface. X axis represents the preferred surface of mouth mirror and Y axis represents the frequency of responses of the surface of mirror preferred. It is found that concave surface mirror is the most preferred 30% mirror among the undergraduates(blue) and plane surface is the most preferred 4% among post graduate students(green). The association between the year of study and the preferred mouth mirror surface was statistically not significant. Chi square test, p =.259 (P>0.05).



65 % of the participants accepted to invest in a good quality mouth mirror after completing the survey[Figure:5] and 76% found the survey to be useful. [Table:2]After analysis of the results obtained from the survey, it did produce quite unsatisfactory results however the participants were interested in updating themselves regarding the knowledge attitude and practice on dental mirrors hence more awareness on the proper selection and usage of the dental mirror.

CONCLUSION

Dental mirror being an important armamentarium

available in various forms proper knowledge and awareness of the instrument is vital. As proper diagnosis is the key for a better prognosis in any treatment. This study assessed the knowledge attitude and practice of dental mirrors on endodontic procedures and found out that 49 % of the participants were aware of the parts of a dental mirror, which is quite satisfactory, 36% of the participants preferred disposable mouth mirrors for diagnostic purposes as it is easy to manage does not need sterilization procedure provided it is properly disposed. 65 % of the participants agreed to invest in a good quality mouth mirror after completing the survey.

ACKNOWLEDGMENTS

The authors would like to acknowledge the participants of the study.

Conflict of Interest: The authors declare no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-301-306

BBRC
Bioscience Biotechnology
Research Communications

KAP on Haemostasis and Usage of Styptics Among Dental Students

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ABSTRACT

Control of bleeding is one of the most common problems faced during a clinical procedure in both minor and major surgery. Haemostasis is a paramount importance during clinical procedures and usage of hemostatic agents are now being commonly used in uncontrolled or excessive bleeding. These agents act to halt bleeding by means of either mechanically or coagulation action. The purpose of this study was to assess the knowledge, awareness and practices on haemostasis and usage of styptics among dental students. A survey was conducted amongst the undergraduate students in a University hospital. A total of 100 responses were obtained from the students. Results were analysed and compared using the SPSS Statistical Software by doing both the frequency tests and correlation tests. This study showed that 46 % of the participants found hemorrhage was very common throughout their clinical practices. Based on their knowledge, 33% of the students agreed that vasoconstriction is the main action of styptics and 71% participants were familiar with haemostatic agents. In regard to their clinical practice, 29% of the participants agreed that it is necessary to use haemostatic agents to arrest bleeding. Overall, 80 % of the participants agreed that more knowledge about haemorrhage and its effective management is necessary in the future.

KEY WORDS: HAEMOSTASIS, HAEMOSTATIC AGENT, HAEMORRHAGE, STYPTIC, THROMBIN.

INTRODUCTION

Bleeding or haemorrhage is a normal incidence that may take place during or following a surgery. Control of haemorrhage is one of the challenging situations dentists confront during any clinical procedures. Uncontrolled bleeding is a harm as it leads to serious life threatening consequences. Furthermore, bleeding may compromise the visibility and possibly the entire procedure itself. Bleeding occurs when a vessel is cut, traumatized or injured during surgery. In most of the cases, applying pressure to the bleeding site alone is enough to achieve haemostasis. The bleeding can either originate from hard tissue or soft tissue such as bone and mucosa. Bleeding can be categorized as arterial, venous or capillary bleeding according to the type of vessel affected in an injury (Ogle, Swantek and Kamoh, 2011).

The bleeding source can be recognized by proper illumination, adequate retraction and comprehensive suctioning. Haemorrhage following minor oral surgical procedure can be categorized into primary haemorrhage, reactionary haemorrhage and secondary haemorrhage.

ARTICLE INFORMATION

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Received 4th Aug 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/155

This classification is in relation to the period of bleeding induced. Primary haemorrhage occurs during surgery, reactionary haemorrhage two to three hours following the procedure due to halt of vasoconstriction and secondary haemorrhage take place up to 14 days after the surgery mostly due to infection. Haemostasis process involves three major steps that are vasoconstriction, formation of platelet plug and coagulation, secondary hemostasis (Themes, 2016).

When there is damage to the blood vessels, immediate constriction occurs as a result of released vasoconstrictive paracrine by the endothelium cells. This happens because of impermanent reduction of blood flow in the injured blood vessels. This process is known as vasoconstriction. Following this, formation of a platelet plug occurs as a result of plug forms as platelets adhere to the collagen site that has been exposed in the injured endothelial. This is later activated and releases cytokines such as serotonin, thromboxane A2, and endothelin 1 in the injured region. Platelet factors (adenosine diphosphate, fibronectin, thrombospondin, fibrinogen, and platelet derived growth factor) buttress the process of vasoconstriction and greater number of platelets adhere to one another, platelet aggregation and forming platelet plug at the injured site. Coagulation cascade occurs at the same time and ends as fibrin polymer in which helps in the platelet plug stabilization, thus forming blood clot. Secondary haemostasis or clotting cascade can be further classified into intrinsic and extrinsic pathways (Mani et al., 2018).

Minimizing blood loss in the operating field is a key factor during clinical practices as even the smallest amount of bleeding can compromise vision and affect the expected result of a treatment. The outcome may be affected when poor view is associated with haemorrhage. In order to reduce the rate of postoperative haemorrhagic events, various haemostatic agents are used widely in dentistry to achieve optimum outcome (Galanakis, Vasdev and Soomro, 2011). Haemostatic agent or antihaemorrhagic is a substance that promotes haemostasis, stops bleeding (Mani et al., 2018). An ideal haemostatic agent must be effective as well as biocompatible to be used in the body in addition to affordable. Local haemostatic agents can be classified as passive and active haemostatic agents (Kamoh and Swantek, 2012).

Passive haemostatic agents are mostly used as first line agents as they are certainly obtainable, special storage is not needed in addition to low cost. It can be used in heavier bleeding due to its absorption capability and its fibrous/dense structures making them as bigger mass (Brodbelt et al., 2002). It is recommended to be used in less amount as it is able to expand many times than their original mass when they come in contact with fluids. Once haemostasis has been achieved, the agent needs to be removed as it can compress the surrounding structures like nerves and vessels. Examples of passive haemostatic agents are collagens, cellulose, gelatines, and polysaccharide spheres (McCarthy, 2009). Active haemostatic agents involved in clot formation. Examples are thrombin and those product formulations in which thrombin is combined along with a passive agent to provide an active product. It is beneficial in patients on antiplatelet or anticoagulation medications and usually used with gelatin foam.

Most haemostatic agents are contraindicated in contaminated wounds (McCarthy, 2009)(Samudrala, 2008). A styptic is a type of haemostatic agent that acts by tissue contraction in order to seal injured blood vessels. They are also known as local hemostatics. Examples of styptics include aluminum solutions. When it is applied locally, it causes hemostasis by contracting tissue to seal injured blood vessels (Mani et al., 2018). Styptic or haemostatic pencil is a short stick of medication in which Anhydrous aluminium sulfate is the main ingredient, and acts as a vasoconstrictor to halt the blood flow. It is applied directly onto the bleeding region and initiates local vasoconstriction by its astringent chemical that promotes flocculation of the blood (Dorland, 2011).

Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about various methods practiced and general knowledge of halitosis among dental students. The main purpose of this study being that by determining the frequently practiced methods in management of hemorrhage and a better insight on the degree of understanding of homeostasis and use of haemostatic agents.

MATERIAL AND METHODS

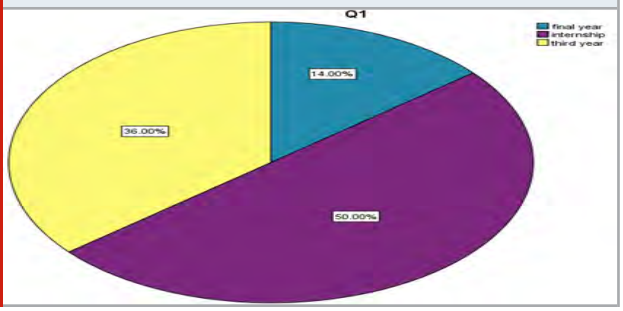
Study Setting: This cross-sectional study was done among undergraduate students (includes third years, final years, interns) of Saveetha Dental College and Hospitals. A total of 100 students participated in this study. Study subjects a total of 100 students participated in this study of which 36 were third years, 14 were final years and the remaining 50 were interns.

Methodology: A survey was conducted through an online standard questionnaire with 10 multiple choice questions sent via a Google Form application. The questionnaire consisted of questions about the knowledge, awareness and practices regarding haemostasis and usage of styptics among dental students throughout clinical practices. Adequate time was provided to fill the questionnaire. The responses of the students were recorded, analysed, checked for completeness and were taken up for assessment.

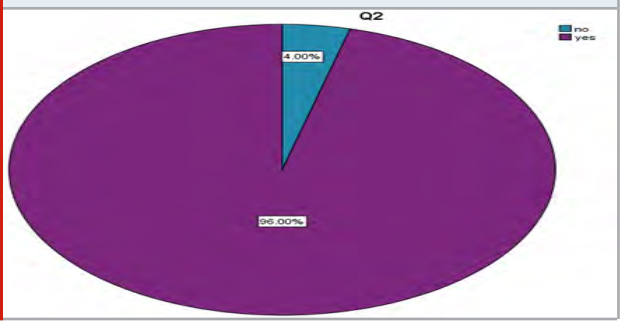
Statistical Analysis: After data was collected and coded, the statistical analysis was done using IBM SPSS

Statistical Software package (Version 23.0). All the frequency tests were carried out and the Chi-square test was done at a significance level.

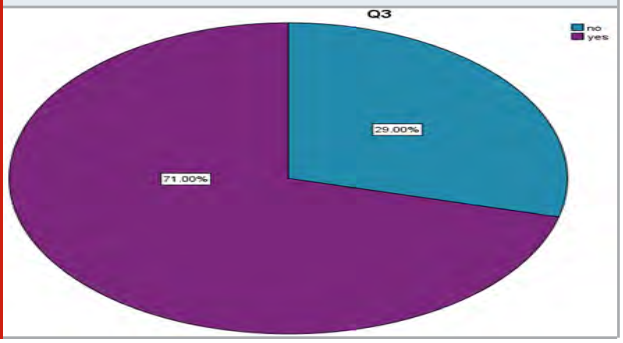
Graph 1: Pie chart showing responses to the question among undergraduates based on their year of study. 50.0% of the respondents were interns. 14.00% of the respondents were final year undergraduate students. 36.0% of the respondents were third years.



Graph 2: Pie chart showing responses to the question "Do you know what is haemostasis?". 96.0% of the respondents were acknowledged and 4.00% were not.



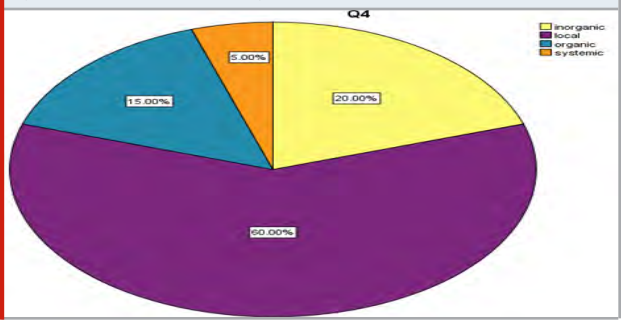
Graph 3: Pie chart showing responses to the question "Are you familiar with haemostatic agent?". 71.0% of the respondents had an insight regarding antihemorrhagic agent while 29.00% were not.



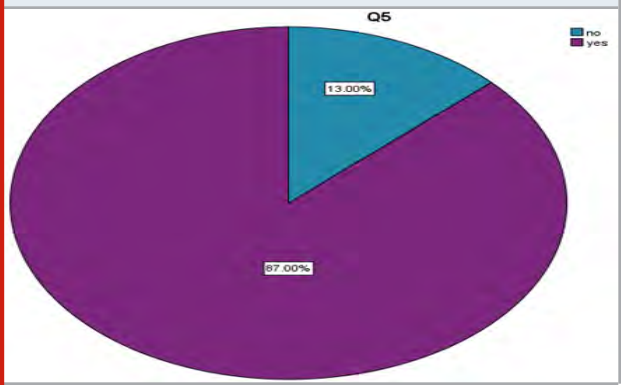
RESULTS AND DISCUSSION

A total 0f 100 students participated in the study, 36% were third years, 14% were final years and the remaining 50% were interns [Graph 1]. When inquired about haemostasis, 96% of the participants were aware about the possibility of haemostasis in clinical practice while 4% did not [Graph 2]. Assessment on familiarity with haemostatic agents gave the following results, 71% of the participants acknowledged the use of haemostatic agents whereas 29% were not [Graph 3]. When questioned about knowledge regarding which type of styptics classification, 60% of the students recognized that styptics are local haemostatic agents, while remaining chose inorganic, 20%, organic, 15% and systemic, 5% [Graph 4].

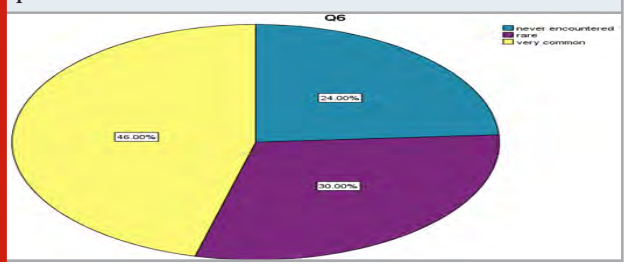
Graph 4: Pie chart showing responses to the question "What type is styptics?". 60.0% of the respondents acknowledged that styptic is a local haemostatic agent, 20% chose inorganic, 15% organic and 5 agreed it is a systemic haemostatic agent



Graph 5: Pie chart showing responses to the question "Are you aware of the use of styptics in dentistry?". 87.0% of the respondents recognized the use of styptics in dentistry while 13.00% were not.

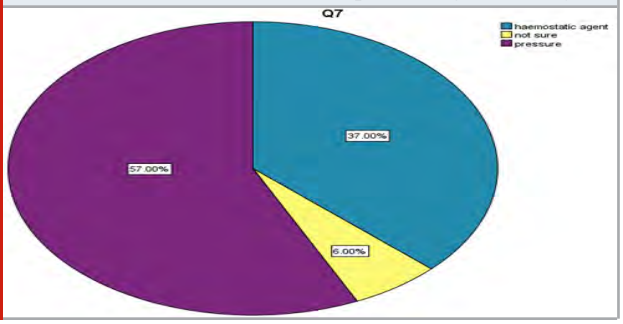


Graph 6: Pie chart showing responses to the question, "Based on your experience, have you encountered patients with profuse bleeding?". 46.0% of the respondents commonly encountered haemorrhage among dental patients. 30.0% of the respondents stated that the excessive bleeding is rare and 24.9% of the respondents never encountered excessive haemorrhage during clinical procedures.

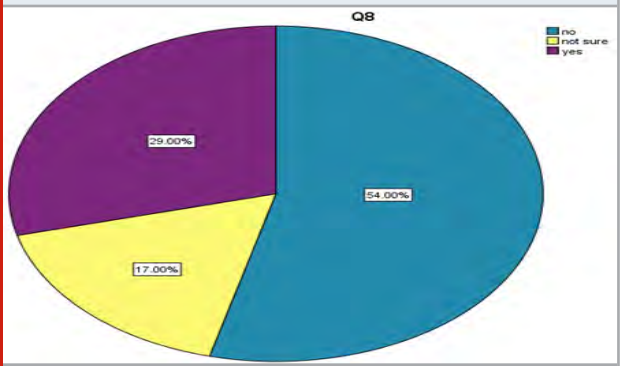


About 87% participants were aware and 13% did not acknowledge the use of styptics in dental practice [Graph 5]. Assessment on their personal experience of the occurrence of haemorrhage in patients while doing treatment gave the following results, 46% agreed that it was very common, 30% have admitted that it was rare and 24% has never encountered such an experience [Graph 6]. On the other hand, when inquired about their knowledge on which method is preferable to arrest bleeding, 57% believed applying pressure works efficiently, 37% agreed with the use of haemostatic agents while only 6% not sure the best method to achieve haemostasis [Graph 7].

Graph 7: Pie chart showing responses to the question, "Which method do you think is the most successful to arrest bleeding?". 57.0% of the respondents commonly applied pressure to achieve haemostasis, 37.0% of the respondents stated preferred to use haemostatic agents and 6.00 % were not sure how to stop bleeding efficiently.

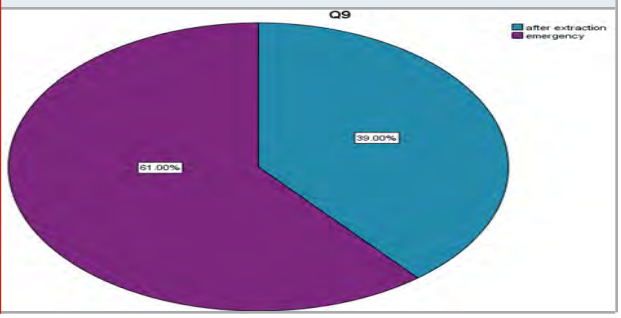


Graph 8: Pie chart showing responses to the question, "Do you think it is necessary to use haemostatic agents to arrest bleeding in all cases?". 54.0% of the respondents disagree to use haemostatic agents in all cases, 29% preferred to use while 17.0% were not sure if it is necessary to use anti-haemorrhagic agents in haemorrhage patients.

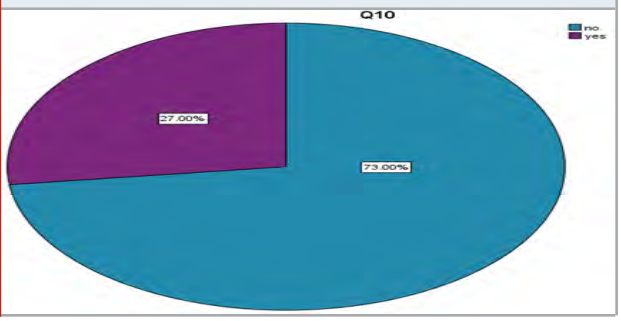


Assessment on the necessity to use haemostatic agents to arrest bleeding in all cases, 29% agreed that using haemostatic agents help to arrest bleeding, 54% believed that it is not required to use styptics in all cases while 17% of the participants were not sure [Graph 8]. Based on their own experience on haemostasis, 39% preferred to use the agents following surgical extraction and 61% favoured to use in emergency situations [Graph 9]. 73% were not aware that some haemostatic agents can cause allergy reactions while 27% acknowledge the possibility of anti-haemorrhagic tools to cause such reactions [Graph 10]. Moreover, when questioned on action of styptics to achieve haemostasis, 33% acknowledged it is by vasoconstriction, 41% chose coagulation and 26% of the students were not sure [Graph 11]. A majority of the participants, 80% believed that more knowledge on haemostasis and use of anti-haemorrhagic agents to control bleeding is necessary [Graph 12].

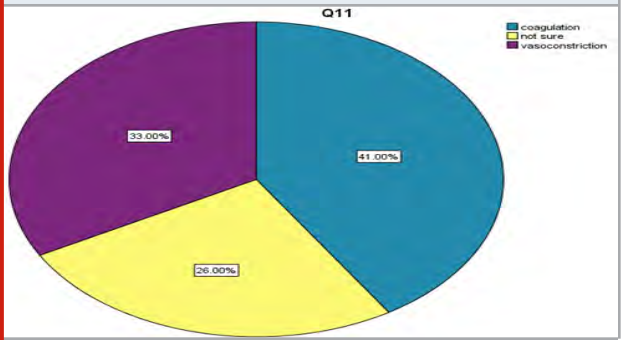
Graph 9: Pie chart showing responses to the question, "When do you think preferable to use haemostatic agents?". 39.0% of the respondents preferred to use in surgical extraction and 61.0% preferred in emergency cases.



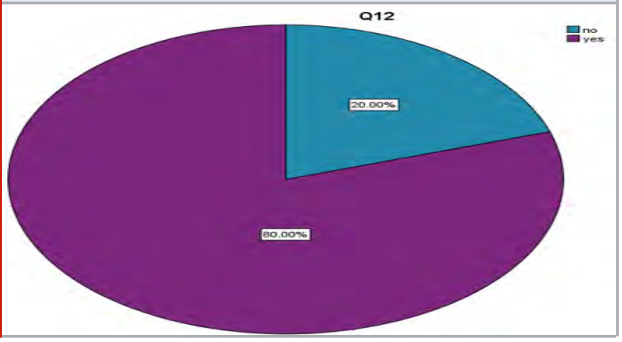
Graph 10: Pie chart showing responses to the question, "Do you aware that haemostatic agents can cause allergy reactions?". 73.0% of the respondents did not acknowledge while 27.0% aware the possibility of antihemorrhagic agents to cause allergic reactions.



Graph 11: Pie chart showing responses to the question, "Action of styptics to achieve haemostasis?". 33.0% agreed it is by vasoconstriction, 41.0% chose a coagulation process while 26.0% of the respondents were not aware.



Graph 12: Pie chart showing the responses to the question "Is more knowledge on haemostasis and use of styptics to manage bleeding is necessary?". 80.0 % of the respondents confirmed that they need more knowledge regarding haemostasis and use of styptics in management of haemorrhage. 20.0% respondents stated that they are well aware about haemorrhage and its management.



This cross-sectional study was used to assess the knowledge, awareness and practices on haemostasis and usage of styptics among students of Saveetha Dental College. Majority of the participants experienced profuse bleeding in patients while doing treatment. This study is justified by a study done by Gill et al. where haemorrhage was found in patients (Gill et al., 2007). In regard to use of haemostatic agents to arrest bleeding, some participants preferred the use of these agents to control bleeding. This finding is not rare as a wide variety of haemostatic tools have been used in management of haemorrhage in a study performed by Galakani et al. (Galanakis, Vasdev and Soomro, 2011). Based on this study, most participants agreed that the use of haemostatic agents should be implemented only in emergency cases. Galakani et al. recognized that hemostatic agents and tissue sealants should not be considered as a surgical alternative technique, but rather as a tool to assist and achieve the optimal surgical outcome (Rosenstiel, Land and Fujimoto, 2006).

In this study, most participants were familiar with the use of haemostatic agents. This is not a rare finding as chemical haemostatic agents such as Rosenstiel et al. and Mohaan et al. employed the use of aluminium chloride, AlCl3 and ferrous sulphate have been used to arrest more serious haemorrhage from cut capillaries and arterioles (Rosenstiel, Land and Fujimoto, 2006) (Mohan et al., 2011). A majority of the participants acknowledged that styptics work by vasoconstriction and are helpful to arrest haemorrhage. Weir et al. recognized the use of aluminium sulphate as haemostatic agents in restorative dentistry as alum can be used as a substitute for epinephrine because it is safer and has lesser systemic effects (Weir and Williams, 1984).

CONCLUSION

Knowledge on usage of haemostatic agents are necessary among dental practitioners as bleeding during and post-operative procedures are common in clinical practices. As local haemostatic agents are effective in controlling bleeding during oral surgical procedures in individuals with congenital and acquired bleeding disorders as well as in patients who are on antithrombotic medications for their systemic conditions, thus the agents should be made available in clinical institution to avoid harm to patients and help in achieving optimum treatment required.

ACKNOWLEDGEMENTS

Nil

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-307-313

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Awareness of Oral Cancer Among Dental Students – A Survey

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ABSTRACT

Oral cancer represents one of the most common malignancies. The objective of this survey was to assess the awareness and determine the understanding of oral cancer among dental students This study was conducted based on a questionnaire which consist of 10 questions through a web-linked application called Survey Monkey. A puposive random sample size of 100 dental students from Chennai participated in the study. The overall awareness of oral cancer was good with the vast majority being aware of the family history, role of Human Papilloma Virus(HPV), screening aids for oral cancer. A statistical analysis was done with SPSS to look for gender based differences and it was found there was a statistically significant difference in between the genders for the common site of oral cancer and the role played by HPV. As a conclusion, the majority of the dental students within the study were aware of the term oral cancer. However, this study was limited to one particular institute. Further, study should be conducted in a larger scale area and sample size to get a proper overview regarding this topic within the general public concerning the new advent technologies.

KEY WORDS: ORAL CANCER; HPV; AWARENESS; SQUAMOUS CELL CARCINOMA.

INTRODUCTION

Oral cancer represents one of the most common cancers in our population. It most often occurs due to improper life style and adverse habits. According to WHO research an approximate of 20,000 deaths annually worldwide and around 4,600 deaths were occurring in India due to this oral cancer. There is a significant difference in the incidence of oral cancer in different regions of the world. As a result of many publications regarding oral cancer incidences compared according to the gender level, had shown that highest incidences in India constituting around 60% of all cancers in men and 40% of all cancers among women(Jemal et al. 2010).

Though there have been severa advances in the detection and treatment of cancer, Oral cancer carries a very low five year disease free survival rate of around 50%. Earlier diagnosis greatly increases the patient's chances of survival as the mouth is very accessible for a clinical or self-examination(Agrawal et al. 2012). Yet, most of the oral cancer namely squamous cell carcinoma is frequently diagnosed in advanced stages due to lack of awareness among the public and lack of health education campaigns in rural area of India(Monteiro et al. 2012).

Oral cancer usually begins with a primary ulcer originating from the oral tissue. It has a high tendency to metastasize to regional lymph nodes. There are numerous kinds of oral cancer, but approximately 90% are squamous cell carcinoma arising in the tissues that line the oral cavity and labial tissues.

ARTICLE INFORMATION

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Received 7th Aug 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

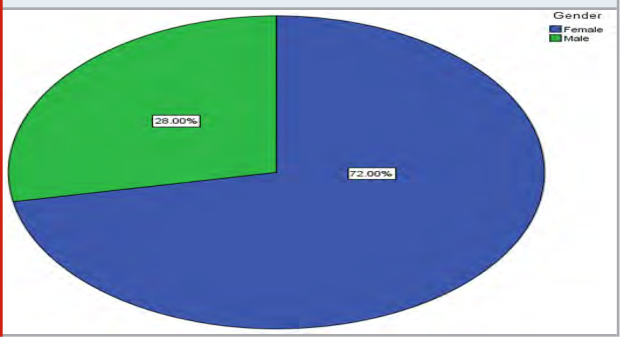
Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/156

Squamous cell carcinoma is epithelial in origin and is malignant whereas other tumour-like angio-sarcoma is mesenchymal in derivation and is also malignant(Srikanth Reddy et al. 2012). Squamous cell carcinoma usually occurs in sites like the floor of the oral cavity, buccal mucosa, gingiva(gums), lips, and palate (Hassona et al. 2015). The etiology of squamous cell carcinoma depends on numerous factors. It is divided into two groups which are extrinsic or intrinsic. The extrinsic factors are smoking, smokeless tobacco, actinic radiation, infection, alcohol or sexually transmitted infection like syphilis or radiation whereas, the intrinsic reasons or which act as co-factors are nutritional deficiency like iron deficiency anemia.(Kumar et al. 2016).

Apart from epithelial malignancies, there are also cancers arsing from salivary gland tissues adenocarcinoma resulting from a main salivary gland, lymphoma from lymph nodes and further lymphoid tissues, or melanoma from the pigment-producing cell of oral mucosa(Prasad 2014). Oral squamous cells carcinoma has diverse medical appearance including, exophytic mass appearance with papillary and verruciform growth, whereas an endophytic ulcerations also can be seen. Most of the oral cancers precede a precursor lesion. The most precursor lesion presents with a clinically white non-scrapable patch referred to as leukoplakia and erythroplakia which appears as a red patch and erythroleukoplania which presents as a red and white patch.(Ramachandra 2012). The oral cancer when it involves the bone presents as a moth-eaten radio-lucency with ill defined boundaries.

The treatment of oral cancer is predominantly surgical followed by radiotherapy. Nevertheless most cases of oral cancer are diagnosed late due to the lack of pain in the early stages and inadequate knowledge on the presentation of oral cancer. These reasons cumulatively make oral cancer one of the most common diseases in our country.(Ariyawardana and Vithanaarachchi 2005). Our recent research have features as numerous articles in reputed journals(Subramaniam and Muthukrishnan 2019; Vadivel et al. 2019; Santosh Rayagouda Patil et al. 2020; Santosh R. Patil et al. 2018; S. R. Patil et al. 2018). Based on this experience we planned to pursue a study to evaluate the awareness of knowledge about oral cancer among Dental students.

Figure 1: Bar chart showing the distribution of the gender among the respondents. 72 were females and 28 were males



MATERIAL AND METHODS

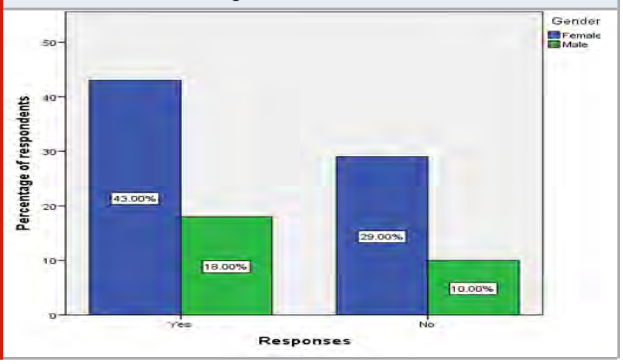
The survey consisted of using a close ended questionnaire. A set of 10 questions were prepared by the authors and were pre validated by two senior faculties in the Department. Based on the comments received during the prevalidation phase the options were slightly modified and the final questionnaire was prepared. A total of 100 dental students were selected based on the purposive random sampling from a private Dental Institution in Chennai. The questionnaire was circulated online using Survey Monkey.

Inclusion criteria: The Inclusion criteria was Interns from one Dental Colleges and who had a expressed a willingness to be a part of the survey.

Exclusion criteria: The students who were not willing to be a part of the survey were excluded.

Though the name, age and gender of the participants were collected during the survey, the name and age were not used for any discriminatory purpose in the survey and a strict confidentiality of the names of the students were maintained during the study. The responses received were extracted in the form of an excel worksheet. In this worksheet data encoding was done and was imported into SPSS ver 21. Here the basic descriptive statistics was worked out for each question and the final inferential statistics looking for an association between the gender and the nature of responses was done using Chi-square analysis.

Figure 2: Bar graph showing association between the awareness of oral cancer and the gender of the participants. 61% of the respondents were aware that family history was an etiological factor in the causation of oral cancer. A Chi-square association between the gender and the response(0.176 p-0.674(p>0.05)) which is not statistically significant implying no association between the gender and the nature of response.



RESULTS AND DISCUSSION

The survey population consisted of 100 participants of which 72 were females and 28 were males. Fig1.The first question of the survey was if family history had a significant etiological association in the causation of oral cancer. 61% of the respondents believed that family

history does cause oral cancer. In this group, 43% were females and 18% were males.Fig2.Following question was asked about the important risk factor that was involved in oral cancer, where about 59% of the students chose tobacco chewing, whereas remaining of them claimed that it was of alcohol (5%), family history (2%) and HPV (34%), as shown in Fig3. The next question was on the site of oral cancer, where 71% of the dental students answered the most common site of oral cancer which is the labial or buccal mucosa. However, remaining 16%, 2%, 3% and 7% assumed that it was tongue, gingiva, palate and alveolar mucosa, respectively.

Figure 3: Bar graph showing association between the risk factor of oral cancer and the gender of the participants. The great majority of the respondents were for tobacco followed by HPV. A Chi-square association between the gender and the response(1.194 p-0.74(p>0.05)) which is not statistically significant implying no association between the gender and the nature of response.

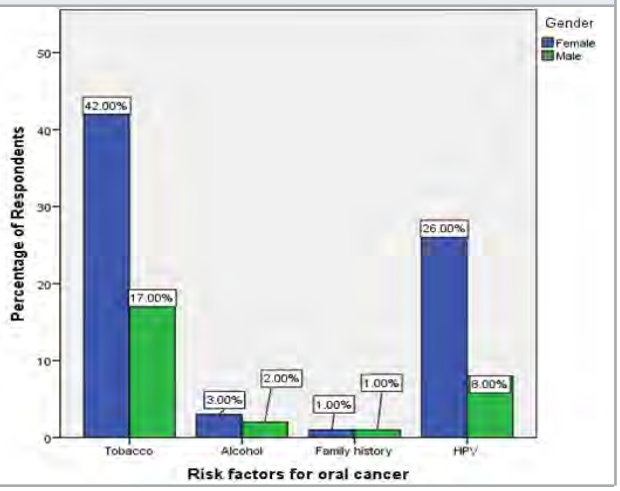
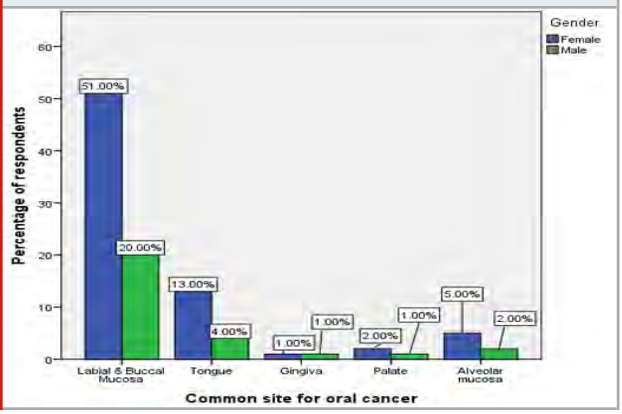


Figure 4: Bar graph showing association between the common site of oral cancer and the gender of the participants. 74% of the respondents felt that labial and buccal mucosa was the predominant site for the oral cancer. A Chi-square association between the gender and the response(0.693 p-0.04(p<0.05)) which is statistically significant implying an association between the gender and the nature of response.



There was a statistically significant association between the gender and the nature of the responses(P<0.05) which was statistically significant. Fig 4. The next question on awareness was to check if the students routinely gave information regarding the awareness of etiological factors in the causation of oral cancer. For this question 76% of the respondents said they inform the patients about the risk factors of oral cancer if noted during a routine clinical examination. Fig 5. The next question assessed the awareness of students on the most common presenting symptom of oral cancer which showed that majority (61%) of the students answered saying the important clinical features of oral cancer by choosing white or red patches. Remaining 35% and 4% chose difficulty in swallowing and lump in mouth, respectively.

Figure 5: Bar graph showing association between the dissemination of information on oral cancer and the gender of the participants. 76% of the respondents felt that information on oral cancer was passed on the patients during routine history taking. A Chi-square association between the gender and the response(0.446 p-0.72(p>0.05)) which is statistically not significant implying no association between the gender and the nature of response.

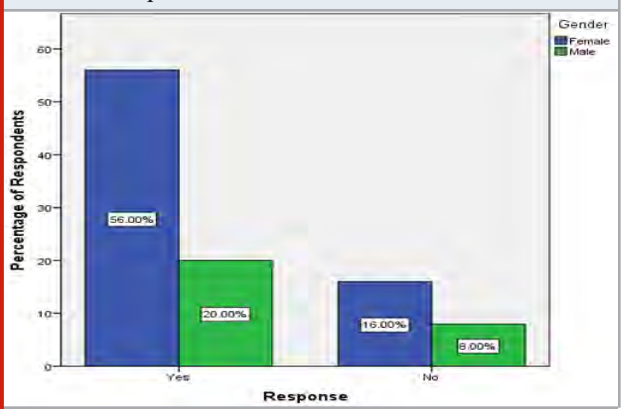


Figure 6: Bar graph showing association between the awareness on the symptoms of oral cancer and the gender of the participants. Majority of of the respondents felt that oral cancer presents itself as a red/white patch. A Chi-square association between the gender and the response(2.336 p-0.311(p>0.05)) which is statistically not significant implying no association between the gender and the nature of response.

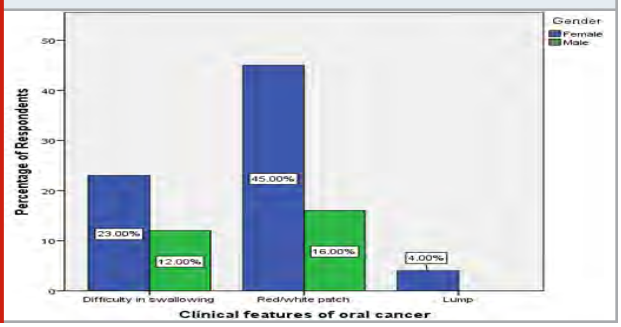


Figure 7: Bar graph showing association between the awareness on the role of HPV in oral cancer and the gender of the participants. Majority of of the respondents felt that HPV can cause oral cancer.. A Chi-square association between the gender and the response(0.511 p-0.04(p<0.05)) which is statistically significant implying association between the gender and the nature of response.

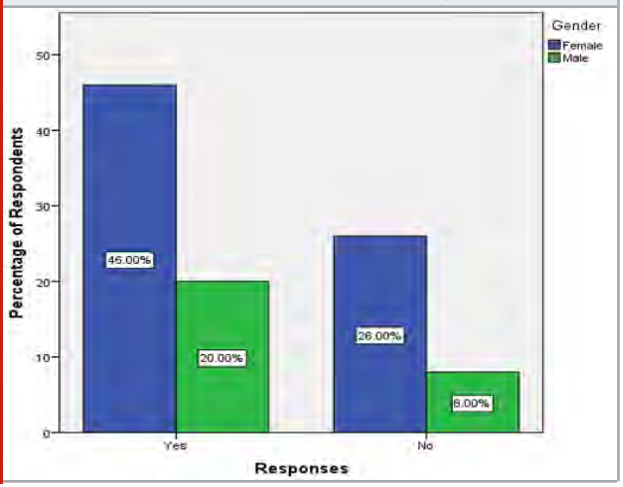
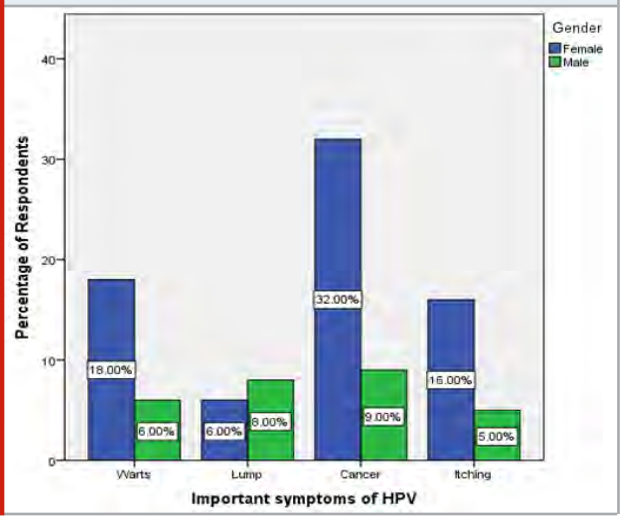


Figure 8: Bar graph showing association between the symptoms of HPV and the gender of the participants. Majority of of the respondents felt that HPV can cause oral cancer.. A Chi-square association between the gender and the response(6.932 p-0.07(p>0.05)) which is statistically not significant implying no association between the gender and the nature of response.



In figure 7 we read the responses to the question asked about awareness on the role of HPV in oral cancer, where 66% of the students are aware of it. Remaining 34% of them were not aware of the role of HPV in oral cancer which was statistically significant(p<0.05)Question number 8 was asked about important symptoms of HPV, majority (41%) chose cancer and remaining of them chose warts (24%), lumps (14%) and itching (21%). Figure 8 The majority of the students (45%)chose cryotherapy as the treatment of choice for HPV, whereas remaining 28% and 27% chose chemotherapy and radiotherapy respectively as shown in figure 9.According to figure10, only 61% of dental students answered correctly regarding the important screening aids for oral cancer, which is oral brush biopsy. Remaining of them chose vital staining (20%), Auto-Fluorescence (10%) and chemiluminescence (9%).. The final question was asked about the opinion of dental students regarding the first person to identify oral cancer.

Figure 9: Bar graph showing association between the treatment of HPV and the gender of the participants. Majority of of the respondents felt that cryotherapy is the best treatment for oral cancer. A Chi-square association between the gender and the response(4.469 p-0.72(p>0.05)) which is statistically not significant implying no association between the gender and the nature of response.

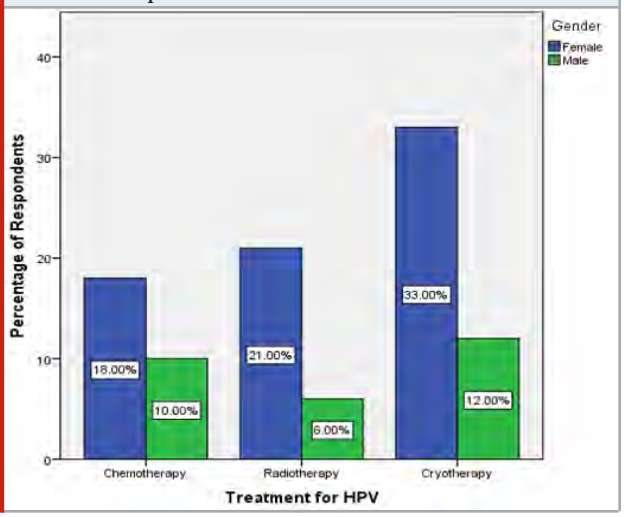
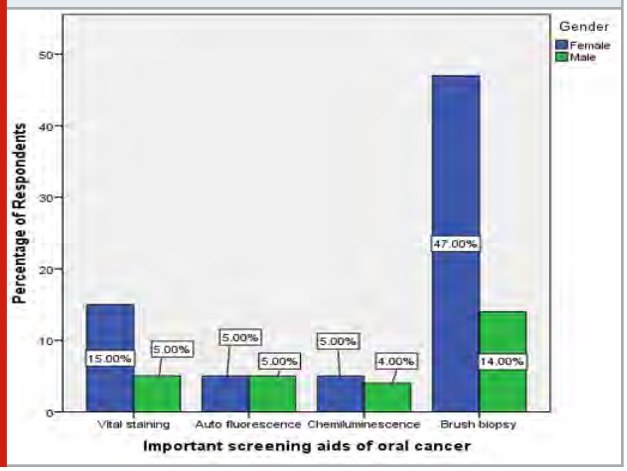
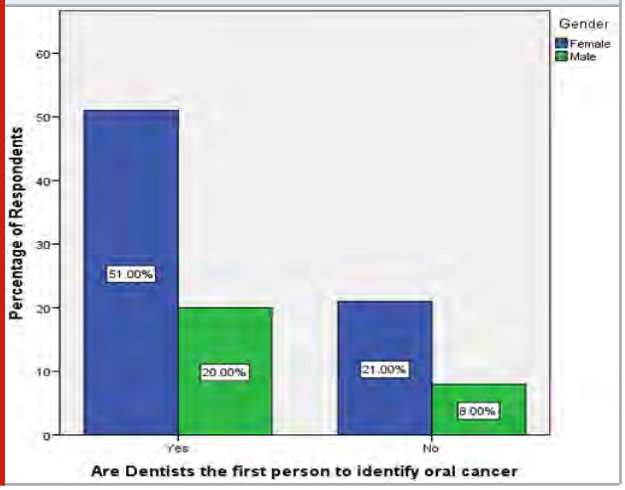


Figure 10: Bar graph showing association between the screening aids of oral cancer and the gender of the participants. Majority of of the respondents felt that brush biopsy is the best screening tool for oral cancer. A Chi-square association between the gender and the response(5.125 p-0.95(p>0.05)) which is statistically not significant implying no association between the gender and the nature of response.



Here, about 71% agreed that it is a dentist to identify first, whereas 29% of them disagreed with the statement. Fig 11 In a study by Avinash et al.,(Jnaneswar et al. 2017) identified that their students are aware of tobacco chewing was proved it as the most important avoidable factor of oral cancer. The known risk factors for oral cancer are tobacco use and alcohol consumption. Identifying patients' tobacco and alcohol use, whether current or past, is crucial for a practitioner to be knowledgeable about his or her patient's risk of developing oral cancer. According to a portfolio by WHO in 2016, infection with certain types of human papillomavirus has also been linked to oral cancer. Owing to the multitude of causes that could possibly hinder the prognosis, early detection is, thus, crucial(Sankaranarayanan et al. 2016).

Figure 11: Bar graph showing association between the awareness of dentist on oral cancer and the gender of the participants. Majority of of the respondents felt that dentists are the first person to report on oral cancer. Chi-square association between the gender and the response(0.03 p-0.75(p>0.05)) which is statistically not significant implying no association between the gender and the nature of response.



In a literature by Khan et al.,(Khan 2012) showed that the count of oral cancer in South Asia are up to 40% of all cancers. However, in India, the incidence of oral cancer is about 3–7 times more common as compared to resource-rich countries. They also emphasized that in India the prevalence of oral cancer is high than the rest of the world. Oral cancer is the third most common cancer in India after cervical and breast cancer among women. The age-standardized incidence rate of oral cancer is reported at 12.6/100,000 people.

The increased prevalence of oral cancer in the Indian subcontinent seems to be due to the heavy usage of tobacco in the form of smoking, and other smokeless tobacco habits, alcohol, spicy food, and neglect of overall oral health. It is said that one-third of all oral cancers are preventable and one-third of them occur due to risk factors.Moreover in study conducted by Coelho et al.,(Coelho 2012) in the United States, for example, tobacco in the form of snuff and chew and certain lifestyle and environmental factors do pose as risk factors.

Early detection and diagnosis of this disease spectrum by not only the dental practitioners, but also by the medical practitioners is therefore of utmost importance in its successful treatment, and thus directly affecting prognosis. In a study carried out by Carter et al., (Lachlan M. Carter and Ogden 2007) revealed that the individuals at greatest risk for oral cancer rarely visit a dental practitioner but do consult general medical practitioners and thus concluded that these practitioners could play an important role in the early detection of oral cancer. Thus, it is important for dental practitioners as well to be knowledgeable regarding oral cancer.

Another similar study by Ogden et al.,(L. M. Carter and Ogden 2007) showed that dental practitioners had a higher score for knowledge and practice questions. Interestingly, they also had a better attitude than medical practitioners regarding oral cancer. This may be attributed to the fact that professional courses that familiarize them with the more common and important oral diseases enhance their diagnostic abilities than the medical practitioners. A survey by Sitheeque et al,(Sitheeque, Ahmad, and Saini 2014) on awareness of oral cancer and pre-cancer among final year medical and dental students of Universiti Sains Malaysia showed the dental students had better knowledge in some key areas which were different from their medical colleagues. The authors pointed to a necessity to strengthen these aspects of medical and dental undergraduate curriculum.

Similar studies were done by Alami et al,(Alami, El Sabbagh, and Hamdan 2013) to assess the knowledge of oral cancer among recently graduated dental professionals in Amman, Jordan. The results revealed an inadequate level of knowledge of oral cancer among the study population. Das et al,(Das and Patro 2010) in his article stresses on the increase in efforts to expand the resources for health education and increase awareness of cancer prevention to the people and health care providers with an unprecedented level of cooperation among international agencies, government and nongovernmental organizations, international foundations, healthcare system and local institutions can help us control the incidence of new cases.

CONCLUSION

Within the limitations of this study, we find the majority of the dental students were aware of the term oral cancer. There needs to be an improvement in the depth of knowledge pertaining to HPV virus.Further, study should be conducted in a larger scale area and sample size to get a proper overview regarding this topic within the general public concerning the new advent technologies.

ACKNOWLEDGEMENTS

The authors would like to thank the Management of Saveetha Dental College for providing us the encouragement and permission to carry out the study.

Conflict of Interest: The authors declare that this is a self funded study and there is no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-314-325

BBRC
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Research Communications

Bone Bonding of Hafnium – A Literature Review

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ABSTRACT

Numerous biomaterials have been constantly researched upon for dental implants. We wanted to evaluate alternative elements that may have the potential to offer equivalent or superior osseointegration. One such element of interest is Hafnium. In the periodic table by IUPAC, tantalum belongs to period 6 (d block) of periodic table. Hafnium belongs to the same period and block as tantalum, in the periodic table. Various in vitro studies were conducted on hafnium metal. Studies have reported that hafnium has a similar response in soft and hard tissues in two different animal species (rat and rabbit), which suggests that hafnium might be an interesting material for biomedical applications. This review aims at analysing the existing literature on hafnium as potential implant biomaterial.

KEY WORDS: HAFNIUM, OSSEOINTEGRATION, COATING, IMPLANT BIOMATERIAL, BIOCOMPATIBILITY, TITANIUM.

INTRODUCTION

For a successful design of a dental implant, it is of utmost importance to have the knowledge about material science together with the biomedical considerations. The prime requirements for dental implants are appropriate mixture of mechanical properties and biocompatible properties. An ideal implant material should have biocompatibility (Smith, 1991; '13 Implant Material Properties', 2015; Duraisamy et al., 2019), corrosion resistance (Solar, no date),(Greene, no date; Syrett and Davis, no date), elastic modulus (Song et al., 2011), and good bone anchorage (Sakka and Coulthard, 2009; Gabet et al., 2010).

One of the most commonly used materials for this purpose is titanium and its alloys (Adya et al., 2005; Chaturvedi, 2009). In various studies conducted till date, Tantalum has revealed superior properties fulfilling criteria required for an implant which include excellent chemical stability, body fluid resistance, biological inertia and remarkable osteoconductivity (Committee and F04 Committee, no date; Balla, Bodhak, et al., 2010). Although tantalum is shown to be promising in bone defect repair (Tang et al., 2013; Mrosek et al., 2016; Wang et al., 2018), its elastic modulus (Leigh, 2011; Parsons, 2014; Constable, 2019)is much higher than that of human bone tissue (Arciniegas et al., 2007; Lu et al., 2015) and prone to stress shielding effect (Saha, Inturi and Barnard, 1996; Korabi, Shemtov-Yona and Rittel, 2017).

ARTICLE INFORMATION

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Received 10th Aug 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/157

In the periodic table by IUPAC , tantalum belongs to period 6 (d block) of periodic table (Leigh, 2011; Parsons, 2014; Constable, 2019; Scerri, 2019). Hafnium belongs to the same period and block as tantalum, in the periodic table (Leigh, 2011; Parsons, 2014; Constable, 2019). Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about This review aims at analysing the existing literature on hafnium as potential implant biomaterial.

Review of Literature

History of Dental Implants: Tracing back, the record of the first use of implants as a biomaterial to perform immediate replacement of a lost tooth was attempted by the use of volcanic glass which was shaped like a tooth itself in the era of the Mayans (Metz, 1992; Gehrke, 1997; Crabb, 2006). The first metal used in implantology was Gold,in 1809, by Maggiolo, an Italian dentist (Maggiolo, 1809). He also followed the same immediate implantation method after extraction whose root shape matched the tooth socket like the Mayans. Slowly, other metals came into use like platinum, iridium, lead, rubber and porcelain (Brunski, 1988; Meffert, Langer and Fritz, 1992; Duraccio, Mussano and Faga, 2015; García-Gareta et al., 2017; V. Rajaraman, Dhanraj and Jain, 2018). In 1934, Hans Abel used ferrous alloys as implants (Steinemann and Perren, 1977; Miyazaki and Others, 1998).

The first implant that resembled the modern dental implant configuration was designed by Strock in 1983 (Linkow and Dorfman, 1991; Burch, 1997). It was manufactured from cobalt-molybdenum alloy. Currently, for the past few decades, titanium and its alloys are the abundantly used metal in dental implantology (Patil, 2015); (Saini, 2015) . Due to its inertness, low elastic modulus (Graft and Rostoker, no date; Baumgarten, 2018), biocompatibility and resistance to change in oral fluids, pure titanium is mostly preferred as a dental implant biomaterial (McCracken, 1999; Elias et al., 2008; Niinomi and Nakai, 2011; Saini, 2015).

Non-metal materials started to be produced as dental implants, in order to improve the aesthetic aspects (Campbell, 1999). The first ever ceramic material used in implantology was aluminium oxide, owing to its good osseointegration properties (Jahnke and Plester, 1981; Albrektsson et al., 1983). The implant systems manufactured with aluminium oxide were used for immediate implantation in single tooth loss cases, especially in the areas of relatively weak forces like anteriors (Albrektsson et al., 1986; Oshida et al., 2010). The success of these implants was between 87% and 92.5%, in the follow-up examinations after 10 years (Albrektsson et al., 1983, 1986). Due to their inadequate mechanical strength, when subjected to occlusal forces, aluminium-oxide implants were discontinued (Roland-Taylor, no date). Though these implants were used in clinical practice earlier, another superior substitute ceramic material was introduced later ,the zirconium (Correia et al., 2013; Patil, 2015; Focsaneanu et al., 2017; Kaur, Sherrill and Duan, 2019; Kim and Lee, 2020). However, failures still exist in these materials in spite of the survival rates of these biomaterials (Rajaraman et al., 2018)

Methods To Determine Osseointegration: The implant stability can be measured by invasive or non-invasive methods namely, radiography (Nogueira et al., 2006; Atsumi, Park and Wang, 2007); (Rajaraman et al., no date; McFarland, 1954), cutting torque analysis (Friberg et al., 1995; Atsumi, Park and Wang, 2007), impact hammer method (Teerlinck et al., 1991; Wijaya et al., 2004), reverse torque test (Sullivan et al., 1996; Simeone, Rios and Simonpietri, 2016; Nallaswamy, 2017), insertion torque analysis (Tricio et al., 1995; Lages, Oliveira and Costa, 2018), pulse oscillation waveform (Meredith, 1998; Atsumi, Park and Wang, 2007) , percussion test (Dario, Cucchiaro and Deluzio, 2002; Vaidya et al., 2017) and resonance frequency analysis (Ersanli et al., 2005; Atsumi, Park and Wang, 2007; Deng et al., 2008). Radiograph is a noninvasive method but only when demineralization exceeds 40%, it detects the density change (Halse et al., 1994; Yang and Dutra, 2005; White and Pharoah, 2018).

The removal torque analysis is an invasive method that involves the disturbance of bone implant contact which was proposed by Roberts et al 1984 (Favero, Pisoni and Paganelli, 2007; Rittel, Dorogoy and Shemtov-Yona, 2018). The disadvantage is that it's a destructive method that can irreversibly harm the bone surrounding implant. Percussion test, pulsed oscillation waveform and implant hammer method are similar to principles used in periodontics, which are based on vibration, mechanical and acoustic signals (Meredith, 1998; Dario, Cucchiaro and Deluzio, 2002; Jung et al., 2003; Atsumi, Park and Wang, 2007; VanSchoiack et al., 2013; Nallaswamy, 2017). The best method uses resonance frequency analysis (RFA) that measures the implant stability quotient (ISQ), with values greater than 65 showing good osseointegration (Ersanli et al., 2005; Deng et al., 2008; Abrahamsson, Linder and Lang, 2009; Bafijari et al., 2019; Charatchaiwanna et al., 2019; Kastala and Ramoji Rao, 2019).

Osseointegration – Why The Prime Focus: Osseointegration is influenced by the surface properties and the surface chemistry of dental implants (Taché et al., 2004; Sul et al., 2009; Sartoretto et al., 2015). The bone-implant interface is the site where biological reactions occur. Studies have reported that the surface features of the implant material promoted the osteoblast cell proliferation and thus accelerated the process of osseointegration (Anselme, 2000; Osathanon et al., 2011; Song et al., 2013). Another study researched the biomechanical

property, biocompatibility and bioactivity of the Ti-Nb-Hf alloy, fabricated with a low Young's modulus as a dental implant biomaterial (Kim, Jeong and Choe, 2011; González et al., 2014). Some studies suggest that Ti-Nb-Hf implants have biological potential similar to cast pure titanium (cpTi), and they have remarkable osseointegration (Niinomi, 2003; Bai et al., 2016).

The biocompatibility of niobium, tantalum, hafnium and zirconium metals have been established with in vitro murine osteoblastic cell lines(Matsuno, 2001; Biesiekierski et al., 2012; Niinomi, Narushima and Nakai, 2015; Stenlund et al., 2015). To improve the biological behaviour of the titanium alloys, many modifications have been studied that include bioactive ions such as calcium(Ca), (Kizuki et al., 2010; Yamaguchi et al., 2010), zinc (Zn) (Yamaguchi et al., 2012) and strontium (Sr) (Yamaguchi et al., 2013; Cacciotti, 2017), that have enhanced the bone formation capacity (Gil et al., 2002; Zhang et al., 2013; Su et al., 2017; Vaishnavi Rajaraman, Dhanraj and Jain, 2018).

Coating Process: Various coating techniques exist in the field of implant manufacturing that are constantly being researched upon to enhance the regeneration of bone in the titanium bone implant interface (Pazo, Saiz and Tomsia, 1998; Gineste et al., 1999; Darimont et al., 2002; Nguyen et al., 2004; Bedi et al., 2009; Wen, 2015). These include physicochemical and biochemical coating techniques that are recently investigated (Lacefield, 1998; Roy, Bandyopadhyay and Bose, 2011; Xuereb, Camilleri and Attard, 2015). The purpose of these coatings over titanium surfaces is primarily to create a smooth transition from bony hard tissue to metallic implant surface (Keller et al., 1994; Wiskott and Belser, 1999; Bedzinski et al., 2010; Subramani, 2010; Bosco et al., 2012). The coatings should intend to form a physiological connection between the titanium surface and surrounding bone tissue and also replicate the organic and inorganic constituents of living bone tissue. In this way, the coated titanium implants aid to enhance strong integration by initiation of bone formation (Oates, 2001; Miron et al., 2010; Bosco et al., 2012; Kohal et al., 2013).

Many coating techniques have been investigated and implemented such as dry deposition, plasma spraying (Yang et al., 2000; Heimann and Lehmann, 2015; Xuereb, Camilleri and Attard, 2015); (Li et al., 2017), resonance frequency magnetron sputtering (Yokota et al., 2014; Das and Shukla, 2020), pulsed laser deposition (Garcia-Sanz et al., 1997; Czél, Teghil and Janovszky, 2003), ion beam assisted deposition (Ohtsuka et al., 1994; Yoshinari, Klinge and Dérand, 1996), biomimetic deposition (Rigo et al., 2004; Zhang, Leng and Xin, 2005; Fuming, Guoli and Xiaoxiang, 2008; Kim et al., 2011; Stefanic et al., 2012), sol-gel deposition (Lacefield, 1998), electrophoretic deposition and electrospray deposition (Yang et al., 2000; Heimann and Lehmann, 2015; Xuereb, Camilleri and Attard, 2015). The concept of type of coatings has drifted from a passive protecting layer in the 1980s to bioactive layers (Graber, 1982; Manero et al., 2002; Nogueras-Bayona et al., 2004). In recent times, plenty of coating techniques are being studied and this will be discussed in detail in our next section.

Latest Research on Coatings: The bone implant surfaces are increasingly added with biomolecules to fasten the process of healing of bone. To obtain the optimal therapeutic efficacy, these biomolecules need to be immobilized from the surface of implants (Gao et al., 2009; Bosco et al., 2012). For this purpose, a wide variety of biomolecules such as growth factors, bioactive proteins, enzymes, and non-viral genes (DNAs, RNAs) are currently being evaluated pre-clinically (Tonetti, Hämmerle and European Workshop on Periodontology Group C, 2008; Shimono et al., 2010; Quesada-García et al., 2012; Arya et al., 2019; Mohamed, El-Mohandes and El-Feky, 2019).

The Shift Towards Newer Biomaterial Coatings: The reason for the modification of dental implant surfaces with biomaterial coatings is to enhance the osseointegration and decrease the time required for healing (Taché et al., 2004; Javed et al., 2014; Wang et al., 2015; Wen, 2015)(Garcia-Sanz et al., 1997; Darimont et al., 2002; Rigo et al., 2004; Bosco et al., 2012); (Taché et al., 2004; Javed et al., 2014; Wang et al., 2015; Wen, 2015). The portion of the dental implant that comes in immediate contact with the surrounding living tissue is its surface. Various surface coatings have been tried, to modify the texture and bioactive properties for the improvement of osseointegration (Balla, Banerjee, et al., 2010; Stefanic et al., 2012; Yang et al., 2012; Tang et al., 2013). The principle mechanism of these types of coatings is on the lines of increase in the functional surface area of the implant available at the bone-implant interface for osseointegration which would consequently lead to efficient distribution of stress (Sykaras et al., 2000; Gardon and Guilemany, 2014; Sartoretto et al., 2015). The implant modifications can be achieved either by additive or subtractive methods.

The additive methods include the process in which other biomaterials are coated or impregnated, by adding onto the surface (Petrovic et al., 2012; Wang et al., 2016). Coatings like plasma sprayed titanium exhibit high roughness compared to machined surfaces (Cooper et al., 1999; Xie et al., 2005; Endres et al., 2008). Hydroxyapatite (HA) coatings decrease the healing period (Garcia-Sanz et al., 1997; Darimont et al., 2002; Rigo et al., 2004; Bosco et al., 2012). Subtractive techniques involve the procedure of removal of the layer of the surface of core material (Anil et al., 2011; Parekh, Shetty and Tabassum, 2012; Jemat et al., 2015; Mistry et al., 2016). This could be by various means like mechanical methods by shaping/removing, grinding, machining, or grit blasting via physical force (Wennerberg, 1996; Kim et al., 2014; Shemtov-Yona, Rittel and Dorogoy, 2014).

The chemical methods are by using acids or alkali solutions to change the surface roughness and to induce the wettability of the surface (Li et al., 2002; Zareidoost et al., 2012; Al-Radha and Al-Radha, 2016). Another method is the physical treatment such as plasma or thermal spray

(Wang, Khor and Cheang, 1998; Lavos-Valereto et al., 2001; Roy, Bandyopadhyay and Bose, 2011; Robotti and Zappini, 2019). Additionally, ion implantation (De Maeztu, Alava and Gay-Escoda, 2003; De Maeztu et al., 2007; Su et al., 2017), laser treatment (Lacefield, 1998; Hindy, Farahmand and Tabatabaei, 2017) and sputtering (Lacefield, 1998; Rigo et al., 2004; Yokota et al., 2014) are also sort for coating surfaces. Of the methods described, additive methods have been established as more effective for surface characterization. In our study, we employed a coating technique to achieve standardized results.

The behavior of modified surface on cells culture studies has revealed that an acid etched zirconia implant surface shows a significant improvement in cell proliferation (Langhoff et al., 2008; Kohal et al., 2013; Noro et al., 2013; Schünemann et al., 2019). Commercially pure titanium surface was blasted followed by two-step chemical treatment (acid-alkali) resulting in optimized surface topography (Parsikia, Amini and Asgari, 2012; Jemat et al., 2015; Moon et al., 2017). The cell bioactivity was improved and expected to have good osseointegration at an early stage. Titanium implant surfaces coated with bioactive glass were osseointegrated into host bone without any intervening of connective tissue capsue with high removal torque than uncoated titanium surfaces (Kim and Kwon, 1997; Bloyer et al., 1999; Moritz et al., 2004; Mistry et al., 2011) . Hydroxyapatite coatings integrate faster and they provide a combination of mechanical properties of the titanium and bioactivity of hydroxyapatite (Lacefield, 1998; Rigo et al., 2004; Bosco et al., 2012).

Calcium phosphate crystals within TiO2 layer are impregnated to the surface, in different thicknesses on the surface of titanium core material to enhance the osseointegration (Feng et al., 1999; Mendes, Moineddin and Davies, 2007; Reiner, Klinger and Gotman, 2011; Bosco et al., 2012). Nitride coatings by a process called plasma nitriding improves the mechanical strength, surface hardness and the corrosion resistance of the dental implant (Shi et al., 2012; Rizzi et al., 2014; Seo et al., 2017; Ozmeric et al., 2019). Fluoride treatment of implant surface causes formation of soluble TiF4 that accelerates the osseointegration (Le Guéhennec et al., 2007; Surender et al., 2011; Dahiya, Shukla and Gupta, 2014; Barfeie, Wilson and Rees, 2015) . Recently, bioactive drugs including bisphosphonate , simvastatin and antibacterial coatings like gentamicin and tetracycline are being researched upon (Chudzik et al., 2006; Le Guéhennec et al., 2007; Wennerberg et al., 2013). Thus, the surface treatment is used not only to maintain the existing properties of the implants but also to enhance several behaviours as required by dental applications particularly in improving the healing process.

New Metal - Hafnium: Hafnium also called 'Hafnia' was first discovered by Dirck Coster and Georges de Hevesy in Copenhagen, 1923 (Coster and Hevesy, 1923). The word is Latin for Copenhagen. It is found in nature along with Zirconium as a mineral ore called zircon ('PHYSICAL PROPERTIES OF ZIRCONIUM AND HAFNIUM', 1970; Mukherji, 2013). The main mineral where it is found is zircon, with a ratio of Hafnium/Zirconium of about 2.5% (Predel, no date). The ideology behind introduction of this material is its position in the periodic table of elements. The metal Hafnium belongs to the same group (Group 4) as titanium and zirconium and is in the period (Period 5) as tantalum of the periodic table of elements. Considering the common properties of a group in periodic table, hafnium seems to possess ideal properties for dental implants.

Hafnium is a passive metal , with no reactiveness in body fluids. It has various mechanical advantageous properties like strength, high ductility, chemical inertness, resistance to corrosion and mechanical damage ('PHYSICAL PROPERTIES OF ZIRCONIUM AND HAFNIUM', 1970). Owing to its good biocompatibility and osteogenic capability, hafnium has been suggested as a potential biomaterial for orthopaedic applications. Hafnium has also been used as an alloying element in various metals like iron, titanium, niobium etc. It also finds use as a control material for nuclear reactors and as an alloying element in some super alloys used in aircrafts engines (Risovany, Klochkov and Ponomarenko, 2001); (Ruane and Storm, 1959).

CONCLUSION

In attempt to replace a missing tooth, apt selection of the implant biomaterial is a significant factor for long term success of implants. The implants should be selected in such a manner so as to minimise the negative biologic response while maintaining acceptable function. Research has shown promising results for hafnium as a biocompatible material. These studies were mostly in vitro and animal studies. Although this remains proven, little evidence is available on its osseointegration properties of hafnium and its behaviour in the intraoral environment. Thus, further studies of hafnium coating under biological conditions are needed in order to determine the suitability of this material, as a surface coating for biomedical applications.

ACKNOWLEDGEMENTS

I/We hereby acknowledge the valuable contribution of all author/s in the present research. I would also like to acknowledge Saveetha Dental College and Hospital for their support in collecting the necessary evidence and constant help and support throughout the process.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-326-331

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Age And Reason for the First Dental Visit of Children in Chennai City- A Survey

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ABSTRACT

According to The American Academy of Paediatrics and the American Academy of Paediatric Dentistry, a child's first dental visit should be during the child's first year of life for prevention of dental disease and to decrease the invasive restorative interventions. Hence, this study aims to evaluate the age and reason for the first dental visit of a child. A total of 100 children were examined in a cross- sectional study for the age of the child and the reason for their first visit to a dental clinic.A questionnaire was applied to the parents. From the study,it is observed that most of the first dental visit of a child is due to pain-which is 67%. Regarding the age of the first visit, about 58% of the participants responded that they had a consultation done for their child at age of 2-4years. Only 51% of parents consider primary teeth important for the eruption of secondary dentition. Thus, from the present study, it is evident that most of the child's first dental visit is due to pain from caries progression and the age at which they visit revolves around 2-5 years of age. Awareness of parents regarding dental check ups and treatment remains low.

KEY WORDS: AGE, CARIES, EARLY CHILDHOOD CARIES, FLUORIDE, PAIN.

INTRODUCTION

The age at which children receive their first dental care is of at most importance and the reason for the visit varies greatly and also might depend on many factors, like socio economic status, Locality, level of education, etc (Mathew et al., 2020; Mathew, Roopa and Soni, 2020; Mathew, Soni and Khan, 2020). The major academies of dentistry have stated the recommended age for a child's first dental visit. For years, the recommended age was around one year of age but it has been altered recently to a more general timeframe: the period between 6 months of age and the eruption of the first tooth (Ravikumar and Gurunathan, 2016).

To children, the first experiences will always be reference to the following and, for this reason, the first dental experience should be driven as comfortably as possible to avoid any chances of psychological traumas, leading to difficulties during treatment ((Mathew, 2020a, 2020b)). Thus, the first dental visit should be part of a general health program, providing preventive information and orientation to the parents as early as possible to improve their lifelong oral health, also the choice of dentist's attire influences a child's view of the dentist (Ravikumar and Gurunathan, 2016).

Early childhood caries is the most common health status of a child (Braun et al., 2017) Early childhood caries (ECC) is the terminology that is used to describe any

ARTICLE INFORMATION

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Received 27th July 2020 Accepted after revision 20th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/158

presence of decayed, missing or restored teeth in the primary dentition of children younger than six years old. It is considered one of the most prevalent diseases in childhood, affecting 50 to 90% of children globally (Mathew, 2020a). Early childhood caries are associated with pain and tooth loss as well as impaired growth, decreased weight and negative effects on speech (Khani-Varzegani et al., 2017).

Though fluoridated toothpaste and the use of fluoride in various forms are effective in caries prevention, ECC is still prevalent among children in public in both developing and developed countries. Untreated decayed teeth can cause disturbed sleep, difficulties in eating and a child's overall growth and development (Duangthip et al., 2017). Early childhood caries can be associated with lot of risk factors which include high levels of bacterial colonisation, frequent intake of dietary sugar and carbohydrate, inappropriate bottle feeding, low saliva flow rates, developmental defects of tooth enamel, previous caries, lack of access to dental care, low community water fluoride levels, in- adequate tooth brushing or use of fluoride-containing toothpastes, lack of parental knowledge regarding oral health, and maternal risk factors (Kilinc, Uzuner and Karaman, 2016).

The International Federation of Dentistry (FDI) reported that ECC is one of the main reasons for school absence in several countries. It can progress rapidly, resulting in pain and infection and affecting a child's oral health related quality of life (Grzesiak-Gasek and Kaczmarek, 2016). The American dental association recommends that to avoid oral cavity diseases, individuals should floss and brush at least for once in a day and also to visit the dentist regularly (Narayanan, 2017) According to WHO, a dental health program should include dental education in conjunction with other activities related to prevention, restoration and emergency attention (Cadavid, Lince and Jaramillo, 2010). Although at present there is an increase in the knowledge of dental caries, regarding both its causes and prevention, the implementation of preventive measures regarding the same has not raised significantly. Therefore, in most cases, a child's first visit with the dentist takes place only if tooth decay has been noticed.

The primary goals for recommending early visits to a dentist is to prevent early childhood caries (ECC) and to detect and arrest the progression of any incipient carious lesion. Other goals such as educating parents about proper oral hygiene for infants and toddlers, the use of fluoride, oral habits, teething management, can also be done to maintain a proper oral hygiene of the child (Cui et al., 2016). Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years (Govindaraju, Jeevanandan and Subramanian, 2017a, 2017b; Panchal, Gurunathan and Shanmugaavel, 2017; Ravikumar, Jeevanandan and Subramanian, 2017; Jeevanandan and Govindaraju, 2018; Nair et al., 2018; Ravikumar et al., 2018, 2019; Ravindra et al., 2018, 2019; Subramanyam et al., 2018; Vishnu Prasad et al., 2018; Jeevanandan, Ganesh and Arthilakshmi, 2019; Ramadurai et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Veerale Panchal, Jeevanandan and Subramanian, 2019; Vignesh et al., 2019; V. Panchal, Jeevanandan and Subramanian, 2019; Samuel, Acharya and Rao, 2020). With this inspiration we planned to pursue research on age and reason for the first dental visit of children in Chennai city. Thus, the aim of this paper was to determine the reason and age of the patient during the first dental visit and also to determine the risk factors associated with it.

Table 1. Table showing the Questionnaire which was distributed to the respondents.

QUESTIONNAIRE
1.REASON FOR THE VISIT
1) Due to pain (Y/N)
2) For check up only (Y/N)
3) Orthodontic purpose (Y/N)
4) Dental trauma (Y/N)
HABITS AND ROUTINE
2. Oral hygiene habits-
i) Brushes once a day
ii) Brushes twice a day
3. Eating habits-
5) High carbohydrate contents
6) High calorie contents
7) Balanced diet
4. AGE OF THE PATIENT
i) 6months-2years
ii) 2-4years
iii) 4-7years
5. How important is the primary tooth according to you?
i) 25%
ii) 50%
iii) 75%
iv) 100%
6. Are you aware of space maintainers in case of early shedding of teeth?
i) Yes
ii) No
7. Are you aware about myofunctional appliance
i) Yes
ii) No

MATERIAL AND METHODS

The study was initiated after obtaining ethical approval from the institutional ethical committee. A total of 100 children living in the urban area of Chennai, Tamilnadu, were examined in a cross- sectional study for the age of the child and the reason for their first visit to a dental clinic. A questionnaire was given to the parents or legal

guardians of the children to determine the variables related to oral hygiene, eating habits, level of motivation for first dental appointment and systemic medication.The questions listed was about the health, eating habits, oral hygiene of the child and awareness of parents regarding dental procedures and dental dental treatment.

Data analysis: The collected data was tabulated in Excel sheet and were imported into SPSS software version 23. Chi square test was done. The level of significance was set at 0.05.

Figure 1: Pie chart showing the reason for the first dental visit of children. It is observed that the majority of the patients have visited due to pain (gold) followed by check up (blue) and orthodontic purpose (green).

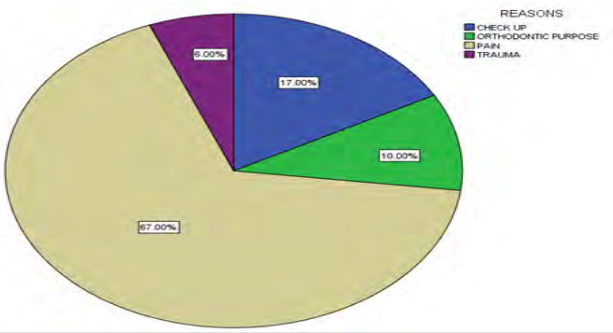
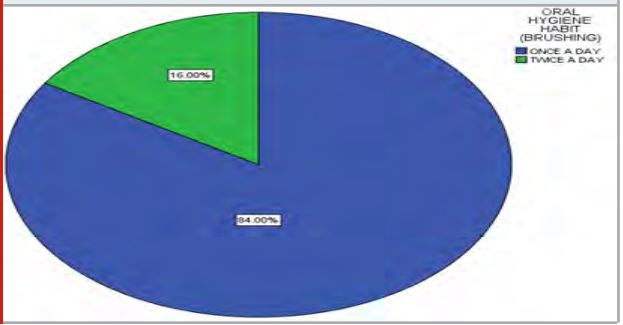


Figure 2: Pie chart showing oral hygiene habits of the patients. It is observed that the majority of the patients brush only once a day (blue).



RESULT AND DISCUSSION

From the study, it is evident that most of the first dental visit of a child is due to pain-which is 67%. There were only a few participants who stated other reasons such as for check up - 17% and for orthodontic correction of dentition-10% and for regular dental check up -6% (Figure 1). About 84% of the participants responded that their children brush once in a day (Figure 2). Regarding the dietary habits of the child, most children fall into the category of high calorie intake (53%) (Figure 3). Regarding the age of the first visit, about 58% of the participants responded that they had a consultation done for their child at age (range) of 2-4years (Figure 4). Only 51% of the parents consider primary teeth as hundred percent important for the eruption of secondary dentition (Figure 5). Regarding the awareness on space maintainer (Figure 6) and myofunctional appliance (Figure 7) was little on the lower side. Association between age of first visit and reason of visit showed that patients at age group 2-4years had visited for trauma management (6%), for pain (45%) and for regular dental check up (7%) for which the P value was found to be statistically significant (p-0.000) (Figure 8).

Figure 3: Pie Chart showing the eating pattern of the patients. It is observed that the majority of the patients have a high calorie diet (green) followed by a high carbohydrate diet (gold) and healthy diet (blue).

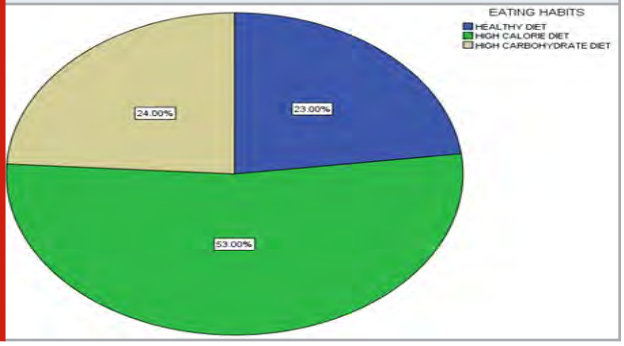


Figure 4: Pie chart showing the age of first visit of the patient. It is observed that the majority of the patients have visited at 2-4 years (blue) followed by 4-7years (green) and 6months-2years (gold)

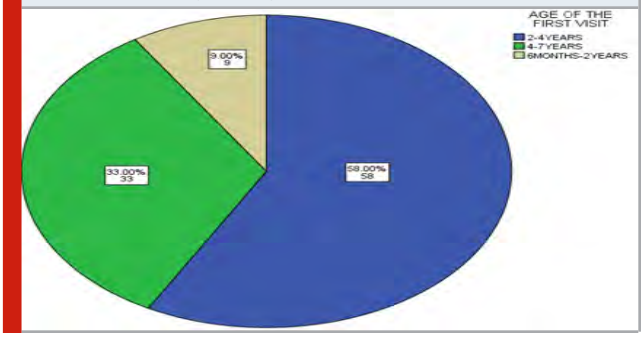


Figure 5: Pie chart showing awareness on the importance of primary teeth among parents. It is observed that only half of the total sample (blue) considers primary tooth to be 100% important.

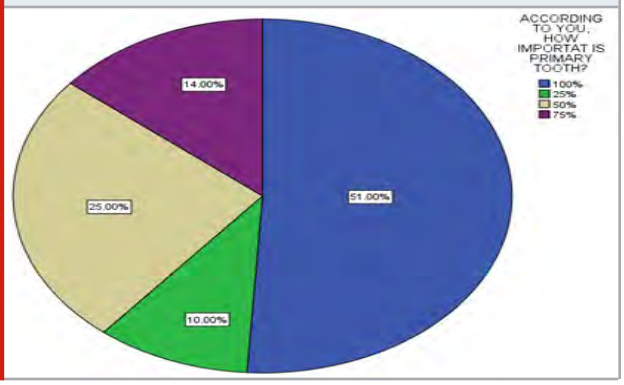


Figure 6: Pie Chart showing awareness on space maintainer among parents. It is observed that the majority of the parents are unaware of it (blue).

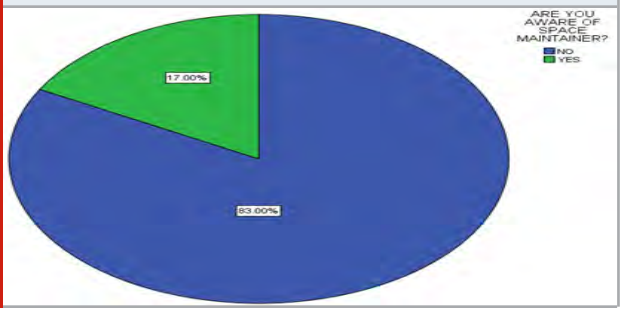


Figure 7: Pie Chart showing awareness on myofunctional appliance among parents. It is observed that the majority of the parents are unaware of it (blue).

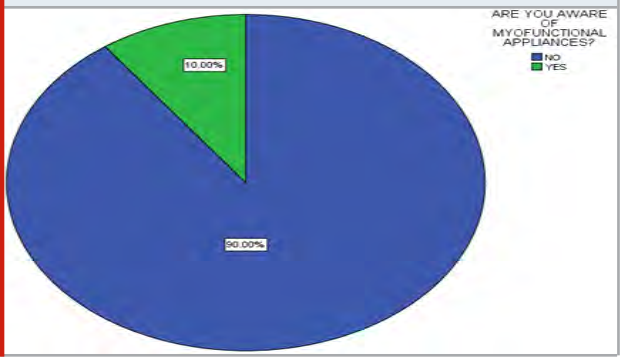
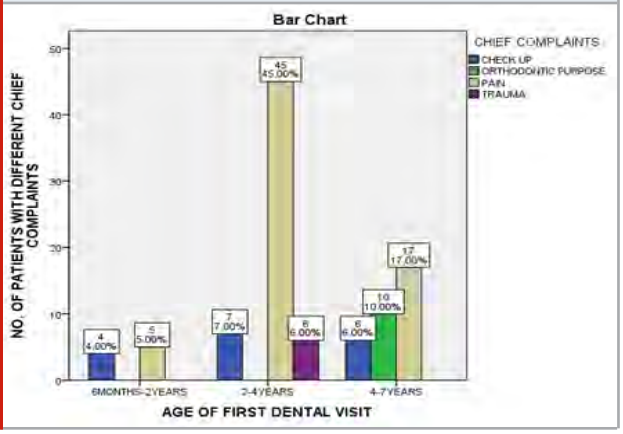


Figure 8: Bar graph showing association between age of first visit of the patients and reason of the visit. The X axis shows age of the visit and Y axis shows number of patients with different chief complaints. It is observed that patients at the age group 2-4 years had visited for pain (gold), trauma(purple) and check up (blue) and patients at age 4-7 years visited for orthodontic treatment also (green). This association was found to be statistically significant (p-0.000).



From the present study, it is observed that most of the first dental visit of a child is due to pain-which is 67%. Regarding the age of the first visit, about 58% of the participants responded that they had a consultation done for their child at age of 2-4years. Regarding the awareness of myofunctional appliance and space maintainer was little on the lower side. About 84% of the participants responded that their children brush once a day. Only 51% of parents consider primary teeth important for the eruption of secondary dentition.

In the study conducted by Heather Beil, et al, North Carolina Medicaid sample, children who had a dental visit by age 24 months had similar numbers of teeth affected with dental caries at the time they were examined in kindergarten as children who had a visit at age 24 to 36 months, but higher rates of disease than those who had a visit at age 37 to 60 months. However, children who had a visit with 2 or more treatments before 24 months had the same rate of disease as children who had visits with 2 or more treatments at older ages (Beil et al., 2012). In the study by Fatemeh Khani-Varzegani et l, only 15.2% of preschool children had decay free teeth, that is 17.2% boys and 13.1% girls. The study conducted by Lahore et al, showed a 33.3% prevalence of caries in 3 years children, 47.6 and 75% in 4 and 5-year-olds (Khani-Varzegani et al., 2017).

In the study by Ebtissam et al, Most of the children in the current study visited dental clinics for the first time between the ages of 3 and 5 years. (Murshid, 2016). In the study conducted by Leili Shafie et al showed that the majority of children (65.6%) had pain following pulpotomy and SSC placement irrespective of the pulpotomy agent used (Shafie, Barghi and Parirokh, 2017). Luzzi et al. reported that 56.4% of the children who received pulpotomy with formocresol and SSC reported pain following the treatment that is comparable with the results of the present study indicating 65.6% post-treatment pain following the same procedure (Luzzi et al., 2017). In the study conducted by Volpato et al, the search for caries/treatment also increased with age, responding for 0% at ages 0–6 and 7–12 and increasing until reached 48.3% of the reasons why parents of infants aged 31 to 36 months seek dental attendance (Volpato, Palti and de Oliveira Lima, 2013)

In the study, conducted by Dulgergil et al, ECC was identified among 38 children representing 27.7% of the sample. The most common type of ECC was pre-cavitated caries which affected 22 children (16.1%), followed by cavitated caries which affected 15 children (10.9%) (Dülgergil et al., 2013). In the study conducted by Alexandra Saldarriaga Cadavid et al, The results revealed severe early childhood caries at the d2d3 level in 332 (74.3%) children, and at the d5d6 level in 88 (19.7%) children. Only a quarter of the children were dental caries-free (Cadavid, Lince and Jaramillo, 2010). In the study conducted by Fan C et al, more than 70 % of the ECC children in this study had dental visit history. The results of the study suggest that most children visit a dentist only after caries were developed (Fan et al., 2016). In the present study, insufficient percentages of parents sought initial dental care for their children for preventive reasons, such as check-up. These results demonstrate a clear lack of dental knowledge and unawareness of

the significance of primary dentition among parents of the study participants. Thus, the awareness regarding a child's first dental visit and the importance of primary teeth must be enhanced among parents.

CONCLUSION

Thus, from the present study, it is evident that most of the child's first dental visit is due to pain from caries progression and the age at which they visit revolves around 2-5 years of age. Awareness and knowledge of parents regarding dental check ups and treatment remains low.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-332-337

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Evaluating Parents' Fear and Anxiety Towards Children Undergoing Chair Side and General Anesthesia Treatment Procedures - A Survey

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ABSTRACT

The anxiety levels of parents is usually greater in children undergoing dental procedure due to the invasive procedures. General anaesthesia is generally advised in case of extensive dental decay or subsequent referral to general anaesthetic extraction. Parents usually feel that when their child is on GA, the procedure is more invasive and life threatening to that of the chair side procedure. This study is conducted to assess the anxiety of parents when their child undergoes a local anaesthetic procedure and a GA procedure. A simple closed ended questionnaire was provided to the parents of patients in the Pedodontics Department of Saveetha Dental College. A sample size of 50 was chosen. 80% of the parents preferred local anaesthesia to general anaesthesia. Within the limitations of the study it was found that the majority of the parents preferred local anesthesia and preferred general anesthesia only under given conditions, such as in case of trauma or minor surgery.

KEY WORDS: GENERAL ANAESTHESIA, LOCAL ANAESTHESIA, CHILDREN, DENTAL TREATMENT, FEAR.

INTRODUCTION

Operative procedures in dentistry are controlled with the use of anaesthesia to a large extent (Haas, 2002). Anaesthesia are drugs that produce reversible loss of sensation. Dentists are professionals who use anaesthesia due to the invasive dental procedures done. Children are prone to dental caries and experience pain. Dentists, to overcome this pain during dental procedures inject anaesthesia so that the procedure can be done without any pain and the patient is co-operative as well. Dental caries, commonly known as tooth decay, is a bacterial breakdown of the tooth (Vellingiri and Gurunathan, 2015). The cavities may vary from yellow to black depending upon the amount of dentin being affected and the type of caries. In a study which was in rural India, it was found that Caries was high among children (Gangwar et al., 1990; Khera, Tewari and Chawla, 1996; Rao, Sequeira and Peter, 1999; Chatufale and Goyal, 2002; Mathew and Soni, 2019). It was also found that the age group 8 to 10 years showed higher caries than age group 6 to 7 years. Poor oral health, particularly in children with chronic illness, can prove to be a risk factor for severe, even life threatening complications.

Good oral hygiene is utmost important for efficient mastication, aesthetics and for speaking ((Mathew, Roopa, et al., 2020; Mathew, Samuel, et al., 2020). If the caries is not treated at an earlier stage then it subsequently leads to the loss of tooth structure, pain and infection

ARTICLE INFORMATION

*Corresponding Author: mebingeorgem.sdc@saveetha.com
Received 2nd Aug 2020 Accepted after revision 25th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/159*

leading to invasive procedures (Foster and Fitzgerald, 2005). If the caries is left untreated due to negligence, it may eventually result in aggravated problems such as pain, suffering, odontogenic infection, early loss of teeth and space loss that might later on require more invasive, extensive and expensive treatments (Low, Tan and Schwartz, 1999; Thomas and Primosch, 2002; Anderson, Drummond and Thomson, 2004; Ratnayake and Ekanayake, 2005; Nagaveni, Poornima and Bajaj, 2019; Mathew, Soni and Khan, 2020; Nagaveni, Poornima and Mathew, 2020). The stages for the development of dental fear occurs in children during childhood and adolescent years (Ost, 1987; Milgrom et al., 1988; Locker et al., 1999).

Therefore, it is important that children develop a positive attitude towards dentistry((Neena et al., 2017; Mebin George Mathew, 2020). An objective of dental care is to lead children step-by-step through the provision of dental care. Dental care for children is usually carried out by the use of behavioural management techniques coupled with the use of local anaesthesia (Nagaveni, Yadav and Poornima, 2017). However, the various behaviour management techniques used must be tailored to the individual patient and practitioner. When techniques fail or when treatment needs are extensive, general anaesthesia or dental care in children is sometimes necessary to provide safe, and effective treatment(Mebin George Mathew, 2020; M. G. Mathew, 2020). General anaesthesia are agents which when administered induce various degrees of analgesia, depression of consciousness, circulation, and respiration; relaxation of skeletal muscle; reduction of reflex activity; and amnesia (Olsson and Hallén, 1988; Morita et al., 2001). General anaesthetics are of two types, namely inhalation and intravenous. From the previously conducted studies, it can be inferred that there is a higher pre-operative mortality rate in children compared with adults.

Local anaesthesia are the agents that block nerve conduction when administered locally to nerve tissue in appropriate concentrations. The drugs act on any part of the nervous system and also on every type of nerve fiber. When in contact with a nerve trunk, these agents can cause both sensory and motor paralysis in the innervated area. The action of local anaesthetic is completely reversible (Brunton, Chabner and Knollman, 2011). Adverse effects of local anaesthesia includes- anaesthetic toxicity, postoperative soft tissue injury, allergic reactions, and paresthesia . Parents' opinion on the anaesthesia to be administered on their children and the reason for their preference is to be evaluated (Luong, 2010). Generally, local anaesthetic is only administered during a chair side procedure which is simple. But when there are complications or a lot of treatment needed to be done to a very young patient or a patient who is uncooperative, general anaesthesia is administered. The opinions of the parent of the patient is important as the parents are well aware and educated about the approaches in the medical field. Hence it is important to get the consent from the parent (Haas, 2002).

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years (Govindaraju, Jeevanandan and Subramanian, 2017a, 2017b; Panchal, Gurunathan and Shanmugaavel, 2017; Ravikumar, Jeevanandan and Subramanian, 2017; Jeevanandan and Govindaraju, 2018; Nair et al., 2018; Ravikumar et al., 2018, 2019; Ravindra et al., 2018, 2019; Subramanyam et al., 2018; Vishnu Prasad et al., 2018; Jeevanandan, Ganesh and Arthilakshmi, 2019; Ramadurai et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Veerale Panchal, Jeevanandan and Subramanian, 2019; Vignesh et al., 2019; V. Panchal, Jeevanandan and Subramanian, 2019; Samuel, Acharya and Rao, 2020). With this inspiration we planned to pursue research on evaluation of the anxiety of parents while doing a clinical procedure under local anaesthetic and general anaesthetic.

MATERIAL AND METHODS

A simple questionnaire was prepared which was given to the parents of the children undergoing a dental treatment. The questionnaire was close ended with simple yes/ no answers. A sample size of 50 was taken. Parents of patients who had come to the Pedodontics Department of Saveetha Dental college were chosen. An informed consent was taken from these parents before taking part in the survey. The survey also had basic demographic detail of the participants.

QUESTIONNAIRE:

Parent's Name: Gender:
Parent's contact number:
Age:

1. Kind of pain you expect your child to have while administered with general anaesthesia .
a) Mild
b) Moderate
c) Severe
d) No pain
2. Do you prefer general anaesthesia when the child is not co-operative
a) Yes
b) No
3. Does your child have fear of medical treatments
a) Yes
b) No
c) Don't know
4. Do you want the child not to cry during medical procedures?
a) Yes
b) No
5. I prefer general anaesthetic during trauma
a) Yes
b) No
6. Do you prefer administration of general anaesthesia/ local anaesthesia for the treatment?
7. Do you prefer general anaesthesia in case of minor surgery?
a) Yes

b) No
8. After local anaesthesia, the kind of pain I expect my child will be having
a) Mild
b) Moderate
c) Severe
d) No pain at all
9. Expect my child to be drowsy
a) Yes
b) No
10. Expect my child to have sore throat
a) Yes
b) No

RESULTS AND DISCUSSION

Of the 50 parents who took the survey, it was found that 23 participants were males and 27 were females. 34% of participants aged between 21-25 years were females, 18% of participants aged 26-30 years were males and 4% of participants in the age group of 31-35 years were females. (Figure 1) From this survey , it was found that 40% of the parents believed that there will be no pain induced to the child when given a general anaesthesia. 60% of the parents also preferred general anaesthesia when the child was not co-operative. About 20% of the parents didn't know if their child fears treatment as it was the first dental visit of the child. It was also found that 60% of the parents agreed on the administration of general anaesthesia during trauma and 80% preferred while undergoing minor surgery. It was found that 80% preferred local anaesthesia for dental procedures as it would cause much lesser side effects and also that the child will be co-operative under local anaesthesia. 20% of the parents believe that their child will have moderate pain on administration of local anaesthetic. 50% of the parents felt that their child would be drowsy after the administration of general anaesthesia and 60% believed that their child will have sore throat. (Table 1)

Figure 1: Bar graph shows association between age and gender of participants who took up the survey. X-axis denotes age of participants and Y-axis denotes number of participants in each gender. It was found that females (blue) were more in the age group of 21-25 years and males (31-35 years) were more in the age group of 31-35 years. P value is 0.337, hence statistically not significant.

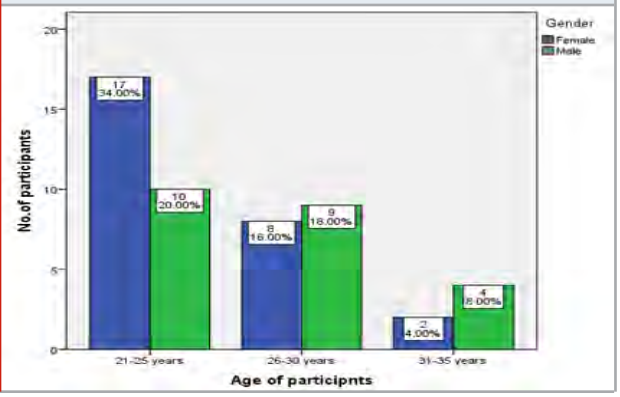

Table 1. Table showing the responses given by the participants to the questionnaire.

Question	Results
1. Kind of pain you expect your child to have while administered with general anaesthesia	Mild – 30% Moderate-30% Severe- No pain-40%
2. Do you prefer general anaesthesia when the child is not co-operative	Yes-60% No-40%
3. Does your child have fear of medical treatments Don't know-20%	Yes-40% No-40%
4.Do you want the child not to cry during medical procedures?	Yes-50% No-50%
5. I prefer general anaesthetic during trauma	Yes-40% No-60%
6. Do you prefer administration of general anaesthesia/ local anaesthesia for the treatment?	General anaesthesia-20% Local anaesthesia -80%
7. Do you prefer general anaesthesia in case of minor surgery?	Yes-80% No-20%
8. After local anaesthesia, the kind of pain I expect my child will be having	Mild-40% Moderate-20% Severe-No pain-40%
9. Expect my child to be drowsy	Yes-50% No-50%
10. Expect my child to have sore throat	Yes-40% No-60%

Dental caries is common in children aged less than 6 years. It is a rapid and progressive disease that can be painful and increases the likelihood of poor child growth, development and social outcomes (Resine, 1985; Gift, Reisine and Larach, 1992; Hollister and Weintraub, 1993; Coté et al., 2000; Edelstein, 2000; Acs et al., 2001).[20-25] It has been found that by 5 years of age approximately 30% of children have had one or more teeth with dental decay, of which approximately 7% of the children required urgent care, in Canadian surveys. In a study conducted by Sutharshana et al, it was found that 97% of the parents preferred local anaesthesia over general anaesthesia for their child's dental treatment (Vellingiri and Gurunathan, 2015).

In a study conducted in 1992, statistics have been shown that 39% of emergency dental visits were in the Dental Department of Montreal Children's Hospital were due to severe dental decay and 70% of these visits were children in the age group of 1 to 5 years. The same age group contained 70% of the cases with toothaches and 48% of the cases with dental infections caused by dental caries in a study conducted by Schwartz (Schwartz, 1994). Surveys have found that 30% of children have had dental caries

in one or more teeth , and 7% of these children required urgent treatment.

The satisfaction of parents plays a major role in the healthcare domain, With the growing awareness of the parents due to the availability and ease of accessibility of information It is important for the dental care professionals to understand that parents visit a dentist to get relief from the physical discomfort of their child's dental pain and to treat the obvious dental disease and therefore agree for the general anesthesia to carry out dental procedures.

The physicians indicated in a study that was conducted in 2008, that socioeconomic status and educational qualification of the patient did affect their clinical management decisions. Hence, physicians had to commonly make changes to their management plan in an effort to increase the efficiency of the treatment outcomes, but they experienced numerous strains when trying to balance what they believed was feasible for the patient with what they perceived as established standards of care (Bernheim et al., 2008). Thus, the socioeconomic status and educational qualification of the parents plays a major role in treatment decisions and outcome for their children's medical care.

A study conducted on parental educational and children's health shows a strong positive association between parental socioeconomic status and child health. In this study on parent's preference to general or local anesthesia, parent's socioeconomic status was also and most of the parents who participated in this study consisted of upper lower class and they preferred local anesthesia generally for the dental treatments and preferred general anesthesia only under specific conditions.

CONCLUSION

Within the limitations of the study it was found that the majority of the parents preferred local anesthesia and preferred general anesthesia only under given conditions, such as in case of trauma or minor surgery. The opinion of the parents can be altered according to the behaviour of the child, and irrespective of this, the procedure should be explained to the parent and other members of the healthcare team to prevent miscommunication and parental dissatisfaction. The ultimate goal of paternalistic dental treatment achieving positive behavior of the child and delivering safe and quality dental treatment.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-338-344

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Research Communications

Awareness of Laser Dentistry Among Undergraduate Dental Students

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ABSTRACT

Lasers can make dental treatments more efficient, more cost-effective and more convenient. Laser dentistry has been approved by the Food and Drug Administration (FDA), as a treatment option for several dental conditions. The word LASER stands for "light amplification by stimulated radiation emission." The instrument produces light energy in a very small, centered beam. This laser light causes a reaction when it hits tissue which allows the tissue to be removed or formed. Lasers in the field of dentistry have wide scope in treating certain dental conditions, but majority of the laser treatments are used in aesthetic procedures. The aim of the study is awareness of laser dentistry among undergraduate dental students.A comprehensive cross-sectional study was conducted among 104 undergraduate dental students. A self-administered, close-ended questionnaire has been created and distributed among college students to learn about their knowledge about Laser Dentistry. 50% of the undergraduate students were aware about Laser dentistry. From the above results the following conclusion can be drawn that most of the students have a basic idea about what a laser is and its uses in dentistry but they are not aware of types of lasers.

KEY WORDS: LIGHT AMPLIFYING DEVICE; HARD TISSUE; SOFT TISSUE; DENTISTRY; WAVELENGTH.

INTRODUCTION

The word LASER stands for "Light Amplification By Stimulated Radiation Emission." The instrument produces light energy in a very small, centered beam. This laser light causes a reaction when it hits tissue which allows the tissue to be removed or formed(Graeber, 2006). The first laser was invented in 1964, where it eventually had many modifications with a desire to implement in various fields like Defence, Scientific Research, Industries, Civil Constructions and Medical purposes(Dostálová and Jelínková, 2013). From the last three decades there was an evolution of lasers in the field of medicine within the disciplines of Ophthalmology, Dermatology and General surgery. In 1989 the lasers were introduced in dental treatments and it became commercially used for procedures in clinical dental practice(Pradhan, 2017).

History of lasers in dentistry: Lasers were first introduced by Prokhoruv, Maimen & Towens with their first innovation of gas laser in the year 1961. Now lasers are widely used in dentistry. Laser was first brought into dental practice in 1989 Drs. William and Terry Myers and they modified an ophthalmic Nd:Yag (Yttrium aluminum garnet) laser for dental use(Shih, 2012; Mahajan, Srivastava and Coluzzi, 2017). In 1960, laser was first introduced in dentistry,

ARTICLE INFORMATION

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Received 1st Aug 2020 Accepted after revision 21st Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/160

Later Gelskey S C introduced Nd;Yag laser which can be used for dentine hypersensitivity and lasers for cavity preparation was introduced in 1993. CO2 and argon lasers were introduced in the year 1994. Laser weider was introduced in 1996. Yttrium aluminum perovskite (Nd: YAP) was introduced in 1997 and finally in the year 1998, Er : YAG hard tissue or osteotomy laser was introduced(Miserendino and Pick, 1995).

Lasers in the field of dentistry have wide scope in treating certain dental conditions, but the majority of the laser treatments are used in aesthetic procedures(Rechmann, Goldin and Hennig, 1998). Laser dentistry potentially offers a more comfortable treatment option compared to drills and other non-laser tools for a number of dental procedures involving hard or soft tissue. Laser dentistry is used in a number of treatments, including: dentinal hypersensitivity, treatment of tooth decay, treating periodontal diseases, teeth whitening etc, advanced procedures involving surgical implantology, soft tissue contouring in fixed dental treatments, hard tissue treatment in restorative dentistry and soft tissue contouring/incisions in Oral surgery.

Lasers can make these dental treatments more efficient, convenient and cost-effective. The use of Lasers dentistry has also been approved by the Food and Drug Administration (FDA), as a treatment option for several dental conditions(Yamamoto, Atsumi and Kusakari, 1989). It is worth noting that the American Dental Association (ADA) has yet to do so at this time, although they are hopeful about the field's potential. The two principal types of lasers available for the procedures in dentistry are hard tissue and soft tissue lasers. Hard tissue is the teeth, and soft tissue is the gums(Mahajan, Srivastava and Coluzzi, 2017).

Laser effects on tissue: Light focussed by lasers on tissue might get reflected, absorbed, scattered throughout the tissue or transmitted into the tissue. Reflected light usually bounces off the tissue surface and is directed outwards. Scattered light bounces within the tissue(Zein, 2017). The absorption property of lasers is responsible for thermal effects within the tissue and transmission of light irradiates the surrounding tissue. So the primary beneficial goal of lasers is absorption of light. There are two photo biologic effects possible while using dental lasers, they are photothermal and photochemical(Ramos et al., 2015).

1. Photochemical effects that lasers produce to stimulate chemical reactions, such as composite resin healing. These can also induce a breakdown in chemical bonds, such as during the photodynamic therapy phase.
2. Photo ablation-When a laser is absorbed it raises the temperature and produces photochemical effects depending on the tissue's water content. When the temperature is ex 100°(Freitas et al., 2015).

Fluorescence of the tissue-used as a diagnostic method for the detection of light reactive substance in tissue. So, e.g. Diagnodent 4 for detection of caries. Vaporization & Carbonization-Proteins begin to denature at temperatures below 100 ° C but above nearly 60 ° C, without vaporizing the underlying tissue. On the other hand, the tissue is then burnt at temperatures above 200 ° C, resulting in carbonisation(Ramalho et al., 2015).

Classification

Lasers are generally classified into 4 types based on their wavelength and power output.

Class 1: Viewing with the nakied eye. Examples include CD players and caries detection.

Class 2: This can be viewed using both naked eye and magnification. For example laser pointers.

Class 3: These are laser measuring devices. Example: soft medical lasers.

Class 4: These are high powered industrial, scientific, military, surgical lasers. All surgical lasers used in dentistry and oral and maxillofacial surgery lasers have been included(Jablonski-Momeni et al., 2019).

Table 1. Applications in dentistry

S.No	LASER TYPE	APPLICATION
1.	Carbon dioxide	Incision of soft tissue and de-epithelialization of gingival during periodontal regenerative procedures.
2.	Neodymium: Yttrium aluminium garnet	Incipient caries removal and soft tissue incision and ablation.
3.	Erbium: Yttrium-aluminium garnet	Caries removal, cavity preparation, root canal preparation and U.S. FDA clearance for use of melting or alteration of the calcium.
4.	Erbium, Chromium: Yttrium- selenium-Gallium Garnet	Enamel etching, caries removal, cavity preparation, cutting bone in vitro without burning, and melting or alteration of calcium: phosphorus ratio in root canal preparation.
5.	Argon	Curing resins, soft tissue incision and ablation and also used in bleaching.
6.	Holmium: Yttrium Aluminium- Garnet	Soft tissue incision and ablation
7.	Gallium Arsenide (or diode)	Soft tissue incision and ablation

Now coming to the classification based on content of active media, wavelength spectrum, energy levels, and operation. They can be solid media like Nd: YAG (1064nm, 1350nm), Ruby lasers (94nm), holmium -YAG laser (2100nm), Erbium laser (2960nm), Krypton Laser (476nm, 521nm, 468nm, 647nm) and also with gas media like Carbon Dioxide (10,600nm), Argon laser (488-514nm), Helium Neon (633nm), Gold vapour (628nm), Excimer lasers are further classified into argon fluoride (193nm), krypton fluoride (248nm), Krypton chloride (222nm), xenon chloride (308nm) and xenon fluoride (351nm) and there are also liquid media lasers like Dye Laser fluorescent organic dyes(Olivi and Olivi, 2015).

Hard tissue Lasers: Common procedures relating to **hard tissue include:** Cavity detection; Lasers can detect cavities early by finding evidence of tooth decay. Tooth preparations and Restorations; Local anesthesia and traditional drills are often not needed with laser treatments. Bacteria present in the oral cavity can be killed with the help of lasers, which maintains tooth health for longtime. To treat sensitivity; Teeth sensitive to hot and cold can be treated with dental lasers which seal tubules on the root of the tooth. Dental practitioners either use lasers for hard tissue or for soft tissue, depending on the procedure. Lasers with hard tissue will cut through the surface of the dents. The wavelengths are absorbed by water and a particular mineral that is embedded in teeth.These lasers are most commonly used for preparing or shaping composite bonding teeth, repairing worn-out dental fillings, and removing a certain tooth structure(Miserendino and Pick, 1995).

Soft tissue applications: Wound healing, Post herpetic neuralgia and aphthous ulcer, Photoactivated dye disinfection using lasers, Photodynamic therapy for malignancies(PDT), Aesthetic gingival re contouring and crown lengthening, Exposure of unerupted and partially erupted teeth, Removal of inflamed, hypertrophic tissue, and miscellaneous tissue removalIsolated areas of transient tissues, Frenectomies(Sulieman, 2005; Vescovi et al., 2010; Heinrich et al., 2011).

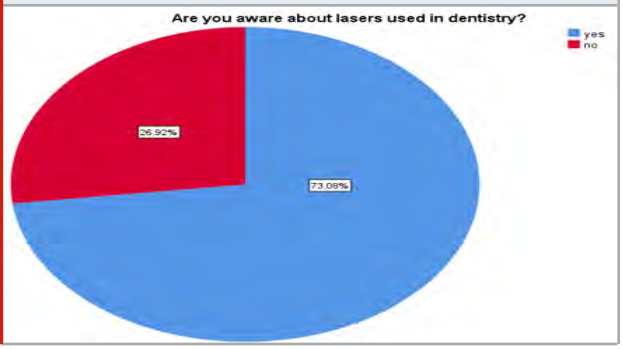
Other laser procedures include: Tissue viewing. Optical consistency tomography helps a doctor to see a tooth or gum tissue securely inside it. Removal of benign tumours. A pain-and suture-free method allows lasers to extract *tumors from the tongue, gums, and sides of the lips and cheeks(8,9). Treating apnea to obstructive sleep. Lasers can reshape the throat and relieve related respiratory problems while sleeping.

Benefits of using laser dentistry over conventional methods: The need for sutures with soft tissue lasers is theoretically diminishing. Bleeding in treated soft tissues is minimized, as the laser promotes blood clotting. Anesthesia is unnecessary, with some procedures. There's less risk of bacterial infections because the laser sterilizes the region. Wounds can heal more easily, and tissue can regenerate. The procedures will result in less damage to surrounding tissues(Vescovi et al., 2010). Soft tissue lasers can be absorbed via hemoglobin and water. Hemoglobin is a protein which can be found in red blood cells. These lasers are used to treat periodontitis including bacteria killing and tissue regrowth activation.Lasers of soft tissue surround the nerve endings and blood vessels when penetrating the tissue. For this reason, after laser treatment, many feel virtually no pain. The lasers also facilitate faster tissue healing(Vescovi et al., 2010).

Laser dentistry disadvantages: Lasers can not be used on teeth which already have certain types of filling such as amalgam. Sometimes hard lasers can injure pulp on the tooth. Now, some laser procedures need anesthesia. Laser dentistry risks are comparatively small. Finding a suitable dental professional is crucial, because using the wrong wavelength or power level might harm the tissue(Aronoff, 1982).

Furthermore, some services fear that advertisers are going beyond what people actually need to use laser treatment. To find a qualified laser treatment dentist, search for a professional who has taken educational courses and received the proper training. Popular sources of education are the dental schools and associations, as well as the Laser Dentistry Academy (ALD). You can also seek recommendations from your insurance provider and ask friends and family who have had positive experiences with laser dentistry(Khalkhal et al., 2020). Our department has previously published articles on prosthetic dentistry (Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Deogade, Gupta and Ariga, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about awareness of laser dentistry among undergraduate dental students.

Figure 1: The above given figure represents the Awareness about lasers used in dentistry among undergraduate students. Blue colour indicates 'yes' and red colour is 'no'. 73.08% of the survey population is aware about lasers used in dentistry while the other 26.92% are unaware.



MATERIAL AND METHODS

A comprehensive cross-sectional study was conducted among 104 undergraduate dental students. A self-administered, close-ended questionnaire has been created and distributed among college students to learn

about their knowledge about Laser Dentistry. Language was restricted to english.

Figure 2: The above given figure represents the association between gender with the awareness about lasers used in dentistry among undergraduate students. Blue colour indicates 'yes' and red colour is 'no'. X-axis represents gender and Y-axis represents the number of participants. 49% of the male population is aware about lasers while only 27% of the female population is aware about lasers used in dentistry. Chi-square value = 1.030, P value= 0.310, (>0.05) Hence, statistically not significant. Although statistically not significant it is implied that the majority of males (49%) are more aware about lasers in dentistry rather than females.

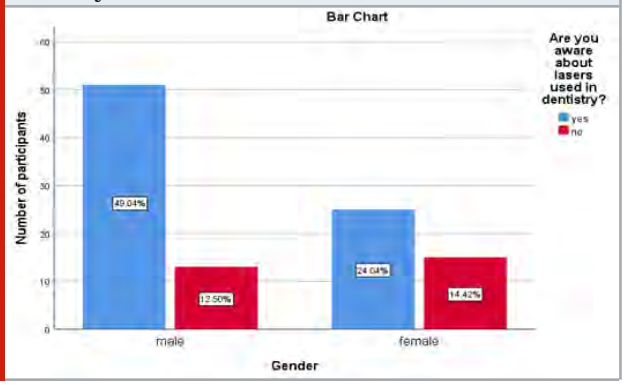
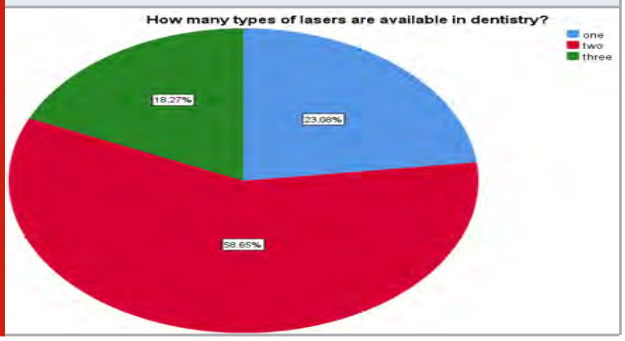


Figure 3: The above given figure represents the number of lasers available in dentistry. blue is one, red is two and green is three. 58.65% of the population are aware that two types of lasers are available.



RESULTS AND DISCUSSION

From the above survey we can understand the knowledge about laser technology in dentistry among college students. Figure: 1: represents the Awareness about lasers used in dentistry among undergraduate students. 73.08% of the survey population is aware about lasers used in dentistry while the other 26.92% is unaware. Figure: 2: represents the Awareness about lasers used in dentistry among undergraduate students among different genders. 49% of the male population is aware about lasers while only 27% of the female population is aware about lasers used in dentistry. Figure:3: represents awareness about how many types of lasers available in dentistry. 23.08% of the college students have told that it is one, 58.65% have told it is as two and 18.27% have told it as three. Figure: 4 : represents awareness about how many types of lasers available in dentistry among different genders. 22% of males and 2% of females tell it as one, 36% of the males and 25% of the females tell as two and 12% of males and 7% of females tell as three.

Figure 4: The above bar chart represents the number of lasers available in dentistry. blue is one, red is two and green is three. X-axis represents gender and Y-axis represents the number of participants. 30.77% of the male population say it as two and also 27.88% of the female population say it as two. Chi-square value = 8.526, P value= 0.014, (<0.05) hence, statistically significant. Majority of males 30.77% are aware about types of lasers available in dentistry rather than females.

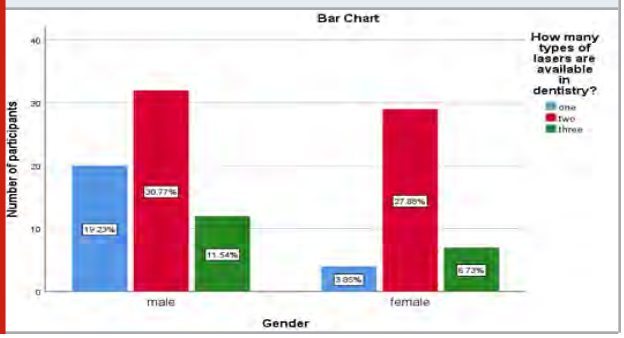


Figure 5: The above given figure represents the most common classification of lasers in dentistry. Blue is hard tissue lasers, red is soft tissue lasers and green is both. 71.15% of the population say it as both hard and soft tissue lasers.

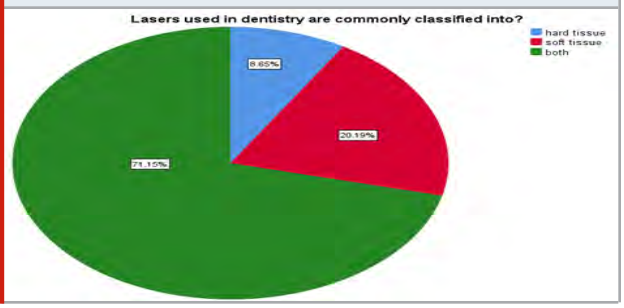


Figure: 5: Lasers used in dentistry have been classified into soft tissue, hard tissue or both but 20.19% students have told it as soft tissue, 8.65% have told it as hard tissue 71.15% told it as both hard tissue and soft tissue. Figure: 6: represents the types of lasers used in dentistry among different genders. 48% of the males and 26% of the females tell it as both. Figure: 7: 79.81% students think that lasers diverge and only 20.19% say that lasers don't diverge. Figure: 8: represents the divergence property of lasers. 60% of the males and 23% of the females have told yes lasers diverge. Figure: 9: Awareness about most commonly used laser over hard tissue. 32.69% of students say that CO2 is widely used in hard tissue, 36.54% say it as Argon, 13.46% say it as erbium and only 17.31%

is aware that HeNe is the most commonly used laser over hard tissues. Figure: 10: Most commonly used laser over hard tissue among different genders. 11% of the males and 7% of females are aware that HeNe is most commonly used over soft tissues.

Figure 6: The above bar chart represents association between gender and the most common classification of lasers in dentistry. Blue is hard tissue lasers, red is soft tissue lasers and green is both. X-axis represents gender and Y-axis represents the number of participants. 36.54% of the male population is aware that both soft and hard tissue lasers come under commonly used classification whereas only 34.62% of the female population is aware. Chi-square value =0.955, P value= 0.620, (>0.05) hence, statistically not significant. Although statistically not significant it is implied that, majority of males 36.54% are aware about the types of lasers available rather than females.

Figure 7: The above given figure represents the Awareness about lasers used in dentistry among undergraduate students. Blue colour indicates 'yes' and red colour is 'no'. Only 79.81% of the population is aware that lasers diverge.

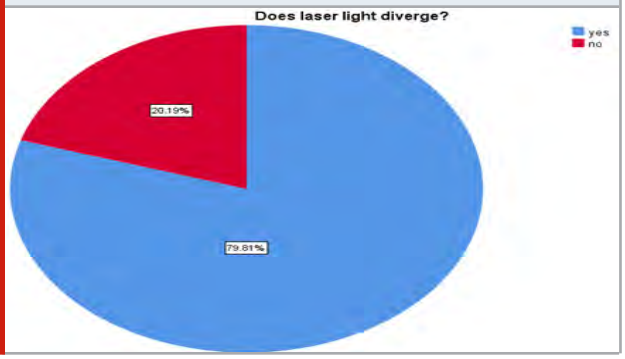


Figure: 11: Awareness about Most commonly used lasers over soft tissue. Only 27.88% of students are aware that CO2 is widely used in soft tissue, 27.88% say it as Argon, 24.04% say it as erbium and 20.19% say it as HeNe. Figure: 12: Awareness of the most commonly used laser over soft tissue. Only 19% of the males and 10% of the females tell it as CO2. Figure: 13: represents whether hard tissues lasers can be used over soft tissues. 59.62% say it as yes, 22.12% say it as no, and 18.27% don't have any idea. Figure: 14: represents knowledge about usage of hard tissue lasers over soft tissue among different genders. 44% of the males and 18% of the females say that yes hard tissue lasers can be used over soft tissues.

Figure 8: The above given figure represents the Awareness about lasers used in dentistry among undergraduate students. Blue colour indicates 'yes' and red colour is 'no'. X-axis represents gender and Y-axis represents the number of participants. 48.08% of the male population is aware that lasers diverge and whereas 31.73% of the female is aware about this. Chi-square value = 4.635, P value= 0.031, (<0.05) hence, statistically significant. Majority of males 48.08%% are aware about the types of lasers available rather than females.

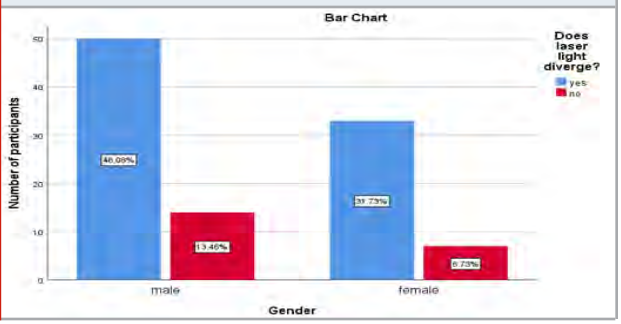


Figure 9: The above given figure represents the lasers used on hard tissue. Blue is CO2, red is argon, green is erbium and orange is HeNe. Only 32.69% is aware that Erbium is the most commonly used laser in hard tissues.

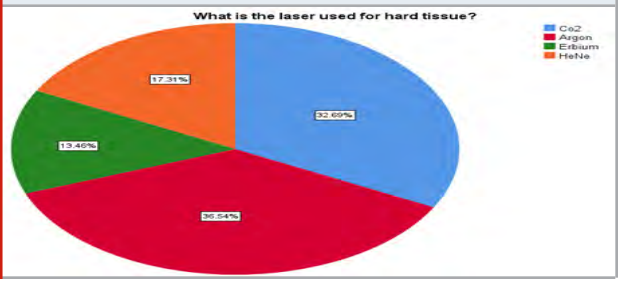


Figure 10: The above given figure represents the lasers used on hard tissue. Blue is CO2, red is argon, green is erbium and orange is HeNe. X-axis represents gender and Y-axis represents the number of participants. 7.69 % of the male population say it as HeNe and even 5.77 % of female population say it as Erbium. Chi-square value = 0.616, P value= 0.893, (>0.05) hence, statistically not significant. Although statistically not significant it is implied that, majority of males 7.69 % are aware about the type of lasers used in hard tissues.

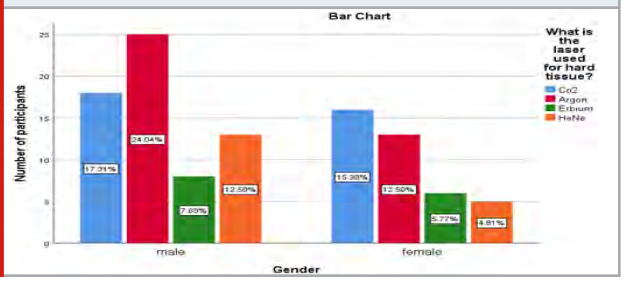


Figure 11: The above given figure represents the lasers used on soft tissue. Blue is CO2, red is argon, green is erbium and orange is HeNe. Only 27.88% of the survey population is aware that CO2 lasers are most widely used over soft tissues.

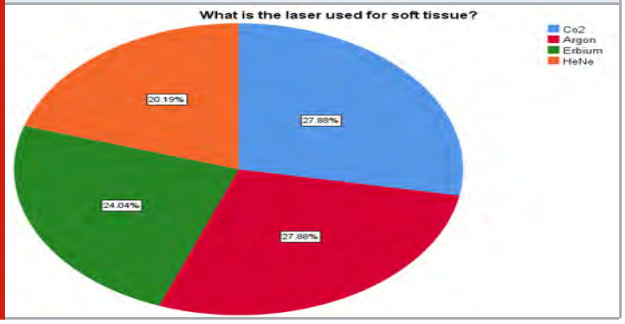
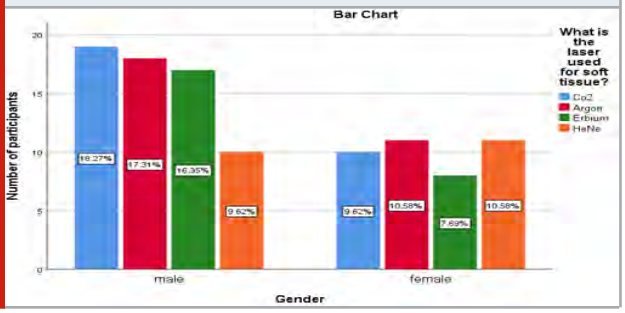


Figure 12: The above given figure represents the lasers used on soft tissue. Blue is CO2, red is argon, green is erbium and orange is HeNe. X-axis represents gender and Y-axis represents the number of participants. 18.27% of the male population and 9.62% of female population say it as CO2. Chi-square value = 0.088, P value= 0.993, (>0.05) hence, statistically not significant. Although statistically not significant it is implied that, majority of males 18.27% are aware about the type of laser used for soft tissues.



CONCLUSION

While lasers can not replace all traditional dentistry procedures, their use allows some procedures to be done differently from the standard method and their advancement in the field of dentistry continues to expand further, allowing for greater patient care. From the above results the following conclusion can be drawn that Most of the students have a basic idea about what a laser is and its uses in dentistry but they are not aware of types of lasers and there is no significant gender variation with the awareness level of dental lasers. There is a requirement for students to gain knowledge and how to use different types of lasers by conducting practical sessions.

Figure. 13: The above figure represents awareness on the usage of hard tissue lasers over soft tissues. blue is 'yes', Red is 'no', and green is 'may be'. Only 22.12 % of the population are aware that both hard tissue lasers cannot be used in soft tissues.

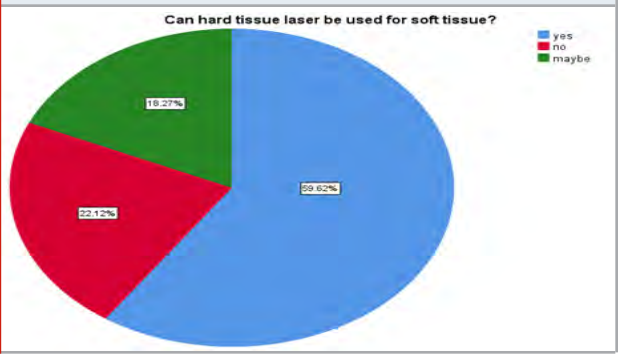
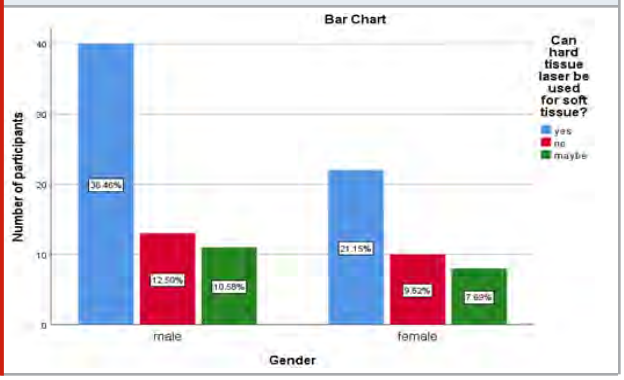


Figure 14: The above given figure represents association between gender and the usage of hard tissue lasers over soft tissues. Green is 'yes', Red is 'no', and green is 'no idea'. X-axis represents gender and Y-axis represents the number of participants. 12.50% of the male population and 9.62 % of the female population say it as no. Chi-square value = 1.188, P value=0.552, (>0.05) hence, statistically not significant. Although statistically not significant it is implied that, majority of males 12.50% are aware that hard tissue lasers cannot be used for soft tissues.



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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-345-350

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A Survey on Swimming as a Fitness Practice Among Dental Students

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ABSTRACT

Physical activity is basically required by an individual, which improves health and avoids illness . It plays an important role In rehabilitating the patients who have mental and physical illness . Health education, especially on physical fitness and nutrition . Academic pressure and comprehensive examination will lead to accumulated tension and anxiety.Swimming is an exercise that stretches the human body beyond its limits . It is an exercise that is done for soothing body ache and relaxes all the muscles . Swimming develops self concept and improves adaptive behaviour.Swimming motion showed excellent effect when compared to other sports in participants' health and reducing stress.This is a cross sectional survey was conducted among dental students through a self administrated questionnaire through an online survey link with google forms .The study population included dental students.The participants were explained about the purpose of study in detail.The questions were carefully studied and corresponding answers were marked by the participants. The responses were collected and the results were analysed.83.5% of the dental students believed that fitness is really important for a dental graduate and only 16.5% of dental students did not agree to it . 71.6 %of the dental students choose swimming as a good alternative for all the previously mentioned fitness regimes .So many studies showed that physical activities are very important for human health. Therefore, it can be said that the present study results supported many studies done about the physical activities and psychological health in the past and current literature. Swimming is also liked by a lot of people but due to insufficient time most of them do not practice it.

KEY WORDS: NUTRITION ; HEALTH ; PHYSICAL FITNESS ; SWIMMING.

ARTICLE INFORMATION

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Received 28th July 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/161

INTRODUCTION

Physical activity is basically required by an individual, which improves health and avoids illness(Irazusta et al., 2006; Kim and Park, 2006) (Tsai and Kao, 2010). It plays an important role In rehabilitating the patients who have mental and physical illness (Kim and Park, 2006). Current lifestyle is associated with an increase in pathology of all the physiological systems of the human body (Kassim, Othman and Ujang, 2020).lack of nutrition also plays an impotent role in the ethology of diseases (Kurosaka et al., 2018). Health education, especially on physical fitness and nutrition is necessary for health care workers (Mohammed, 2019) but, Modern lifestyle has reduced human activity due to automation which will lead to a sedentary lifestyle (Lee and Oh, 2015).

Stress is a matter of perception, the students in professional courses like medicine, dentistry, nursing or other paramedical courses have extensive working hours which creates stressful conditions in the students (Paykel, 1976; Jain and Jain, 2012).(Garbee, Zucker and Selby, 1980; Grover et al., 2018). This stress can be due to academic pressure and comprehensive examination will lead to accumulated tension and anxiety (Garbee, Zucker and Selby, 1980; Polychronopoulou and Divaris, 2005; Sudhakar, 2012). Continuous exposure of stress may lead to long-term work-related exhaustion and diminished interest (Jain and Jain, 2012; D et al., 2019). The consequences of stress may lead to mood alteration, tiredness, sleep disturbance, effect of performance, obsessive-compulsive disorders, severe level of depression, interpersonal sensitivity etc (Jain and Jain, 2012). These depression might be a greater burden among many students (Nabkasorn et al., 2006; Legrand, 2014). Stress and depression can be reduced by maintaining physiological fitness (Nabkasorn et al., 2006).

Swimming is an exercise that stretches the human body beyond its limits (Prentice, 2014; Foley, 2017). It is an exercise that is done for soothing body ache and relaxes all the muscles (Foley, 2017). Swimming develops self concept and improves adaptive behaviour (Kurokawa and Ikegami, 1980; Yilmaz et al., 2004). Mostly people prefer swimming as a hobby for pleasure (Huttunen, Kokko and Ylijukuri, 2004). There is a belief that swimming in cold water is beneficial to health (Huttunen, Kokko and Ylijukuri, 2004). Swimming reduces tiredness and fatigue, improves self esteem, boosts mood and relieves pain from many diseases (Huttunen, Kokko and Ylijukuri, 2004). Swimming motion showed excellent effect when compared to other sports in participants' health and reducing stress (Berger and Humphrey, 1986; Judge et al., 1993) (Huttunen, Kokko and Ylijukuri, 2004; Lee and Oh, 2013).

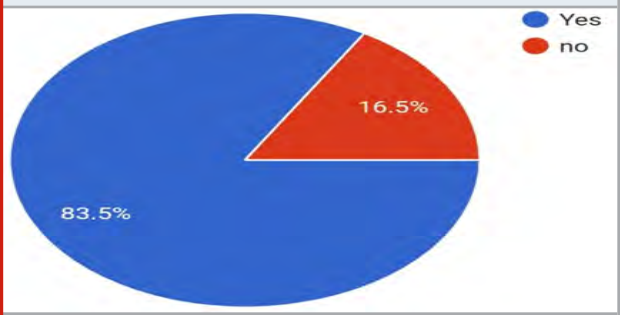
The purpose of this study is to determine that water exercises and swimming are motor exercises which will improve the physical fitness of the dental students (Yilmaz et al., 2004). One of the most important factors is to maintain the fitness of dental students and their attitude towards health promotion. (Kassim, Othman and Ujang, 2020). No previous study is based on the topic " swimming as a fitness practice among dental students ". Though several physical fitness practices are available, swimming is an activity which involves movement of all parts of the body, all the muscles are stretched and relaxed during this exercise also it is very helpful to cope up with stress , to improve the physical fitness of our body and maintain a good healthy lifestyle.

Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017;(Avula et al., 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, Ranganathan and Ganapathy, 2017)(Gupta, Ariga and Deogade, 2018; Mahmod et al., 2018; Ashok and Ganapathy, 2019; Das et al., 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019) this vast research experience has inspired us to research about a survey as a fitness practice among dental students.

MATERIAL AND METHODS

This study had been conducted in dental college which included 109 dental students. A survey was conducted and a questionnaire was prepared through an online survey "Google forms", including the demographic data (gender, age, fitness, Weight, height, Mentality, Physical activities on their daily basis). The link was shared among the students. The questionnaire was carefully analysed and answered. The results of the survey were collected and statistically analysed.Clearance from Ethical committee of Saveetha college of dentistry was obtained with Ethical Committee Registration. The type of research is original study. The method of studying is simple random sampling. The independent variable are dental students. The dependent variables are hobbies. The types of statistics are descriptive statistics.

Figure 1: The pie chart representing the responses based on 83.5% of the dental students believed that fitness is really important for a dental graduate and only 16.5% of dental students did not agree to it.



RESULTS

After collecting the results which were received after the circulation of survey through the online survey link the data was analysed. 83.5% of the dental students

believed that fitness is really important for a dental graduate and only 16.5% of dental students did not agree to it. (Figure 1). 20.2% of the dental students felt that maintain an ace of physical fitness will improve overall ability ,46.8% of dental students think that maintaining physical fitness will reduce stress, 21.2% think that physiological well being will be good and 11.9 % think that physical fitness can be useful for maintaining all the above points (Figure 2). 57.8% of the students say that fitness is improving good physique but 42.2% of the students say that the body should be maintained in an active and healthy position all the time (Figure 3). To maintain fitness 34.9%of students preferred going to the gym,32.1% of students preferred playing outdoor games, 20.2 % of the students preferred doing yoga and 12.8% preferred doing all the above (Figure 4).

Figure 2: The pie chart representing the responses based on 20.2% of the dental students felt that maintain an ace of physical fitness will improve overall ability ,46.8% of dental students think that maintaining physical fitness will reduce stress, 21.2% think that physiological well being will be good and 11.9 % think that physical fitness can be useful for maintaining all the above points.

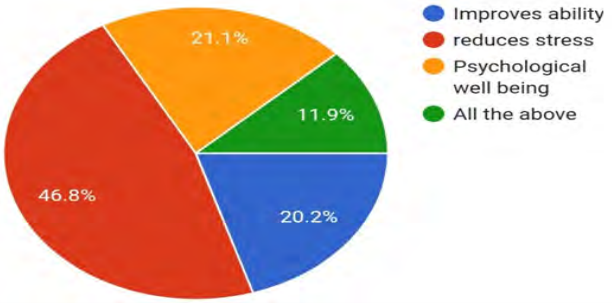
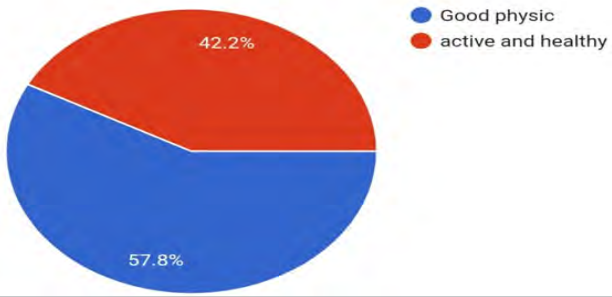


Figure 3: The pie chart representing the responses based on 57.8% of the students said that fitness is improving good physic but 42.2% of the students say that body should be maintained in an active and healthy position all the time.



In the common fitness regime employed by most of the students 26.6% of the preferred jogging, 48.6% preferred weight lifting, 13.8% traditional exercises and 11 % swimming (Figure 5). 71.6 %of the dental students choose swimming as a good alternative for all the previously ment fitness regimes and only 28.4 % of the students have opposed it (Figure 6). 23.9 %of the people felt that swimming is useful than other exercises because it maintains overall health, 51.4 % of dental students say that occurs due to weight reduction,16.5 % of the dental students felt that it is due to increasing muscular energy and 8.3 % of the students prefer all the above (Figure 7).84.4% of the dental students know the fact that swimming everyday causes ill effects on health and 15.2% of dental students have no idea about it (Figure 8). 71.6% of the dental students are aware that swimming in the same pool might lead to skin ,eye,ear infection and 28.4% are not aware of that (Figure 9). 78% of the students know that swimming is an exercise that would reduce our stress level and 22% of the dental students are not aware that swimming gives relief from stress (Figure 10).

Figure 4: The pie chart representing the responses based on maintaining fitness 34.9%of students preferred going to gym,32.1% of students preferred playing outdoor games, 20.2 % of the students preferred doing yoga and 12.8% preferred doing all the above.

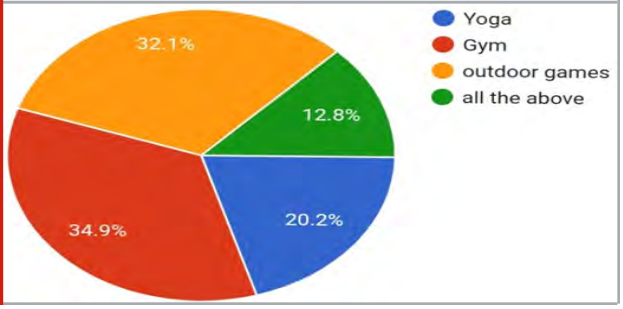
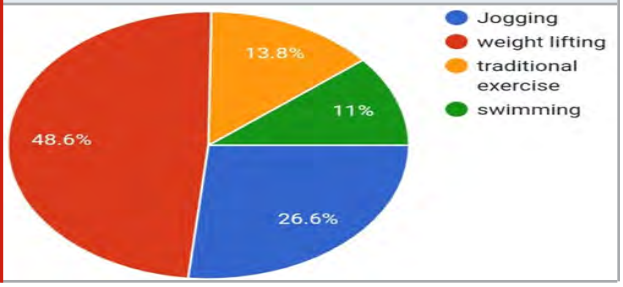


Figure 5: The pie chart representing the responses based on common fitness regime employed by most of the students 26.6% of the preferred jogging, 48.6% preferred weight lifting, 13.8% traditional exercises and 11 % swimming.



DISCUSSION

This study makes it very evident that swimming is one of the fitness practices followed by dental students. BDS is a professional course where the students are taking a lot of stress and so much of workload. Most of them do not tend to maintain a proper balanced diet. Some people take in too much stress that they don't even have time to do physical exercise and keep their body healthy. Swimming is an exercise where your whole body gets to move. One hour of swimming daily will improve your physical fitness and health conditions. Majority of the students (83.4%) knew that physical fitness was really

important in the students who are in the field of BDS. There was a similar study done(Hou et al., 2020) where 74 % of the people were aware that physical fitness was really important to improve human health.

Figure 6: The pie chart representing the responses based on 71.6 %of the dental students choose swimming as a good alternative for all the previously mentioned fitness regimes and only 28.4 % of the students have opposed it.

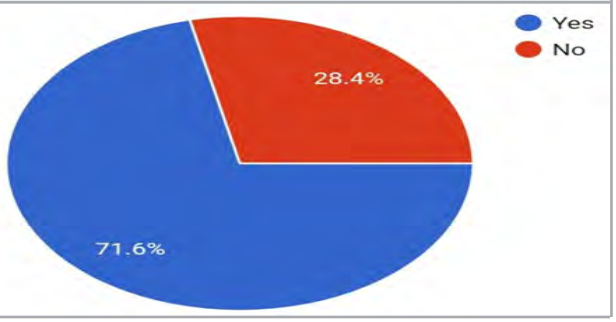


Figure 7: The pie chart representing the responses based on 23.9 %of the people felt that swimming is useful than other exercises because it maintains overall health, 51.4 % of dental students say that weight reduction,16.5 % of the dental students increasing muscular energy and 8.3 % prefer all the above.

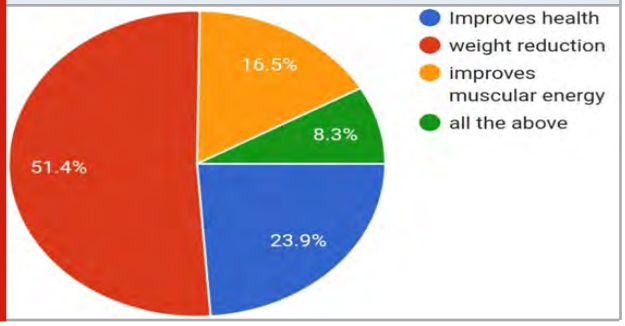
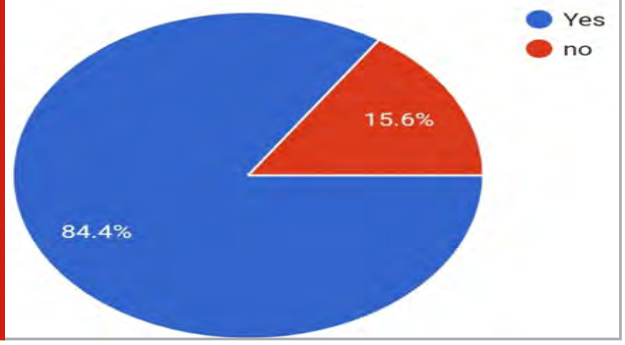


Figure 8: The pie chart representing the responses based on 84.4% of the dental students know the fact that swimming everyday causes ill effects on health and 15.2% of dental students have no idea about it.



There are no opposing articles regarding it(Hou et al., 2020).Majority of the participants (78%) felt that swimming is a sport that causes stress relief among dental students. There is an article which has a similar finding (David et al., 2019) where 82% of the population felt that doing physical activity would relieve stress in people. There are no opposing articles(David et al., 2019) . Majority of the students 48.2% were aware that physical fitness will reduce health. There was a similar finding in (United States. Office of Education. Committee on Wartime Physical Fitness for Colleges and Universities, 1943) where 50 % of the participants felt that physical fitness is important to reduce stress.

Figure 9: The pie chart representing the responses based on 71.6% of the dental students are aware that swimming in the same pool might lead to skin ,eye,ear infection and 28.4% are not aware of that.

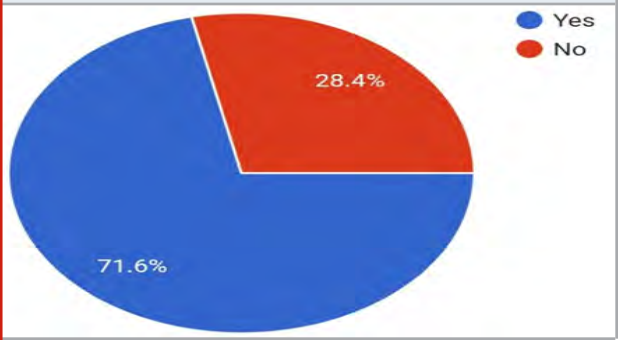
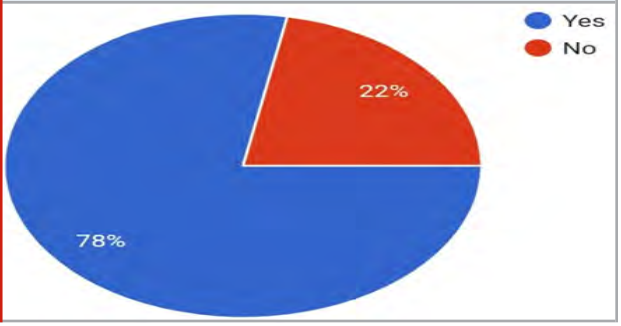


Figure 10: The pie chart representing the responses based on 78% of the students know that swimming is an exercise that would reduce our stress level and 22% of the dental students are not aware that swimming gives relief from stress.



There are no opposing articles. Majority of the students (48.6%) preferred jogging as an easy way to keep up physical fitness. There was a similar finding in ((Kornev, 2018) where 55% of the people also preferred jogging as an easier method to improve physical fitness. There are no opposing articles. According to Rosenstock (1990), the more susceptibility or seriousness is perceived, the more health belief model is active in practice of health behavior, the other way, practice of health behavior has been decreased, when a barrier to this kind of behavior is perceived (Lee and Oh, 2013; Lee and Lee, 2014). This theory states that patients in swimming have a higher susceptibility and concern for health (Lee and Oh, 2013). Study by Son et al. (2009) also reported that lack of exercise will lead to serious diseases ((Lee and Oh, 2013). (Berger &t:Owen, 198~, 1986, in press) stress reduction due to swimming is surprising (Berger and Owen, 1988).

Positive mood benefits are found in swimmers (Berger and Owen, 1988). There haven't been so many studies done under the topic swimming as a fitness practice among dental students.This is a new study ,where no research has been done on this particular topic.If further studies are done it would be very effective to find out new ways to reduce stress and improve physical fitness.

CONCLUSION

So many studies showed that physical activities are very important for human health. Therefore, it can be said that the present study results supported many studies done about the physical activities and psychological health in the past and current literature. Swimming is also liked by a lot of people but due to insufficient time most of them do not practice it.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-351-357

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Awareness of Depression Level and its Management Among Dental Students: A Questionnaire Survey

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ABSTRACT

Depression, stress and anxiety are one of the communities that resemble as indicators for mental health. Depression is considered as a common mental disorder characterised by a swing mood or depressed mood, loss of interest and appetite, sleep disturbances, fatigue or low energy, feelings of low self-esteem and poor concentration. Failure to address this unstable emotion will unfortunately results in serious consequences such as suicide. In addition, depression can make students vulnerable to find balance in their quality of life and negative self-esteem. The aim of this study is to evaluate the level of depression among the students and their coping strategies. This cross-sectional study was conducted from June 2019-March 2020 among dental students of Saveetha Dental College. Study questionnaire was conducted through a Google Form application. The Depression, Anxiety and Stress Scale 21 (DASS-21) inventory was used to measure the level of depression among students with addition of few questions related to coping strategies. This questionnaire consisted of 3 sections: demographic data, 7 questions from DASS (depression scale) and coping strategies. The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 23.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Descriptive statistics (frequency distribution and percentage) and inferential statistics (chi-square test) were done. The results showed that the majority of dental students were free from experiencing depression. Some male and female students were having mild (8.77% and 11.40%), moderate (7.02% and 5.26%), severe (3.51% and 6.14%) and extremely severe (1.75% and 4.39%) levels of depression. The most frequently mentioned coping method for relieving depression for male and female students was "emotional discharge" (9.65% and 22.81%), followed by "positive reappraisal" (11.4% and 6.14%). There was statistical significance between coping strategies of depression and gender (p value = 0.03). In the present study, emotional disturbance such as depression exists at a considerable rate among dental students.

KEY WORDS: ANXIETY; COPING STRATEGIES; DEPRESSION; STRESSORS; STUDENTS.

ARTICLE INFORMATION

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Received 20th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/162

INTRODUCTION

According to WHO definition, "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Most people perceive health as being physically as fit as a fiddle and free from any health issues. However, they have forgotten about being mentally well as mental health is an irreplaceable aspect of health. Mental health includes emotions, psychological and social well-being. Many people suffer life threatening diseases such as cardiovascular diseases and hypertension due to poor mental health (Teh et al., 2015).

Depression, stress and anxiety are one of the communities that resemble as indicators for mental health. Depression is considered as a common mental disorder characterised by a swing mood or depressed mood, loss of interest and appetite, sleep disturbances, fatigue or low energy, feelings of low self-esteem and poor concentration. It is related to the disturbances of psychology, attitude and physical symptoms (Sravani et al., 2018). This disorder is currently leading to the cause of disability worldwide in which more than 300 million people suffer from depression globally. Failure to address this unstable emotion will unfortunately results in serious consequences such as suicide (Cukrowicz et al., 2011); (Farabaugh et al., 2012). In addition, depression can make students vulnerable to find balance in their quality of life and negative self-esteem. Over time, their decision-making ability, social interaction and emotional well-being will be disturbed (Sawhney, Kunen and Gupta, 2020).

University students are facing major transitions in their life with many new stressors. Most students are going through major life changing events at university which can impose negative mental health to them and they are burdened with stresses on which some may not be able to take up the loads (Crocker and Luhtanen, 2003); (Ceyhan, Ceyhan and Kurtyılmaz, 2009); (Lee et al., 2009). Dental students have shown considerable levels of depression during their training periods. They also are associated with interpersonal sensitivity and obsessive-compulsive disorders (Musser and Lloyd, 1985). The prevalence of depression in public and private medical universities ranged from 10.4% to 43.8% and 195 to 60%, respectively (Saravanan and Wilks, 2014). A study was conducted in India and found out the prevalence of current depression was 18.5%, ranging from mild to severe depression. Comorbidity of anxiety and depression reported as high as 87% and clinical depression observed was 12.1% (Sahoo and Khess, 2010). While in Hong Kong, an online survey showed 27% of the respondents suffer stress with moderate severity or above (Wong et al., 2006).

According to Synder, coping is a response focused to lessen any physical, emotional and psychological disturbances that are associated with stressful life events. People tend to develop a preference for coping strategies; (1) approach vs avoidance and (2) problem focused vs emotion focused (Snyder, Ford and Harris, 1987). Meanwhile Moss had identified three types of coping strategies. They are active behaviour, active cognitive and avoidance coping. It is evident that approach coping strategies have better positive impressions than avoidance coping strategies on depression (Billings and Moos, 1985).

Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about the awareness of depression level and its management among dental students. The aim of this study is to evaluate the level of depression among the students and their coping strategies. There is a lack of existing studies on depression in university students in India that focus on the relationship between gender and coping strategies.

MATERIAL AND METHODS

Study design and setting: This cross-sectional study was conducted in Saveetha Dental College and Hospital, Saveetha university, Chennai, to assess dental anxiety of dental treatment among undergraduate students (final years and interns). The approval for this university setting study was obtained from the institutional review board.

Study subjects: A total of 114 students had participated in the study, among which 25 (21.93%) were final years and the remaining 89 (78.07%) were interns.

Table 1. Shows the severity of depression and its score.

Rating	Depression
Normal	0-9
Mild	10-13
Moderate	14-20
Severe	21-27
Extremely severely	28+

Questionnaire survey: Study questionnaire was conducted through a Google Form application. The Depression, Anxiety and Stress Scale 21 (DASS-21) inventory was used to measure the level of depression among students with addition of few questions related to coping strategies. This questionnaire consisted of 3 sections: demographic data, 7 questions from DASS (depression scale) and coping strategies. Each question from DASS was using a 4-point frequency scale to rate the extent to

which the respondents had experienced each symptom over the past week from "never" (1) to "most of the time" (4). The sum of the scores obtained was multiplied by 2 and then evaluated as per the severity rating index. The minimum score is zero and the maximum score is 42.

Statistical analysis: All the data collected were tabulated in MS Excel and incomplete data was eliminated. The data was validated and analysed with Statistical Package for Social Sciences for Windows, version 23.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Descriptive statistics in the means of frequency distribution and percentages were used.

Figure 1: Pie chart showing responses to the question, "I could not seem to experience any positive feeling at all". 30.7% of the respondents rarely experienced no positive feeling at all. 23.68% of the respondents could not seem to experience positive feelings at most of the time.

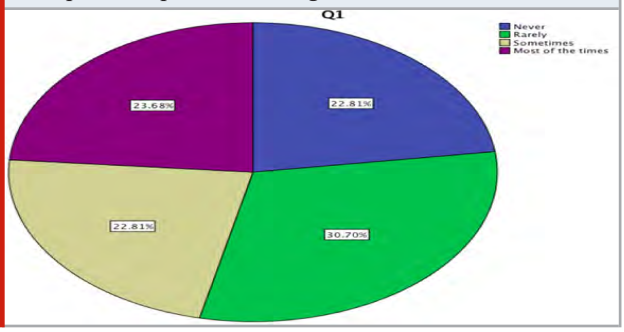
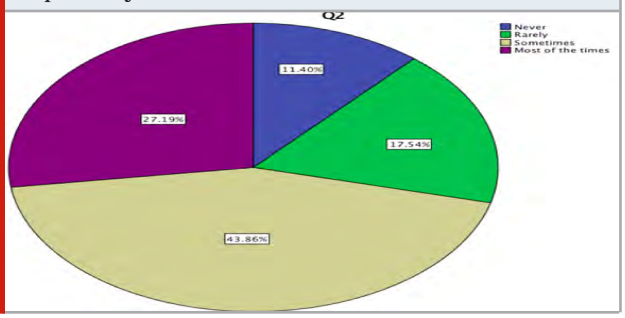


Figure 2 : Pie chart showing responses to the question, "I found it difficult to work up the initiative to do things". 43.86% of the respondents seldomly found it is hard, 27.19% commonly found it difficult to have initiative to do things. 17.54% and 11.40% of the respondents rarely and never felt it is hard to work up initiative to do things, respectively.



RESULTS AND DISCUSSION

In the present study, 114 undergraduate dental students had completed questionnaires. This study group compromised 65 (57%) females and 49 (43%) males. Based on the year of undergraduate study, 25 (21.93%) were final years and the remaining 89 (78.07%) were interns. Assessment on depression level among dental students showed the majority of the respondents rarely (30.7%) experienced any positive feeling at all. [Figure 1]. However, when questioned on their difficulty to work up the initiative to do things, 43.86% agreed that it was sometimes followed by 27.19% of the respondents have admitted that it was very common. [Figure 2]. 35.9% rarely believed that they had nothing to look forward to and conversely, 15.79% of them accepted that they did feel so most of the time. [Figure 3].

Figure 3: Pie chart showing responses to the question, "I felt that I had nothing to look forward to". 35.09% of the respondents rarely felt of having nothing to look forward to and 19.30% never had such feelings

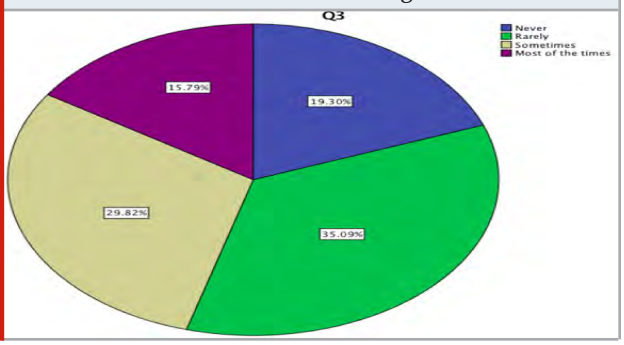


Figure 4: Pie chart showing responses to the question, "I felt downhearted and blue". 41.23% of the respondents rarely felt dispirited and 34.21% sometimes felt gloomy and dejected.

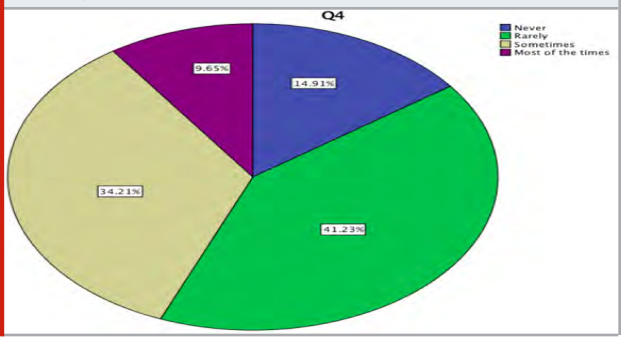
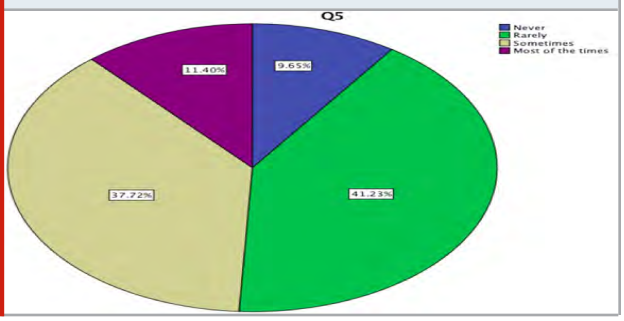


Figure 5 : Pie chart showing responses to the question, "I was unable to be enthusiastic about anything". 41.23% of the respondents rarely felt halfhearted to do anything and 37.72% of them sometimes were unable to be enthusiastic about anything.



When inquiring about feelings of down-heartedness and blue, most of the respondents (41.23%) chose rarely and 14.91% had never encountered such an

experience. [Figure 4]. Assessment on being unable to become enthusiastic about anything gave the following results; 37.72% agreed that it was sometimes and 11.4% of respondents admitted that it was very frequent. [Figure 5]. 15.79% had never felt that they were not much as a person and 14.04% of them felt as such for most of their time. [Figure 6]. On the other hand, when questioned on their life if it was meaningless, 34.21% believed it for some time and 35.96% rarely thought about it. [Figure 7].

Figure 6: Pie chart showing responses to the question, "I felt l was not worthy much as a person". 42.11% of the respondents sometimes felt unworthiness and 15.79% of the respondents never felt that they were not worthy.

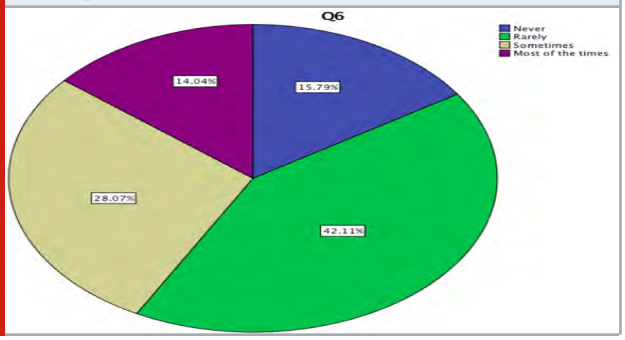
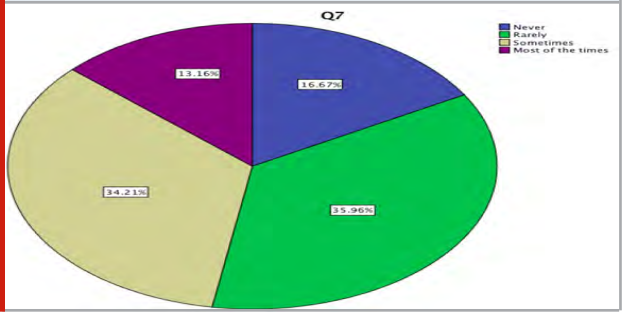


Figure 7: Pie chart showing responses to the question, "I felt life was meaningless". 34.21% of the respondents sometimes felt that life was meaningless and 13.16% of the respondents commonly thought life was meaningless.



The most frequently mentioned coping method for relieving depression for male and female students was "emotional discharge" (9.65% and 22.81%), followed by "positive reappraisal" (11.4% and 6.14%). Focus on problem-solving and seeking guidance and support were mentioned by some students as other coping methods. Only eleven female students mentioned using acceptance techniques to relieve depression. There was statistical significance between coping strategies of depression and gender (p value = 0.03). [Figure 8].

Depression is divided into 5 categories, which are normal, mild, moderate, severe and extremely severe. In depression of male population, 21.93% of the respondents were normal while 8.77%, 7.02%, 3.51% and 1.75% of the respondents have mild, moderate, severe and extremely severe depression respectively. Those female students who are free from depression was 29.82%, mild level of stress consisted of 11.4%, followed by moderate level of stress (5.26%), severe level of stress (6.14%) and lastly extremely severe level of stress (4.39%). There was no statistical significant association between prevalence of depression and gender. [Figure 9].

Figure 8: Bar graph depicts the association between coping strategies and gender. X axis represents coping strategies and the Y axis represents number of respondents. Males (grey) and females (orange). Chi square test was done and association was found to be statistically significant between coping strategies and gender. Pearson's Chi-square value - 18.023 ; p = 0.03 (p <0.05), hence statistically significant. Coping strategies such as emotional discharge, seeking guidance and acceptance was more prevalent among females than males. Males were more likely to focus on problem solving, practice positive reappraisal and use alternative rewards to overcome depression.

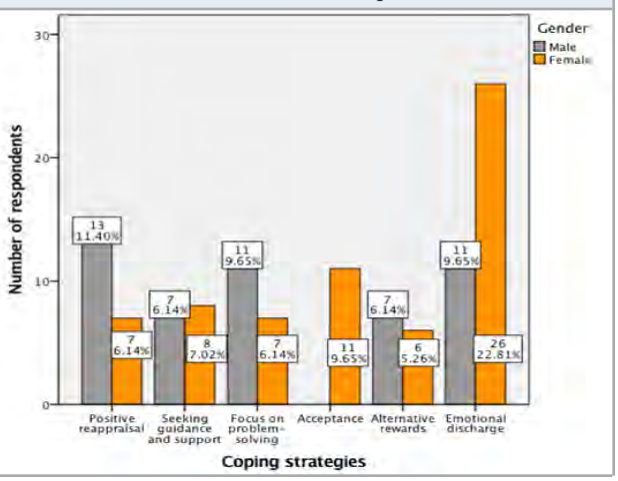
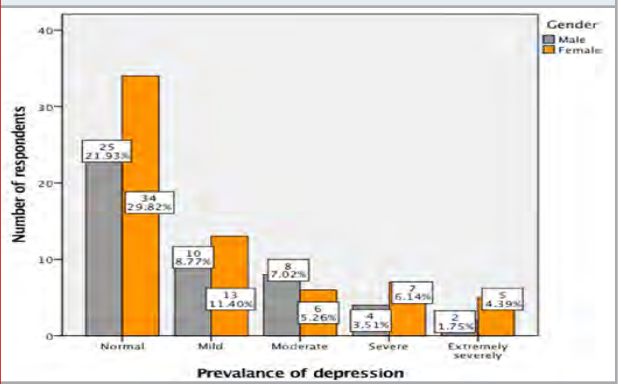


Figure 9: Bar graph depicts the association between prevalence of depression and gender. X axis represents prevalence of depression and the Y axis represents the number of respondents. Males (grey) and females (orange). Chi square test was done and association was found to be statistically insignificant between coping strategies and gender. Pearson's Chi-square value - 1.947 ; p = 0.746 (p >0.05), hence statistically insignificant. Female students were more prevalent of having all severity of depression, except moderate when compared to male students.



The results showed that the majority of dental students were free from experiencing depression. However, there are some students having moderate to extremely severe levels of depression, which is alarming in relation to the psychiatric morbidity among the students. This finding is in concurrence with one study done among Malaysian undergraduate students. 54.2% of them are normal and the level of depression from mild to extremely severe ranging from 3.5% to 15.1% (Teh et al., 2015). According to another similar study, the prevalence of depression was found to be 30.7% (Shamsuddin et al., 2013). To the best of our knowledge, depression among dental students could be explained by enormous factors which include sudden change of lifestyle, financial problem, thought of failing in examinations and having stress in clinical training. Additionally, social interactions with peer groups, hostel friends and patients could also contribute to depression.

In this study, females were highly associated with depression when compared to males. Concurrently, the occurrence of depression among female students in Saudi Arabia was high. This observation is consistent with the findings of previous studies on the prevalence of depression and stress among undergraduate students in India (Sravani et al., 2018) ; (Madhan, Rajpurohit and Gayathri, 2012)and other countries (Prinz et al., 2012) ; (Othman et al., 2013) ; (Takayama et al., 2011). Psychologically, females articulate more worries and emotions.

Several strategies for management of depression among dental students have been introduced and discussed in this study, among which majority of the respondents discharged their emotions and practiced positive reappraisal to overcome depression. Also, some college students in our study seek guidance and support from close friends or family members. This is in line with previous study that revealed a group of dental students were less likely to seek guidance (Sawhney, Kunen and Gupta, 2020). Other studies reported that high depressive symptoms generally avoid an active coping approach such as to seek guidance compared to those groups with low depressive symptoms. The reason is still unclear but it could be partially explained to fear of criticism, influence of culture and negative self esteem among themselves (Osborn and Egede, 2012).

There was statistical significance between coping strategies of depression and gender in present study. Female students were more likely than males to use avoidance coping methods such as discharge their emotions, acceptance and seek guidance and support. In contrast, males usually were more problem oriented and focused on problem-solving than females. This findings is consistent with previous studies that stated men mostly use their logical analyses and direct actions to solve their problems (Folkman and Lazarus, 1980 ; (Nolen-Hoeksema and Aldao, 2011). Studies have shown that men tend to be dealing with stressful situations to a greater extent, meanwhile women are more likely to dwelled in emotions and avoid active coping strategies (Meléndez et al., 2012).

To pinpoint some limitations of current study, we had chosen lack of baseline information of mental status of the students. Also, this cross-sectional study has the disadvantage of not being unable to determine the incidence rate of depression and changes in psychological status over a period of time. The self-reported questionnaire also does allow us to rule out response bias in this study. Henceforth, there is a need for longitudinal study design of different community-based investigations or association with different universities at international level. More attention must be devoted to individuals with high depressive symptoms and their psychological well-being to improve the quality and quantity of the workforce in future.

CONCLUSION

Within the limitations of this study, emotional disturbance such as depression exists at a considerable rate among dental students. Respondents with abnormal depression score require clinical diagnosis to receive further treatment. Considering a number of college students having severe and extremely severe levels of depression, an early identification, education and intervention for psychological conditions must be initiated in dental schools with both students and faculty involvement.

ACKNOWLEDGEMENTS

The authors of this study would like to express their gratitude towards everyone who facilitated and enabled us to carry out this study successfully.

Authors Contributions: Nor Masitah Mohamed Shukri analysed, interpreted, tabulated data and wrote the manuscript. Dhanraj Ganapathy and Revathi Duraiswamy performed the validation, data design and critically revised the manuscript. Arthi Balasubramaniam revised the manuscript. All the three authors have equally contributed to the final manuscript.

Conflict of Interest: There is no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-358-362

BBRC
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Morphometric Study of Lumbar Vertebrae in South Indian Population

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ABSTRACT

The lumbar vertebrae consists of five cylindrical bones that form the spine in the lower back. These vertebrae carry all of the overlying body's weight while providing flexibility and movement to the trunk region. They also protect the delicate spinal cord and nerves within their vertebral canal. The dimensions of lumbar vertebrae should be understood for clinical diagnosis of diseases.The aim of the study is to study about the lumbar vertebrae morphometrically. A total number of 70 dry human lumbar vertebrae were used of which 40 were of males and 30 were of females were obtained from the Department of Anatomy, Saveetha Dental college and Hospitals, Chennai and Sri Ramachandra Medical College and Research Institute, Chennai.The anteroposterior body diameter, transverse body diameter, interpedicular distance and midsagittal diameter was measured using Vernier caliper.The average, mean and standard deviation were calculated. In the present study, the mean Anteroposterior body diameter was found to be 32.15 mm ± 1.0627 in males and 27.04 mm ± 0.3170 in females. The average transverse body diameter was found to be 45.06 mm ± 0.3637 in males and 40.92 mm ± 0.3074 in females. The average interpedicular distance was found to be 26.50 mm ± 0.39 in males and 25.42 mm ± 0.3028 in females . The average midsagittal diameter was found to be 17.96 mm ± 0.2597 in males and 16.94 mm ± 0.2313 in females. The present study concluded that the dimensions of lumbar vertebrae for the South Indian population showed significant differences between males and females. The measurements were higher in males than females.

KEY WORDS: MORPHOMETRY, LUMBAR VERTEBRAE, ANTEROPOSTERIOR DIAMETER.

INTRODUCTION

The lumbar vertebrae consists of five vertebrae and are located in the lower back of the body. It bears all of the overlying body's weight and possesses a bigger body than thoracic and cervical vertebrae. It also provides easy bend and movement to the trunk region of the human body (Priyadharshini and Mohanraj, 2019). The vertebral column provides support, posture and initiates movements (Keerthika and Keerthika, 2017).They also house and secure the delicate spinal cord and nerves within their vertebral canal. Since the spinal cord passes through the vertebral canal, it is also called as spinal canal. Some devices such as rods, plates or wires can be fixed to the spinal column by screws for immobilization (Chawla et al., 2011). The accurate knowledge of the vertebral dimensions is important for diagnosis and treatment of certain vertebral diseases and instabilities.

Since ethnic and gender variations were found in vertebral dimensions, it is required to determine the origin and gender of the patient (Teo et al., 2017) (Varol et al.,

ARTICLE INFORMATION

*Corresponding Author: mebingeorgem.sdc@saveetha.com
Received 4th Aug 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/163

2006). Vertebrae morphology is identified to have genetic and ethnic variation but the majority of the studies were based on white population around different parts of the world, whereas a very few studies are available on Indian population (Grivas et al., 2019) . Pedicles are the strongest part of the vertebrae and it is made up of cortical bone with a small core of cancellous bone (Tiwari, Pandey and Naik, 2015). Transpedicular screw fixation has evolved into a very successful method for correcting spinal disorders by providing stable fixation and correcting spinal deformities (Lien, Liou and Wu, 2007) (Babu and Mohanraj, 2019).

Morphology of lumbar vertebrae has an important role in clinical diagnosis of lower backache. Low back pain is a musculoskeletal condition affecting the adults (Vinaya Swetha, Yuvaraj Babu and Mohanraj, 2018). It is one of the main health problems all over the world and around 75% of the population is estimated to have experienced it at least at some point of their life (Choubisa and Babel, 2018) (Banik et al., 2019). Lumbar spinal stenosis is the common cause in older age group which is narrowing of the spinal canal in which the antero-posterior and lateral measurements of the canal are less than the normal value for the particular age and sex. This narrowing causes compression of the nerves that passes through the canal and causes pain in the lower back (Azu et al., 2016).

Other causes of low backache include abnormal orientation of joints (Mohanty et al., 2017). Many cases of spinal canal stenosis have found to have some relation with the anatomical differences. Due to the common occurrence of low backache in workers around the world, researchers have tried to focus on this region for their further study (Philipose et al., 2015) . Anatomical studies of lumbar vertebrae have been studied in different ethnic groups such as the Greek population, Western Maharashtra and in the South African population but have not yet been studied in the south Indian population. Some studies were done without taking ethnicity as a factor. The present study will serve as a database for the south Indian population.

MATERIAL AND METHODS

The study was conducted in the Department of Anatomy, Saveetha Dental College and Hospitals, Chennai and Department of Anatomy and Sri Ramachandra Medical College and Research Institute, Chennai. A total of 70 dry human lumbar vertebrae out of which 40 are of males and 30 are of females (which were recorded in the Department of Anatomy) without any gross abnormalities were collected and measured. The anteroposterior body diameter, transverse body diameter, interpedicular distance and midsagittal diameter were measured using Vernier caliper and noted down. The midsagittal diameter (MSD) was measured as the maximum anteroposterior distance of the spinal canal (figure 1) of each vertebrae while the interpedicular distance (IPD) was measured as the minimal distance between the medial surfaces of the pedicles on either side (figure 2). Transverse body diameter (TD) was measured as the transverse distance of each vertebral body (figure 3). The anteroposterior body diameter (APD) was measured as the anteroposterior distance of each vertebral body (figure 4).

Figure 1: Showing the midsagittal distance of the lumbar vertebrae

Figure 2: Showing the interpedicular distance of the lumbar vertebrae

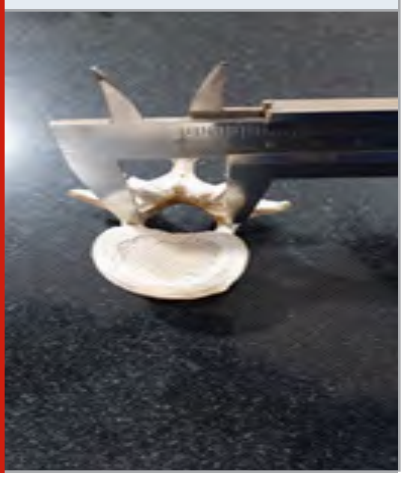


Figure 3: Showing the transverse body diameter of the lumbar vertebrae

Figure 4: Showing the anteroposterior diameter of the lumbar vertebrae

RESULTS AND DISCUSSION

Male

Table 1. Measurements of male vertebrae

Measurements	Mean in mm	Standard deviation
Anteroposterior body diameter	32.15	1.0627
Transverse body diameter	45.06	0.3637
Interpedicular distance	26.50	0.3900
Midsagittal diameter	17.96	0.2597

Female

Table 2. Measurements of female vertebrae

Measurements	Mean in mm	Standard deviation
Anteroposterior body diameter	27.04	0.3170
Transverse body diameter	40.92	0.3074
Interpedicular distance	25.42	0.3028
Midsagittal diameter	16.94	0.2313

In the present study, the mean anteroposterior body diameter was found to be 32.15 mm ± 1.0627 in males and 27.04 mm ± 0.3170 in females. The average transverse body diameter was found to be 45.06 mm ± 0.3637 in males and 40.92 mm ± 0.3074 in females. The average interpedicular distance was found to be 26.50 mm ± 0.39 in males and 25.42 mm ± 0.3028 in females . The average midsagittal diameter was found to be 17.96 mm ± 0.2597 in males and 16.94 mm ± 0.2313 in females (table 1 and 2). From the data obtained a significant difference is seen among the males and the females dimensions indicating sexual dimorphism. All the dimensions obtained were greater in males than females but the difference in the dimensions of the vertebral body is greater than the difference in other dimensions (figure 5 – 8).

Figure 5: Bar graph representing the association of anteroposterior diameter of the body of the lumbar vertebrae in males and females. "Males" (blue) and "Females" (orange). X axis represents the gender and Y axis represents the mean value of anteroposterior diameter of lumbar vertebrae. Males have larger anteroposterior diameter than females.

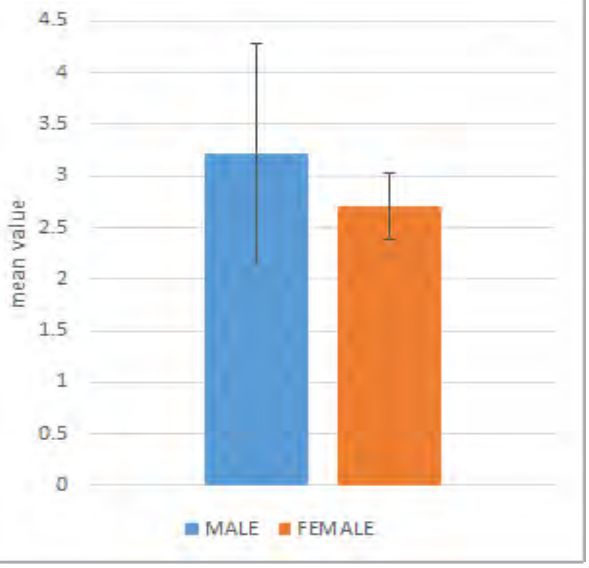


Figure 6: Bar graph representing the association of transverse diameter of the body of the lumbar vertebrae in males and females. "Males" (blue) and "Females" (orange). X axis represents the gender and Y axis represents the mean value of transverse diameter of lumbar vertebrae. Males have larger transverse diameter than females.

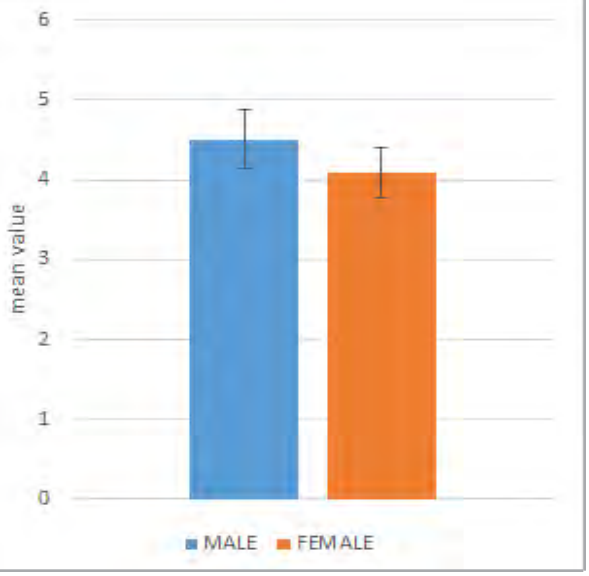


Figure 7: Bar graph representing the association of the interpedicular distance of the lumbar vertebrae in males and females. "Males" (blue) and "Females" (orange). X axis represents the gender and Y axis represents the mean value of interpedicular distance of lumbar vertebrae. Males have larger interpedicular distance than females.

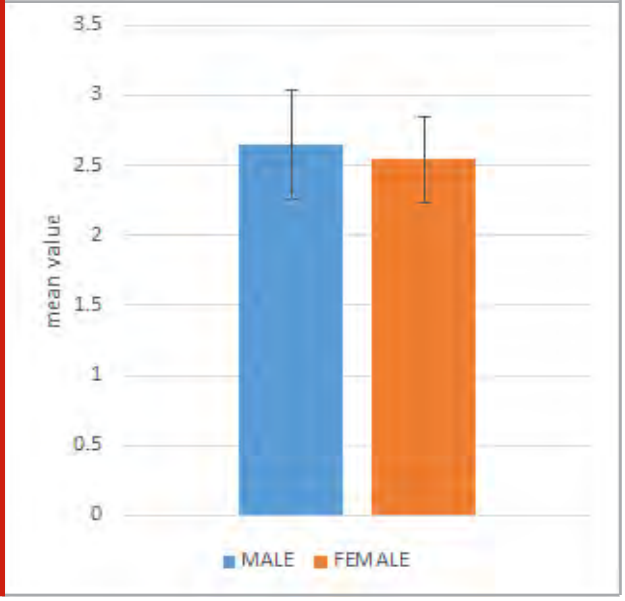
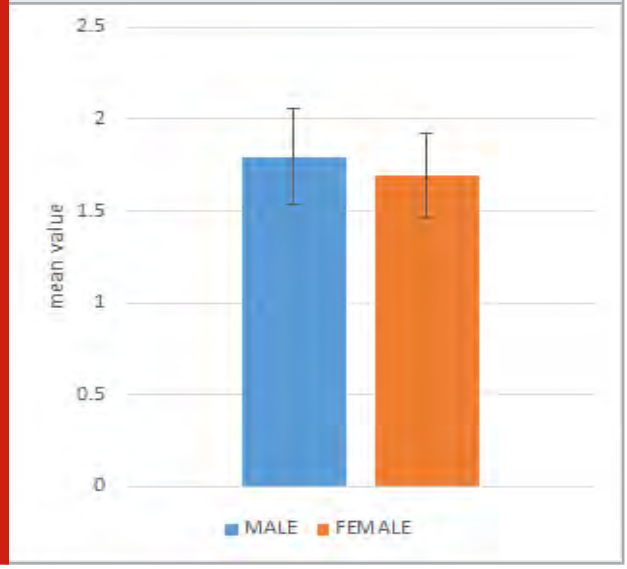


Figure 8: Bar graph representing the association of midsagittal diameter of the lumbar vertebrae in males and females. "Males" (blue) and "Females" (orange). X axis represents the gender and Y axis represents the mean value of midsagittal diameter of lumbar vertebrae. Male have larger midsagittal diameter than females.



In a study done on the western maharashtra population, 420 lumbar vertebrae were measured to find out the regional and sexual differences in them. The parameters measured in this study were the anteroposterior body diameter, transverse body diameter, Interpedicular distance and midsagittal diameter which were the same as that of our study. The result when compared with previous studies had considerable differences in them. Differences in male and female lumbar vertebrae dimensions were identified with females having comparatively smaller vertebral body and smaller vertebral canal than males which is similar to our results (Jadhav et al., 2013). In a study done on Pakistani population , the vertebral dimensions were obtained for 33 males and 16 females. The measurements in this study would be more accurate than our study as it was done using computer tomography scans. The vertebral body diameters, the pedicle dimensions and the canal diameter was obtained. The vertebral dimensions were found to be higher in males than females which is similar to our results (Alam et al., 2014).

When compared with other studies, similar gender variations have been noted with the males vertebrae having larger dimensions and larger vertebral body than the female vertebrae. Variations of the dimensions are seen in different populations which could be due to environmental and genetic causes. Assessing the size of the lumbar vertebral canal is an important diagnostic tool for low back ache. Hence, these parameters could be helpful in early diagnosis of lumbar stenosis and other vertebral diseases

CONCLUSION

This study gives an understanding of the morphology of the lumbar vertebrae in the south indian population. From the study it was concluded that the lumbar vertebrae showed significant difference morphometrically for sexual dimorphism as well as for the knowledge of surgical procedures like fixation. Lumbar vertebrae morphology could be useful to find relevance in clinical diagnosis of lumbar spinal stenosis and intraspinal tumors. As Vertebrae morphology has genetic and ethnic variations, more research can be done in various populations. The dimensions obtained in this study serves as a database for the south indian population and can be compared and studied with different sets of population.

Conflict of interest: The author declares that there was no conflict of interest in the present study.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-363-368

BBRC
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Prevalence of Musculoskeletal Pain among Dental Students

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ABSTRACT

One of the professions with high incidence of musculoskeletal disorder in the course of their professional career are dentists. Musculoskeletal disorders among dental professionals start as early as during the course of clinical training period at dental school. The aim of this study was to evaluate the prevalence of musculoskeletal pain among dental students. The survey included the distribution of questionnaires to dental students from a private dental hospital during a one-week period. The criterion for selection was third to fifth year undergraduate dental student. The questionnaire included information on age and gender, and other variables such as year of study, presence of musculoskeletal pain, location of pain, characteristic of pain such as pain duration and intensity and frequency of weekly exercise. Data was analysed using SPSS Software and a chi-square test was done to find out association between variables. A total of 114 students participated in the study. 71.1% experienced musculoskeletal pain and this was more common in females (80.5%). The percentage of participants reporting pain appeared to increase with the number of years in dental school . The order of most prevalent pain locations was the neck/shoulder (44.4%), lower back (28.4%), thumb/hand (14.8%), upper back (9.9%) and wrist (2.5%). The order of most prevalent pain locations was the neck/shoulder (44.4%), lower back (28.4%), thumb/hand (14.8%), upper back (9.9%) and wrist (2.5%). Regular exercise was associated with alleviation of some pain. Within the limits of this study, it was observed that there was a high prevalence of musculoskeletal pain among dental students and prevalence was higher among females and dental interns. The most common area affected by pain was the neck/shoulder region.

KEY WORDS: BODY PAIN, DENTAL STUDENTS, EXERCISE, MUSCULOSKELETAL PAIN, NECK PAIN.

ARTICLE INFORMATION

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Received 24th July 2020 Accepted after revision 23rd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/164

INTRODUCTION

Musculoskeletal disorders are characterized by the presence of discomfort, persistent pain or disability of the joints, tendons, and muscles, aggravated or caused by repeated movements, static work postures or forced body postures. One of the professions with high incidence of musculoskeletal disorder in the course of their professional career are dentists (Pollack, 1996; Leggat, Kedjarune and Smith, 2007; Hayes, Cockrell and Smith, 2009). Musculoskeletal disorder has also been documented for dental hygienists and dental assistants (Murtomaa, 1982; Stockstill et al., 1993; Augustson and Morken, 1996). Studies have shown that dentists experience more neck, shoulder and back pain compared to practitioners in other occupational groups (Kuorinka et al., 1987; van Doorn, 1995).

The work area of a dentist is narrow and because of this, dentists are subjected to very inflexible work posture during performance of dental treatment (Bramson, Smith and Romagnoli, 1998). Furthermore, precise motor skills are required during dental procedures to complete goal-oriented tasks in a dynamic setting. The persistence and aggravation of pain could be related to many physical factors such as repetitive motion, awkward back postures, long period of static posture and precise hand and wrist movement (Graham, 2002; Alexopoulos, Stathi and Charizani, 2004; Lindfors, von Thiele and Lundberg, 2006). Psychological stress during procedures due to unexpected procedural challenges, time constraints and such and possible pre-existing pain conditions may also contribute to musculoskeletal pain among dental practitioners.

Previous studies suggest that musculoskeletal disorders among dental professionals start as early as during the course of clinical training period at dental school (Melis et al., 2004; Thornton et al., 2008). This is because dental students train in the same environment and adapt the same work behaviour as dental practitioners. However, students perform dental procedures without an assistant as four-handed dentistry is usually not available in a dental school clinical setting. Thus, students have to shift back and forth from the operating site to the tray table, reach instruments after instruments, twist, bend and contort their bodies in order to get closer to the treatment site. Today's generation of dental students have been reported with increased prevalence of back pain (Smith and Leggat, 2007). Melis et al reported that work-related musculoskeletal disorder among dental students occurs during the 4-year academic training period (Melis et al., 2004) . Reising et al concluded that 70% of dental students experienced pain in the third year (Rising et al., 2005). The development of chronic pain problems and the frequency and duration of which pain is maintained are greatly influenced by the methods of which students use to acquire dental skills since the first year of dental school.

Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research the prevalence of musculoskeletal pain among dental students.

MATERIAL AND METHODS

This retrospective study involved the construction and distribution of questionnaires to dental students from a private dental hospital during a one-week period. The criterion for selection was third to fifth year undergraduate dental students. Students who have a history of trauma. rheumatoid arthritis, surgery of neck, shoulder, back and hands were excluded from the study. The survey was approved by the Ethical Committee Board of the dental hospital. Informed consent was obtained from all the participants and participation was voluntary without any incentives offered. The survey was done anonymously without identifiers of the participants.

The questionnaire included demographic information such as age and gender, and other variables such as year of study, presence of musculoskeletal pain, location of pain, characteristic of pain such as pain duration and intensity and frequency of weekly exercise. The location of pain was classified into 5 regions: neck/shoulder, upper back, lower back, thumb/hand and wrist. If more than one body region was identified as being painful, students marked the most symptomatic region. Pain characteristic was assessed by duration and intensity of pain. Pain duration was categorised to less than 1 hour, 1-3 hours and 4-8 hours per day. Pain intensity was divided into mild, moderate and severe. Frequency of weekly regular exercise was recorded as never, once a week, thrice a week and five times a week.

Statistical Analysis: All the data obtained were entered into Microsoft Office Excel (2013) and analysed using SPSS Software Version 26.0. Data were subjected to descriptive statistics in the form of frequency and percentages. Chi-square test was conducted to check for statistical significance between variables. Significance test level was set at $p<0.05$.

RESULTS AND DISCUSSION

A total of 114 undergraduate dental students participated in the survey. This included 37 (32.5%) males and 77 (67.5%) females. Based on the year of study, 31 (27.2%) were third years, 18 (15.8%) were fourth years and 65 (57%) were interns. Out of the total 114 participants, 71.1% reported with some type of musculoskeletal pain. Based on gender, musculoskeletal pain was observed in 80.5% of females and 51.4% of males and this result was statistically significant ($p<0.05$)(Figure 1).

According to the year of study, the reported presence of pain was higher in interns (83.1%), followed by fourth years (61.1%) and third years (51.6%). The percentage of participants reporting pain appeared to increase with the number of years in dental school and this was found to be statistically significant (p<0.05)(Figure 2).

Figure 1: Bar chart denotes the association between presence of musculoskeletal pain and gender. X-axis represents the presence of musculoskeletal pain and Y-axis represents the percentage of male and female students. Pearson Chi-Square value- 10.337; df- 1; p value- 0.001 (<0.05), hence, statistically significant. Presence of musculoskeletal pain was significantly higher in females (pink) compared to males.

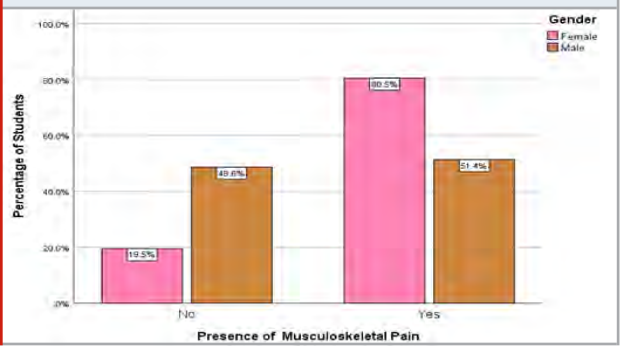
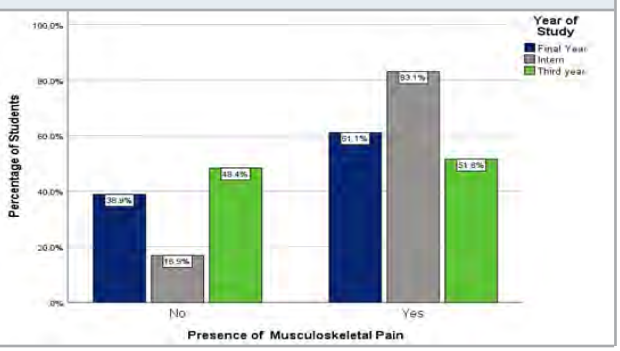


Figure 2: Bar chart denotes the association between presence of musculoskeletal pain and year of study. X-axis represents the presence of musculoskeletal pain and Y-axis represents the percentage of students based on year of study. Pearson Chi-Square value- 11.130; df- 2; p value- 0.004 (<0.05), hence, statistically significant. Presence of musculoskeletal pain was significantly higher in interns (grey) compared to final year and third year students.



The order of most prevalent pain locations was the neck/shoulder (44.4%), lower back (28.4%), thumb/hand (14.8%), upper back (9.9%) and wrist (2.5%). However, the association between the location of pain and gender, and the location of pain and year of study was statistically not significant (p>0.05)(Figure 3)(Figure 4). Most participants (59.3%) reported that the pain they experienced lasted for 1-3 hours and this was more common in females compared to males but this was statistically not significant (p>0.05)(Figure 5). Based on the year of study, the majority of interns (64.8%) and final years (63.6%) experienced musculoskeletal pain which lasted for 1-3 hours and most third years (62.5%) had musculoskeletal pain which lasted for less than an hour. The association between duration of pain and year of study was statistically significant (p<0.05) (Figure 6). 65.4% of participants with musculoskeletal pain reported the intensity of pain was mild, whereas 33.3% experienced moderate pain and 1.2% experienced severe pain.

Figure 3: Bar chart denotes the association between location of musculoskeletal pain and gender. X-axis represents the location of musculoskeletal pain and Y-axis represents the percentage of male and female students. Pearson Chi-Square value- 1.885; df- 4; p value- 0.757 (>0.05), hence, statistically not significant. Males (brown) experience more pain in the neck/shoulder and thumb/hand region compared to females but the result was statistically not significant.

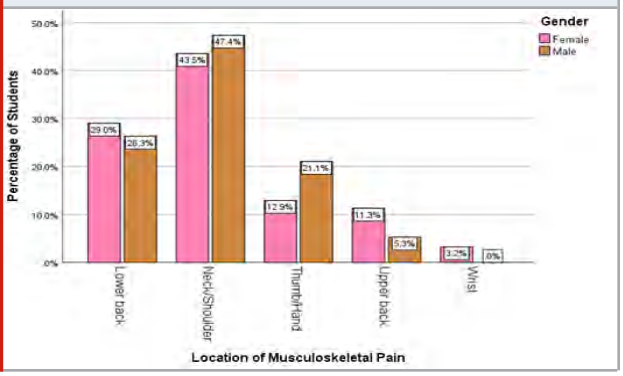
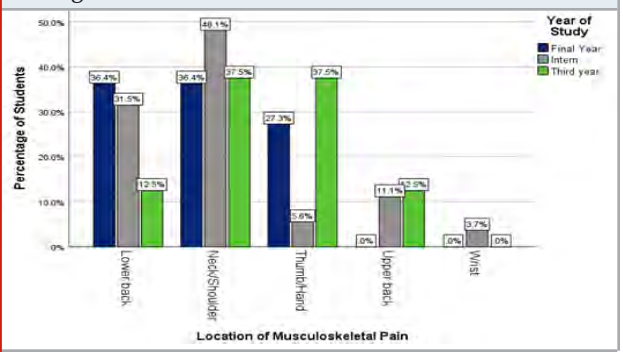


Figure 4. Bar chart denotes the association between location of musculoskeletal pain and year of study. X-axis represents the location of musculoskeletal pain and Y-axis represents the percentage of students based on year of study. Pearson Chi-Square value- 14.469; df- 8; p value- 0.070 (>0.05), hence, statistically not significant. Pain in the neck/shoulder and wrist region was more among interns (grey) whereas lower back pain was higher among final year (blue) students but the result was statistically not significant.



The association between intensity of pain and gender, and between intensity of pain and year of study was statistically not significant (p>0.05)(Figure 7)(Figure 8). Presence of musculoskeletal pain was significantly higher among those who do not engage in exercise or any

physical activity (80.9%) compared to those who exercise once and three times a week (p<0.05)(Figure 9). This study evaluated the prevalence of musculoskeletal pain in a sample of dental students at a private dental hospital. Many research studies have reported high prevalence of work-related musculoskeletal disorder among dentists. Dental students were no exception. The results of this study confirmed the presence of musculoskeletal pain among dental students.

Figure 5: Bar chart denotes the association between duration of musculoskeletal pain and gender. X-axis represents the duration of musculoskeletal pain and Y-axis represents the percentage of male and female students. Pearson Chi-Square value- 1.640; df- 2; p value- 0.440 (>0.05), hence, statistically not significant. Most musculoskeletal pain lasted for 1-3 hours and this was more common in females (pink) compared to males but the result was statistically not significant.

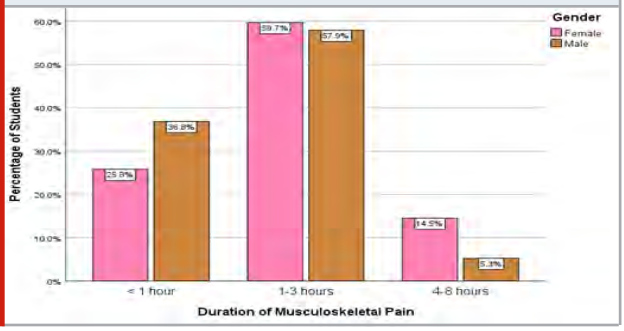
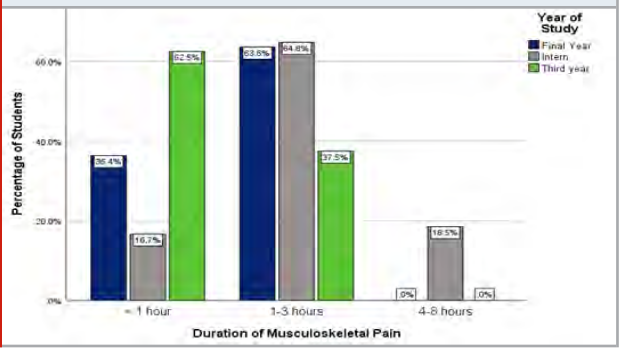


Figure 6: Bar chart denotes the association between duration of musculoskeletal pain and year of study. X-axis represents the duration of musculoskeletal pain and Y-axis represents the percentage of students based on year of study. Pearson Chi-Square value- 16.011; df- 4; p value- 0.003 (<0.05), hence, statistically significant. Musculoskeletal pain which lasted for 1-3 hours were significantly higher among interns compared to final year and third year students.



The survey revealed that 71.1% of students reported some type of musculoskeletal pain. This confirmed an early study by Rising et al on their reports of body pain in a dental student population which concluded 46-71% of dental students reported body pain (Rising et al., 2005). Movahhed et al studied the musculoskeletal pain report among Mashhad dental students and found that most undergraduate dental students (81.6%) reported pain at least in one region of the body (Movahhed et al., 2013). A study on the perceived musculoskeletal symptoms among dental students in the clinic work environment by Thornton et al also found that the majority of dental students had musculoskeletal pain (Thornton et al., 2008). The studies were in agreement with our current findings.

Figure 7: Bar chart denotes the association between intensity of musculoskeletal pain and gender. X-axis represents the intensity of musculoskeletal pain and Y-axis represents the percentage of male and female students. Intensity of musculoskeletal pain was mild for most male and female students. Pearson Chi-Square value- 0.363; df- 2; p value- 0.834 (>0.05), hence, statistically not significant. More males (brown) experienced mild intensity of musculoskeletal pain compared to females but this was statistically not significant.

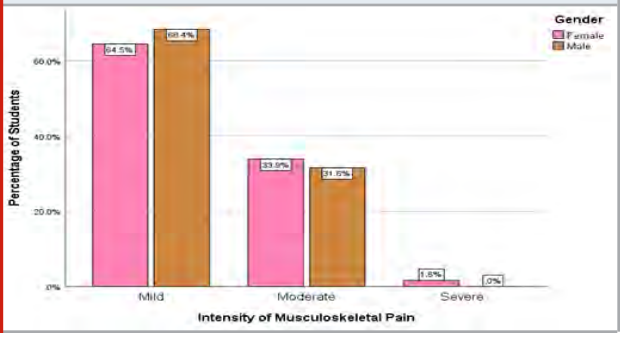
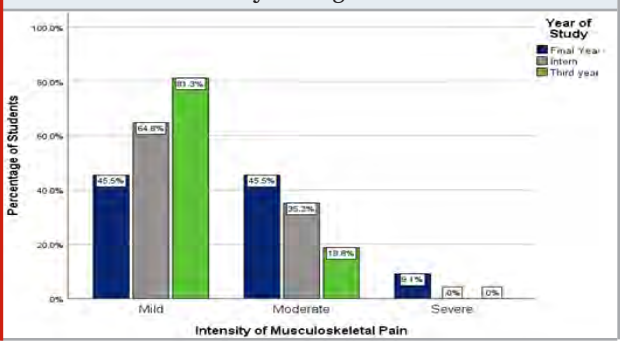


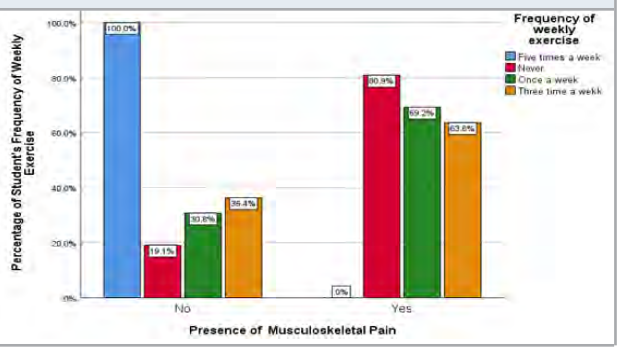
Figure 8: Bar chart denotes the association between intensity of musculoskeletal pain and year of study. X-axis represents the intensity of musculoskeletal pain and Y-axis represents the percentage of students based on year of study. Pearson Chi-Square value- 9.211; df- 4; p value- 0.056 (>0.05), hence, statistically not significant. More third years (green) experienced mild intensity of musculoskeletal pain compared to interns and final years but this was statistically not significant.



The current study found that musculoskeletal pain was higher in female dental students compared to males students. In 2006, Lindfors et al reported that female dentists showed a higher prevalence of musculoskeletal pain (Lindfors, von Thiele and Lundberg, 2006), which coincided with our findings. Movahhed et al also reported the majority of dental students with body

pain were females (Movahhed et al., 2013). A past study on the prevalence and risk factor associated with musculoskeletal pain among students of MGM Dental College found that more male dental students experienced musculoskeletal pain compared to female students (Madaan and Chaudhari, 2012) and this did not coincide with the current study.

Figure 9: Bar chart denotes the association between presence of musculoskeletal pain and frequency of weekly exercise. X-axis represents the presence of musculoskeletal pain and Y-axis represents the percentage of student's frequency of weekly exercise by students. Pearson Chi-Square value- 13.390; df- 3; p value- 0.006 (<0.05), hence, statistically significant. Significantly more students who did not experience musculoskeletal pain exercise five times a week whereas most students who experience musculoskeletal pain never engage in weekly exercise.



According to our results, a higher percentage of interns experienced musculoskeletal pain, followed by fourth years and third years. Musculoskeletal pain appeared to increase with the number of years in dental school. This finding coincided with a study by Rising et al who also found body pain to be more prevalent in interns and least prevalent in third year students (Rising et al., 2005). Interns (84%) were also reported to experience more body pain compared to fourth year (81%) and third year (78%) students in a study by Madaan et al (Madaan and Chaudhari, 2012).

We found that the most common area affected by pain was the neck/shoulder region (44.4%), followed by the lower back region (28.4%). Rising et al also reported a similar finding which stated the most prevalent location of pain reported by dental students were neck/shoulder region and back pain (Rising et al., 2005). Prevalence of neck/shoulder pain in our survey was almost similar to the results of a study by Morse et al in 2007 in which 37% of students reported neck pain (Morse et al., 2007). Melis et al found the prevalence of neck pain among Italian dental students as 40.4% which was similar to our study (Melis et al., 2004).

The results of this study showed that dental students are at a risk for development of musculoskeletal disorders. Strategies for reducing musculoskeletal disorder should be elucidated before it affects a large number of dentists. It is of utmost importance to educate students on proper ergonomics during clinical procedures as well as musculoskeletal cares.

CONCLUSION

Within the limits of this study, it was observed that there was a high prevalence of musculoskeletal pain among dental students and prevalence was higher among females and dental interns. The most common area affected by pain was the neck/shoulder region.

ACKNOWLEDGEMENTS

We would like to express sincere gratitude to Saveetha Dental College and Hospital, Chennai for the contribution and involvement in this study.

Conflict of Interest: No conflict of interest has been declared by the authors.

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-369-373

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Impact of Physical Fitness and Nutritional Diet for Healthy Life- A Cross- Sectional Questionnaire Survey

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ABSTRACT

Physical fitness is the ability of the body to carry out work without getting tired. Fitness is often achieved through proper nutrition, exercise, rest and moderate vigorous physical activity. Nutrition is vital ,as it gives energy to carry the heavy workouts. The growing epidemic of obesity is linked to recent decline in physical activity levels. Maintaining the normal weight involves a good physical activity, in combination with dietary changes.The aim of the study is to assess the impact of physical fitness and nutritional diet to lead a healthy life.A cross sectional questionnaire study was conducted to 100 people of General Population in Thiruvalluvar district of Tamil Nadu. The obtained data were analysed through SPSS software. The results were depicted in the form of graphs.The results say that 38% of the respondents follow both exercise and a healthy diet, 29% of the respondents practice only regular exercise and visit the gym often and 31% of the respondents stated they follow only a nutritional diet to maintain a healthy life.Fitness awareness had a significant and positive effect on physical fitness and healthy habits. The questionnaire survey shows that the General population was aware of the importance of physical fitness and nutritional diet to lead a stress free healthy life.

KEY WORDS: EXERCISE,HEALTHY LIFE, NUTRITIONAL DIET, PHYSICAL FITNESS.

INTRODUCTION

Physical fitness is the ability of the body to carry out work without getting tired. It is commonly obtained through proper nutrition, moderate-vigorous physical exercising and sufficient rest (Tremblay et al., 2010). Health is a state of bodily, intellectual and social well-being in which disease and infirmity are absent. It is referred to as the ability to maintain homeostasis and recovery from insults (Definitions of Health | Primer on Public Health Population, no date). It is a measure of the body's capability to function effectively and efficiently. It is defined as the state of health and well-being of an individual. Fitness is often achieved through proper nutrition, exercise, rest and moderate to vigorous physical act (Medina-porqueres et al., 2015).. Exercise improves muscle strength inside the lungs, heart, and whole body. It lowers blood pressure, improves circulation and blood flow inside the muscles (Booth, Roberts and Laye, 2012).

It is a behavioral interference that has shown first-rate promise in allaying signs and symptoms of depression .The effects of practical degeneration are enormous and greatly lessen the general fitness of paraplegics, particularly in the musculoskeletal and cardiovascular systems,

ARTICLE INFORMATION

*Corresponding Author: brundha.sdc@saveetha.com
Received 7th Aug 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/165

thereby increasing their hazard for cardiovascular disease(Caspersen, Powell and Christenson, 1985). In addition, exercise education has been stated to lower the resorptive process of the skeleton by decreasing bone and collagen catabolism and likely aiding in new bone formation (Martinsen, 1990). Physical activity is found to be a primary prevention against congestive heart failure, endothelial dysfunction, arterial dyslipidemia , hemostasis, deep vein thrombosis, cognitive dysfunction, despair and anxiety, osteoporosis, osteoarthritis, balance, bone fracture/falls, rheumatoid arthritis, colon cancer, breast cancer (Cowell, Squires and Raven, 1986).

Complete nutrition requires ingestion and absorption of vitamins, minerals, essential amino acids from protein and essential fatty acids from fat-containing food, also food energy in the form of carbohydrate, protein, and fat. Dietary habits and choices play a vital role in the quality of life, health and long life. Nutrition is the science that decodes the supplements and other material in food with respect to the maintenance ,development,reproduction,health and sickness.(Severson, 2010). Nutrition is vital and most effective for the development of human beings and animals and also for the prevention and remedy of disease. Nutrition is also essential to the preservation of appropriate fitness and functionality (Bell, 1988). In people, an undesirable food routine can create insufficiency related maladies, for example, frailty, scurvy, preterm birth, stillbirth and cretinism, or supplement overabundance, wellbeing compromising circumstances comprehensive of weight and metabolic disorder and some regular interminable fundamental sicknesses like cardiovascular infection, diabetes, and osteoporosis. Malnutrition can cause wasting of muscle in acute cases, and stunted growth are in chronic conditions (S. D. Ohlhorst et al., 2013).

Deficiencies can lead to quite a few fitness problems. These can encompass digestion problems, pores and skin disorders, stunted or defective bone growth, or even dementia(Whitney and Rolfes, 2005). Eating the right amount and exercising often can assist you avoid bloat and hold a healthy weight. Being physically lively is vital to achieve weight reduction goals. Even if you're not trying to lose weight, everyday exercise can improve cardiovascular health, boost your immune system, and increase your strength level (the Healthline Editorial Team, no date). A balanced diet is one that gives your body the supplements it needs to work accurately.To get the correct nourishment from your eating routine, you ought to expend most of your day by day calories as new organic products, vegetables, entire grains and vegetables, nuts, lean proteins('Healthy Lifestyle Habits Benefiting the Aging Body and Mind', 2011).

There are many literatures emphasizing the importance of physical inactivity as one of the most significant causes of reduced quality of life, disability, and death in the developed world. Some studies say maintaining a healthy body weight, or losing weight, is a direct function of calories consumed and expended (Patrick J. Skerrett, 2010). This study was conducted to assess the preference of the general population towards physical fitness and nutritional diet in order to maintain healthy lifestyle.

MATERIAL AND METHODS

The results were analysed by obtaining the percentages of each response using Microsoft excel and statistical analysis used was descriptive analysis using SPSS software.

Sample Selection: A cross- sectional questionnaire study was conducted among the general population of Sample size 100. The questions in subject were selected from various sources and compiled to required form. A preliminary set of questionnaires were given to the senior faculty members to validate the questions. Later implemented in the general population, to know how they understood the questions. These pre validated questions were implemented in the study.

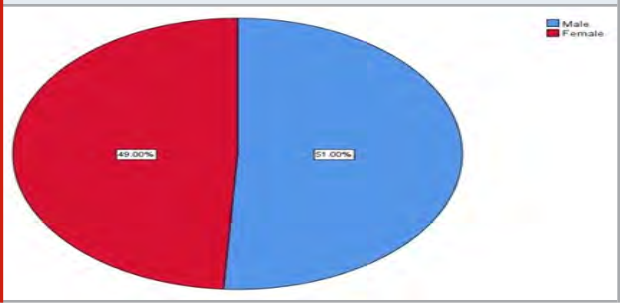
Inclusion and Exclusion Criteria: Inclusion criterion set was general population, both males and females with age group moret than 18 years who are willing to participate in the study. Exclusion criterion:Chilren and people aged less than 18 years were excluded.

Sampling Method: In the present study,the sampling method used is a random sampling method.

Data Collection and Tabulation: The questionnaire which was taken on a survey planet and the responses were entered into the excel sheets and then tabulation of the data finally and the question comparison was done. The representation of the data is through the pie and bar graph .

Statistical Analysis: The statistical software used IBM SPSS V22.The statistical test used is Chi square test (p value).Type of analysis used were descriptive analysis,demographic data.

Figure 1: pie chart shows the result of the people participated in the study ,59% were male (red) and 41% were female respondents (blue)



RESULTS AND DISCUSSION

Among 100 respondents, male participants are 51 and female participants are 49 (Figure 1). Based on the obtained results, the respondents are grouped in three sets. The first set of people stated they consume healthy

food in order to stay healthy. Second set of people stated that they follow regular exercise and the third set of people stated that along with healthy food, practicing regular exercise improves the lifestyle and reduces the risk of cardiovascular diseases.

People who're physically energetic at a sufficient level attain a big range of bodily and mental health benefits in comparison to the ones who aren't lively (Blair et al., 1995) . Exercise may be a set of physical activity that's planned, structured, associated repetitive and has a final or an intermediate objective in the development or maintenance of body's health (Golden, 2002). Nutrition is also vital, not only for the growth and development of humans but also in the prevention and treatment of disease (Sarah D. Ohlhorst et al., 2013). Figure 2 shows that 14% of the respondents practice regular exercise and 15% of them go to gym, 31% of the respondents eat only a healthy diet, 40% of the respondents follow both exercise and a healthy diet.

Figure 2: Pie chart shows various methods followed to maintain the fitness level.40% of them follow exercise and follow a healthy diet(orange).14% follow regular exercise(blue),whereas 15% go to gym (red). 31%eat only a healthy diet(green).

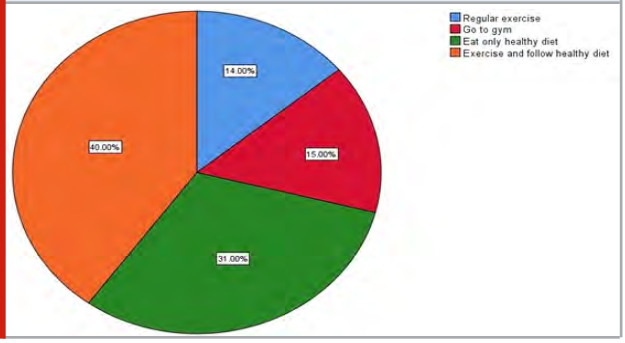


Figure 3:Bar graph represents the association between gender and the ways they maintain their fitness level.X-axis represents gender and Y axis represents the count /number of responses.26% of the females exercise and follow nutritional diet ,which is an ideal way to attain healthy lifestyle ,whereas only 14% of the males follow healthy diet and exercise.Chi square test value is 12.721, p value is 0.005(p>0.05).Hence there is no statistical difference between the gender and various techniques in maintaining fitness level.

The people going to gym are advised to follow a healthy diet by gym instructors to maintain/improve the body build. Almost 2 million deaths per year were confirmed due to physical inactivity, thereby making physical activity the "best buy in public health"(Morris, 1994). 63% of them think that following a nutritional diet maintains the body health and 16% of them think that a nutritional diet alone can't maintain body health [figure 3]. However, many people know, more or less, were not aware of what healthy nutrition is and what is not. But this knowledge is not translated directly into behavior. They are not really following it in practice (Povey, 1999).

Figure 4: Pie chart shows 63% of the respondents think that following a nutritional diet maintains body health(blue).16% of the respondents do not agree with the fact that body health can be achieved by following a healthy diet(red).21% of the respondents have no idea(green).

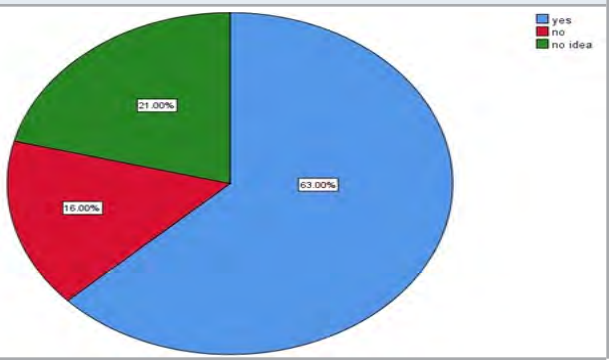


Figure 5: Pie chart shows that 41% of the respondents feel tired after consuming small amounts of food during exercise(blue).59% of the respondents do not feel tired after consuming small amount of food (red).

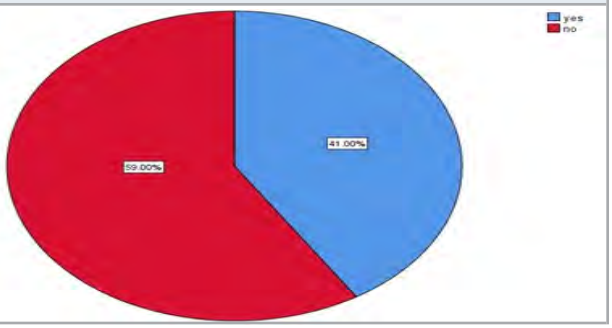


Figure 4 shows that 41% of the respondents feel tired after consuming a small amount of food during exercise. This might be due to inadequate intake of healthy drinks and nutritious supplements in between their practice sessions. 58% of the respondents agree with the fact that one can lead a healthy life by only having a diet without exercise and 28% of them don't agree with the fact having a nutritional diet without exercise can lead to a healthy life [figure 5]. The roles of nutrition and fitness, both singularly and together, helps in maintaining bodily functions, including cognitive,

immune, skeletal, muscular, and other functions. When asked about the changes they made in their diet plan, 12% of the population have reduced the intake of sugar rich foods, 19% of them have stopped consuming carbonated drinks [figure 6].

Figure 6: Pie chart shows that 58% of the respondents feel that one can lead a healthy life by following only a nutritional diet without exercising(blue).19 % of the respondents do not agree with this fact(red).23% of the respondents have no idea(green).

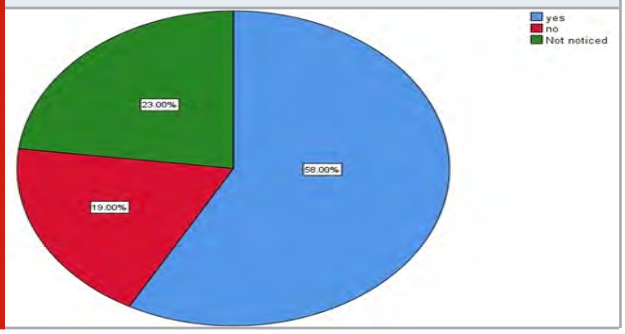
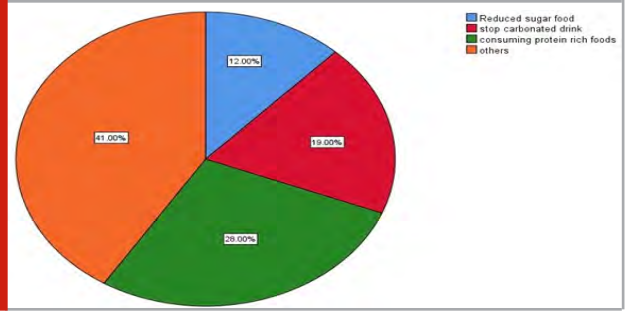


Figure 7: Pie chart shows the changes made by the respondents to achieve a healthy lifestyle .12% of the respondents have reduced taking sugar foods(blue).19% of the respondents have stopped having carbonated drinks(red).28% of the respondents have stopped consuming protein rich foods(green). 41% of the respondents had their own ways of maintaining physical fitness(orange).



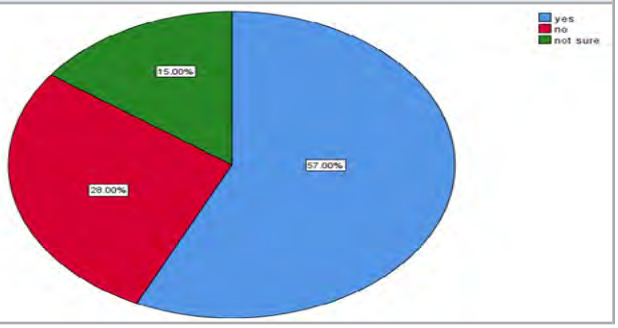
As because our diet has a direct impact on our muscle's ability to recover after a workout, we need to maintain a proper diet. 57% 0f the participants think that motivated individuals have a healthier lifestyle [figure7]. Though the participants in the survey were aware of the benefits of doing regular physical activity and following a nutritional diet, few don't find time to practice regular exercise. They say following a balanced diet and consuming cholesterol free food makes them healthier and they don't often fall sick. This survey gets a mixed review on the practice to lead a healthy life.

CONCLUSION

Within the limitations of the questionnaire survey, we conclude that the majority of the population are aware of the importance of physical fitness and nutritional

Figure 8: The bar graph represents the association between gender and the changes the respondents made in their diet. The X-axis represents the gender and Y-axis represents the count/number of responses.14% of the males stopped consuming protein carbonated drinks ,whereas only 5% of the females have reduced consuming carbonated drink.Red represents respondents who stopped drinking carbonated drinks.Chi Square test was done to find the variables.Chi square test value is 10.969 p value is .012 (p>0.05).Hence there is no statistical significant difference between gender and changes made in the dietary planner.

Figure 9: Pie chart shows that 57% of the respondents think that the motivated individuals lead a healthier life (blue) .27% of the respondents do not agree with this fact(28%).16% of the respondents have no idea (red).



diet to lead a stress free healthy life. The females are more aware of fitness in relation to diet than the males. Fitness awareness had a significant and positive effect on physical fitness and healthy habits.

ACKNOWLEDGEMENTS

We thank Saveetha dental college for the support to carry out this survey.

Conflict of Interests: None to declare.

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Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-374-379

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Does Colour Affect Mood – A Survey Among College Students

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ABSTRACT

Colour is something everyone visualises everyday, it is the basic component of everything we see. When psychologically considered colours are said have an effect on one's behaviour.Colour is also an effective tool for communications. It is known that various colours denote various meanings,religiously and socially. Everyday we come across various colours. Each colour is said to have specific psychological properties.This study was conducted among college students to assess if colour had inverse effects on their daily behaviour. Survey population included 184 college students. A self structured questionnaire was circulated online.The results obtained were analysed and it was found that colour has an effect on one's day to day behaviour.

KEY WORDS: COLOUR, PSYCHOLOGY, MOOD, WAVELENGTH, HAPPY, SAD.

INTRODUCTION

Colour can be defined as the property of light,seen by people.It is said that colours could be used as a powerful tool for communication.Not only that ,but colour can also influence one's physiological and psychological reactions.It has also been medically proven that colours have influence over blood pressure,metabolism etc.We see colours with our brains.The occipital lobe of our brain is responsible for visual information of colour. Human eyes visible wavelength ranges from 350nm to 750nm.In the eye the cones and rods are responsible for photo reception.Almost everything we see in our day today life has has colours.We live in a world filled with colours.According to various researches ,the environment in which we live and the colours present around us can influence our psychological behaviour.Use of colours in treatment of mood disorders or nervous disturbances is known as chromotherapy.Hence it is evident that colours could play a vital role in a person's day today life.

Several ancient cultures, including the Egyptians and Chinese, practiced chromotherapy, or the use of colors to heal. Chromotherapy is sometimes referred to as light therapy or colorology.It is also found that different colours triggered different psychological emotions (Cherry, no date).From beverages to consumer electronics, marketers are using color in innovative ways. Despite this, little academic research has investigated the role

ARTICLE INFORMATION

*Corresponding Author: vishnupriya@saveetha.com
Received 28th July 2020 Accepted after revision 21st Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/166

that color plays in marketing (Labrecque and Milne, 2012).Even with an affinity for nature, it has become increasingly important to realize that individuals exist within enclosed structures for most of their lives. Therefore, understanding how spaces affect individuals is necessary for personal well-being (Kwallek, Lewis and Robbins, 1988).The development of color vision in primates was shaped by adaptation to selection pressures that were part and parcel of a visually complex natural environment. Critical behaviors such as wayfinding, foraging for food, and recognizing predator and prey, or friend and foe, must have played a vital role in the evolution of trichromatic color vision. An evolu-tionary advantage could have accrued if color had facili-tated natural scene recognition by enhancing encoding and recognition(Spence et al., 2006).Colours have found place also in cultural beliefs all over the world (Adams and Osgood, 1973).

Black is viewed as the color of evil and death in virtually all cultures. With this association in mind, we were interested in whether a cue as subtle as the color of a person's clothing might have a significant impact on his or her behavior (Frank and Gilovich, 1988).Hence, using the appropriate color in design is important in such buildings. It is also significant to draw cognitive maps and wayfinding in interiors. Environmental interventions that promote way finding can be implemented on two levels: the design of the floor plan typology and environmental cues, which comprise signage, furnishings, lighting, colors, and so on (Kurt and Osueke, 2014).In summary, different colors might influence students' affective states, which have impact on their workload, and in turn degenerate their performance (Kumar, Sterkenburg and Diekfuss, no date). The main aim of this study is to assess and analyse the effect of colours on moods of college students.

MATERIAL AND METHODS

A self administered questionnaire was framed based on the effect of colour on mood among college students. The questionnaire was distributed through an online 'Survey Planet' link. The study population included 184 college students.The participants were explained about the purpose of study in detail.The questions were carefully studied and corresponding answers were marked by the participants.The data was collected and statistically analysed.The results were obtained in the form of a pie chart.

RESULTS AND DISCUSSION

The data was collected and statistically analysed. From fig1, it was evident that only 86% of the population (153 students) were aware that colour affects mood and the rest 14% (25 students) were unaware of it. From Fig2, it was observed that 94.4% population (169 students) were aware of various colours and the rest were not aware of all the colours. Fig 3 represents the choice of favourite colour among the students. It was seen that blue,black,red and green are the most preferred and favourite colour by most of the students.From previous studies it was found that blue was the most favourite colour among most of the students. A total of 136 students opted the colour blue among a total population of 490 students (Kurt and Osueke, 2014). From Fig4, it was known that only 24.9% population choose the colour of their dress based on their mood, the rest does not follow that or some occasionally follow that. Fig5 shows that every student on an average has 4 to 5 favourite colours. From Fig 6, it was evident that favourite colours did not change frequently among 57.7% population.

Figure 1: Pie chart depicts percentage distribution of responses on awareness about colour and its effect on mood. 86% are aware (blue) and 14% are unaware (red).

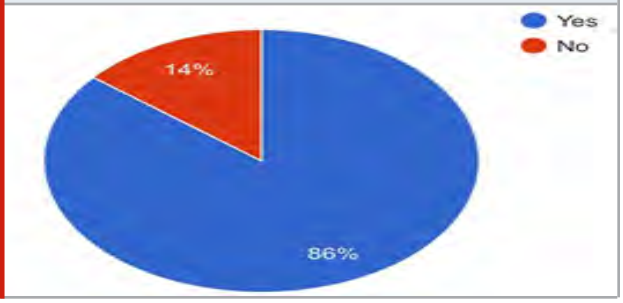


Figure 2: Pie chart depicts percentage distribution of responses on awareness about presence of various colours. 94.4% are aware (blue) and 5.6% are unaware (red).

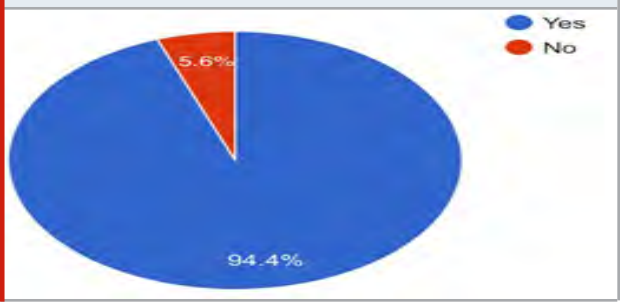


Figure 3: Pie chart depicts percentage distribution of responses on favourite colour of participants. Blue 33.9% (blue), Black 17.8% (red), Red 15% (yellow), Green 12.8% (green), Pink 4.5% (purple), Orange 4% (teal), White 4% (pink), Violet 4% (light green), and Yellow 4% (maroon).

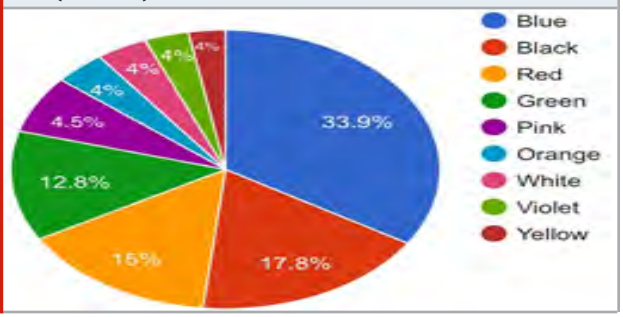


Figure 4: Pie chart depicts percentage distribution of responses on whether the participants choose the colour of the dress to wear based on their mood. 24.9% say yes (blue), 37.9% say no (red) and 37.3% do it occasionally (yellow).

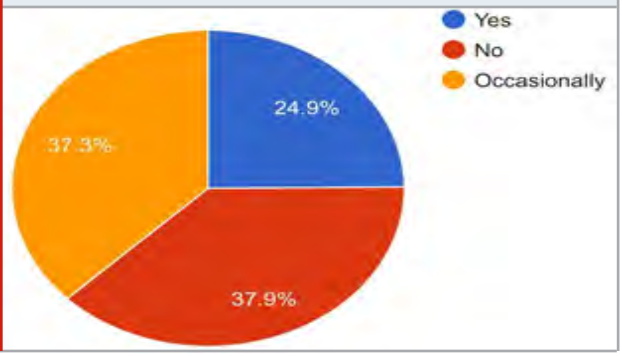


Figure 5: Scalar representation of how many favourite colours the participants have. On an average everyone has 4 favourite colours.

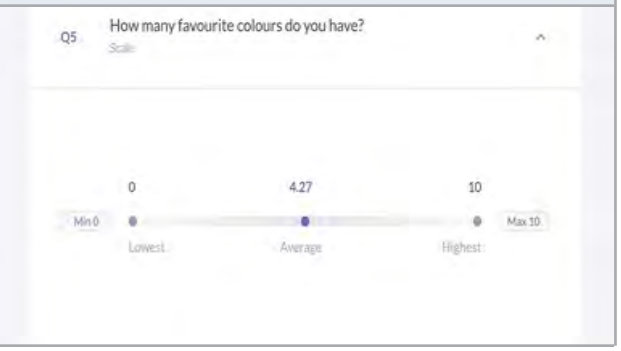
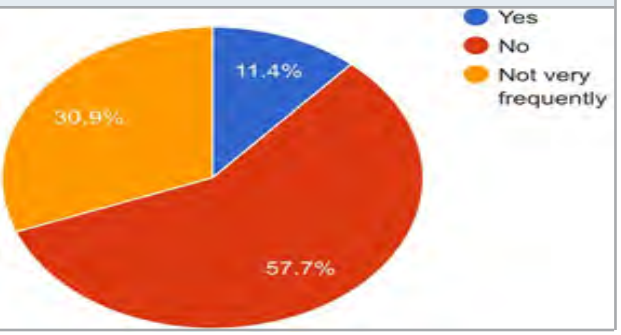


Figure 6: Pie chart depicts percentage distribution of responses on frequency of change in favourite colour. 11.4% change it frequently (blue), 57.7 do not change it (red) and 30.9% do not change it very frequently (yellow).



The rest 30.9% say that it doesn't change frequently and for 11.4% population it does change.Fig 7, the frequency of preference of buying products based on the favourite colour.It is seen that 64.4% prefer buying their favourite colours and the rest 35.6% say it doesn't matter.From fig8, it is understood that only 45% of the students wear colours to denote something special and the rest do not practice it.From fig 9, 54.4% of the population say that wearing their favourite colour energises them and for 33.9% it does sometimes and for 11.7% of the population it never does.From fig 10, it is assessed that certain colours sometime causes depression in 17.3% of the population,and 57.5% disagree to that also it sometimes causes depression in 25.1% of the population.

Figure 7: Pie chart depicts percentage distribution of responses on whether the participants purchase products in their favourite colours only. 35.6% say yes (blue) and 64.4% say no (red).

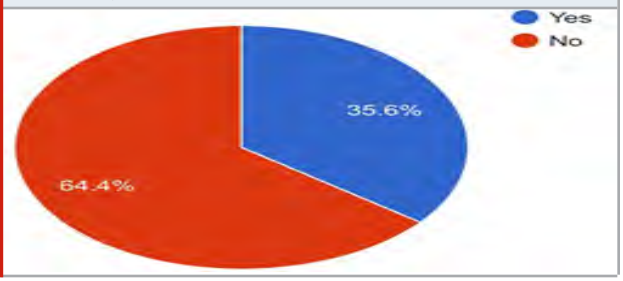


Figure 8: Pie chart depicts percentage distribution of responses on whether the participants wear colours to denote something special. 45% say yes (blue) and 55% say no (red).

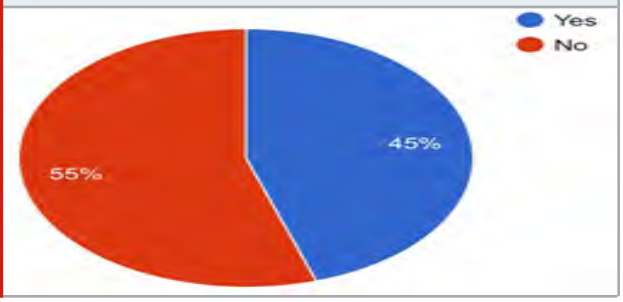
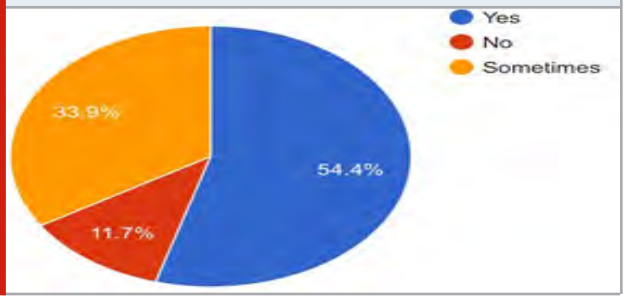


Figure 9: Pie chart depicts percentage distribution of responses on whether the participants get energised by wearing their favourite colours. 54.4% say yes (blue), 11.7% say no (red) and 3.9% say sometimes (orange).



It is seen that only 62.6% of the population are aware of happy and sad colours whereas 37.4% of the population are unaware from fig 11. From fig 12, it is evident that 65.4% of the the population's mindset is always being happy and only 10.6% feel sad most of the time.It is seen that 82.7% of the population feel happy when they look at their favourite colour and only 5% feel sad from fig 13.From fig 14, it is evident that bright colours cheered up 80.3% of the population and 19.7% disagreed to that. From a previous study which was conducted 326 students

among 490 students claimed that their excitement level increased as they approached a particular place due to the colours used there(Frank and Gilovich, 1988).Almost 77.3% of the students think that different colours affect moods in different situations and 22.7% disagreed to it from fig 15.

Figure 10: Pie chart depicts percentage distribution of responses on whether the participants get depressed by any colour. 17.3% say yes (blue), 57.5% say no (red) and 25.1% say sometimes (orange).

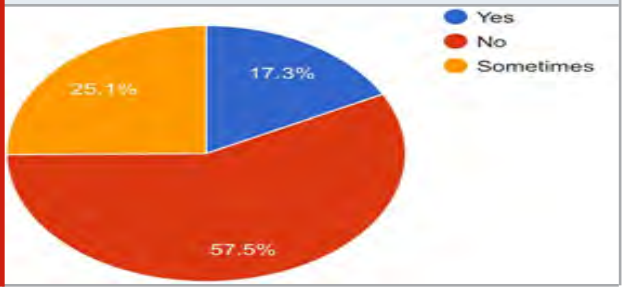


Figure 11: Pie chart depicts percentage distribution of responses on awareness about happy and sad colours. 62.6% are aware (blue) and 37.4% are unaware (red).

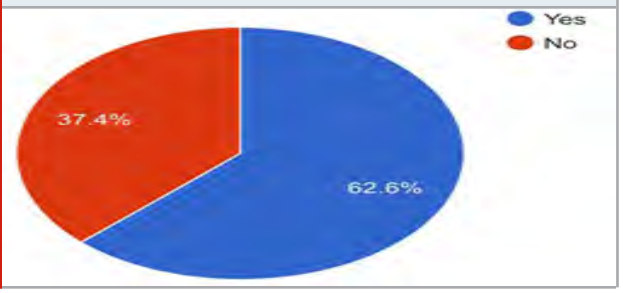
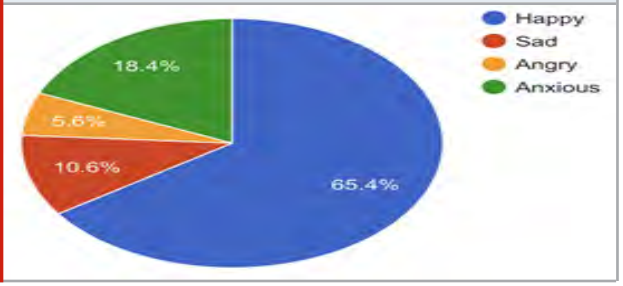


Figure12: Pie chart depicts percentage distribution of responses on the mood of participants most of the time.65.4% say happy (blue), 10.6% saysad (red), 5.6% say angry (orange) and 18.4% say anxious (green).



From fig16, it is seen that only 45% prefer wearing their favourite colours when they are happy and the rest don't.From fig 17, it is evident that 70.1% are aware that different colours denote different things and 29.9% are unaware of it.From fig 18, it is seen that only 30.3% students had the habit of wearing specific colours on specific days and the rest didn't have that habit.It is seen that wearing their favourite colour improved the day today activities for 53.4% of the students and the rest didn't find any adverse effects from fig 19.

Figure 13: Pie chart depicts percentage distribution of responses on the mood of participants upon visualising their favourite colour. 82.7 say happy (blue), 5% say sad (red), 12.3% say no effect (orange).

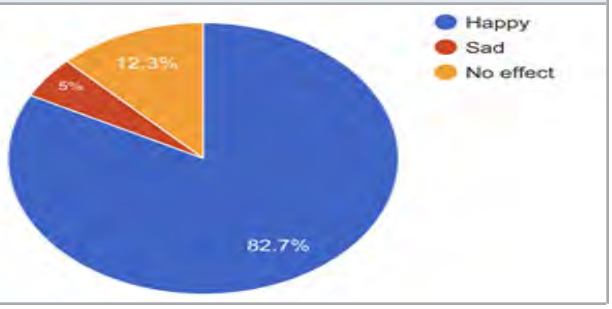


Figure 14: Pie chart depicts percentage distribution of responses on whether the participants get cheerful on seeing their favourite colour. 80.3% say yes (blue) and 19.7% say no (red).

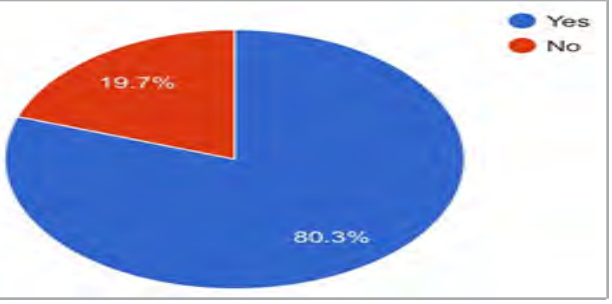


Figure 15: Pie chart depicts percentage distribution of responses on whether the participants are aware that various colours affect moods in different situations. 77.3% say yes (blue) and 22.7% say no (red).

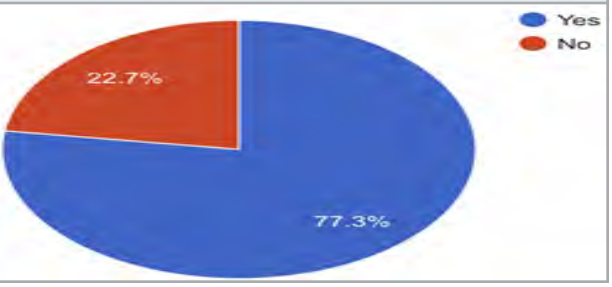


Figure 16: Pie chart depicts percentage distribution of responses on the colour that participants wear when they are happy. 55% say any colour (blue) and 45% say favourite colour (red).

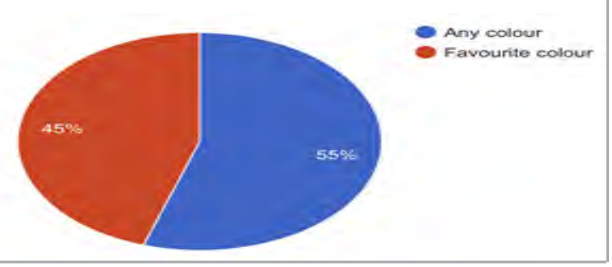


Figure 17: Pie chart depicts percentage distribution of responses on whether the participants are aware that different colours denote different things. 70.1% say yes (blue) and 29.9% say no (red).

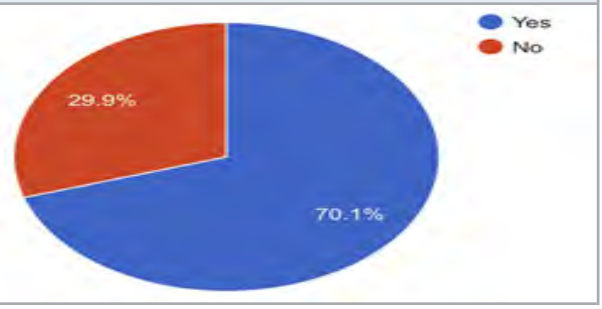


Figure 18: Pie chart depicts percentage distribution of responses on whether the participants have a habit of wearing specific colours on specific days. 30.3% say yes (blue) and 69.7% say no (red).

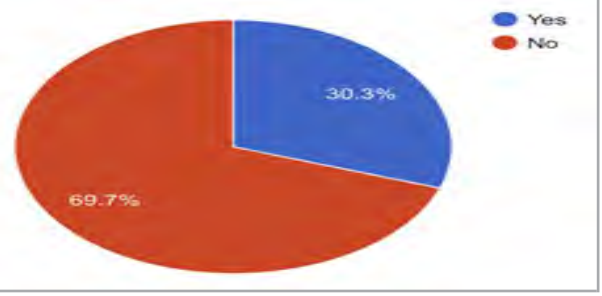


Figure 19: Pie chart depicts percentage distribution of responses on whether daily activities of participants are improved upon wearing their favourite colour. 53.4% say yes (blue) and 46.6% say no (red).

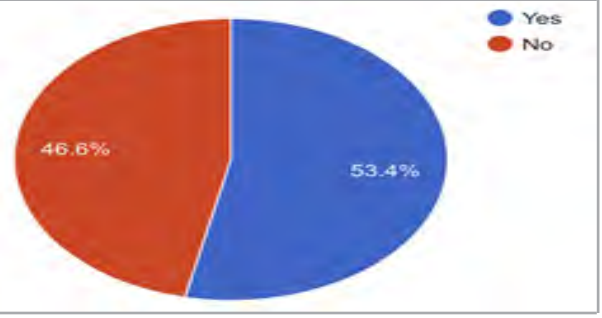
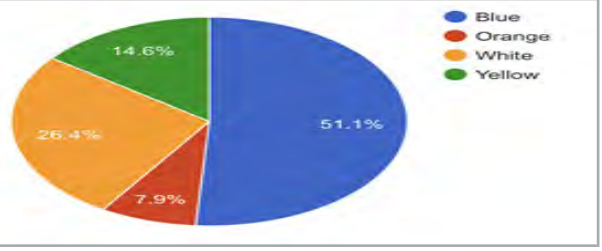


Figure 20: Pie chart depicts percentage distribution of responses of opinion in relation to the happiest colour. 51.1% say blue (blue), 7.9% say orange (red), 26.4% say white (orange) and 14.6% say yellow (green)



From fig20, it is seen that 51.5% of the population think that blue is the happiest colour in the world and 26.4% think that white is the happiest colour,also 26 students think yellow and 14 students think orange is the happiest colour in the world. From fig21, it is found that colour had an impact on 63.1% of the population and 36.9% did not find any impact.From fig 22, it is studied that blue is the colour that brings serenity,calmness and relaxation to 57.7% of the population,the next majority think that it is black.

Figure 21: Pie chart depicts percentage distribution of responses on whether the participants are affected by wearing their favourite colour. 63.1% say yes (blue) and 36.9% say no (red).

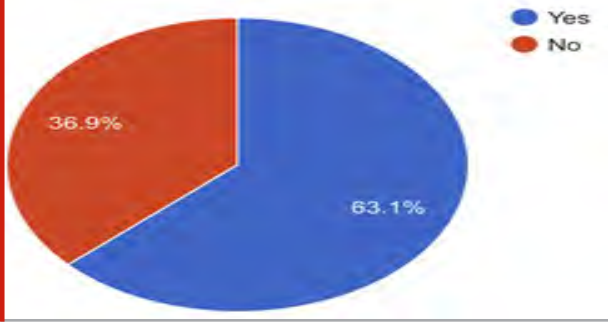
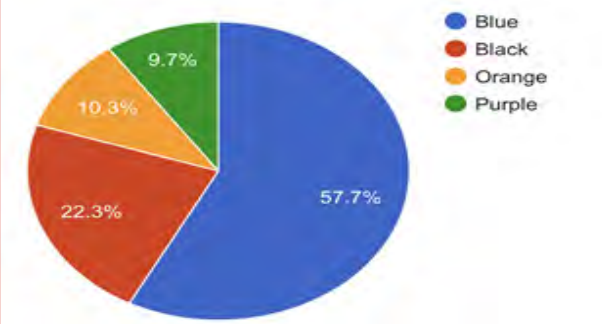


Figure 22: Pie chart depicts percentage distribution of responses on opinion of the colour that keeps them relaxed. 57.7% say blue (blue), 22.3% say black (red), 10.3% say orange (orange) and 9.7% say purple (green).



CONCLUSION

From the study it may be concluded that colour affects mood of an individual as colour is a powerful communication tool and can influence the psychological and physiological reactions.Individuals encounter a kaleidoscope of color in navigating daily life. Surprisingly, almost nothing is known at present regard- ing how the different colors that people perceive impact their effect, cognition, and behavior. In future this study can be used to design or construct various places to provide a pleasant and comfortable environment to the students. Even a counselling room needs to have certain colour codes to carry out the procedure successfully.

ACKNOWLEDGEMENTS

The authors extend gratitude to Saveetha Dental college for rendering full support to complete this study.

Conflict of Interest: No conflict of interest declared.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-380-386

BBRC
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A Comparison of Shear Bond Strength of two Visible Light Cured Orthodontic Adhesives -An In-vitro Study

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ABSTRACT

The aim of the study was to evaluate and compare the shear bond strength of the brackets bonded with two different orthodontic light cure adhesives.Twenty extracted human premolars were divided into 2 groups. Premolar brackets were bonded to the tooth specimens in each group with their respective adhesive according to the manufacturer's instructions. Group1- bonded with Enlight (ORMCO) and Group2- tooth specimen bonded with Brace Paste (American Orthodontics) and then examined for shear bond strength. The teeth were placed in INSTRON universal testing machine at crosshead speed of 0.5 mm/minute, and the shear force to remove the brackets was recorded. The independent t test revealed that there was no significant difference between the shear bond strength of the two groups. The mean shear bond strengths of two adhesive systems showed no significant differences.(P value - 0.068) Thus either of the composite adhesives would provide similar results with respect to the bond strengths.

KEY WORDS: BONDING, LIGHT-CURE ADHESIVE, INSTRON MACHINE, SHEAR BOND STRENGTH, ORTHODONTIC BRACKETS.

INTRODUCTION

Bonding orthodontic brackets with visible light-cured adhesives was first reported by Tavas and Watts (O'Brien et al., 1989). Di-acrylate resin, commonly known as Bowen's reshz or bisglyceral methacrylate (bisphenol A glycidyl dimethacrylate), were designed to enhance bond strength and increase dimensional stability by cross linking, Stainless steel orthodontic brackets can be secured to teeth with this resin. The predominantly weak link in the bonding chain is at the resin/bracket base interface.

The fact that light-cured composite resins exhibit markedly less porosity than chemically cured resins have been reported by numerous authors.(O'Brien et al., 1989; Underwood, Rawls and Zimmerman, 1989; Rezk-Lega and Øgaard, 1991) The polymerization of light-activated resins under metal brackets by transillumination has been shown to be successful, because the tooth conducts visible light well enough. A lot of claims have been made that light polymerization (command curing) improves the accuracy of bracket positioning and thus minimizes the need for position in realigning of teeth after debonding (Raptis, Fan and Powers, 1979; Underwood, Rawls and Zimmerman, 1989).

The advantage of a light-cured adhesive system is that it gives the clinician the ideal working time to position the

ARTICLE INFORMATION

*Corresponding Author: navaneethan@saveetha.com
Received 8th Aug 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/167

bracket, reduces the risk of contamination, and helps in easy removal of excess material after bonding.(King et al., 1987; Underwood, Rawls and Zimmerman, 1989) Many factors affect the retention of the brackets during fixed orthodontic treatment. (Rezk-Lega and Øgaard, 1991) However, studies have shown that clinical bond failure still occurs with 5% to 7% of brackets bonded with light cured or chemical-cured composite resins for different reasons. (O'Brien et al., 1989) (Underwood, Rawls and Zimmerman, 1989). The polymerization of light activated resins under metal brackets by transillumination has been shown to be successful, because the tooth conducts visible light well. (King et al., 1987).

Bond failures of brackets can significantly increase chair-side time, treatment time, and efficiency. Therefore, much effort has been put into improving the quality of the adhesive systems for direct bonding. Bond strength can be influenced by various factors such as light-curing devices, type of enamel conditioner, acid concentration, etching time, composition of the adhesive, bracket base design, and bracket material.(Newman, 1965)(O'Brien et al., 1989). The most commonly used adhesive systems are light-cured or chemically cured composite resins, usually combined with acid-etching. Recently a new light cured adhesive called Brace Paste was introduced by American Orthodontics.

Previously our team has done extensive research that ranged from epidemiological studies to randomised clinical trials that have been published in reputed journals. (Felicita, 2017a, 2017b, 2018; Felicita, Thirumurthi and Jain, 2017; Korath, Padmanabhan and Parameswaran, 2017; Krishnan, Pandian and Rajagopal, 2017; Charles et al., 2018; Pandian, Krishnan and Kumar, 2018; Reddy et al., 2018; Chinnasamy et al., 2019) .we have also done clinical trials on bond strength (Samantha, 2017). We wanted to compare the shear bond strength of the new adhesive- Brace Paste with that Enlight - an orthodontic adhesive produced by Ormco and hence this study.

MATERIAL AND METHODS

This study was conducted to evaluate the Shear Bond Strength of two different orthodontic adhesives used for orthodontic bonding. Twenty premolar teeth, extracted for orthodontic purposes, and free from enamel cracks, caries, and fillings were used in this research. The teeth were cleaned in water to remove any traces of blood and then they were placed in saline. Subsequently, they were stored in distilled water, which was changed at regular intervals to avoid deterioration.

They were divided into two groups:
1. Group I (n= 10) samples were color-coded with white.
2. Group II (n = 10) samples were color-coded with pink

Then teeth in each group were mounted vertically on two different color-coded acrylic boxes for identification (white- Enlight, pink - Brace Paste).

Bonding procedure: Twenty metal premolar brackets were used for the study. The base area of each bracket was calculated. Prior to bonding, the buccal surfaces were subjected to prophylaxis, polished with a rubber cup, pumice powder and rinsed with water. Etched with 37% phosphoric acid gel for 30 seconds, and then washed with water. Subsequently, the enamel surfaces were completely dried with compressed air. A thin layer of Ortho Solo (ORMCO) primer was applied to the tooth and light cured in both groups. Brackets were bonded on buccal surfaces with Enlight in group 1 and Brace Paste in group 2 according to manufacturer's instructions.

In group -1 The Enlight (Figure 1)was applied to the bracket base and then pressed firmly onto the tooth. First the mesial side was cured for 20 sec and the distal side was cured for 20 sec. Thus each bracket was light cured to a total of 40 sec with a light curing unit (Figure 3).

In group -2 The Brace Paste (Figure 2) was applied to the bracket base and then pressed firmly onto the tooth. The light curing was done similar to that of group 1

Figure 1: Enlight - ORMCO

Figure 2: Brace Paste-American Orthodontics

Bond strength test:
Group I (n = 10): 10 samples were color-coded with white.
Group II (n = 10): 10 samples were color-coded with pink

Figure 3: i.LED Light cure unit

Figure: 4 Instron Universal Testing Machine

Each group had 10 teeth which were used to carry out Shear Bond Strength testing, with the Instron universal testing machine at the cross head speed of 0.5 mm/min machine (Figure:4). The brackets were then held at their crossheads by the instron testing machine for debonding of the bracket using the instron machine and to calculate the shear bond strength. (Figure 5)

Statistical Analysis: The data obtained from the study was tabulated. The level of significance was at (0.08). The mean and standard deviation was calculated for both the groups to get the arithmetic average of the observations. Independent t-test was performed to determine the statistical difference between the shear bond strength of the two groups.

Figure 5: The brackets held at their crossheads by the instron testing machine just prior to debonding.

Table 1. Shear bond strength of Enlight – Group:1

Group-1 Enlight	Shear Bond Strength [Mpa]
1	7.22
2	8.42
3	6.63
4	5.72
5	7.35
6	8.53
7	7.14
8	6.96
9	11.13
10	8.34

RESULTS AND DISCUSSION

Shear bond strength: All data showed normal distribution and homogeneity of variances. Brace Paste had the highest shear bond strength values with a mean of 8.85 MPa (Table 3), closely followed by the light-cured adhesive Enlight with a mean of 7.74 MPa (Table 3) Light-cured Enlight had the lowest shear bond strength, lower than that of Brace Paste. In tested adhesives, the differences in shear bond strength were smaller. The results of the independent `t' test are summarized in [Table 3]. However, statistically no significant difference was found between Enlight and Brace Paste composites. Figure 6 represents the mean and standard deviation of the shear bond strength of the two composite groups (Enlight and Brace Paste). It is inferred from the chart that the Brace Paste has a higher mean shear bond strength than Enlight, but it was not statistically significant. P value - 0.068 (P>0.05)

Bonding of orthodontic brackets has become an accepted clinical technique since 1970 (Zachrisson, 1994). Bonding has largely replaced banding and is superior to banding in terms of gingival and dental health and esthetics. The bonding procedure is based on enamel alteration created by acid etching of enamel as developed by Buonocore. (Buonocore, 1955)

Table 2. Shear bond strength of Brace Paste – GROUP:2

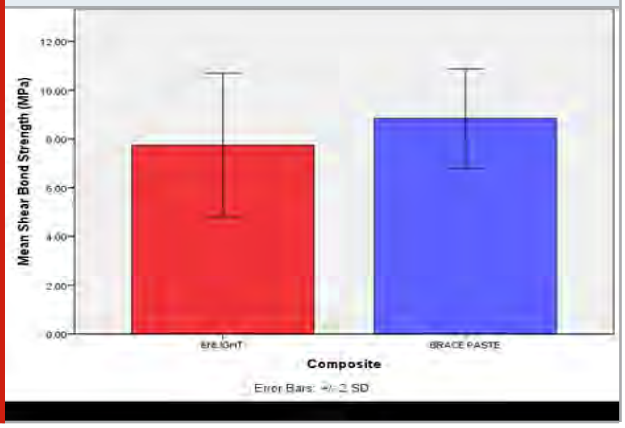
Group-2 Brace Paste	Shear Bond Strength [Mpa]
1	9.32
2	8.57
3	8.64
4	9.21
5	6.89
6	10.44
7	8.8
8	7.58
9	9.57
10	9.43

The advantages of direct bonding are easy bracket placement, acceptable clinical success rate, and reduction in chairside time. The bond failure rate is reported to vary between 0.5% and 16% which is very minimum. (Millward et al., 1997)(Bishara et al., 2007)(Sağır et al., 2013) However, this technique imposes the risk of demineralization of enamel adjacent to brackets and requires drying of the enamel surface; which is important in increasing the bond strength of brackets.(Øgaard, Rølla and Arends, 1988; Silverman et al., 1995).BracePaste® is a medium viscosity, light-curable adhesive that provides optimum bonding of metal and ceramic brackets. BracePaste is compatible with most light cure orthodontic sealants and bond enhancers. To be employed for bracket bonding a material needs to provide adhesion to the tooth surface sufficient to withstand masticatory and orthodontic forces consistently applied. The use of a bonding agent prior to bonding with composite has the advantage of immediate obliteration of enamel pores caused by acid etching that are not covered by the bracket base, thereby, preventing decalcification.

Table 3. Statistical summary of the shear bond strengths of the tested adhesives

Groups		N	Mean	Std. Deviation	Std. Error Mean
Bond Strength	ENLIGHT	10	7.7440	1.47730	0.46716
	BRACE PASTE	10	8.8450	1.01722	0.32167

Figure 6: Bar Graph showing the mean shear bond strength scores (MPa) and Standard Deviation of the two groups (Enlight and Brace Paste). The X-axis represents the two composite groups and the Y-axis represents the mean shear bond strength of the two groups in MPa. It is inferred from the chart that the Brace Paste has a higher mean shear bond strength than Enlight, but it was not statistically significant. P value - 0.068 (P>0.05).



Conventional bonding system has three different agents: the conditioner, a primer solution and an adhesive resin for the process of bonding orthodontic brackets to enamel. The use of primer was an essential part of the bonding procedure of composite adhesives to allow good wetting and penetration of the sealant into the etched enamel surface. Light cured composites are filled resin consisting of a single paste that becomes polymerized through the use of a photosensitive initiator system (CQ-Camphorquinone and amine initiator) and light source activator (visible blue light). UV light cured composite have been replaced by visible blue light activated systems with greatly improved depth of cure and controlled working time.

Exposure of light in the blue region produces an excited state of the photosensitizer, which then interacts with the amine to form free radicals that initiate additional polymerization. The free radical initiating system consisting of a photosensitizer and amine initiator is contained in this paste. Camphorquinone is a commonly used photosensitizer that absorbs blue light. Only small quantities of camphorquinone are required (0.2% or less in the paste). A number of amine initiators are suitable for interaction with camphorquinone, such as dimethylaminoethyl methacrylate, which is also present at a low level that is approximately 0.15wt%.

The mean shear bond strength of Enlight achieved in our study was 7.7440 MPa. This was lower than achieved

in some previous studies (Hajrassie and Khier, 2007) (Prietsch et al., 2007) (Northrup et al., 2007; Prietsch et al., 2007) (Bulut et al., 2007) (Bishara et al., 2007) (Schaneveldt and Foley, 2002) (Sayinsu et al., 2006) (Linn et al., 2006) (Korbmacher, Huck and Kahl-Nieke, 2006) (Korbmacher et al., 2006) (Godoy-Bezerra et al., 2006) (Cal-Neto et al., 2006) but was comparable to the studies of Tecco et al, D'Attilio et al, Rock and Abdullah (Rock and Abdullah, 1997), Sinha et al (Sinha et al., 1997), Tang et al (Tang et al., 2000), Sunna et al (Sunna and Rock, 1999; Tang et al., 2000) and Rix et al (Rix, Foley and Mamandras, 2001).

One mentioned advantage of bonding with Enlight is greater control of working time by orthodontists, which facilitates the proper placement of brackets on the teeth. (Prietsch et al., 2007) We evaluated the shear bond strengths of two common adhesive systems marketed for orthodontic bonding. In the present study, there was a slight increase in shear bond strength values of bonded brackets using Brace Paste (8.8450 MPa) compared with the light-cured composite resin Enlight (7.7440 MPa). There was no statistically significant difference in the shear bond strengths of the Enlight and Brace Paste in our study. However, the bond strengths of both the composites tested were greater than the recommended values of Reynolds. In our study Brace Paste had a slight increase in shear bond strength compared to Enlight.

CONCLUSIONS

Both the materials Enlight and Brace Paste showed no significant difference in shear bond strength. The overall bond strength and mean value for Brace Paste was slightly higher than Enlight. Therefore, Brace Paste can also be used as an ideal orthodontic adhesive in terms of increased shear bond strength, quick cure polymerization, quick cure initiator and provides faster cure. We would also recommend that these composites be tested in vivo in a randomized clinical control trial. Brace Paste, had a slightly increased shear bond strength than the Enlight.

ACKNOWLEDGEMENTS

I would like to record my deep sense of gratitude to my research supervisor Dr. Navaneethan R, Reader, Department of Orthodontics, Saveetha Dental College and Hospitals, Chennai for his inspiring guidance and encouragement with my work during all stages. There was an equal contribution from all the authors.

Conflict of Interest: There is no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-387-393

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Knowledge, Attitude and Practice on Use of Laser in Disinfection of Canals

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ABSTRACT

In the present era, Clinicians are keeny searching for better techniques, instruments and materials that enable the patient with better patient comfort and also superior dental treatment.The use of Laser enables the dentist to work more efficiently and precisely. Treatment of root canal leads to preservation of natural teeth that aid in mastication and esthetics.The more recent development in endodontic treatment is the use of laser. The study aims to assess and to create awareness on knowledge,attitude and practice on use of lasers in disinfection of canals.The study had a sample size/respondents of 100 dental students. An online survey with a pretested and validated questionnaire consisting of 11 questions testing awareness of laser use in disinfection of canals. The Questions regarding laser advantages,limitations, mode of action, wavelength used in disinfection of the canal were framed and shared with 100 dental students and their answers were recorded. Data was entered in Microsoft Excel sheets. The results were demonstrated in the form of pie charts. Association between gender and students awareness on different variables were assessed using chi square test.From the present study, we can conclude that female participants are more aware on laser effect, laser advantages, limitations and on adjuvant role of laser with irrigants, wavelength of Er:YAG,Er,Cr:YSGG, Diode, carbon dioxide laser in disinfection of canals and males are more aware of the wavelength of Nd:YAG. But there is a need for an awareness among students regarding the current application of LASER for providing better treatment without any complications.

KEY WORDS: DIODE; DISINFECTION; LASER; ROOT CANAL.

INTRODUCTION

Preservation of teeth by endodontic therapy has gained a lot of popularity because of the increased and predictable success rate. The main purpose of the root canal is to eradicate microorganisms which are responsible for infection and prevention of its re-infection during and after treatment(Narayanan and Vaishnavi, 2010; Jain and Ranjan, 2014).Removal of microorganisms from the infected root canal is a complicated task(Sheik and Ranjan, no date). This can be achieved by chemo-mechanical debridement(Siddique et al., 2020). Standard Endodontic Irrigation Protocols includes Sodium Hypochlorite (NaOCl)Ethylene-diamine-tetra-acetic Acid (EDTA)Chlorhexidine (CHX).In addition, there are other disinfection systems such as Photo-Activated Disinfection (PAD),LASER, OZONE(Plotino et al., 2016).Most currently used irrigants and intracanal medicaments has limited antibacterial activity and limited ability to diffuse into dentinal tubules.

Newer technologies like LASER can penetrate >1000µm into dentin thus facilitating the complete canal

ARTICLE INFORMATION

*Corresponding Author: manish@saveetha.com
Received 14th July 2020 Accepted after revision 27th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/168

sterilization. LASER stands for light amplification by stimulated emission of radiation. The laser wavelengths described for cleaning and disinfecting the root canal system are: erbium: yttrium aluminium garnet (Er:YAG), 2940 nm; erbium, chromium: yttrium scandium gallium garnet (Er,Cr:YSGG), 2780 nm; neodymium:yttrium aluminium garnet (Nd:YAG), 1064 nm; diode, 635 to 980 nm; potassium titanyl phosphate (KTP), 532 nm; carbon dioxide (CO2), 9600 and 10 600 nm.(Asnaashari and Safavi, 2013).Initially Nd: YAG laser was first used for root canal disinfection. It is introduced by Hardee and Myers and McDaniel. Moritz et al. introduced use of diode laser for root canal disinfection(Kaiwar et al., 2013).Laser has its own advantages such as penetration of secondary canals, improved disinfection efficacy, more effective root canal cleaning, reduction of permeability, reduction of micro-leakage, and elimination of the need to use toxic solvents(Gutknecht, 2008). Laser has its own disadvantages. The interaction between laser and tissue results in rise in temperature.

The rise in temperature results in damage to soft tissue. If the temperature is too high, it may result in injury to the surrounding bone.Since root canals are more curved than straight, root canal instruments can be curved following the curvature of the canal and clean the canal. But in contrast, Laser light travels in a straight path(Mathew et al., 2015). Even Though, laser has its own advantages and disadvantages, the clinicians acceptance towards laser technology still remains limited(Meire and De Moor, 2007).We have numerous highly cited publications on well designed clinical trials and lab studies(Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019; Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019). This has provided the right platforms for us to pursue the current study. This vast research experience has inspired us to research about the awareness of use of lasers in disinfection of canals among dental students.

MATERIAL AND METHODS

The study was conducted in a private dental institution in Chennai. The study setting was carried out in a University setting with approval of the Institutional review board. Inclusion criteria and Exclusion criteria. Undergraduate third year students, final year students and Interns were included in the study. Post graduate students and dental practitioners were excluded from the study.

Data Collection: A pre-tested questionnaire with 11 questions was formulated for the collection of information. The questionnaire was simple and brief. The self made questions were developed. The questionnaire included self made questions to assess about the knowledge, practise and awareness among the dental students regarding use of laser in disinfection of canals. The questionnaire was shared with 100 dental students and practitioners and their answers were recorded using an online surveying tool(Google Forms).

Statistical Analysis: Data was entered in Microsoft Excel sheets. The data was imported and transferred to the computer and subjected to statistical analysis using SPSS(IBM SPSS Statistics, Version 24.0, Armonk, NY: IBM Corp]. Chi-square test was performed to find the association between the variables.The level for a statistical significance was set at $p<0.05$. The results were demonstrated in the form of bar graphs.

Questionnaire

1.Are you aware that lasers are used in disinfection of root canal?
a)aware
b)not aware

2.In disinfection of root canals, Laser can be used as
a)adjuvant with disinfectants
b)substitute to disinfectants

3)Action of laser in disinfection of canals
a)bactericidal
b)bacteriostatic

4)Type of laser used in disinfection of canals
a)Nd:YAG
b)Er:YAG
c)Er,Cr:YSGG
d)Diode
e)Carbon dioxide
f)all

5.Wavelegth of Nd:YAG laser used in disinfection of canals
a)1064nm
b)2780nm
c)2940nm
d)635-980nm
e)9600-10600nm

6.Wavelegth of Er:YAG laser used in disinfection of canals
a)1064nm
b)2780nm
c)2940nm
d)635-980nm
e)9600-10600nm

7.Wavelegth of Er,Cr:YSGG laser used in disinfection of canals
a)1064nm
b)2780nm
c)2940nm
d)635-980nm
e)9600-10600nm

8.Wavelegth of diode laser used in disinfection of

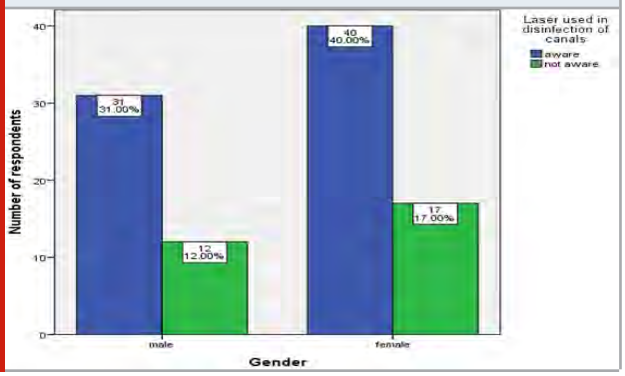
canals
a)1064nm
b)2780nm
c)2940nm
d)635-980nm
e)9600-10600nm

9.Wavelegth of Carbon dioxide laser used in disinfection of canals
a)1064nm
b)2780nm
c)2940nm
d)635-980nm
e)9600-10600nm

10.What are advantages of laser in disinfection of canals over conventional techniques
a)improved disinfection efficacy
b)more efficient root canal cleaning
c)reduction of permeability
d)reduction of microleakage
e)elimination of the need to use toxic solvents
f)all the above

11.What are the limitations of laser in disinfection of canals
a)thermal damage to periapical tissues
b)ledges
c)perforations
d)expensive
e)all the above

Figure 1: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.834 (p >0.05) which shows that it is not significant. However females (40%) were more aware of laser use in disinfection of canals.



RESULTS AND DISCUSSION

43 male students and 53 female students participated in this study. From figure 1, it is evident that females (40%) were more aware of laser use in disinfection of canals than males(31%). From figure 2, it is evident that females(48%)were more aware that lasers can be used only as adjuvant not as a substitute for irrigants than males(23%). Ivano et al concluded no specific laser is superior to the traditional endodontic treatment. He also recommended laser cannot be used as an alternative to NaOCl but as an adjunct to the traditional disinfection and debridement methods(Juric and Anil, 2014).Several studies also proved better antibacterial effect when sodium hypochlorite is combined with laser(Kreisler et al., 2003; Perin et al., 2004).Mathew et al in his microbial study concluded use of diode laser or NaOCl alone did not produce considerable changes in bacterial colony. He also observed effective eradication of gram positive and aerobic bacteria when diode laser and NaOCl was used in combination(Mathew et al., 2015).

Figure 2: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.001 (p <0.05) which shows that it is highly significant. It means females(48%)were more aware that lasers can be used only as adjuvant not as a substitute for irrigants than males(23%).

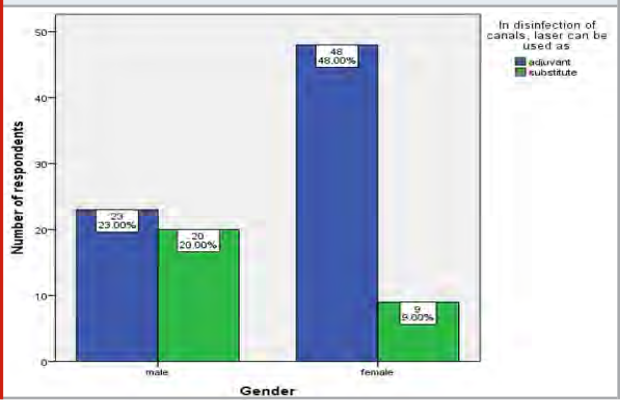
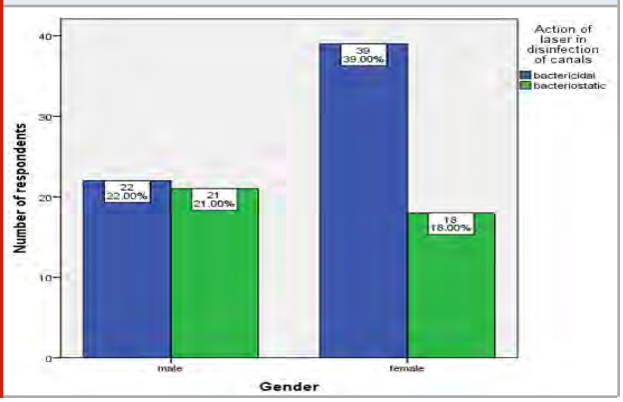


Figure 3: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.080 (p >0.05) which shows that it is not significant. However females(39%) were more aware that laser is bactericidal in action.



From figure 3, females(39%) were more aware that laser is bactericidal in action than males(22%). Diode laser has superior bactericidal effect than chemical disinfectants since the penetration of diode laser into dentinal tubules is upto 1000 µm whereas in chemical disinfectants it is

limited to 100 µm(Preethee et al., 2012). Kaiwar et al also in his study concluded that 980nm diodes can penetrate into dentin and eliminate bacteria which eventually increase the success rate of endodontic therapy(Kaiwar et al., 2013).

Figure 4: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.103(p >0.05) which shows that it is not significant.However more females(18%) were aware of the type of laser used in disinfection of canals.

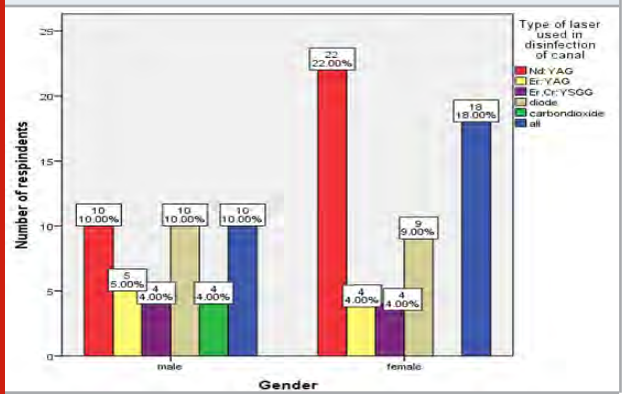
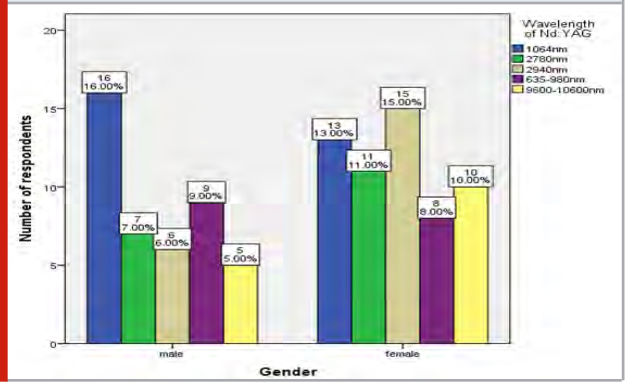


Figure 5: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.296(p >0.05) which shows that it is not significant. however more males(16%) were aware of the wavelength of Nd:YAG used in disinfection of canals.



From figure 4, more females(18%) were aware of the type of laser used in disinfection of canals. than males(10%). From 5, more males(16%) were aware of the wavelength of Nd:YAG used in disinfection of canals than females(13%). From 6, more females (21%) were aware of the wavelength of Er:YAG used in disinfection of canals than males(9%). From 7, more females(22%) were aware of the wavelength of Er,Cr:YSGG used in disinfection of canals than males(10%). From 8, more females (25%) were aware of the wavelength of diode used in disinfection of canals than males(17%). From 9,females (19%) were more aware of the wavelength of carbon dioxide used in disinfection of canals than males (8%). The laser wavelengths described for cleaning and disinfecting the root canal system for erbium: yttrium aluminium garnet (Er:YAG) was found to be 2940 nm, erbium, chromium: yttrium scandium gallium garnet (Er,Cr:YSGG) was found to be 2780 nm; neodymium:yttrium aluminium garnet (Nd:YAG)was found to be 1064 nm, diode was found to be 635 to 980 nm,

Figure 6: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.191(p >0.05) which shows that it is not significant. However more females (21%) were aware of the wavelength of Er:YAG used in disinfection of canals.

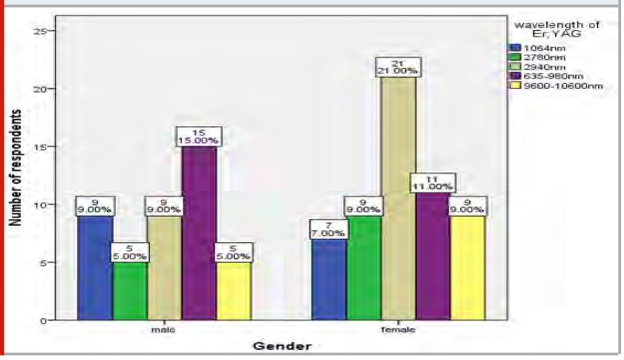
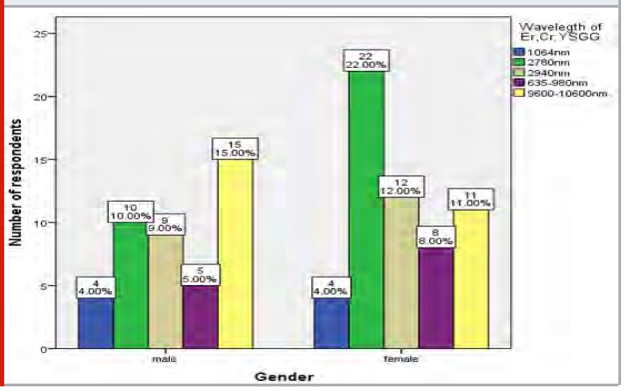


Figure 7: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.359(p >0.05) which shows that it is not significant. However more females(22%) were aware of the wavelength of Er,Cr:YSGG used in disinfection of canals.



carbon dioxide (CO2)was found to be 9600 and 10 600 nm(Asnaashari and Safavi, 2013).Nd:YAG have bactericidal effect up to 1 mm into the dentine. Moritz et al reported reduction of bacteria such as Enterococcus faecalis and Escherichia coli after Nd:YAG irradiation(Moritz et al., 1999). Gutknecht et al. also reported reduction in the number of intracanal Enterococcus faecalis using the Nd:YAG laser at 15 Hz and 100 mJ(Gutknecht et al., 1996).Diode lasers have lower penetration depth into the dentine compared to

Nd:YAG laser. Diode laser stimulates cell proliferation and shows inhibiting inflammatory enzymes. The bactericidal effect of Er,Cr:YSGG and Er:YAG is not as good as achieved with the Nd:YAG or diode laser. This kind of laser can penetrate only the areas closer to the canal.(Bhatia and Kohli, 2013).

Figure 8: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.440(p >0.05) which shows that it is not significant. However more females (25%) were aware of the wavelength of diode used in disinfection of canals.

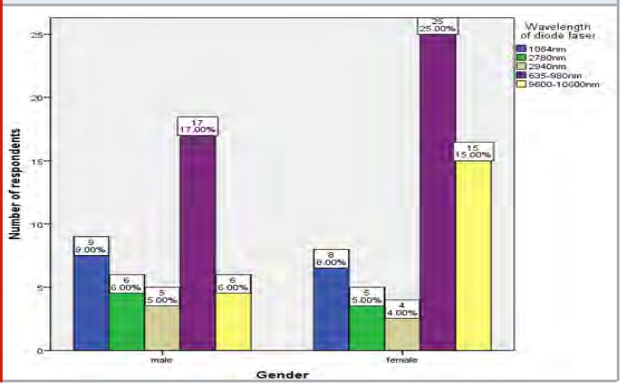
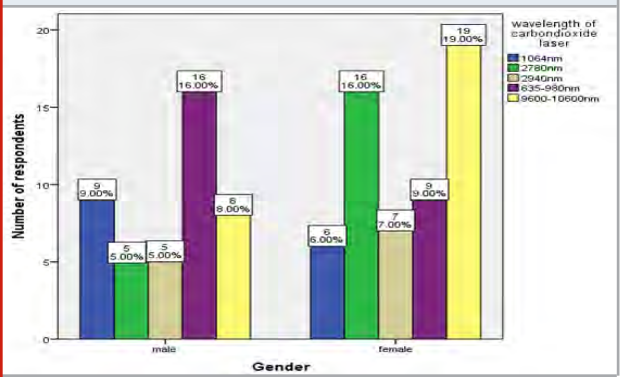
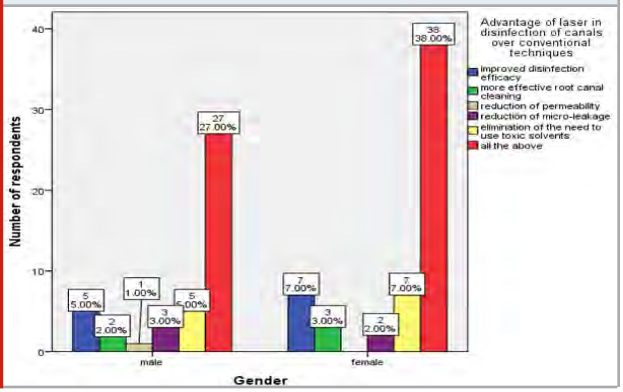


Figure 9: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.022(p <0.05) which shows that it is significant. It means the females (19%) were more aware of the wavelength of carbon dioxide used in disinfection of canals than males (8%).



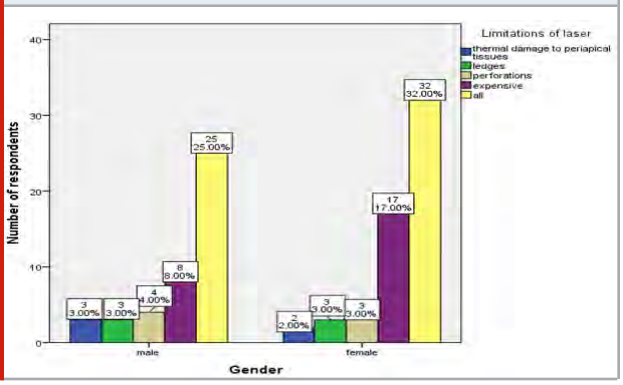
From figure 10, more females(38%) were aware of the advantages of lasers used in disinfection of canals than males(27%).Laser light can reach areas of canals where irrigating and disinfecting solutions cannot penetrate. Lasers can penetrate secondary canals and deep dentinal tubules and also can eliminate microorganisms(Asnaashari and Safavi, 2013). Various advantages of laser include improved root canal cleaning, disinfection efficacy, reduction of permeability, reduction of micro leakage and elimination of the need to use toxic solvents(Mathew et al., 2015).

Figure 10: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.848(p >0.05) which shows that it is not significant. However more females(38%) were aware of the advantages of lasers used in disinfection of canals.



From figue 11, more females(32%) were aware of the limitations of lasers used in disinfection of canals than males(25%). Thermal damage of periradicular tissues through the open apical foramen may occur when using the erbium lasers at ablative settings(Hellingwerf, Hoff and Crielaard, 1996)Laser is dangerous in curved root canals because of the risk of creating ledges and perforations(Gutknecht et al., 2000; Jahan et al., 2006). Expense of the laser unit is often the limitations of laser usage.

Figure 11: This graph shows the association between gender and number of respondents for the survey where X-axis depicts the gender and Y-axis depicts the number of respondents. p value- 0.639(p >0.05) which shows that it is not significant.However more females(32%) were aware of the limitations of lasers used in disinfection of canals.



CONCLUSION

Within the limitations of the present study, it can be concluded that proper awareness should be created regarding laser use in disinfection of canals. From the present study, we can conclude that female participants are more aware on laser effect, laser advantages, limitations and on adjuvant role of laser with irrigants,

wavelength of Er:YAG,Er,Cr:YSGG, Diode, carbon dioxide laser in disinfection of canals and males are more aware of the wavelength of Nd:YAG. But there is a need for an awareness among students regarding the current application of LASER for providing better treatment without any complications.

ACKNOWLEDGEMENTS

The authors would like to thank Saveetha Dental College and Hospitals for providing a platform to conduct the study.

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-394-399

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Awareness on Risk Factors of Colorectal Cancer Among Elderly Population – A Survey

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ABSTRACT

Colorectal cancer (CRC) is an adenocarcinoma which may turn malignant later. CRC is diagnosed by various screening tests such as 'colonoscopy' which is considered as a therapeutic and powerful diagnostic procedure. Younger people may recognise these risk factors and also are aware of various diseases. But in the case of elderly population, only a few are aware. This may be because of less education or negligence of the symptoms that appear. For educating the elderly people about cancer, frequent awareness camps must be held and also through social media it can be spread. The aim of this study is to create awareness on risk factors of colorectal cancer among elderly population. Questionnaire was prepared and administered to a total of 100 participants through survey planet - an online survey link. Out of 100 participants, only 29.8% were aware of colorectal cancer. It was also noticed that only 6.9% have undergone screening tests (colonoscopy). This shows that awareness on the risk factors of colorectal cancer may be created among the community. People should be educated on balanced diet and healthy lifestyle modifications for well being.

KEY WORDS: COLORECTAL CANCER, AWARENESS, ELDERLY PEOPLE, ONLINE SURVEY, SURVEY PLANET.

INTRODUCTION

Colorectal cancer(CRC) is one of the most malignant and also one of the leading causes of mortality worldwide (Wong et al., 2013). Few of the major reasons for the cause of CRC are old age, male (gender), family history of colorectal cancer and also smoking, air pollution and occupational exposure (Glanz et al., 1999) (Wong et al., 2002). An increase in the iron content can also lead to various colon related diseases (Nelson, 2001). In men, CRC is the 3rd most common and in females, CRC is the 2nd most common disease. Talking about CRC, what is CRC? It is an adenocarcinoma which may begin as a benign polyp but later may turn malignant (Nasaif and Al Qallaf, 2018). It shows no symptoms in the early stage. But the majority of cancer is recognised only in the last stage. But if it shows symptoms then they are diarrhoea, constipation, rectal bleeding, weakness & fatigue, unintended weight loss, cramping and abdominal pain. CRC risk can be increased by a high intake of a high red diet (Saeed et al., 2018).

CRC is diagnosed by various screening tests such as 'colonoscopy' which is considered as a therapeutic and powerful diagnostic procedure. It is also said that cancer can be prevented by an increase in physical activity,

ARTICLE INFORMATION

*Corresponding Author: vishnupriya@saveetha.com
Received 23rd July 2020 Accepted after revision 27th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

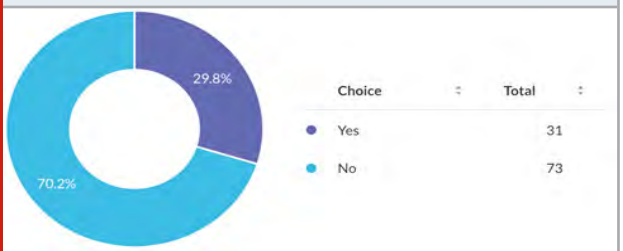
NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/169

maintenance of body weight, increase in fibre diet and reduction of intake of red meat and also reduce intake of alcohol (Nasaif and Al Qallaf, 2018) (Inoue et al., 2006). To avoid CRC we must go for regular medical check up (Berkowitz et al., 2008). Younger people may recognise these risk factors and also are aware of the various diseases (Al-Azri et al., 2019). But in the case of elderly population, only a few are aware because of less education or negligence of the symptoms that appear (Berkowitz et al., 2008). For educating the elderly people about cancer, frequent awareness camps must be held and also through social media it can be spread (Saeed et al., 2018).

In the reference articles, there have been many studies conducted among populations General Public of Kuwait, Kingdom of Bahrain, Oman, Hong Kong, Japan, Saudi Arabia, Spain (Zubaidi et al., 2015). There are also articles comparing the relation of colorectal cancer with for example iron, gold nanoparticles, cytotoxic effect of caralluma fimbriata, etc (Vairavel, Devaraj and Shanmugam, 2020) (Ashwini, Ezhilarasan and Anitha, 2017). There has also been studies on interest ofelderly population participating in bowel cancer screening (Wardle et al., 2000). Even the associated health behaviours with colorectal cancer- screening tests have been studied previously (Shapiro, Seeff and Nadel, 2001). The research done in this study had a very limited population of 104 participants above the age of 30 years. The other researches had taken a larger random population in different countries while this study had been studied in India. Previous studies on cancer biology, nano materials, herbal products [(Ke et al., 2019), (Ma et al., 2019), (Wu et al., 2019), (Ramya, Priya and Gayathri, 2018), (Menon, Priya and Gayathri, 2016)] have motivated me to pursue this current research which is useful to our community. The main aim of this study is to create and spread awareness on risk factors of colorectal cancer among elderly people.

Figure 1: Pie chart depicts the percentage distribution of awareness on colorectal cancer among the participants. 70.2% (sky blue) of the participants were aware of colorectal cancer while 29.8% (dark blue) were not aware.



MATERIAL AND METHODS

A self-administered questionnaire was designed based on the awareness of colorectal cancer and its knowledge among elderly people. The questionnaire was distributed through an online survey planet link. The study population belonged to an age group of above 40 years. There were 104 participants who took the survey, they were explained the purpose of the study in detail. The questions were carefully studied and the corresponding answers were marked by the participants.

Figure 2: Pie chart depicts the percentage distribution of awareness on history of colorectal cancer in participant's families. Almost 80.6% (sky blue) of the participant's family did not have a history of colorectal cancer but 19.4% (dark blue) of the participant's family had a history of colorectal cancer.

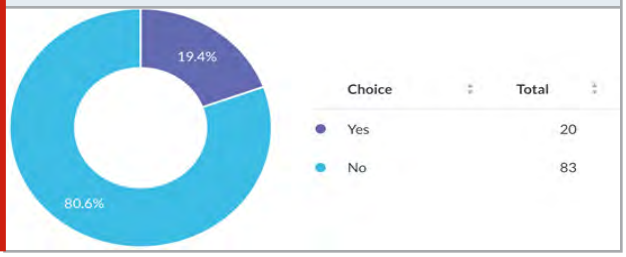


Figure 3: Pie chart depicts the percentage distribution of awareness on eating healthy food everyday. Almost 53.8% (dark blue) of the participant's ate healthy food everyday while 46.2% (sky blue) did not eat healthy food everyday to keep themselves healthy.

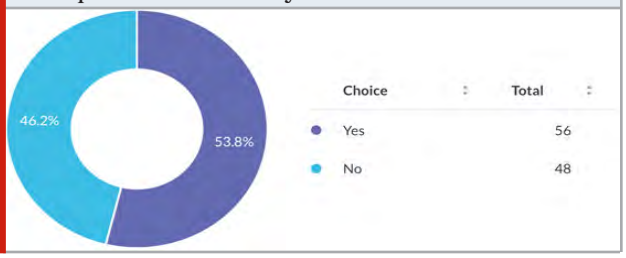
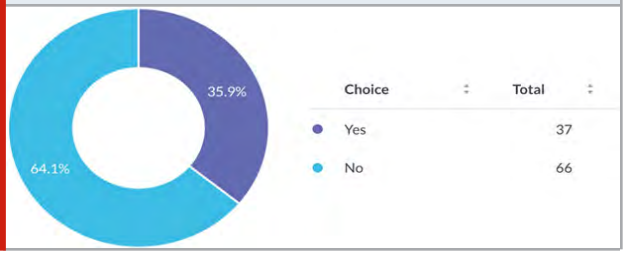


Figure 4: Pie chart depicts the percentage distribution of awareness on exercising regularly. 35.9% (dark blue) of the participant's kept their body fit by regularly doing exercise while 64.1% (sky blue) did not exercise regularly.



RESULT AND DISCUSSION

The data was collected and statistically analysed. The results were well interpreted. Based on the result of this study, 29.8% of the participants were not aware of colorectal cancer [FIGURE 1]. Colorectal cancer is the fourth most common cause of cancer in relation to death and is also the third most common type of cancer in both men and women all around the world (Saeed et al., 2018). 19.4% of the population had a history of cancer in their

family [FIGURE 2]. Family history of colorectal cancer gets associated with a high chance of colorectal cancer in the patient (Glanz et al., 1999). 53.8% of the population eat healthy food everyday [FIGURE 3]. By taking a high fibre diet, chances of colorectal cancer can be reduced (Nasaif and Al Qallaf, 2018). 35.9% of the population exercise regularly [FIGURE 4].

Figure 5: Pie chart depicts the percentage distribution of participants having diabetes. Among all the participants who had participated in this study, only 7.8% (dark blue) of the participants were diabetic while remaining 92.2% (sky blue) were not diabetic.

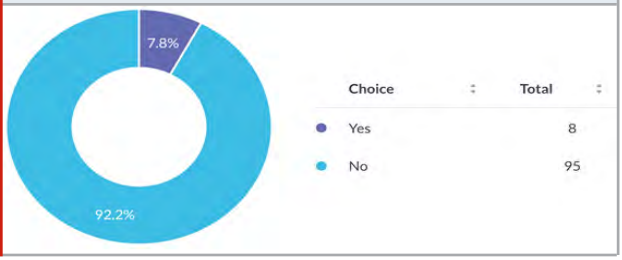


Figure 6: Pie chart depicts the percentage distribution of participants who consume alcohol regularly. 22.3% (dark blue) participants consume alcohol regularly while 77.7% (sky blue) of the participants did not consume alcohol regularly.

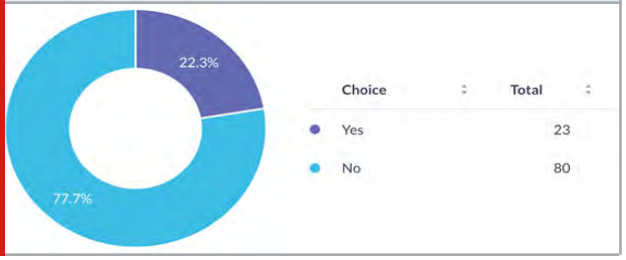
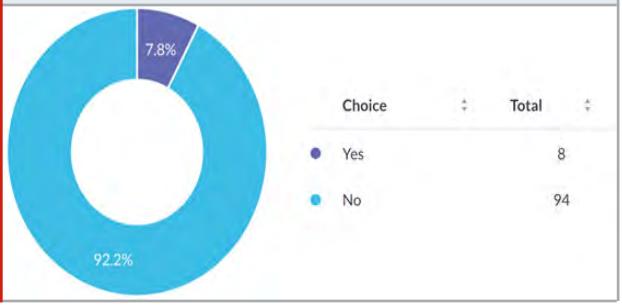


Figure 7: Pie chart depicts the percentage distribution of participants who have a habit of smoking. 7.8% (dark blue) of the participants have a habit of smoking while 92.2% (sky blue) of the participants did not have a habit of smoking.



By doing exercise regularly, cancer is said to be prevented (Anderson et al., 2015). 7.8% of the population are diabetic [FIGURE 5]. Almost 31% of the population get cancer because of diabetes (Saeed et al., 2018). 22.3% of the population consumes alcohol [FIGURE 6]. Almost 22% of a particular population were affected by colorectal cancer because of alcohol (Inoue et al., 2006). 7.8% of the population have a habit of smoking [FIGURE 7]. Almost 70.6% of the population's main cause of cancer is smoking (Al-Azri et al., 2019). 19.4% of the population get a frequent stomach ache [FIGURE 8].

Figure 8: Pie chart depicts the percentage distribution of participants who get frequent stomach aches. 19.4% (dark blue) of the participants get frequent stomach aches which is one of the symptoms of colorectal cancer, while 80.6% (sky blue) of the participants did not get frequent stomach aches.

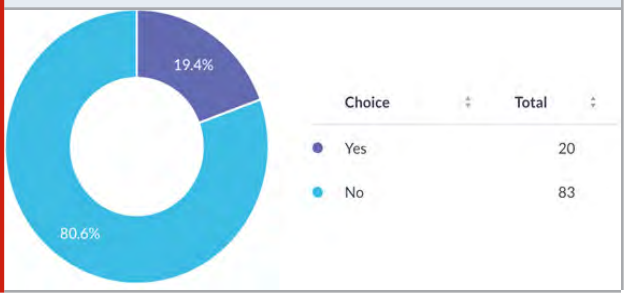
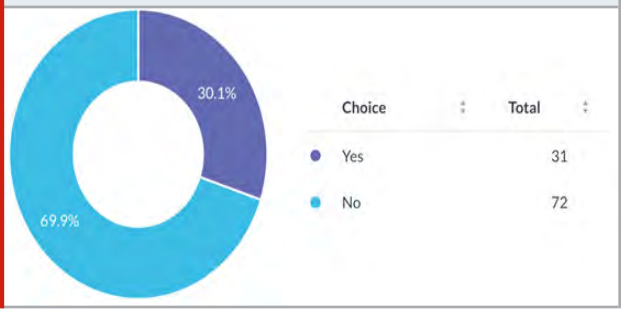


Figure 9: Pie chart depicts the percentage distribution of participants who undergo regular medical checkup. 30.1% (dark blue) of the participants did go for regular medical check- up, while 69.9% (sky blue) of the participants did not go for regular medical check- ups.



Change in bowel movements causes stomach ache (Nasaif and Al Qallaf, 2018). 30.1% of the population goes for regular medical check ups [FIGURE 9]. By going for regular medical check ups, any early symptoms of cancer can be checked or the doctor can educate the patient about colorectal cancer (Berkowitz et al., 2008). 52.4% of the population are said to feel weak at times [FIGURE 10]. Weakness can be one of the symptoms for colorectal cancer (Saeed et al., 2018). 7.8% of the population get blood in their stool [FIGURE 11]. Blood in the stool can also be a symptom of colorectal cancer (Saeed et al., 2018). 34.6% of the population have gastric problems [FIGURE 12]. Consumption of a lot of junk food or oily food can lead to gastritis (Inoue et al., 2006). 87.3% of the population were non vegetarian [FIGURE 13]. By asking the patient whether they are a vegetarian or a non-vegetarian, we will get to know they're diet (Saeed et al., 2018). 62.1% of the population consumes meat often [FIGURE 14].

Figure 10: Pie chart depicts the percentage distribution of participants who feel weak at times. Almost 52.4% (dark blue) of the participants felt weak at times while 47.6% (sky blue) did not feel weak at times.

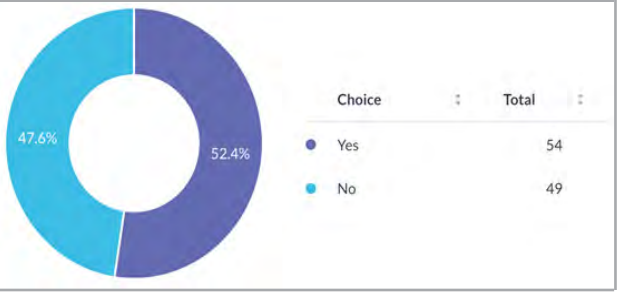


Figure 11: Pie chart depicts the percentage distribution of participants who pass blood in their stool. 7.8% (dark blue) of the participants got blood in their stool which is one of the major symptoms of colorectal cancer. While 92.2% (sky blue) of the participants did not get stool in their blood.

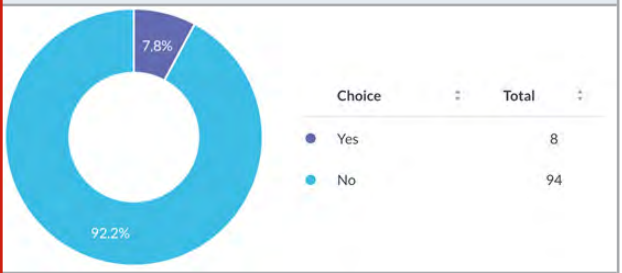


Figure 12: Pie chart depicts the percentage distribution of participants who have gastric problems. 34.6% (dark blue) participants had gastric problems whereas 65.4% (sky blue) did not have gastric problems.

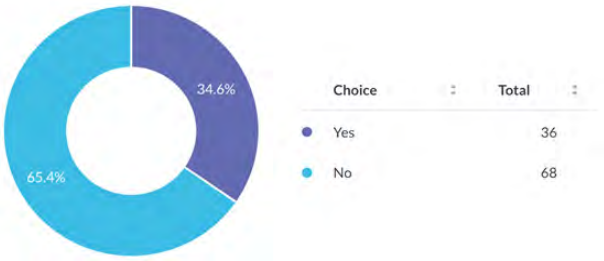


Figure 13: Pie chart depicts the percentage distribution of participants who are non- vegetarians. 12.7% (sky blue) of the participants were vegetarians while 87.3% (dark blue) were non- vegetarians.

Figure 14: Pie chart depicts the percentage distribution of participants who consume meat regularly. Consuming a lot of meat daily can cause a lot of health problems. 62.1% (dark blue) of the participants did consume meat often, 29.1% (sky blue) did not consume meat often and 8.7% (green) were vegetarians.

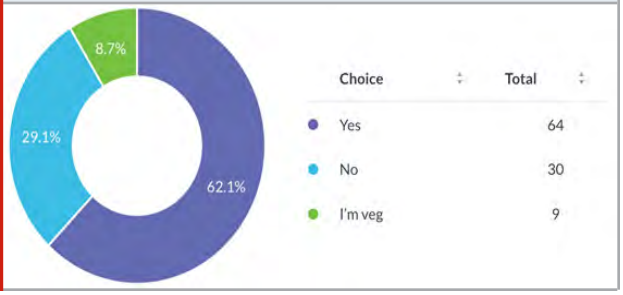


Figure 15: Pie chart depicts the percentage distribution of participants who get cramps which take time to recover. Getting cramps are normal but ones which last for long are not normal at all. Almost 27.5% (dark blue) of the participants did get cramps which took time to recover while 72.5% (sky blue) did get cramps which did not take time to recover.

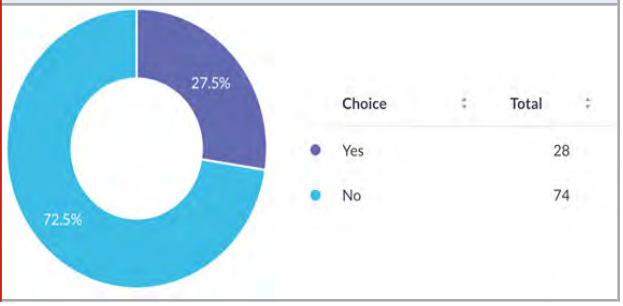
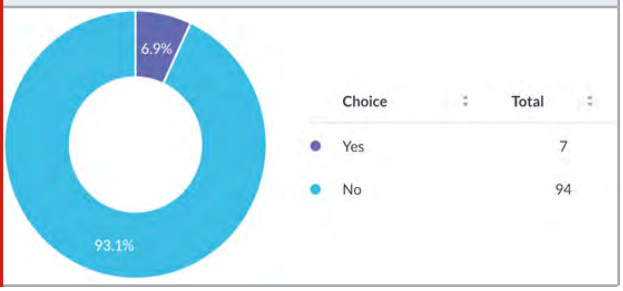


Figure 16: Pie chart depicts the percentage distribution of participants who have undergone a screening test (colonoscopy). 6.9% (dark blue) have undergone screening tests while 93.1% (sky blue) have not undergone screening tests.



This information is to know if their meat in take is a lot (Saeed et al., 2018). 27.5% of the population get frequent cramps which take time to recover [FIGURE 15]. Getting frequent cramps can also be a symptom for colorectal cancer (Saeed et al., 2018). 6.9% of the population have undergone screening tests [FIGURE 16]. Many people undergo screening tests to know their health (Al-Azri et al., 2019). 19.2% of the population experienced a

sudden weight loss [FIGURE 17]. This is also a symptom of colorectal cancer (Saeed et al., 2018). 22% of the population's bowel movements had changed [FIGURE 18]. This is also a symptom of colorectal cancer (Saeed et al., 2018).

Figure 17: Pie chart depicts the percentage distribution of participants who had experienced sudden weight loss. Almost 19.2% (dark blue) of the participants have experienced sudden weight loss while 80.8% (sky blue) have not experienced sudden weight loss.

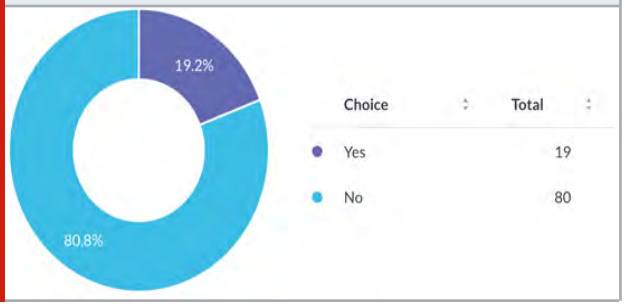
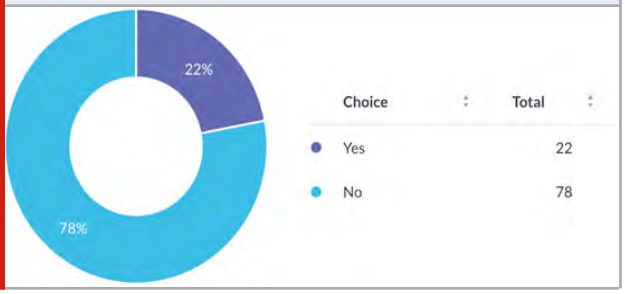


Figure 18: Pie chart depict the percentage distribution of participants who have frequent changes in their bowel movement. 22% (dark blue) of the participant's bowel movements changed while 78% (sky blue) of the participant's bowel movement had not changed.



A. Z. Gimeno Garia had conducted a study on public awareness of CRC and its screening in Spain. The results on awareness were very low while the participants who were willing to participate were very high. Zubaidi had conducted a similar study in Riyadh. And as expected, the results were the same as the above study. The participants had many misconceptions (Gimeno-García et al., 2011). B. John Rozar Raj had studied the relation between coffee consumption and cancer. He had compared coffee consumption with many types of cancer. In the case of CRC, it was seen that about 24% of the participants had lower risk of getting CRC as their consumption level of coffee was very high (Raj, Priya and Gayathri, 2016). Ram S Kalyan had set up a study on awareness of cancer in rural areas.

The awareness of the people in rural areas was considered inadequate, more campaigns and health related programmes had therefore been conducted (Ram and Muthiah, 2019). Pandi had set up an awareness campaign in the United Kingdom, where many were interested in screening tests and which had also increased the demand for CRC services (Pande et al., 2014). Greenwald. B had promoted a community based on awareness for creating more awareness for CRC. This sort of study brought up many advantages to the community and the participants were more aware than before (Greenwald, 2006). In this study, a little awareness had been spread among the population who had participated. More campaigns and awareness programmes must be conducted to help spread awareness to a larger population.

CONCLUSION

As colorectal cancer is becoming one of the leading causes of mortality in the world, more awareness about it and precautions must be spread which is required for a better life of the general public. People should also be educated on balanced diet and healthy lifestyle modifications for well being. The younger generation who are more aware of such diseases can help educate the elderly people in their family to live a healthy life.

ACKNOWLEDGMENTS

We thank Saveetha Dental College for providing us the full support to conduct the study.

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No 8 2020 Pp-400-403

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KAP On Connective Tissue Grafts in Implant Aesthetics

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ABSTRACT

Restoring extreme loss of bone and soft tissue especially in the aesthetic zone is unpredictable and difficult to manage. The aim of this study is to evaluate the knowledge and awareness of connective tissue grafts in implant aesthetics. A questionnaire of 10 questions is prepared and distributed among the dental practitioners and undergraduate students. Some of the questions include year of study, ideal location to obtain graft, ideal thickness of the graft etc. The results are obtained and tabulated. The knowledge and attitude towards connective tissue grafts in implant aesthetics is poor among the dental practitioners. Due to the lack of knowledge, this can lead to failure in implant or in patient satisfaction. In recent years, the prosthetic rehabilitation of partially edentulous jaws has been increasingly influenced by patients' growing interest and expectation regarding sites of aesthetics priority. Hence gaining knowledge and attitude towards connective grafts in implant aesthetics will help in patient satisfaction as well as success of the implant.

KEY WORDS: CONNECTIVE TISSUE GRAFTING; IMPLANT; AESTHETICS; PATIENT SATISFACTION; KNOWLEDGE.

INTRODUCTION

Dental implants are becoming the most preferred treatment of choice to replace missing teeth, especially if the adjacent teeth are free of restorations. With minimal bone width present, the implant placement becomes a challenge and often results in gingival recession and dehiscence around the implant. (Kassab, 2010) The successful use of dental implants to replace missing teeth has become one of the most popular, exciting, and evolving areas of clinical dentistry. When implants are thought of as a treatment option, treatment planning has become more complex for the dental practitioner, and an interdisciplinary team approach is needed. Failure to demonstrate such an approach might lead to an undesirable implant complication. Both the quantity and the quality of the alveolar bone must be assessed when an implant placement is considered.

The anterior maxilla region is an anatomically difficult region for dental implantation. Soft and hard tissue augmentations are often needed to restore the affected site. A sufficient bone density and volume is needed for stable placement of dental implants. (Buser, Martin and Belser, 2004) (Zhang, Skrypczak and Weltman, 2015) (McAllister and Haghighat, 2011) In addition, aesthetic outcome is an important parameter for the patient. The main aesthetic objective for patients is to maintain a harmonious gingival contour with intact papillae and without abrupt changes. Placement of dental implants

ARTICLE INFORMATION

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Received 28th July 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/170*

in the anterior maxillary region can be achieved by different methods.(Belser et al., 1998) The optimal method is dependent on anatomical parameters such as bone volume, bone density, alveolar crest position, adjacent teeth, and gingival morphology.

The success in rehabilitating the stomatognathic system including the aesthetics depends on the optimization of the algorithms specific to the pre-prosthetic, pro-implant and prosthetic stage. However, the anatomical limits, occlusal space management, occlusal stability and periodontal status must be considered prior to the planning of the esthetic parameters for the future prosthetic restoration (Forna and Agop-Forna, 2019) Aesthetic outcomes are important for successful dental implantation which are determined by the smile and lip line. Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Duraisamy et al., 2019; 2019; Ashok and Ganapathy, 2019;Varghese, Ramesh and Veeraiyan,), this vast research experience has inspired us to do research on connective tissue graft in implant aesthetics. The aim of the study is to evaluate the knowledge attitude and practise on connective tissue used in implant aesthetics.

MATERIAL AND METHODS

A questionnaire of 10 questions is prepared and are distributed among the undergraduates. Some of the questions involved years of study, the different types of grafts used in implant aesthetics, the conditions requiring grafts. The results are obtained and tabulated.

RESULTS AND DISCUSSION

A total of 100 students participated in this study and answered the survey questions. The knowledge and awareness among the students based on the success rate of connective tissue grafts compared to other tissue grafts were positive (65%) (figure 1). The most common answer for the aesthetic considerations of the connective tissue grafts compared to the other tissue grafts by the students was not sure (45%) (figure 2) The most common answer for the ideal thickness of the connective tissue graft was found to be 1.5-2mm (41.67%) (figure 3). The most common answer received for the ideal location of an implant connective graft is 5-6mm to the gingival margin of the palatal aspects of the maxillary premolars and the mesial half of the maxillary first molar. (35%) (figure 4).

In the past two decades, the influence of aesthetic values on restorative dentistry and prosthodontics have been increasing dramatically. Various novels and articles have been specifically developed leading to less invasive approaches on one side and having highly predictable results on the other side. (Prasad, Shetty and Mehra, 2013) (Kloukos et al., 2014) (Ehrenfest et al., 2010) Currently, anterior fixed partial dentures can frequently provide long lasting aesthetics and ultimately create the almost perfect illusion, making it difficult to detect that missing teeth have been replaced by a prosthesis. As a consequence, any implant borne prosthesis will be compared to the aesthetic and functional standards that can be achieved today by conventional tooth supported restorations.

Figure 1: Bar graph represents the knowledge and awareness of students on the success rate of tissue grafts after an implant placement. The x axis of the graph represents the knowledge on success rate and the y axis represents the number of participants in the study. The graph infers that most of the students knew about the success rate of connective tissue grafts compared to other tissue grafts used for implant aesthetics depicted as grey in the graph(65.0% of the students) followed by some not sure shown in blue colour (25.0%)

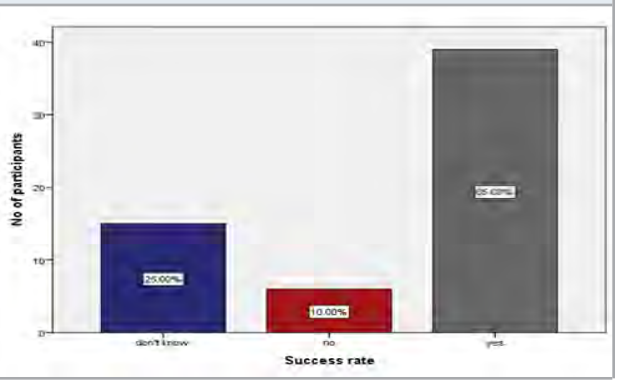


Figure 2: Bar graph represents the knowledge and awareness of students on the aesthetic considerations of tissue grafts compared to other grafts after an implant placement. The x axis of the graph represents the knowledge on aesthetic consideration of the graft and the y axis represents the number of participants in the study. Most of the students were not sure of the answer ie. 45.0% of the students shown in blue in the graph followed by 36.67% of the students answered yes shown as grey colour.

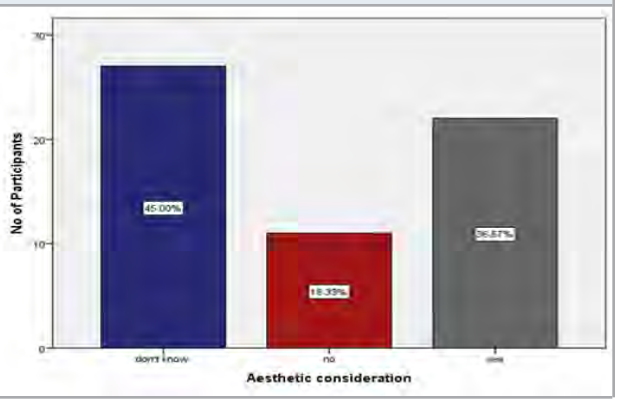


Figure 3: Graph represents the survey knowledge and awareness of the students on ideal thickness of the tissue graft that can be used after an implant placement. The x axis of the graph represents the knowledge on the ideal thickness of the graft and the y axis represents the number of participants in the study. The answer commonly received was found to be 1.5-2mm (41.67%) shown as grey colour followed by 0.5-1mm thickness shown as blue colour (28.37%).

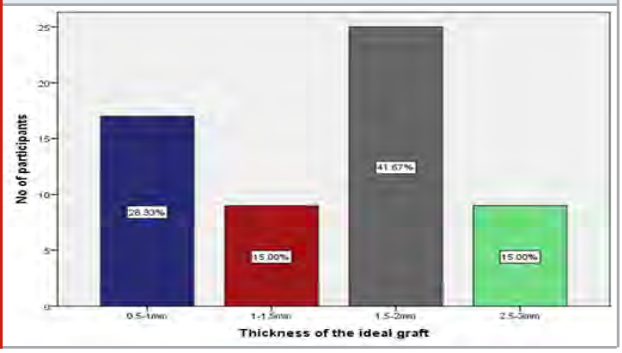
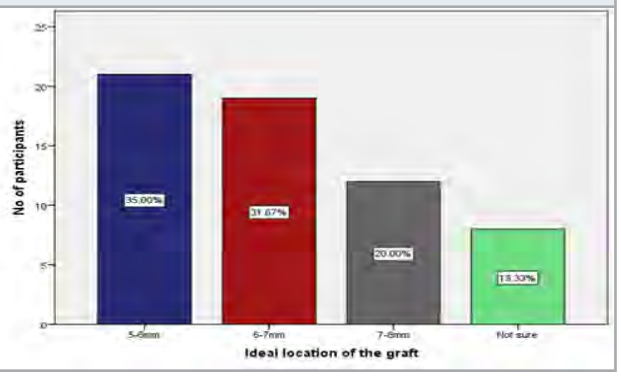


Figure 4: Graph represents the knowledge and awareness of students on the ideal location of the connective tissue graft. The x axis of the graph represents the knowledge on the ideal location of the graft and the y axis represents the number of participants in the study. The most common answer obtained was 5-6mm (shown as blue colour in th graph) apical to the gingival margin of the tooth (35%) followed by 6-7mm (31.67%) shown in red in the graph.



Patients report to the practitioners asking for replacement of teeth and not directly asking for implants. They would like to have their teeth replaced in the most aesthetically and long lasting way possible. This includes criteria such as maximum preservation of sound tooth structure, avoidance of removable prosthesis, minimal surgical risk as well as cost effectiveness. (Öncü et al., 2016) (Dohan et al., 2006) (Mehta and Watson, 2008). Soft tissue augmentation is especially important in the aesthetic zone. The facial soft tissue parts will resorb quite quickly which should be prevented. The interdental papillae will disappear fast after extraction, and in addition, the enormous bone loss will influence the Gingiva. (Lacci and Dardik, 2010) The initial quality of the gingival tissue is important. (Assoian et al., 1983) (Banks et al., 1998) (Gassling et al., 2010) (Streckbein et al., 2012) (Tolstunov, 2016) (Fujioka-Kobayashi et al., 2017) A thin biotype is less predictable then a thick biotype. The wound should be closed primarily without any tension. If the gingival tissue is weak or damaged, sloughing of the soft tissue is likely to occur and will lead to a compromised healing site due to contamination. Long-term clinical studies have shown that functional osseointegration is a predictable outcome. The dental implant therapy success depends not only on the osseointegration but also on aesthetic, function and harmony with the remaining dentition. (Kan, Rungcharassaeng and Lozada, 2005) (Schoenbaum, 2018) The most important factors that influence the esthetic outcome of the implant-supported restorations are as follows :Patient selection and smile line; Tooth position; Root position of the adjacent teeth; Biotype of the periodontium and tooth shape; The bony anatomy of the implant site; The position of the implant.

CONCLUSION

Satisfactory esthetic outcome is challenging in implant-supported restorations replacing missing anterior teeth. The maximization of the esthetic outcome depends mostly on the optimization of the algorithms specific to the pro-prosthetic, pro-implant and prosthetic stage. Hence gaining knowledge and aptitude towards connective tissue grafts in implant aesthetics will help in patient satisfaction as well as success of the implant.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the Chancellor, Director of Academics, The Principal, Associate Dean of Research, The Vice Chancellor of Saveetha University. HOD and their Professors, Readers, Lecturers and their fellow Postgraduates, Department of Prosthodontics and Department of Pedodontic and Preventive Dentistry, Saveetha University, The support from their parents and from their family.

Conflict of Interest: The authors would like to declare that there is no conflict of interest among the authors.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-404-409

BBRC
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Awareness Towards Fixed Orthodontic Treatment Among High School Students in Perambur – A Survey

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ABSTRACT

Facial appearance plays a major role in all stages of human life which has got a great impact during pre-adolescent and adolescent phases. Malocclusion can conciliate the oral health tissues and can lead to social and psychological problems. Hence an investigation of the malocclusion status in growing children to intercept the same is required. The aim of this study is to survey the awareness of Fixed orthodontic treatment among school children in perambur. The objective of this study is to survey the school students about their awareness on fixed orthodontic treatment. The study was conducted among 100 law college students studying at Saveetha Law College in Chennai. A questionnaire was prepared consisting of 11 questions, and it was distributed to each of them, and they were evaluated individually. The results of the study were statistically analyzed both quantitatively and qualitatively through software called SPSS by IBM. Chi-Square analysis was also done. From the collected data it is evident that the female population was more 52.0%. Many of them didn't know about fixed orthodontic treatment of 55.0% of the population. 62.0% of them said their teeths are properly arranged. 57.0% of them responded to the fact that they didn't have any kind of abnormalities in their teeth. 53.0% of them knew that irregularly arranged teeth can be corrected through treatment. 36.36% of them know that oral habits could lead to irregular arrangement of teeth. 60.0% of them knew that flossing, using mouth and proper brushing techniques will help in maintaining oral hygiene during orthodontic treatment. High school children exhibited more awareness towards orthodontic treatment.

KEY WORDS: MALOCCLUSION; HIGH SCHOOL; PERAMBUR; FIXED ORTHODONTIC TREATMENT; KNOWLEDGE.

INTRODUCTION

In 1922, the British Society for the Study of Orthodontics has defined the specialty as "Orthodontics" includes the study of growth and development of jaws and face, particularly, and body generally as influencing position of teeth; study of action and reaction of internal and external influences on the development; and prevention and correction of arrested and perverted development.

Various factors such as adverse oral habits, anomalies in number of dentition, shape, and developmental position of teeth can cause malocclusion. Malocclusion affects periodontal health, causes dental caries and temporomandibular joint problems (Abu Alhaija, Al-Nimri and Al-Khateeb, 2005). Orthodontic treatment, more than improving the quality-of-life, can bring physical, psychological, and social changes (Feldmann et al., 2007). The major benefits of orthodontic treatment

ARTICLE INFORMATION

*Corresponding Author: dhanraj@saveetha.com
Received 27th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/171

are to improve the physical function, prevention of tissue damage, and correction of esthetic components (Kaur, 2009).

A functional appliance is a removable or fixed appliance that alters the posture of the mandible and transmits the forces created by the resulting stretch of Research Article the muscles and soft tissues and by the change of the neuromuscular environment to the dental and skeletal tissues to produce movement of teeth and modification of growth (Marsico et al., 2011). Oral health will have an effect on the overall health and well-being of humans. In several nations, massive numbers of young aged teams square measure unaware concerning the causes, prevalence, and hindrance of most oral diseases (Siddegowda, 2015). Facial appearance plays a major role in all stages of human life which has got a great impact during pre-adolescent and adolescent phases. This is because they develop increased self-consciousness to their appearance. They harbour the belief that others are concerned with their looks as they themselves are. This increased self-awareness leads them to be more concerned about their health. Health is multifactorial and is an inseparable part of general health (Choi et al., 2015). Oral health knowledge and awareness are considered to be an essential pre-requisite for health-related behaviour (Wright, 1982).

Moreover, the treatment of disorder reduces the suffering among the patient and social embracement. Thus, it becomes highly important for us to identify the awareness of fixed orthodontic treatment among the school students in perambur so that they can prevent further malocclusion and cause further complications and moreover its their esthetic appearance and confidence that plays an important role for a high school going children in perambur. Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research the awareness of Fixed orthodontic treatment among school children in perambur.

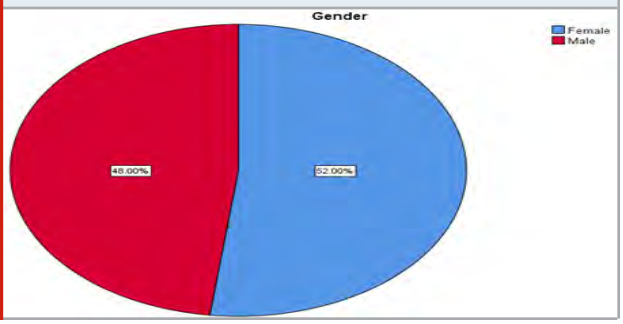
MATERIAL AND METHODS

This is a cross sectional survey study where the study population is randomly chosen. The study was conducted among 100 high school going students in Perambur, Chennai. A questionnaire was prepared consisting of 11 questions, and it was distributed to each of them and they were evaluated individually. The results of the study were statistically analyzed both quantitatively and qualitatively. The data was collected during the time period of June 2019 to March 2020 were reviewed and collected data was statistically analysed with the help of SPSS by IBM and tables and graphs well plotted.

RESULT AND DISCUSSION

This study was mainly conducted to acknowledge the knowledge of high school students in perambur about fixed orthodontic treatment. The results were given in percentage for each question asked to the individual. Out of the total population 52.0% of them were females and 48.0% of them were males (Figure 1)

Figure 1: Shows a pie diagram representing gender prevalence, out of the total population 52.0% of them were females (Blue) and 48.0% of them were males (Red).



55.0% of them didn't know about fixed orthodontic treatment and 45.0% of them knew about the fixed orthodontic treatment. (Figure 2).62.0% of them told their teeths are properly arranged and 38.0% of them told their teeths are not properly arranged. (Figure 3).57.0% of them responded to the fact that they didn't have any kind of abnormalities in their teeth and 30.0% of them responded that they had crowding in their teeth and 13.0% of them felt that they had spacing between their teeth. (Figure 4).39.0% of them saw people wearing braces, 34.0% of them were not sure and 27.0% of them didn't see people with braces. (Figure 5).53.0% of them knew that irregularly arranged teeth can be corrected, 30.0% of them were not sure about the correction and 17.0% of them felt that they cannot be corrected.

Figure 2: Shows a pie diagram represents 55.0% of them didn't know about fixed orthodontic treatment (Blue) and 45.0% of them knew about the fixed orthodontic treatment (Red).

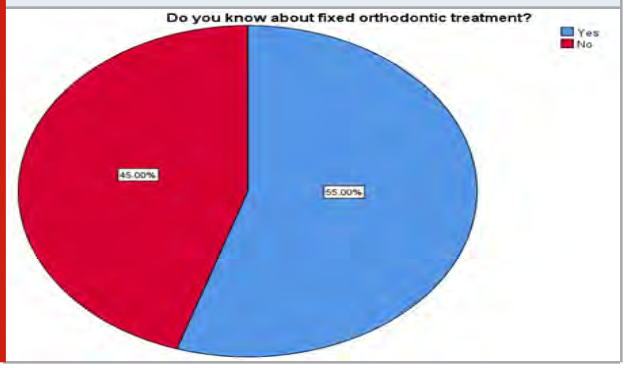


Figure 3: Shows a pie diagram represents 62.0% of them told their teeths are properly arranged and 38.0% of them told their teeths are not properly arranged.

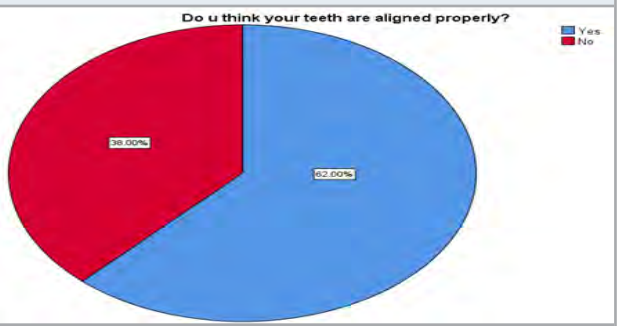


Figure 4: Shows a pie diagram represents 57.0% of them responded to the fact that they didn't have any kind of abnormalities in their teeth and 30.0% of them responded that they had crowding in their teeth and 13.0% of them felt that they had spacing between their teeth.

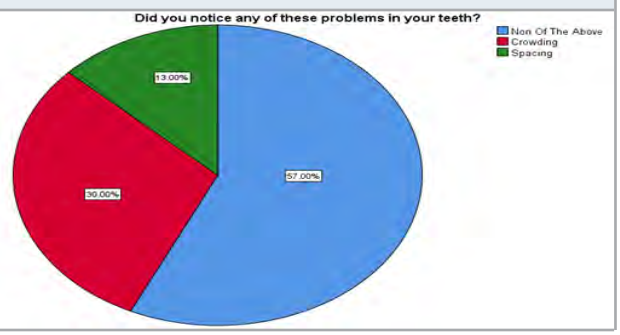
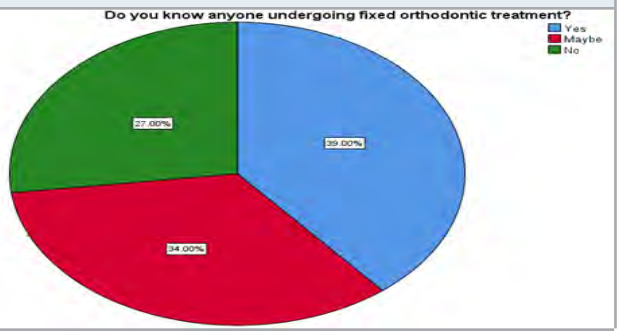


Figure 5: Shows a pie diagram represents 39.0% of them saw people wearing braces, 34.0% of them were not sure and 27.0% of them didn't see people with braces.



(Figure 6).36.36% of the known oral habits could lead to irregular arrangement of teeth, 34.34% of them didn't know that oral habits could lead to irregular arrangement of teeth and 29.29% of them were not sure of the side effects of oral habits. (Figure 7).59.0% of them have seen other people wearing braces and 41.0% of them didn't see any of them wearing braces. (Figure 8).44.0% of them knew that the teeth can come back to the old position as it was before the treatment, 35.0% of them didn't know that teeth can come back to the old position as it was before the treatment and 21.0% of them didn't know that treated teeth can come back to the old position as it was before the treatment. (Figure 9).50.0% of them knew that they have to wear retainers after the treatment and 50.0% of them didn't know that they have to wear retainers after the treatment.

Figure 6: Shows a pie diagram represents 53.0% of them knew that irregularly arranged teeth can be corrected, 30.0% of them were not sure about the correction and 17.0% of them felt that they cannot be corrected.

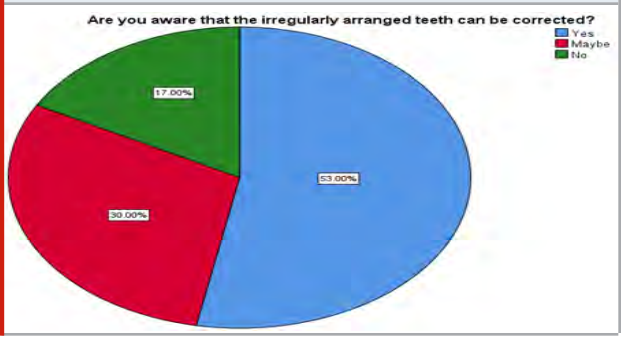


Figure 7: Shows a pie diagram represents 36.36% of the known oral habits could lead to irregular arrangement of teeth, 34.34% of them didn't know that oral habits could lead to irregular arrangement of teeth and 29.29% of them were not sure of the side effects of oral habits.

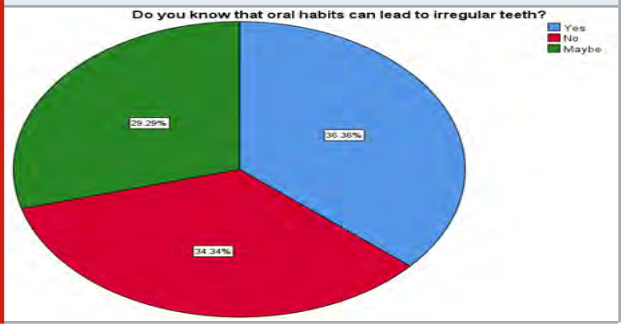
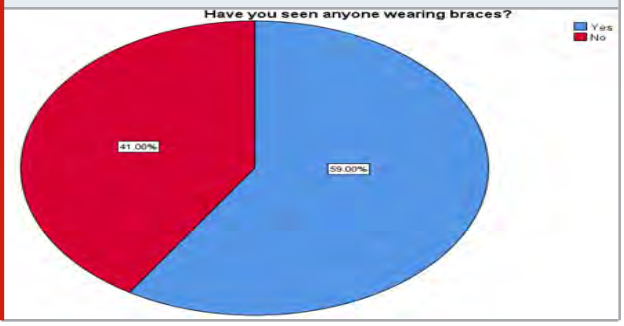


Figure 8: Shows a pie diagram represents 59.0% of them have seen other people wearing braces and 41.0% of them didn't see any of them wearing braces.



(Figure 10).43.0% of them voted for 12 to 18 months, 29.0% of them voted for 6 months, 22.0% of them voted for 6 to 12 months and 6.0% of them thought it would take more than 18 months. (Figure 11).60.0% of them knew that flossing, using mouth and proper brushing techniques will help in maintaining oral hygiene during orthodontic treatment. 22.0 of them

thought using mouth was will help in maintaining oral hygiene during orthodontic treatment, 16.0% of them thought maintaining proper brushing techniques will help in maintaining oral hygiene during orthodontic treatment and 2.0% of them knew that flossing will help in maintaining oral hygiene during orthodontic treatment. (Figure 12)

Figure 9: Shows a pie diagram represents 44.0% of them knew that the teeth can come back to the old position as it was before the treatment, 35.0% of them didn't know that teeth can come back to the old position as it was before the treatment and 21.0% of them didn't know that treated teeth can come back to the old position as it was before the treatment.

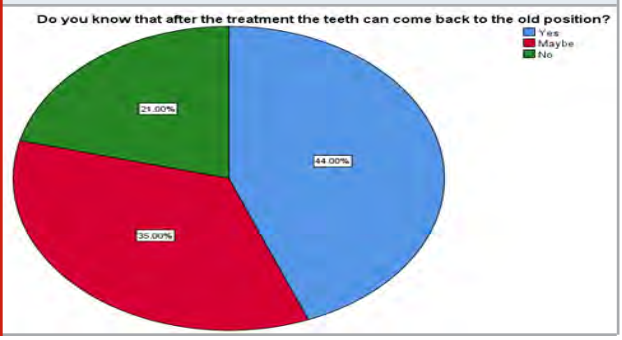


Figure 10: Shows a pie diagram represents 50.0% of them knew that they have to wear retainers after the treatment and 50.0% of them didn't know that they have to wear retainers after the treatment.

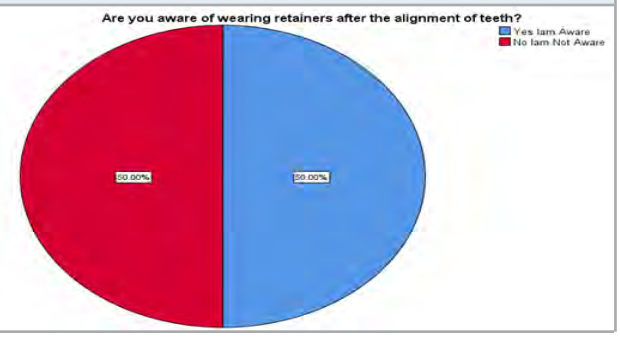


Figure 11: Shows a pie diagram represents 43.0% of them voted for 12 to 18 months, 29.0% of them voted for 6 months, 22.0% of them voted for 6 to 12 months and 6.0% of them thought it would take more than 18 months.

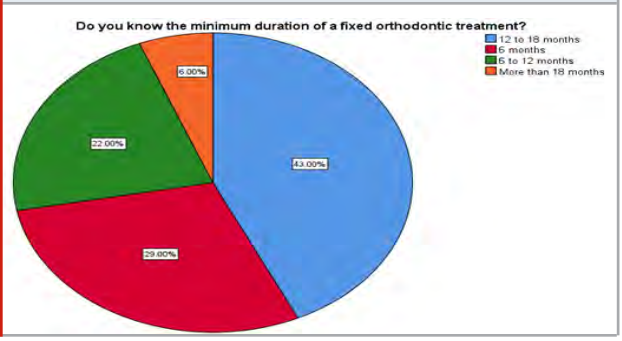
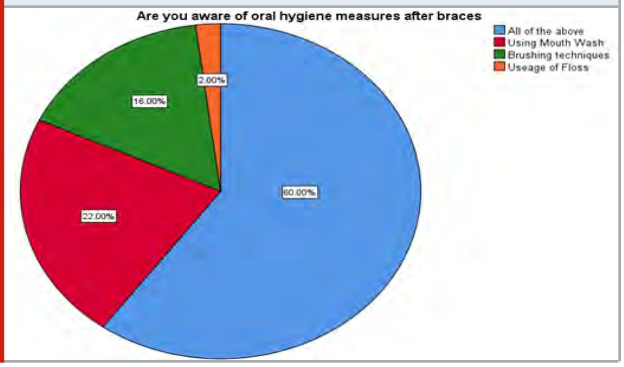


Figure 12: Shows a pie diagram represents 60.0% of them knew that flossing, using mouth and proper brushing techniques will help in maintaining oral hygiene during orthodontic treatment. 22.0 of them thought using mouth was will help in maintaining oral hygiene during orthodontic treatment, 16.0% of them thought maintaining proper brushing techniques will help in maintaining oral hygiene during orthodontic treatment and 2.0% of them knew that flossing will help in maintaining oral hygiene during orthodontic treatment.



Self-awareness is a dynamic process, not a static phenomenon (Rochat, 2003). Attitudes and perceptions towards dental appearance differ among populations and among individuals (Vallittu, Vallittu and Lassila, 1996). Age-related changes in malocclusion concerns ideally should be studied longitudinally because with the progress in age, the awareness of malocclusion increases. The level of dental health knowledge, positive dental health attitude, and dental health behavior are interlinked and associated with the level of education and income as demonstrated by studies in the past (Al-Wahadni, Al-Omiri and Kawamura, 2004) (Kawamura, Iwamoto and Wright, 1997).

From the collected data it is evident that the female population was more by 52.0%. Many of them didn't know about fixed orthodontic treatment of 55.0% of the population, This is also proved by a study conducted by Siddegowda R 39.6% of the were aware of orthodontics (Siddegowda, 2015). 62.0% of them said their teeths are properly arranged this is supported by a study conducted by Shahul Hameed Faizee et,al; that 52.7% of them were happy with the arrangement of their own teeth (Faizee et al., 2018). 57.0% of them responded to the fact that they didn't have any kind of abnormalities in their teeth this is supported by a study conducted by Shahul Hameed Faizee et,al; that 52.7% of them were happy with the arrangement of their own teeth (Faizee et al., 2018).

39.0% of them have seen people wearing braces. This is supported by the study conducted by Siddegowda R 76.4% of them have seen people wearing braces (Siddegowda, 2015). 53.0% of them knew that irregularly arranged teeth can be corrected through treatment. 36.36% of them know that oral habits could lead to irregular arrangement of teeth This is supported by study done by (Siddegowda, 2015) 53.1% of them are aware of

the side effects of oral habits (Siddegowda, 2015). 43.0% of them voted for 12 to 18 months This is evident from the study conducted by (Siddegowda, 2015) reveld 38.9% of them were aware of the duration of the orthodontic treatment (Siddegowda, 2015). 60.0% of them knew that flossing, using mouth and proper brushing techniques will help in maintaining oral hygiene during orthodontic treatment.

A study carried out in China in which 80% of females were not willing for treatment mainly due to the following reasons such as lack of information about orthodontic treatment and may have suffered from dental phobia; women who were single worried that the braces might lower their chances of social life; few worried about appearance and speech with braces; and some the cost, pain, and dental hygiene (Klages et al., 2005). There should be a proper knowledge about fixed orthodontic treatment and proper average cost of treatment and duration of treatment. There should be regular camps in order to make people aware of the need of treatment.

CONCLUSION

From our study we conclude that creating awareness is the first step of oral health education. In a society like ours where most people are not aware of the adverse effects of malocclusion and its consequences, the main reason behind this may be attributed to inadequate implementation of preventive oral health-care programs. High school children exhibited more awareness towards orthodontic treatment.

ACKNOWLEDGEMENTS

We acknowledge Saveetha Dental college for all the help and support.

Conflict of Interest: The authors declare no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No 8 2020 Pp-410-418

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Knowledge, Attitude, Practice About Chemo Mechanical Caries Removal Method in Dental Caries Among Dentist in Chennai City- A Cross-Sectional Study

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ABSTRACT

Minimally Invasive Dentistry (MID) emphasizes conservative caries management strategies resulting in less destruction of tooth structure, a deviation of the traditional GV Black's restorative principles. However, there seems to be either deficiency in knowledge or little intention by general dental practitioners to adopt these principles.The aim of this study was to assess the knowledge and attitude among general dental practitioners towards minimally invasive dentistry in Chennai.The study was conducted through an online survey among the dentists. A structured and self administered questionnaire was adapted from questionnaires used previously in studies done by Schwendicke et al (Schwendicke et al., 2013).The questions assessed the respondents' levels of agreement regarding diagnostic, preventive and restorative techniques, types of caries removable agents, Atraumatic Restorative.The Chi-Square test was applied to assess the association between level of education and responses. In our study it showed that most of the dentists who took part were male dentists,42% of the participants had no awareness regarding CMCR,58% which is the majority of the participants did not have awareness regarding CMCR..75% of the participants were interested in taking part in a CDE programme on CMCR. It was found that MDS graduates had significantly higher knowledge regarding the chemo mechanical agents but clinical usage was comparatively lesser.The curriculum plays an important role in chemo mechanical caries removal agent needs to be determined precisely and clearly.

KEY WORDS: CHEMOMECHANICAL CARIES REMOVAL SYSTEM (CMCR),CARIDEX, CARISOLV, PAPACARIE, SURVEY.

INTRODUCTION

The approach for deep dentin caries management has always been an riddle for the restorative dentist. The old attempt was to eradicate bacteria and all infected dental biomass and subsequent restoration has been debated by new philosophers who have contemplated the benefits of avoiding the potential complications of complete excavation of carious dentin close to the pulp. There is growing evidence supporting the incomplete removal of carious tissue before the cavity is restored(Banerjee, Watson and Kidd, 2000). Suppositionally, it is argued that a completely sealed remaining caries lesion should be arrested. Hence, therapy of cavitated lesions may require less focus on complete excavation than on adequate restorations(Ricketts, 2001; Kidd, 2004).From time immemorial, dentists have removed all infected enamel and dentin using excavators or high- and low-speed instruments, and thereby risking exposure of the pulp. Instead of attempting to remove all bacteria, it should be

ARTICLE INFORMATION

*Corresponding Author: jayashri.sdc@saveetha.com
Received 5th Aug 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/172

sufficient to re-shift the ecologic and Metabolic balance within the biofilm, thus promoting re-mineralization, thereby arresting the caries lesions(Bjorndal and Kidd, 2005).

The primary focus in the minimally invasive dentistry of caries management is identifying and eliminating the causative agent, along with repairing the damages which have been caused by the organism (Banerjee and Doméjean, 2013). Dental caries is now viewed as an infection rather than as a lesion and its treatment protocol is to reduce or eliminate pathogens contents in the teeth; this can be viewed as a retrieval from the traditional restorative treatment (Frencken et al., 2012). The minimally invasive dentistry symbolises knowledge of the disease process and simple concepts on new technologies (Uskoković and Bertassoni, 2010). The minimally invasive dentistry cares to address the early carious lesion and the causes of the disease process and also emphasizes on conservation of tooth structure , which is a deviation from the traditional GV Black's restorative principles (Wolff, Allen and Kaim, 2007). In contrast to traditional methods, this philosophy has allowed control of dental caries via prevention and conservation of tooth structure through conservative cavity preparations, adhesive materials and evidence-based decision-making (Tyas et al., 2000).

One of the most common problems in clinical dentistry is how to minimize the use of drills to overcome fear and have a patient friendly approach. Chemomechanical caries removal system is one of the theories that have changed the perception of dental treatment, making it more patient friendly. This amounts to instill a positive dental attitude, which in turn reduces the efforts of pediatric dentists to imply behavior management techniques and achieve child's cooperation easily. On the other hand, pediatric Dentist's all around, have conceptualized the importance of preserving tooth tissue combined with a patient-friendly approach, which is becoming self-evident. This has led to revolutionize Dentistry with the concept of 'minimal invasive dentistry'. Minimal invasive dentistry comprises various techniques, viz; air abrasion, atraumatic restorative technique, sono abrasion, laser and chemomechanical caries removal system (CMCR) (Kavvadia et al., 2004; Ganesh and Parikh, 2011). Thus,CMCR can be designated as a minimally invasive, painless and patient friendly technique, recommended for pediatric dental patients(Ganesh and Parikh, 2011);(Munshi, Hegde and Shetty, 2001; Kavvadia et al., 2004; Balciuniene, Sabalaite and Juskiene, 2005).

Chemomechanical caries removal technique involves the application of chemical agents, to cause a selective softening of the carious dentine and facilitates removal by gentle excavation. Since, its inception in 1980's, CMCR has been originally marketed as 3 different systems, viz, Caridex,Carisolv® and Papacarie®(Bussadori, Castro and Galvão, 2006; Corrêa et al., 2007) Caridex required large volumes of solution and a special applicator tip, which weaned its popularity around 1990's and thus, was discontinued to be marketed(Beeley, Yip and Stevenson, 2000). Carisolv® and Papacarie® were later introduced around 2000, which had overcome the limitations of Caridex and are being used among clinicians aware of this technique. The Carisolv® system uses a gel and special instruments that removes the pathologically affected portion of the tooth structure and preserves the healthy tissue. Papacarie® is based on a similar system as the latter but does not include special instruments for caries removal and is relatively cheap[16]. Both systems have been proved to be effective in caries removal(Corrêa et al., 2007).However, high cost is a limiting factor to daily use in developing and under- developed countries(Corrêa et al., 2008).

India is one of the developing countries. Since, the popularity of any system depends upon its economic viability, under-developed and developing countries find it difficult to incorporate an expensive mode of treatment. As mentioned previously, CMCR includes high cost, due to which its popularity in a developing country like India is insufficient. Although an expensive mode of treatment, CMCR being an effective technique for pediatric and special children. Hence, this study was carried out to determine the awareness of CMCR among clinicians in chennai, which if not present can be incorporated through continuing dental education programs and marketing.We have successfully completed numerous epidemiological studies for the betterment of our community (Prabakar, John, Arumugham, Kumar and Sakthi, 2018a, 2018b; Prabakar, John, Arumugham, Kumar and Srisakthi, 2018; Vishnu Prasad et al., 2018; Khatri et al., 2019; Manchery et al., 2019; Shenoy, Salam and Varghese, 2019). In this research we are studying the Knowledge, attitude, practice about chemo mechanical caries removal agents among dentists in chennai city.

MATERIAL AND METHODS

Study Design: The present study is a cross-sectional study.

Study area: Saveetha Dental college

Sample size: N= 200 (95% power @ 5% alpha). Sample size was calculated based on the study done by Schwendicke et al., 2013

Sampling technique: Convenience sampling technique.

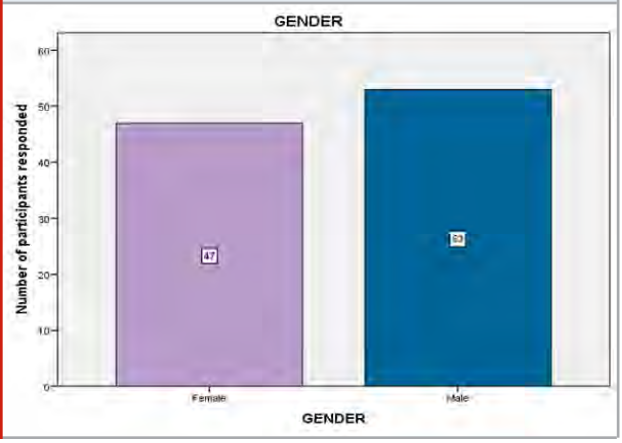
Ethical Approval: The ethical approval was passed by the Institutional ethical committee,Saveetha Dental college & Hospitals Saveetha Institute of medical and Technical science,Saveetha University.

Data collection and Survey Instrument: The study was conducted through an online survey among the dentists. A structured and self administered questionnaire was adapted from questionnaires used previously in studies done by Schwendicke et al (Schwendicke et al., 2013). The survey tool consisted of several parts. The first section collected demographic information of the participants such as age, gender, highest level of education and

number of years of experience in clinical practice. The second part of the questionnaire consisted of 14 questions to assess the participant's levels of knowledge and attitude and practices regarding Chemico-mechanical caries removal method in dental caries.

Data Analysis: Only completely filled forms were considered for analysis. Data was analyzed using the Statistical Package for Social Sciences (SPSS Chicago, Illinois,USA).Frequency distribution were carried out for all variables.The Chi-Square test was applied to assess the significance of differences between groups at a p-value of 0.05.

Figure 1: Bar chart represents the distribution of study subjects based on gender. X axis denotes the gender of the participants and Y axis denotes number of participants(Percentage). 47% of the study population were females and 53% of the study population were male.



RESULTS AND DISCUSSION

In our study the distribution of study subjects based on gender. 47% of the study population were females and 53% of the study population were male is shown in figure-1.The distribution of study subjects based on age. 4% of the study population were 23-30 years old and 5% of the study population were 31-40 years old,91% were 41 and above is shown in figure-2.The distribution of study subjects based on the highest level of education.60.5% participants completed BDS and 39.5% of the participants completed MDS.is shown in figure-3.The distribution of study subjects based on the years of clinical practice.4% of the participants had less than 5 years of clinical practice,5% of the participants had 5-10 years of clinical practice,91% of the participants had more than 10 years of clinical practice is shown in figure-4.Figure 5 shows the distribution of study subjects based on their awareness regarding the CMCR. 42% of the participants had no awareness regarding CMCR,58% which is the majority of the participants did not have awareness regarding CMCR.

Figure 6 shows the distribution of study subjects based on their clinical practice with the CMCR.24% of the participants used CMCR in their clinical practice,76% of the participants did not use CMCR in their clinical practice. Figure 7 represents the distribution of study subjects regarding the CMCR working method. 15% of the participants know how CMCR works,65% of the participants do not know how CMCR works.Figure 8 represents the distribution of study subjects regarding their knowledge on which dentition CMCR is used.

Figure 2: Bar chart represents the distribution of study subjects based on age. X axis denotes the age of the participants and Y axis denotes number of participants responded (Percentage). 4% of the study population were 23-30 years old(Green) and 5% of the study population were 31-40 years old(Light blue),91% were 41 and above(Dark blue).

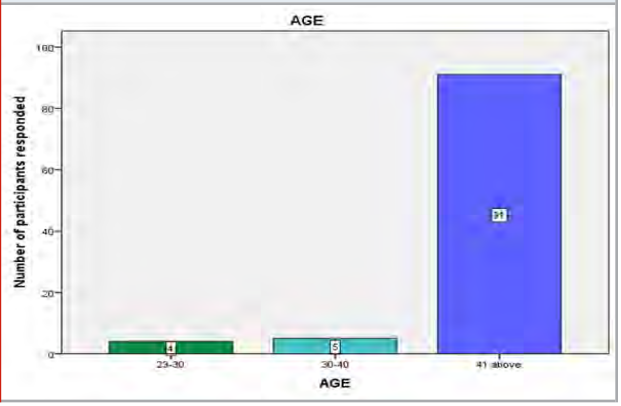
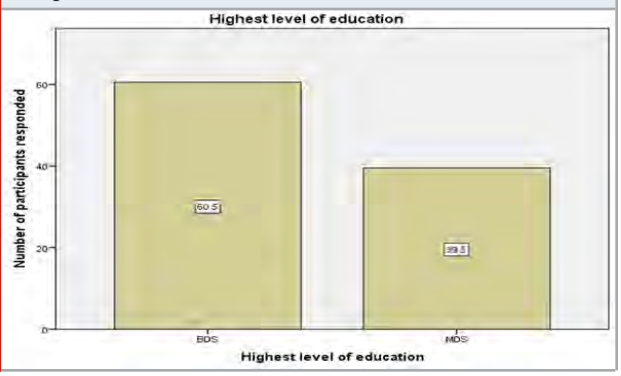


Figure 3: Bar chart represents the distribution of study subjects based on the highest level of education.X axis represents the participants highest level of education.Y axis shows the number of participants responded.60.5% participants completed BDS and 39.5% of the participants completed MDS.



10% of the participants believe CMCR is used in primary dentition, 24% of the participants believe CMCR is used in permanent dentition, 17% of the participants believe CMCR is used in both dentitions, 48% of the participants do not know. Figure 9 represents the distribution of study subjects regarding their knowledge on different types of caries removal agents.46% answered air abrasion, 29.5% answered sono abrasion, 17% answered CMCR,2.5% answered laser abrasion,5% answered ART.Figure 10 represents the distribution of study subjects regarding

their knowledge on different types of CMCR..3% answered cariodex,29.5% answered carisolv,8.5% answered papacarie,1.5% answered biosol,57.5% answered none which accounts more when compared to others.

Figure 4: Bar chart represents the distribution of study subjects based on the years of clinical practice.X axis represents the years of clinical practice..Y axis shows the number of participants responded. 4% of the participants had less than 5 years of clinical practice,5% of the participants had 5-10 years of clinical practice,91% of the participants had more than 10 years of clinical practice.

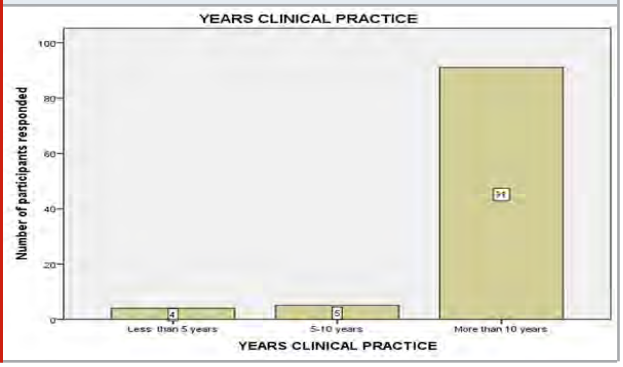


Figure 6: Bar chart represents the distribution of study subjects based on their clinical practice with the CMCR.X axis representing do you use CMCR in your clinical practice. Y axis shows the number of participants responded. 24% of the participants used CMCR in their clinical practice,76% of the participants did not use CMCR in their clinical practice.

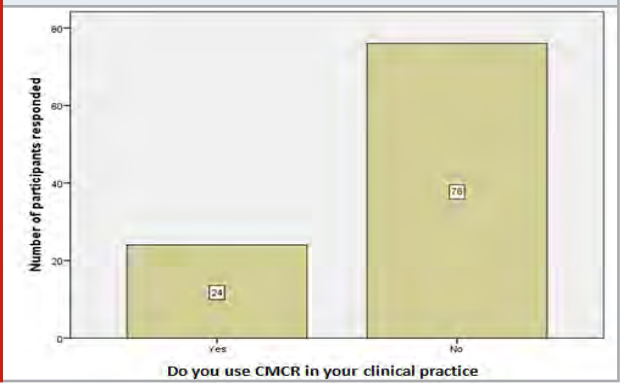


Figure 11 represents the distribution of study subjects regarding their knowledge on different combination of CMCR.10.5% answered cariodex and carisolv,27% answered carisolv and papacarie,6% answered cariodex and papacarie,56.5% answered none which accounts more when compared to others.Figure 12 represents the distribution of study subjects regarding the reason for choosing CMCR.20.5% answered convenience for disable patients,31% answered easy to use in difficult to control children,17.5% answered facilitates ease in anxious patients,17.5% answered because of minimally invasive,13.5% answered because no need to use

Figure 5: Bar chart represents the distribution of study subjects based on their awareness regarding the CMCR.X axis represents the awareness about CMCR. .Y axis shows the number of participants responded. 42% of the participants had no awareness regarding CMCR,58% which is the majority of the participants did not have awareness regarding CMCR.

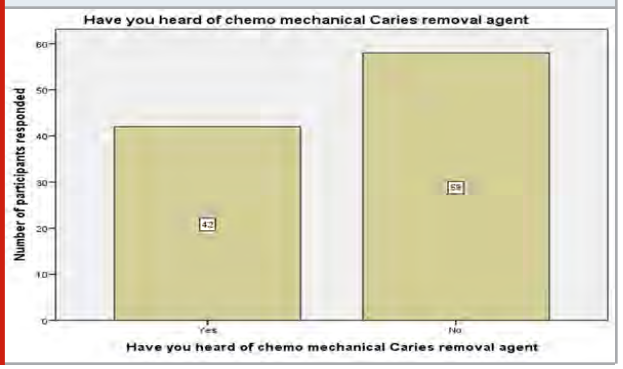
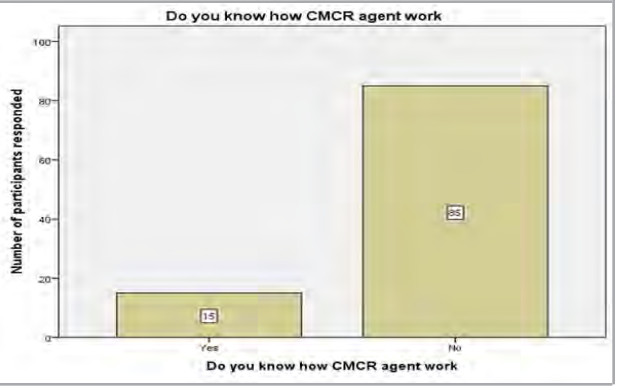


Figure 7: Bar chart represents the distribution of study subjects regarding the CMCR working method. X axis representing do you know how CMCR agent works.Y axis shows the number of participants responded. 15% of the participants know how CMCR works,65% of the participants do not know how CMCR works.



anesthesia.Figure 13 represents the distribution of study subjects regarding their interest in taking part in CDE programme.75% of the participants answered yes and 25% of the participants answered no.The association between levels of education and responses to the questions. A statistically significant association was observed using Chi-square test($p<0.05$). Hence proving Post graduates exhibited higher level of Knowledge and attitude towards chemo-mechanical removal method for caries removal when compared to undergraduates.

In the current scenario, different treatment modalities have been introduced for the removal of carious tissue while maintaining the maximal preservation of the healthy dental structure. The development of caries removal techniques in pediatric dentistry is aiming toward a more biological and conservative direction(ten Berge et al., 1999).The chemical-mechanical method of

caries removal became a new arena in the dental research field due its concept of tissue preservation. As only infected dentin is removed, the painful removal of sound dentin is avoided. Hence, a painless technique is one of the keys to avoid dentally fearful and uncooperative children, and a skill every pediatric dentist should strive to master(Kotb et al., 2009).

Figure 8: Bar chart represents the distribution of study subjects regarding their knowledge on which dentition CMCR is used.X axis represents in which type of dentition CMCR is used.Y axis shows the number of participants responded. 10% of the participants believe CMCR is used in primary dentition, 24% of the participants believe CMCR is used in permanent dentition, 17% of the participants believe CMCR is used in both dentitions, 48% of the participants do not know.

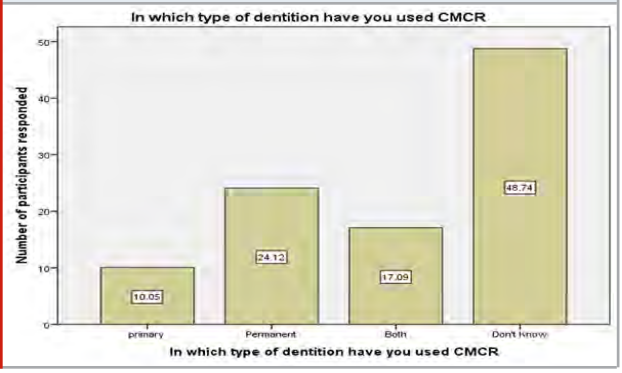
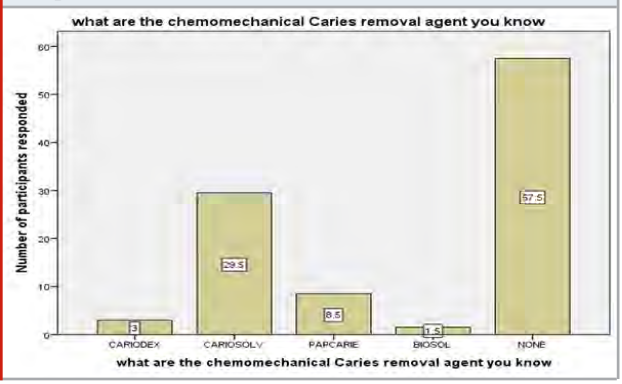


Figure 10: Bar chart represents the distribution of study subjects regarding their knowledge on different types of CMCR.X axis represents what are the CMCR agents you know.Y axis shows the number of participants responded.3% answered cariodex,29.5% answered carisolv, 8.5% answered papacarie,1.5% answered biosol,57.5% answered none which accounts more when compared to others.



The purpose of this study was to investigate whether there was any difference in the level of knowledge and education about the chemomechanical caries removal method among the dentists or newly graduated dentists trained in chennai city. The majority of participants were still in training. The participants with 40 years and above of age had the biggest contribution with

Figure 9: Bar chart represents the distribution of study subjects regarding their knowledge on different types of caries removal agents. X axis represents what other treatment modalities are used for caries removal agent.Y axis shows the number of participants responded.46% answered air abrasion, 29.5% answered sono abrasion, 17% answered CMCR,2.5% answered laser abrasion,5% answered ART.

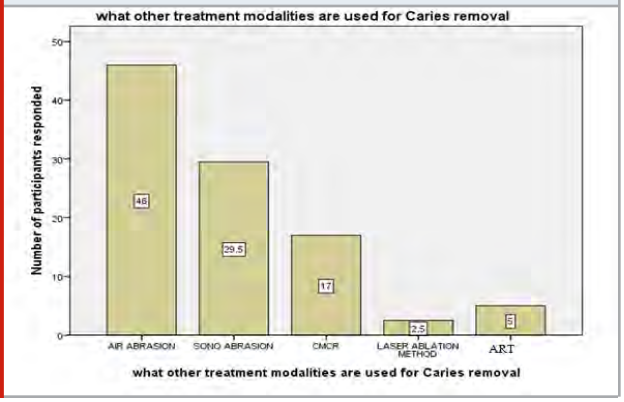
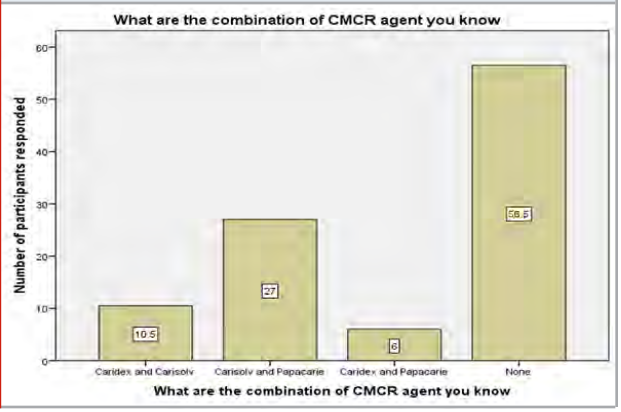


Figure 11: Bar chart represents the distribution of study subjects regarding their knowledge on different combination of CMCR.X axis represents what are the combination of CMCR agents you know.Y axis shows the number of participants responded.10.5% answered cariodex and carisolv,27% answered carisolv and papacarie,6% answered cariodex and papacarie,56.5% answered none which accounts more when compared to others.



91%. In addition, the majority of participants were men. The main point of interest in this study is that the majority of practitioners participating in the study were eager to learn these methods through courses. From this point, it can be argued that it may be necessary to give more time to teach these methods at the level of undergraduate education.

In a study conducted in the USA and Canada, it was reported that the dentistry curriculum does not cover CMCR products, and in the USA and Canada dental medicine graduates reported that they did not have enough knowledge about CMCR products(Scrabeck and

List, 1989).In Turkey, CMCR method and products are in the scope of dentistry curriculum and 13.8%(Baglar and Avunduk, 2018).In India, 14.3% of the participants in Pune city reported that have knowledge about Caridex,57.1% of about Carisolv and 28.6% of them have knowledge about Papacarie. In Mumbai city, 25% of the participants have information about Caridex, 75% of them about Carisolv, and none of the participants in this city have any information about the Papacarie method were as in our present study showed that3% answered cariodex,29.5% answered carisolv,8.5% answered papacarie,1.5% answered biosol,57.5% answered none (Bijle et al., 2013). The ignorance of the new systems has led to the need to follow current studies and transfer these developments to curriculum content.At this point, it is necessary to standardize the course divided into the curriculum and the course content should be put into a certain level.

Figure 12: Bar chart represents the distribution of study subjects regarding the reason for choosing CMCR.X axis represents what do you think is the reason for choosing CMCR system.Y axis shows the number of participants responded.20.5% answered convenience for disable patients,31% answered easy to use in difficult to control children,17.5% answered facilitates ease in anxious patients,17.5% answered because of minimally invasive,13.5% answered because no need to use anesthesia.

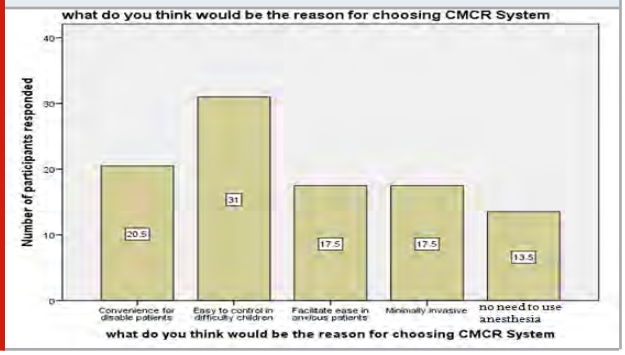


Figure 13:Bar chart represents the distribution of study subjects regarding the reason for not choosing CMCR.X axis represents what do you think is the reason for not choosing CMCR system.Y axis shows the number of participants responded.19.5% answered not having enough information, 35% answered time consumption,30% answered expensive,15.5% answered inadequate method /technique sensitive.

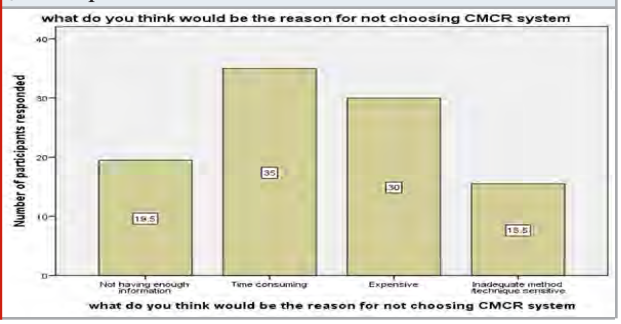


Figure 14: Bar chart represents the distribution of study subjects regarding their interest in taking part in CDE programme.X axis represents are you interested in taking part in CDE on CMCR.Y axis shows the number of participants responded.75% of the participants answered yes and 25% of the participants answered no.

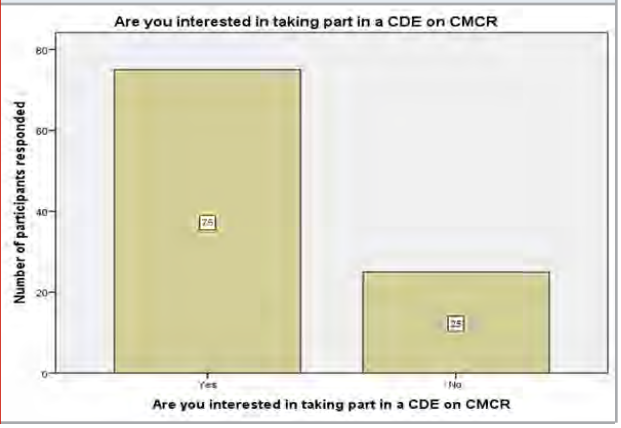


Table 1. Shows the association between levels of education and responses to the questions. A statistically significant association was observed using Chi-square test($p<0.05$). Hence proving Post graduates exhibited higher level of Knowledge and attitude towards chemo-mechanical removal method for caries removal when compared to undergraduates.

QUESTIONS		BDS	MDS	Chi- Square Value	P-Value
1. What other treatment modalities are used for caries removal	Air abrasion	33%	14%	23.02	0.01
	Sono abrasion	14%	15.5%		
	CMCR	6.5%	10.50%		
	Laser ablation	2.5%	-		
	ART	4.5%	0.50%		
2.What are the combination of CMCR agent you know	Cariodex and Cariosolv	9%	1.5%	14.36	0.002
	Cariosolv and	12%	15%		

	Papcarine				
	Cariodex and Papcarin	2.5%	3.5%		
	None	37%	19.5%		
3. What do you think would be the reason for choosing the CMCR system?	No need anesthesia	9.5%	4%	30.47	0.01
	Convenience for disable patients	9%	11.5%		
	Easy to control in difficulty children	17.5%	18.5%		
	Minimally invasive	7.5%	10%		
	Facilitate ease in anxious patients	17%	0.05%		
4. What do you think would be the reason for not choosing the CMCR system?	Expensive	26.5%	3.5%	28.45	0.05
	Time consuming	16.5%	18.5%		
	Not having enough information	10.5%	9.5%		
	Inadequate method/ Technique sensitive	7%	8.5%		

CONCLUSION

It was found that MDS graduates had significantly higher knowledge regarding the chemo mechanical agents but clinical usage was comparatively lesser.The curriculum plays an important role in chemo mechanical caries removal agent needs to be determined precisely and clearly. There is a need for further research with more participants on whether education is sufficient in this regard. Through these researches, deficiencies in the education system should be identified and necessary arrangements made.

Authors Contribution: Author1(Amanthi Ganapathi) Carried out the retrospective study by collecting the data and drafting the manuscript after performing the necessary statistical analysis.Author 2(Dr.Jayashri.P) aided in the conception of the topic,participated in the study design,statistical analysis and supervised the preparation of the manuscript and helped in study design and has coordinated in developing the manuscript.All the authors have equally contributed in developing this manuscript.

Conflict of Interest: None to declare.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-419-423

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Awareness on Risk Factors of Lymphoma Among College Students

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ABSTRACT

Lymphoma is a type of blood cancer caused due to lymphocytes which is a white blood cell that multiplies in this disease. It is a cancer of the lymphatic system which includes lymph nodes, bone marrow, thymus, spleen. Gastro-intestinal tract, spleen and bone marrow are frequently involved in the diagnosis of late stage lymphomas. Non-Hodgkin (NHL) and Hodgkin are the 2 main types of lymphoma. Main symptoms of lymphoma may include enlargement of lymph nodes of the neck, armpit and groin regions without any pain experience and persistent sweating. Early diagnosis is pertinent in lymphomas when compared to other cancers. The aim of the study is to create awareness on risk factors of lymphoma among college students. The survey was conducted among 170 college students. The questionnaire consisted of 15 questions about lymphoma and its risk factors, pathogenesis and treatment modalities. More than 94% of the students are aware about lymphoma, 72% are aware about lymphoma being a complex cancer and 54.3% are aware that it can be cured at the right stage. Advancement in treatment modalities have improved the prognosis of patients with lymphoma.

KEY WORDS: AWARENESS; KNOWLEDGE; LYMPHOMA; RISK FACTORS; SURVEY PLANET.

INTRODUCTION

Lymphoma is a type of blood cancer, different from leukemia (Zheng et al., 2017). Different types of cells present in our body start up different types of cancer and lymphocytes are the cells responsible for lymphoma (Zheng et al., 2017) (Wang et al., 2017) . Lymphoma starts involving the lymphocytes of our immune body i.e., T cells or B cells (Ball, 2017) . Main symptoms of lymphoma may include enlargement of lymph nodes of the neck, armpit and groin regions without any pain experience and persistent sweating. Non-Hodgkin and Hodgkin are the 2 main types of lymphoma (Lynce et al., 2012). Around 5-10% of the non-Hodgkin lymphomas represent mantle cell lymphoma which is an aggressive malignancy of B cells (Kostareli et al., 2012) (Hadzidimitriou et al., 2011) (Agathangelidis et al., 2019).

In the 2nd half of the century, there is an unusual increase in the incidence of non-Hodgkin lymphomas (Hjalgrim et al., 1996) (Varterasian et al., 2000) (McNally et al., 1997) (McNally et al., 1999) (Cartwright et al., 1999) (Cartwright et al., 1994) (Cartwright, 1992) (Groves et al., 2000) (ST Boyle P Holford TR Liu WL Flannery J, n.d.) (Seow A, Lee J, Sng I, Fong CM, Lee HP, n.d.) (Di Lollo S Picoco C, n.d.) (Liu et al., 2003). The classification of NHL comes under the heterogeneous group of malignancies under lymphoproliferative (Harris et al., 2000) . The pathway

ARTICLE INFORMATION

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Received 20th July 2020 Accepted after revision 23rd Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/173

leading to the diagnosis can be complex and time consuming. Early diagnosis is pertinent in lymphomas when compared to other cancers (Allgar and Neal, 2005). These diseases are associated with fluctuating symptoms, seeking help for a long period, taking many primary consultations and opinions before referring a secondary care (Allgar and Neal, 2005) (Howell et al., 2006) (Swann et al., 2018) (Elliss-Brookes et al., 2012).

The United Kingdom has introduced a range of interventions to promote early diagnosis of the disease (Richards et al., 2011). However, a mixed impact has been noted (Neal et al., 2014). Gastro-intestinal tract, spleen and bone marrow are frequently involved in the diagnosis of late stage lymphomas (Richards et al., 2011). Traditionally classified into leukemia, Hodgkin lymphoma, non-Hodgkin lymphoma and myelomas which actually comprises more than 60% of the subtypes of complex cancer which has different onset, diagnosis and treatment (Postgraduate Haematology, 2015).

Allogeneic hematopoietic stem cell transplant is offered in routine to expect betterment of the lymphoma (Richards et al., 2011)(Neal et al., 2014)(Postgraduate Haematology, 2015). The current research is about the finding of hematological malignancies, and focusing on the symptoms getting common for these diseases. Hematological malignancies are the most common collectively fourth placed cancer diagnosed in both females and males in economically developed places in the world (Jemal et al., 2008) (Hartge and Devesa, 1992). Previous studies on cancer biology, nano materials, herbal products (Ponnulakshmi et al., 2019) (Wu et al., 2019) (Ke et al., 2019) (Ma et al., 2019) (Li et al., 2020) (Chen et al., 2019) have motivated me to pursue this current research which is useful to our community. The aim of this study is to create awareness about lymphoma and its risk factors among college students.

MATERIAL AND METHODS

A questionnaire was prepared and administered to 170 college students in Chennai, Tamilnadu through an online survey planet link. The questionnaire consisted of 15 questions which were related to risk factors, age group, pathogenesis and treatment modalities. Data was collected from the link generated and statistically analyzed. Pie chart was used for the representation of the data collected. Dependent variables of this study were knowledge and awareness. Independent variables of this study were caste, occupation, gender, height, weight etc.

RESULTS AND DISCUSSION

The data was collected and statistically analyzed. Figure 1 depicts 94.7% of students know that lymphoma is a life-threatening disease all over the world. Figure 2 shows that people are less aware that both lymphoma and leukemia together involve more than 70% of the complex cancer in the world. Figure 3 shows that 54% of the population are aware that lymphoma can be cured at the right stage if diagnosed. Figure 4 shows that 57% of the students are aware that lymphoma diagnosis causes impairment of the immune system. Figure 5 shows that more than 68% of the students are aware about the present treatment methods i.e., chemotherapy and radiations are performed to treat lymphoma.

Figure 1: This pie chart represents percentage distribution of responses about awareness on lymphoma. Purple denotes yes and blue denotes no that lymphoma is a threatening disease. Majority of the students (94%) responded as lymphoma being a threatening disease.

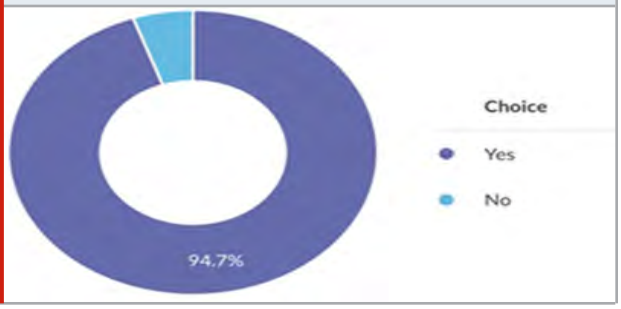


Figure 2: This pie chart represents percentage distribution of responses about awareness on lymphoma and leukemia being the major complex cancers around the world. Purple denotes yes and blue denotes lymphoma and leukemia being the complex cancers. Majority of the students (72%) are not aware about lymphoma and leukemia being the complex cancers around the world.

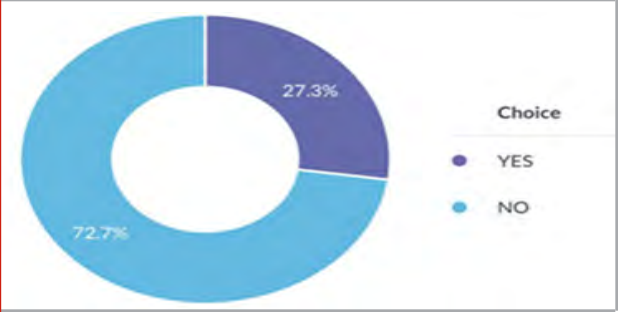


Figure 3: This pie chart represents percentage distribution of responses about awareness on treating lymphoma at the right stage. Purple denotes yes and blue denotes no that lymphoma can be cured at the right stage if diagnosed. Majority of the students (54.3%) are not aware about treatment for lymphoma.

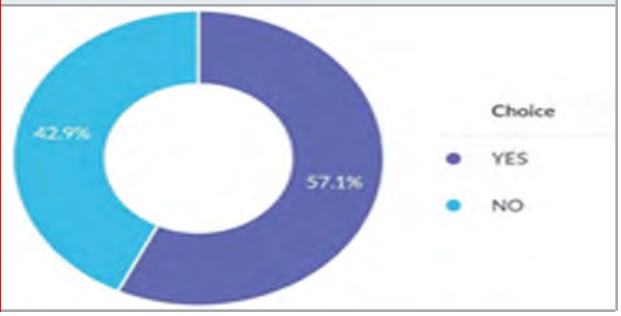


Figure 4: This pie chart represents percentage distribution of responses about awareness on lymphoma affecting the immune system. Purple denotes yes and blue denotes no that lymphomas affects the immune system. Most of the students (57.1%) are aware about lymphoma adverse effects on the immune system.

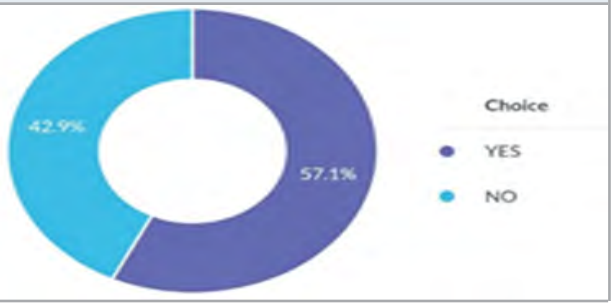
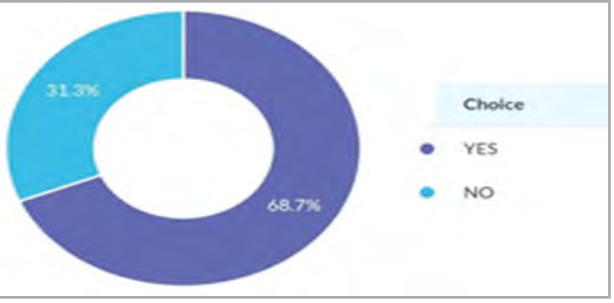


Figure 5: This pie chart represents percentage distribution of responses about awareness on chemotherapy and radiation used to treat lymphoma. Purple denotes yes and blue denotes no about treatment for lymphoma. Majority of the students (68.7%) are aware that chemotherapy and radiation are performed to treat lymphoma.



The purpose of this study is to create awareness about the various risk factors of lymphoma. The main risk factors are,

- AGE: Older people of age group 60-70 tend to develop non-Hodgkin lymphoma than others (Hartge and Devesa, 1992) (Feugier et al., 2004).
- GENDER: Men are more likely to develop lymphoma than women (Hartge and Devesa, 1992) (Cantor et al., 1993) (Roos and De Roos, 2003).
- IMMUNE DEFICIENCY DISORDER: people who have HIV/AIDS are more prone to develop lymphoma (Filipovich et al., 1992) (Smedby et al., 2006).
- AUTOIMMUNITY AND INFLAMMATION: The updates review that many findings on risk, risk factors and lymphoma characteristics that have been presented recently in relation to a broad range of chronic inflammatory, including autoimmune conditions (Smedby et al., 2006).
- GENETIC RISK: First degree relatives of NHL, HL and CLL patients are more likely to show incidence of the risk factors to develop NHL, HL and CLL respectively (Cerhan and Slager, 2015). Clinical trials on going on to identify whether lymphoma is inherited or not (Filipovich et al., 1992).

Previous studies state that nearly 25% of the people will develop tumors, primary b-cell lymphoma when they are genetically immunodeficient (Filipovich et al., 1992). Increased risk of malignant lymphomas is associated consistently with certain autoimmune and inflammatory conditions like rheumatoid arthritis [RA] and Sjogren's syndrome, but it's still not validated that all the inflammatory conditions are associated with lymphoma in general (Papageorgiou et al., 2015). Most of the previous conducted studies were mainly focused on association of lymphoma with genetics and inflammatory disorders. Comparison of this study with the previous literature risk factors are easily understood by the people when it's more understandable than comprehensive. Various risk factors include age, gender, race and ethnicity, immune deficiency disorders, genetics and radiation exposure.

CONCLUSION

In this study, awareness about the complexities lymphoma were asked and concluded that 94% of the survey participants were aware that lymphoma is a type of blood cancer and it is a threatening disease. It further causes impairment of the immune system and it can be cured at the right stage of diagnosis. Advancement in treatment modalities have improved the prognosis of patients with lymphoma. Awareness camps, seminars may be conducted to create awareness on the risk factors of lymphoma among the students. Future research may be required to study the apoptotic markers and therapeutics in different types of lymphoma.

ACKNOWLEDGEMENTS

The team extends our sincere gratitude to the Saveetha Dental College and Hospitals for their constant support and successful completion of this work.

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-424-428

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Anti -Inflammatory effects of *Acacia catechu* Seed Extract –an In vitro study

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ABSTRACT

The *Acacia catechu* is also known by these names like Cutch tree, Terra Japonica as well as Black Catechu. It is also called Khair in hindin and Khadira in Sanskrit.This herb was previously known as Kat or Cacho. There are a lot of significant therapeutic purposes of *Acacia catechu* seed extract which includes Astringent ,Bactericidal ,Refrigerant ,Stimulant Masticator, Expectorant and anti- inflammatory actions. The aim of this study is to study the anti -inflammatory action of *Acacia catechu* seed extract. The estimation of anti inflammatory action was done using protein denaturation method. The inhibitory efficacy of the *Acacia* was better when compared to diclofenac sample which was used as a standard. Acacia catechu seed extract is a promising candidate for controlling the production of auto antigen by inhibiting the denaturation of protein and its effect by comparison with diclofenac.

KEY WORDS: ACACIA CATECHU SEED EXTRACT, PROTEIN DENATURATION, ANTI INFLAMMATORY, DICLOFENAC.

INTRODUCTION

The body's immediate response to damage tissues and cells by pathogens, certain stimuli such as chemicals or even by physical injury is referred to as inflammation. (Macfarlane et al., 2012)(Cruvinel et al., 2010). More recently, inflammation was described as "the succession of changes which occurs in a living tissue when it is injured provided that the injury is not of such a degree as to at once destroy its structure and vitality"or "the reaction to injury of the living microcirculation and related tissues (Spector and Willoughby, 1963; Cruvinel et al., 2010) .Inflammation is of two types : acute and chronic inflammation. Acute inflammation is a short term response that usually results in healings. For example ; leukocytes infiltrate the damaged region , removing the stimulus and thus repairing the tissues. On the other hand, chronic inflammation is a prolonged, and unregulated response that involves acute inflammation ,tissue destruction and also attempts at tissue repair (Preisner et al., 2015) . Therefore, to treat any diseases with inflammatory reactions , natural products with anti inflammatory action can be chosen. Acacia catechu is such one product with impeccable properties.

There are about 1300 species of Acacia (family Mimosaceae), and its exudates, leaves, seeds, heartwood, and bark which are used in numerous ways(Thomas and Kearsley, 1993). Gum Acacia (gum arabic) has been used for its medicinal properties for approximately 2500 years. It is employed as a demulcent (soothing and protective agent) and emulsifier, and is used to increase viscosity of solutions and suspensions. It is also used in the food, soft drink, textile, tanning, cosmetic, and confection industries. The traditional preparation of betel quid (paan masala), which consists of Piper betle leaves, A. catechu paste, chopped Areca nut, lime, and various spices with or without tobacco is done by using Acacia Catechu

ARTICLE INFORMATION

*Corresponding Author: lakshmi@saveetha.com
Received 4th Aug 2020 Accepted after revision 19th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/174*

heartwood extracts have also been used (Steven 1993). Betel chewing is used to produce euphoria, a sense of well-being, heightened sense of alertness, and psycho-stimulation .

The Acacia Catechu tree was a very important export product that was sent from India to China, Persia and Arabia in the early 16th century particularly. This plant was used majorly for the purpose of dyeing and tanning. Japan takes the credit of introducing this plant to countries in Europe in the 17th Century. The tree of Acacia catechu is found all over the Indian country The main areas for its habitat in the country are the eastern slopes of the Western Ghats .This tree is deciduous and has short hooked spines that reach up to the height of 9 to 12 meters.

Recent studies reported that Acacia Catechu bark extract may aid to block the body's pain trigger mechanism. It possesses significant pharmacological , nutritive value. Acacia bark is hardened woody with a rusty appearance, brown color it contains tannins and Gallic acid. Acacia bark is commonly used in maintaining dental and oral hygiene. The fresh twigs are used for protection of gums and teeth. It is also considered useful as an external application for mouth ulcers and even reduces gingival inflammation (Singh, Mittal and Barthwal, 1976; Singh et al., 2010; Rahmatullah et al., 2013) Used in case of leprosy in rural areas.Certain studies have reported that the Acacia catechu induces apoptosis in human oral squamous carcinoma cells and other SCC-25 cells (Lakshmi et al., 2017) (Ezhilarasan et al., 2017)

To study the constituents of A. Catechu seed extract many studies were carried out. One such study done by Shen et al., 2006 shows that when aqueous extract of the heartwood and leaves of A. Catechu was subjected to high -performance liquid chromatography coupled with electrospray ionization mass spectroscopy reveals the primary constituents are catechins which by definition are gallic acid (polyhydroxylated benzoic acid) derivatives and polymers. Catechins , epicatechin, epicatechin-3- O -gallate, and epigallocatechin-3- O - gallate.p are the most predominant catechins.Other secondary products present in the extracts includes flavonol glycosides, flavonal dimers, and caffeine. Li et al (Li et al., 2011) also found other constituents that have been identified in aqueous extracts of A. catechu include rhamnetin, 4-hydroxyphenol, 3,3',5,5',7-pentahydroxyflavone, fisetinidol, 5-hydroxy-2-[2-(4-hydroxyphenyl)acetyl]-3-methoxybenzoic acid, and (2S,3S)-3,7,8,3',4'-pentahydroxyflavone. Thus, this study analyses the anti inflammatory action of Acacia Catechu seed extract in vitro specifically.

MATERIAL AND METHODS

Chemicals: Diclofenc sodium, dimethyl sulfoxide (DMSO) was purchased from Sigma Chemical Co. India. The other chemicals used in this study were purchased locally and were of analytical grade.

Plant collection and extract preparation: Acacia Catechu seed (ACS) was collected during the month of December 2015 from Hosur, Tamil Nadu, India, authenticated by Green Chem Lab, Bengaluru, Karnataka, India. Seeds were shade dried and were milled to fine powder. This seed powder was passed through 100 mesh sieves, and 2.5 kg of powdered ACS were extracted with 10 L of ethanolic, at 65°C, for 1 h. After 1 h of extraction, the extract was altered and collected. The marc, an insoluble residue was extracted repeatedly with 10 L of ethanolic, twice. The extract was evaporated in a Buchi rotary evaporator (Switzerland) at 65°C, to obtain 150 g of powder extract. The w/w yield of the prepared extract was 6%.

Inhibition of Protein Denaturation method
Concentration of test substance: 1000 to 200µg/ml
Standard : Diclofenac sodium
Chemicals Required : Bovine serum albumin,1N HCl, Phosphate buffer (pH 6.3)
Instrument : Incubator, Spectrophotometer - 660nm
The following 4 solutions will be used

1. Test solution (0.5ml) consist of 0.45ml of bovine serum albumin (5%w/v aqueous solution) and 0.05ml of test solution in various concentration and pH will be adjusted to 6.3 by using a small amount of 1N Hcl .The samples were incubated at 370C for 20 minutes and heated at 570C for 3 minutes. After cooling, to the sample add 2.5ml of Phosphate buffer (pH 6.3).
2. Test control solution (0.5ml) consists of 0.45ml of Bovine serum albumin (5% aqueous solution) and 0.05ml of distilled water and pH will be adjusted to 6.3 by using a small amount of 1N Hcl the samples were incubated at 370C for 20 minutes and heated at 570C for 3 minutes. After cooling, to the sample add 2.5ml of phosphate buffer (pH 6.3)
3. Product control (0.5ml) consists of 0.45ml of distilled water and 0.05ml of test solution in various concentrations and pH will be adjusted to 6.3 by using a small amount of 1N Hcl. The samples were incubated at 370C for 20 minutes and heated at 570C for 3 minutes. After cooling to the sample add 2.5ml to phosphate buffer (pH6.3)
4. Standard solution (0.5ml) consists of 0.45ml of bovine serum albumin (5% w/v aqueous solution and 0.05ml of diclofenac sodium solution in various concentrations and pH will be adjusted to 6.3 by using a small amount of 1N Hcl. The samples were incubated at 370C for 20 minutes and heated at 570C for 3 minutes. After cooling, to the sample add 2.5 ml of phosphate buffer (pH6.3)

The percentage inhibition of Protein denaturation will be calculated as follows:

$$\text{Percent Inhibition} = 100 - \frac{\text{OD of test solution} - \text{OD of product control}}{\text{OD of test control}} \times 100$$

The control represents 100% protein denaturation. The result will be compared with diclofenac sodium treated sample.

RESULTS AND DISCUSSION

The results of the study is as follows

Table 1. Percentage of inhibition for acacia catechu seed extract (test)

S.No.	Concentration (µg/Ml)	% Of Inhibition
1	200	99.9
2	400	99.6
3	800	99.96
4	1000	99.81

Table 2. Percentage of inhibition for diclofenac sodium (standard)

S.No.	Concentration (µg/Ml)	% Of Inhibition
1	200	99.88
2	400	98.27
3	800	99.52
4	1000	99.45

It is seen that the percentage of inhibitions varied for both the test and standard sample with varying concentrations. For instance, the % inhibition for A. Catechu was 99.9 % whereas it was 99.88 percent for standard sample at a concentration of 200 µg/ml.Likewise, for 400 µg/ml concentration , the % inhibition was 99.6 and 98.27 for A.catechu seed extract and standard sample respectively. The % inhibition was 99.96 and 99.52 for the test and standard samples for a concentration of 800 µg/ml. For a concentration of 1000 µg/ml the % of inhibition was 99.52 and 99.45 for the respective samples. It was seen that there were differences seen in the inhibitory activity for varying concentrations. This explains the potent anti-inflammatory action of A. Catechu seed extract.

Moreover, Protein denaturation is one of the important known causes of certain anti inflammatory diseases. The mechanism of denaturation involves alteration of electrostatic hydrogen and disulphide bonding. Denaturation of protein in rheumatoid arthritis is probably due to auto antigen production. Hence Acacia Catechu seed extract is a promising candidate for controlling the production of auto antigen by inhibiting the denaturation of protein and its effect by comparison with diclofenac. This prospective study suggests a positive anti inflammatory action of Acacia Catechu seed extract against disease like rheumatoid arthritis. Several studies showed results similar to this study.For eg. A study done by Lakshmi et al shows that Acacia Catechu leaf extract has significant anti inflammatory properties against rheumatoid arthritis. The results were in accordance with our study.In another study the anti inflammatory efficacy of A. catechu bark extract was explored .It states that Acacia Catechu Bark exhibits significant anti inflammatory activity(Al-Gubory and Laher, 2018).

The ethanolic solvent form of Acacia Bark shows an inhibitory activity when tested at 200-1000 µg/ml by inhibiting denaturation of protein and its effect was compared with standard drug diclofenac sodium. Auto antigen production in rheumatoid arthritis is due to denaturation of protein. From the results of the present study it can be stated that ethanolic bark extract of Acacia Catechu is capable of controlling the production of auto antigen and inhibiting the protein denaturation in rheumatoid arthritis. Therefore it is clear that even the leaf and bark extract has significant potential just like the seed extract (Ghayathri and Lakshmi, 2015; Lakshmi, Ramasamy and Thirumalaikumaran, 2015). Not only Ayurvedic plants like Acacia several other herbal extracts are being used for their markable anti inflammatory properties (Lakshmi, Anitha and Geetha, 2011).

The results of different studies are discussed as below: Lycopodium clavatum also known as club moss has been reported to be used for anti inflammatory actions in wound healing effect. According to a study carried out by Orhan et al, (2007) extracts were prepared petroleum ether, chloroform, ethyl acetate and methanol as well as the alkaloidal fraction from the aerial parts of Lycopodium clavatum using acetic acid. This preparation seems to have induced an increase in capillary permeability assessment in mice , revealing that only the chloroform extract and the alkaloid fraction displayed marked anti-inflammatory effect when compared to Indomethacin. The evaluation of the anti inflammatory effect of X. caffra performed a study.The leaf extract on the LPS-stimulated expression of inflammatory enzymes and proinflammatory cytokines, the mRNA expressions of inflammatory markers IL-6, iNOS, and TNF-α were measured by qPCR.

Various studies have noted the presence of anti inflammatory and antioxidant properties in the silver nanoparticles synthesised from cumin oil (Jain, Anitha and Rajeshkumar, 2019; Keerthiga et al., 2019).In addition to it,they have anti diabetic properties as well (Phillips and Poon, 2012). Similarly silver nanoparticles were synthesised from ginger oil(Aafreen, Anitha and Preethi, 2019).The characterisation of these particles is done using visible spectrophotometer(Reddy et al., 2019). In addition to it, the green synthesis of the silver nanoparticles are useful against oral pathogens(Kandhan, Roy and Lakshmi, 2019).

The strongest response was seen for IL- 6, wherein treatment at 312.5 µg/mL induced a nearly 10-fold decrease in expression versus background expression and nearly 100-fold decrease in expression versus LPS induced cells which were not treated by X. caffra leaf extract.This demonstrates clearly the anti inflammatory effects of X. caffra. Animal studies were done by Manjith et al to determine the anti inflammatory efficacy of Mirabilis Jalapa. In his study he said that anti-

inflammatory activity was evaluated using carrageenan and formalin-induced paw edema models in Wistar albino rats. The anti-inflammatory activity was found to be dose dependent in the carrageenan-induced paw edema model.

The aqueous extract has shown significant ($P < 0.05$) inhibition of paw oedema, 37.5% and 54.0% on 4 th hour at the doses of 200 and 400 mg/kg, respectively. The results of this study demonstrated that aqueous extract of the leaves possess significant ($P < 0.05$) anti-inflammatory potential (Zhen et al., 2015) . Besides anti-inflammatory action ,Acacia Catechu is also known to be an Antihyperglycemic and Antinociceptive activity. Though, Diabetes mellitus is a disease currently affecting millions of people worldwide and with no known total cure in allopathic medicine. Moreover, the disease can quickly progress to cardiovascular disorders, diabetic retinopathy, and diabetic nephropathy. As such, a remedy obtained from khoyer, which even if it cannot cure the disease at least is effective in normalising the high blood sugar levels as seen in diabetic patients, can be a boon to human beings(Mizushima and Kobayashi, 1968).

CONCLUSION

This study explains the anti inflammatory properties of Acacia Catechu seed extract. The anti inflammatory activity is due to the presence of flavonoids, phenols, polyphenols, and steroids. Further studies are mandatory, to identify the active constituent(s), that is responsible for the anti inflammatory efficacy.

Author Contribution: All the authors have contributed mutually to prepare ,conduct and approval of the Manuscript

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-429-435

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Knowledge About Indirect Composite Among Dental Students-A Questionnaire Survey

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ABSTRACT

Composites are playing an important role in aesthetic dentistry and it is essential to have in depth knowledge of them. Indirect composite is now being rapidly developed. Indirect composite helps us to overcome the drawbacks of direct composite like polymerisation stresses. Indirect composite have better bonding and are having unlimited working time. Nearly half of the population were aware of the characteristics of indirect composite. Nearly half of the population were aware of the composite blanks and use of them in denture characterisation. Most of them were aware of modeling liquid also which helps in avoiding stickiness of composite and helps in color maintenance. Nearly half of the population were not aware of the use of indirect composite to repair or even characterise the ceramics. Indirect composite have better physical and mechanical properties which makes them more stronger than direct composites.Nearly 44% of our population were only aware of the strength while most of them were not sure about it.Still we need to make most of them aware of the material so that it can help in better efficacy and better clinical usage of them.

KEY WORDS: INDIRECT COMPOSITE, CERAMICS REPAIR, BONDING METHODS, CURING PERIOD, STRENGTH, POLYMERISATION STRESS.

INTRODUCTION

Aesthetic dentistry is evolving rapidly now. Composites are playing an important role in aesthetic potential during restoration. They provide a stable and pleasant result. With simple layering technique it is possible to see good results.Composites also serve as alternatives to other restorative materials especially in the aspect of aesthetics as they are available in different shades to resemble the teeth in a natural manner. Composite resin are aesthetic alternatives for amalgam restorations. They are also being used in posterior teeth now. There are two composites that are direct and indirect composite (Azeem and Sureshbabu, 2018). The use of direct composite has been limited in posterior teeth due to polymerization stresses(Mandikos et al., 2001) . The composite material is condensed in increments into cavity and light cured for 40 sec for each surface(Fuhrer, 1997). More recently the use of indirect composite is having a different method of processing.

ARTICLE INFORMATION

*Corresponding Author: subhabratamaiti.sdc@saveetha.com
Received 29th July 2020 Accepted after revision 19th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/175

The first method includes curing the chamber without oxygen, second includes curing at a slow rate, third method involves introducing heat and light simultaneously into the chamber. In indirect composite the polymerisation level is higher therefore it is superior to direct composite (Bortolotto et al., 2013). They are cured for longer times with high level and depth of cures when compared to direct composites. They are cured outside the mouth and capable of delivering high levels and intensities of energy(Reinhardt, Boyer and Stephens, 1994; Suzuki et al., 2002). Composites are generally preferred over other restorative materials due to many of their properties such as better bonding , used in conservative preparations , offer virtually unlimited working time(Alavi and Kianimanesh, 2002). Indirect composites are also used to fill the teeth cavities and fill gaps between the teeth. They can also reshape the teeth. They can also prepare veneers and adhesive bridges(Leinfelder, 2005).

Restoration done in the way of indirect technique can optimise the marginal integrity. They also have better marginal adaptation which can decrease the incidence of secondary caries(Soares et al., 2005; Angerame et al., 2012). Due to their ability of providing excellent marginal integrity there is a substantial increase in wear resistance (Bartlett and Sundaram, 2006; Rocca et al., 2012). Indirect composite have improved physical properties and have a wide variety of tooth coloured restorative materials with high strength(Souza et al., 2010). Indirect composite wear out soon when compared to amalgam and other restorative materials and they last for a period of 5 years which is a less duration when compared to lifespan of amalgam.This study is of utmost importance now as we progress and advance in prosthetic dentistry. It is important to study about their methods of bonding, their advantages and disadvantages, along with their lifespan and their uses in prosthetic dentistry.

Previously our department has published extensive research on various aspects of prosthetic dentistry ((Ashok et al., 2014; Venugopalan et al., 2014; Ashok and Suvitha, 2016; Ganapathy et al., 2016; Selvan and Ganapathy, 2016; Subasree and Murthykumar, 2016; Vijayalakshmi and Ganapathy, 2016; Ajay et al., 2017; Ganapathy, Kannan and Venugopalan, 2017; Jyothi et al., 2017; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Basha, Ganapathy and Venugopalan, 2018; Kannan and Venugopalan, 2018; Duraisamy et al., 2019) . This vast research experience has inspired us to research about the knowledge of indirect composite. Aim of this study helps us to have a better understanding regarding the properties and uses of indirect composite.

MATERIAL AND METHODS

This study was conducted to dentists and dental students . Sample size was around 70 using the G power software. Questionnaire was prepared and disseminated using the google forms online response collection software. The questionnaire was validated by 5 prosthodontist lecturers. Simple random sampling method was used. The independent variable was gender while the dependent variable was knowledge in indirect composite.SPSS statistical software was used for data analysis. The statistical test used was the chi-square test.

RESULTS AND DISCUSSION

Responses were collected and analysed. From figure I we can observe that 34.29% were aware that composite is being used to repair ceramics or even characterise them. From figure II we can see that nearly half of the population 48.57% were aware of composite blanks while the remaining were oblivious to the fact.From figure III , we can see that nearly 42.86% were aware of the methods of bonding of composite to ceramic. From figure IV we can see that nearly 61.43% that is more than half of the population were aware of indirect composite being used in denture characterization. From figure V we can observe that more than half of the population that is 57.14% was aware of the use of modeling liquid. From figure VI we can see that 44.29% were aware of the fact that indirect composite exert more strength when compared to direct composite. From figure VII it is shown that 70% of the population have known the fact that polyvinyl siloxane is used as die material for chair side work. From figure VIIIwe can see that 51.43% which is nearly half of the population were aware of the proper polishing protocol for indirect composites.

Figure 1: awareness of composite being used to repair ceramics or even characterize them. Nearly 34.29% of the population is aware of it while 54.29% are not aware. 11.43% were not sure about it.

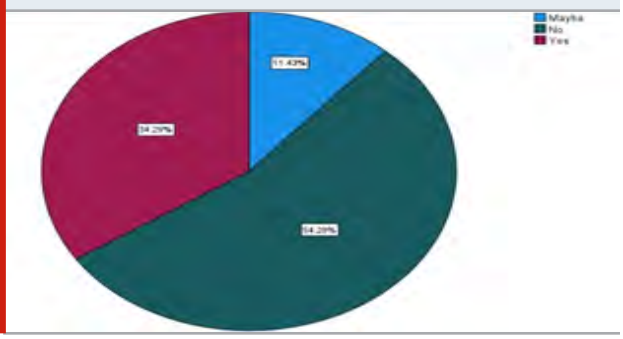


Figure 2: awareness of composite blanks. This chart shows that nearly 48.57% of the population were aware of it while nearly21.43% were not aware and 30% were not sure.

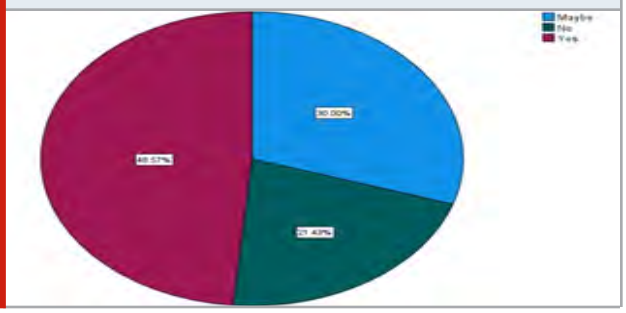


Figure 3: awareness of method of bonding of composite to ceramic. This chart shows that nearly 42.86% of the population was aware of it while 27.14% were not aware of it and 30% were not sure about it.

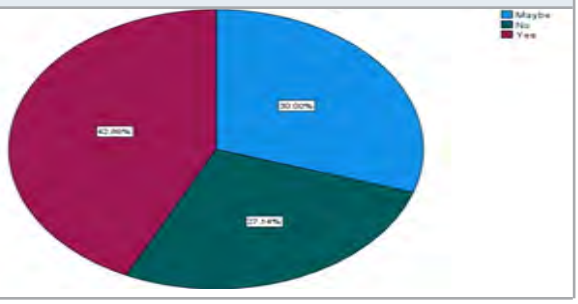


Figure 4: awareness of indirect composite used in denture characterization. This chart shows that nearly 61.43% of the population were aware of it while 20% were not aware of it and 18.57% were not confident about the use of indirect composite for denture characterisation.

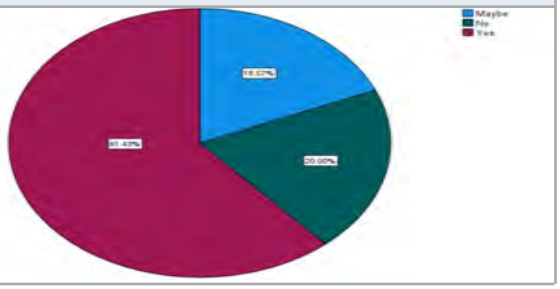
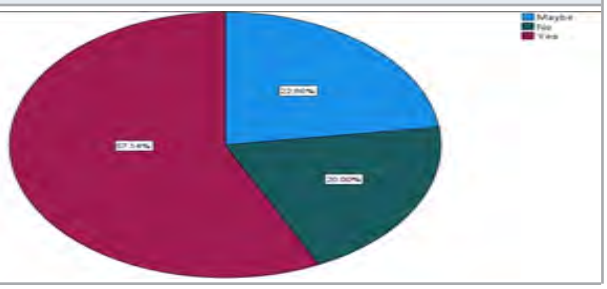


Figure 5: awareness of modeling liquid. This chart shows that nearly 57.14% were aware which is more than half of the population while 20% were not aware of it and 22.86% were not sure about modeling liquid in indirect composite.



As we make progress in the field of prosthetic dentistry it is important to have in-depth knowledge regarding the restorative material used. Indirect composite is paving their way in prosthetic dentistry which makes it necessary to know about them. Some studies show that indirect composite have high marginal integrity which makes them less susceptible to secondary caries. But some studies contra indicate the results by stating that the marginal gap of direct composites was less when compared to indirect composite in an in vitro study (Zarrati and Mahboub, 2010). Pearson correlation analysis was conducted.Table I shows the values of Chi square and P values.From figure IX, we can see there is no significant correlation between gender and awareness of indirect composite used to repair ceramics or even characterize them. From figure X , we can see there is no significant relation between gender and awareness of composite blanks. From figure XI, we can see there is no significant relation between gender and awareness of method of bonding of composite to ceramic. From figure XII , we can see there is a significant relation between gender and awareness of indirect composite in denture characterisation.

Figure 6: awareness of indirect composite has more strength than direct composite. This chart shows nearly 44.29% were aware while 10% were not aware and 45.71% were not sure about the strength level of indirect composite.

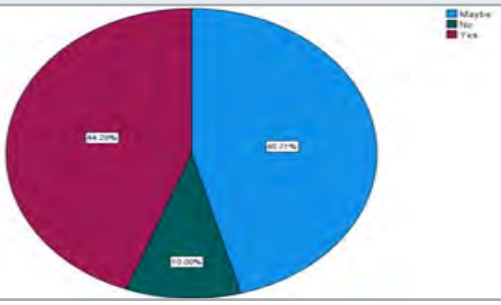


Figure 7: awareness of polyvinyl siloxane as die material in chair side work. Nearly 70% were aware while 14.29% were not aware of it and 15.71% were not confident about it.

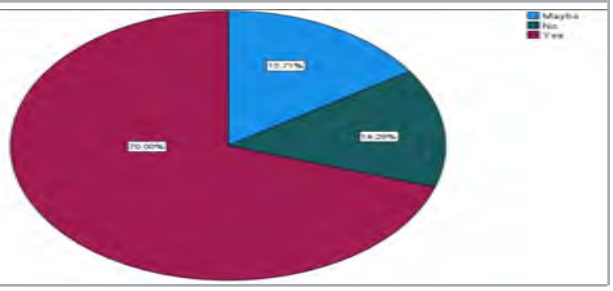


Figure 8: awareness of proper polishing protocol. Nearly 51.43% were aware which is nearly half of the population while 22.86% were not aware of it and 25.71% were not confident about it.

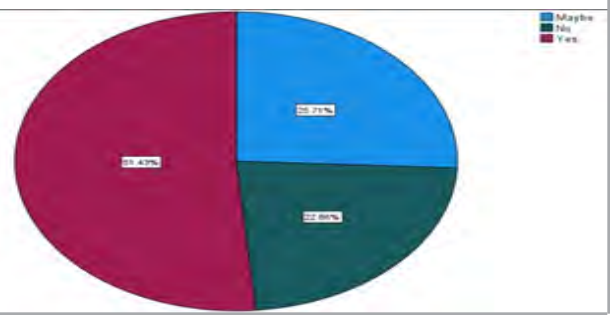


Table 1. This table shows the Chi square and P values obtained

questions	options	Response by female	Response by male	Chi square	P value
Repair ceramics	Yes	12	12	0.8633	0.64
	No	16	22		
	Maybe	3	5		
Composite blanks	Yes	18	16	3.2572	0.1962
	No	5	10		
	Maybe	8	13		
Methods of bonding	Yes	11	19	1.5669	0.456
	No	10	9		
	Maybe	10	11		
Denture characterisation	Yes	15	28	6.4232	0.040
	No	9	5		
	Maybe	7	6		
Modeling liquid	Yes	18	22	3.0605	0.216
	No	4	10		
	Maybe	9	7		
Strength of indirect composite	Yes	14	17	1.166	0.558
	No	4	3		
	Maybe	13	19		
Die material	Yes	22	27	0.4812	0.786
	No	5	5		
	Maybe	4	7		
Polishing protocol	Yes	18	18	1.6041	0.448
	No	6	10		
	Maybe	7	11		

Figure 9: This bar graph shows the association between the gender and the people who are aware of composite being used to repair ceramics or even characterize them. The X axis shows the gender while the Y axis shows the responses. The green bar shows the negative responses while the red bar shows the positive responses and blue bar shows people who are not sure about indirect composite being used to repair ceramics. The chi square value is 0.8633 and the P value is 0.64(>0.05). The P value is not significant. There is no significant relationship between gender and the people who are aware of composite being used to repair or characterise ceramics.

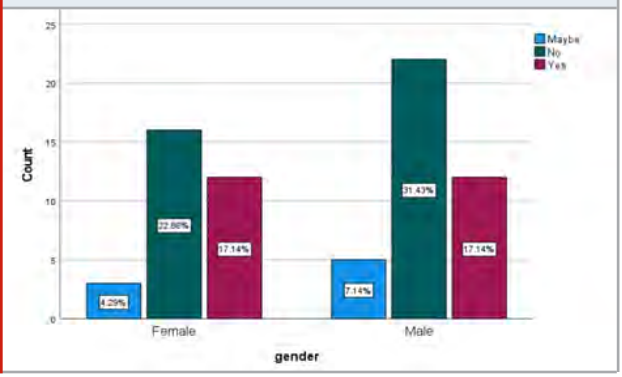


Figure 10 : This bar graph shows the correlation between gender and people aware of composite blanks. The X axis shows the gender while the Y axis shows the responses. The green bar shows the negative responses , red bar shows the positive responses and blue bar shows the people who are not sure about the composite blanks. Chi square value is 3.2572 and the P value is 0.1962(>0.05). The P value is not significant . There is no significant relationship between gender and people with awareness of composite blanks.

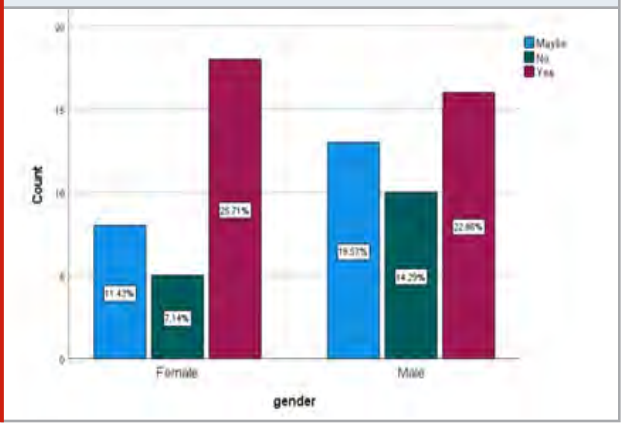


Figure 11: This bar shows the correlation between gender and people who are aware of the methods of bonding for composite to ceramic. The X axis shows gender while Y axis shows the responses.The green bar shows the negative responses and the red bar shows the positive responses. The blue bar shows that people are not sure about the methods of bonding for composite to ceramic. The chi square value is 1.5669 and P value is 0.45683(>0.05). The P value is not significant so there is no significant relationship seen.

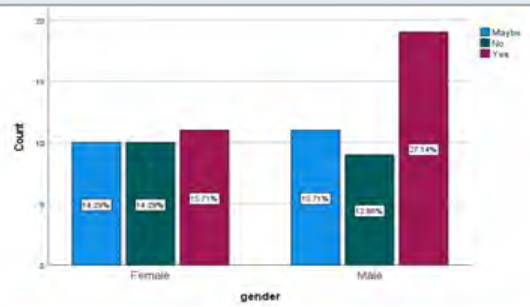
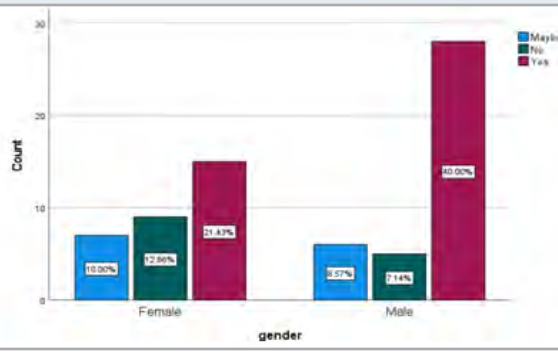


Figure 12: This bar shows the correlation between the gender and people who are aware of the fact that indirect composites are also used for denture characterization. The X axis shows the gender while the Y axis shows the responses. The green bar shows the negative responses and red bar for positive responses. Blue bar shows that people are not sure about the fact that indirect composite are used in denture characterisation. The chi square value is 6.4232 and P value is 0.040(<0.05). The P value is significant and a significant relationship is seen.



From figure XIII, we can see there is no significant relation between gender and awareness of modeling liquid. From figure XIV, we can see that there is no significant relation between gender and awareness of indirect composite having more strength than direct composite. Form figure XV, we can see that there is no significant relation between gender and awareness of polyvinyl siloxane as die material for chair side work. From figure XVI, we can see that there is no significant relation between gender and awareness of proper polishing protocol. This study also showed that indirect composite depicted no change in marginal gap even after cementation and thermo cycling. In some previous studies 43% of dental practitioners use indirect composite for posterior teeth while 32% for anterior teeth and 2% for repair procedures. Modeling liquids are generally used for color stability of the resin composite which in our survey nearly 52.9% that is more than half of the population were not aware.

Figure 13: This bar graph shows the correlation between the gender and the awareness of modeling liquid being used. The x axis shows the gender while the Y axis shows the responses. The green bar shows the negative responses and red for positive responses while the blue bar shows that people are not sure of modeling liquid. The chi square value is 3.0605and P value is 0.216 (>0.05). The P value is not significant and no significant relationship is observed.

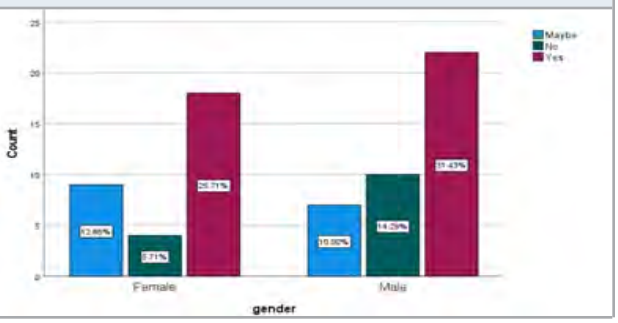
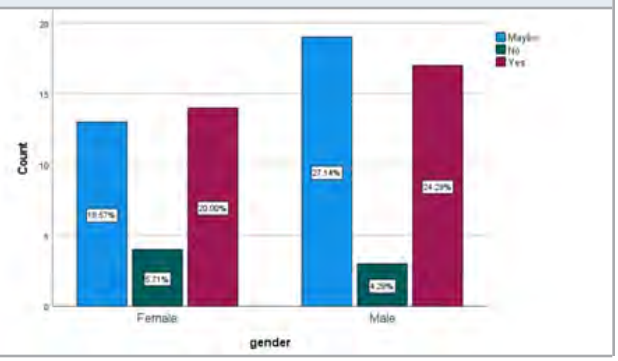


Figure 14: This bar graph shows the correlation between gender and people aware of the fact that indirect composite has more strength than direct composite. The X axis shows the gender and the Y axis shows the responses. The green bar shows the negative responses while the red bar shows the positive responses and the blue bar shows people who are not sure about the strength of indirect composite. The chi square value is 1.166 and P value is 0.558(>0.05). The P value is not significant and no significant relationship is seen.



Most of the composites are sticky reducing their ease of handling which is why modeling liquid is being used in indirect composite (ALShetili and Al-Omari, 2016; Sedrez-Porto, Münchow and Brondani, 2016; Araujo et al., 2018; Kutuk et al., 2020). Indirect composites are said to be more hard which is contraindicated in certain studies where direct composite exhibit high flexural strength and hardness on a comparative scale (Borba, Della Bona and Cecchetti, 2009). Despite the characteristics in direct and indirect composites we can

see that even though both are following the method of incremental build up it is seen that polymerisation shrinkage is less in indirect composite which makes a bit more suitable for application in clinical dentistry(Nandini, 2010; Ozakar-Ilday et al., 2013).

Figure 15: This bar graph shows the correlation between gender and people aware that polyvinylsiloxane is used as die material for chair side work. The X axis shows the gender and the Y axis shows the responses. The green bar depicts the negative responses while the red shows the positive responses and blue bar shows people who are not sure about die material as polyvinyl siloxane. The chi square value is 0.4812and the P value is 0.786(>0.05). The P value is not significant and no significant relationship is observed.

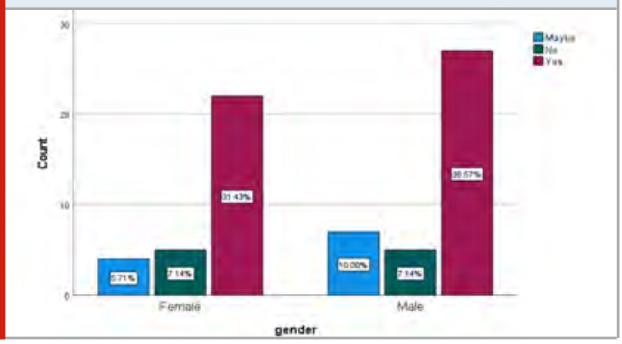
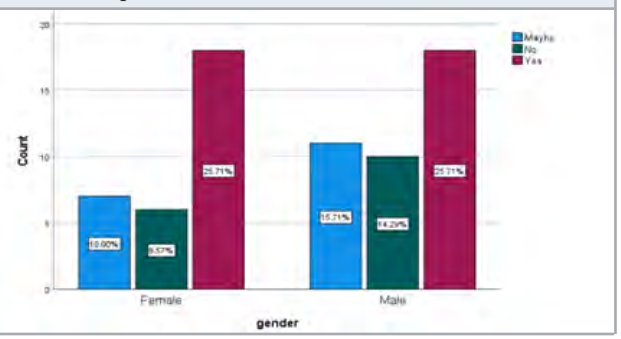


Figure 16: This bar graph shows the correlation between the gender and people aware of proper polishing protocol. The X axis shows the gender while the Y axis shows the responses. The green bar shows the negative responses and red bar shows the positive responses while the blue bar shows the people who are not sure of the proper polishing protocol to be followed for indirect composite. The chi square value is 1.6041 and the P value is 0.448(>0.05). There is no significant P value hence, no significant relationship is observed.



CONCLUSION

Aesthetics is playing an important role in modern dentistry and indirect composite is more aesthetic when compared to other materials. It is of absolute importance to have in-depth knowledge of indirect composite to make better use of them in clinical practice. From this survey, nearly half of the population only was aware of indirect composite which makes the survey even more important to help in spreading awareness. More seminar, conference, webinar, panel discussion, workshop is needed to improve the knowledge.

ACKNOWLEDGEMENTS

We thank Saveetha Dental College for providing us a platform and encouraging us to do research activities.

Conflict of Interest: None to declare

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-436-440

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Distribution of Children Based on the Type of Terminal Plane In Primary Dentition: A Study Among 3 To 5-Year-Old Children in Chennai

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ABSTRACT

The aim of the study is to assess the distribution of children based on the type of terminal plane in primary teeth among children of 3 to 5 years of age. A total of 200 children of 3- 5 years were included in the study. The data of the children were obtained by analysing the patients records, Saveetha Dental College And Hospital. The molar relation of these children were recorded based on the terminal planes. Data obtained were tabulated in excel and imported to SPSS version 20 software. Frequency distribution and Chi-square tests were carried out to determine statistical significance. From the present study it was found that among the 200 children, 118 were male (59%)and 82 were female children (41%). 25.5% of children included in the study were 3 years,42.5% of children were 4 years, 32% of children were 5 years. Majority of children exhibited flush terminal molar relation by 44.5, 30.5% of children showed mesial step, and distal step was seen in 25% of children. The association between gender and type of malocclusion shows that flush terminal was more prevalent in male genders P value $p<0.05$. The association between age and gender of the children shows statistical significance P value $p<0.05$. Flush terminal plane is the most common primary molar relation found in the present study. Flush terminal was more prevalent in boys than girls which was statistically significant.

KEY WORDS: DISTAL STEP, MESIAL STEP,MOLAR RELATION, PRIMARY DENTITION, TERMINAL PLANE.

INTRODUCTION

The occlusal relationship of primary dentition will determine the occlusion of the permanent dentition (Bishara et al., 1988). The characteristic features of the primary dentition lays the foundation for the proper eruption and alignment of the succeeding dentition. The functions of primary dentition are maintenance of the occlusion and space for the permanent dentition in addition to mastication(Wright and Kennedy, 1978). Primary dentition is divided into spaced and non spaced dentition (Baume, 1950). Spaced dentition is when there is a good amount of spaces between the teeth. This space helps to accommodate larger size permanent teeth. Space found in a primary dentition are of two types - physiological space and primate space. Physiological space is present between the primary teeth. Primate space is present between lateral incisor and canine in maxilla and canine and deciduous first molar in the mandible. They are also called anthropoid space or simian space (Nakata and Wei, 1988).

ARTICLE INFORMATION

*Corresponding Author: mebingeorgem.sdc@saveetha.com
Received 28th July 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/176

The primary dentition is complete once the second primary molars erupts (Sriram et al., 2012). Occlusion of primary molars can be divided into three - flush terminal plane, distal step, and mesial step. In flush terminal plane distal surfaces of the maxillary and mandibular second primary molars are in the same vertical plane in centric occlusion. In distal step the distal surface of the mandibular second primary molar is more distal to that of the maxillary molar in centric occlusion and in mesial step the distal surface of the mandibular second primary molar is more mesial to that of the maxillary molar in centric occlusion (Foster, 1975; Moyers, 1988).

Determining the primary molar relationship is very important as it reflects the molar relationship and possible malocclusion of future permanent molar. Flush terminal plane will lead to end on relationship of permanent molars or to Class I permanent molar occlusion with forward growth of mandible. The mesial step will lead to Class I permanent molar relationship and Class III molar relationship with forward growth of mandible. The distal step will lead to Class II permanent molar relationship and with the forward growth of mandible it can lead to end on relationship of permanent molars (Srinivasan et al., 2017).Occlusion in primary dentition plays a major role in determining the occlusion of the permanent dentition.

Our department is passionate about child care,we have published numerous high quality articles in the domain over the past 3 years (Christabel and Gurunathan, 2015; Somasundaram et al., 2015; Gurunathan and Shanmugaavel, 2016; Govindaraju and Gurunathan, 2017; Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017a, 2017b; Govindaraju, Jeevanandan and E. Subramanian, 2017; Jeevanandan, 2017; Packiri, Gurunathan and Selvarasu, 2017; Ravikumar, Jeevanandan and Subramanian, 2017; 'Fluoride, Fluoridated Toothpaste Efficacy And Its Safety In Children - Review', 2018; Jeevanandan and Govindaraju, 2018; Nair et al., 2018; Subramanyam et al., 2018; Panchal et al., 2019). With this inspiration we planned to pursue research on 'Distribution Of Children Based On The Type Of Terminal Plane In Primary Dentition: A Study Among 3 To 5-year-old Children In Chennai'. This study aims to assess the distribution of children based on the type of terminal plane in primary teeth among children of 3 to 5 years of age.

MATERIAL AND METHODS

A cross-sectional study was conducted among children of age 3 to 5 years visiting Saveetha Dental College and Hospital, Chennai. Ethical approval for the study was obtained by the Institutional Review Board (IRB Approval No: SIHEC/2020/DIASDATA/0619-0320). The data were collected after reviewing patients' records between June 2019 to March 2020. A total of 200 children of age between 3-5 years were assessed to determine the type of molar relationship , age, and gender. Inclusion criteria was children of 3-5 years, presence of complete set of primary dentition.Exclusion criteria were children with missing teeth , Children with extensive caries, permanent first molars erupted. Children who fulfilled the inclusion criteria were identified and the clinical photographs obtained from the patients records were evaluated to determine the type of molar relationship (Flush terminal,mesial step,distal step).The data were recorded and tabulated in excel sheets which were imported to IBM SPSS version 20. Descriptive statistics and Chi square test was used to determine the association between the variables where P value < 0.05 is considered statistically significant.

Figure 1: depicts the gender distribution of children. 59% were male children and 41% were female children.

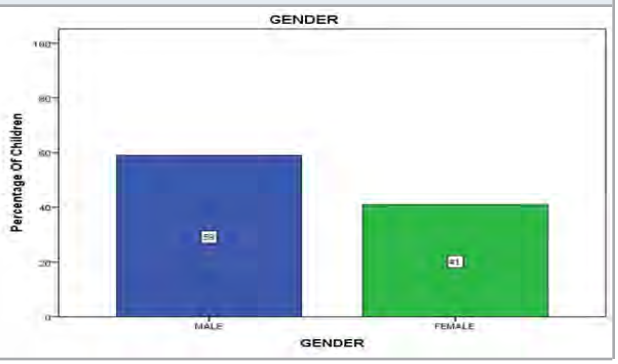
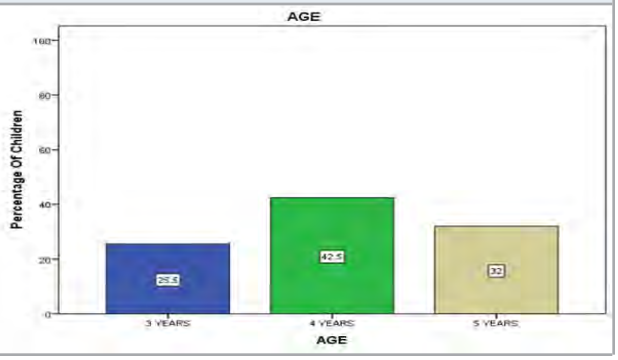


Figure 2: depicts the age distribution of children with different types of malocclusion. Children of 3 years (25.5%), children of 4 year (42.5%) and children of 5 years (32%).



RESULTS AND DISCUSSION

In this present study we assessed the molar relation of the primary dentition of 200 children aged 3 to 5 years. Among the 200 children, 118 were male (59%)and 82 were female children (41%) who were assessed for the prevalence of different types of molar relationship for primary teeth (figure 1). 25.5% of children included in the study were 3 years,42.5% of children were 4 years, 32% of children were 5 years (figure 2). Out of the 200 patients , majority of children exhibited flush terminal molar relation by 44.5%, 30.5% showed mesial step, and distal step was seen in 25% (figure 3). The association between gender and type of malocclusion shows that flush terminal was more prevalent in male

genders P value 0.043 (p<0.05) (figure 4). The association between age and gender of the children shows statistical significance P value 0.044 (p<0.05) (figure 5).

Figure 3: depicts the distribution of different types of molar relation in children. Maximum number of children exhibited flush terminal by 44.5% and least number of children showed distal step by 25%.

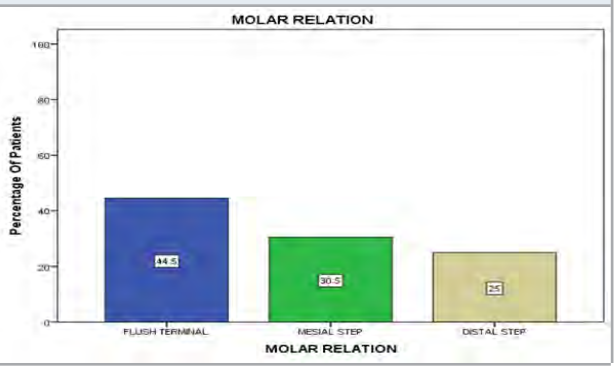


Figure 4: depicts the association between gender and types of molar relation. From the graph we can infer that flush terminal was more prevalent in male genders P value 0.043 (p<0.05). Hence statistically significant.

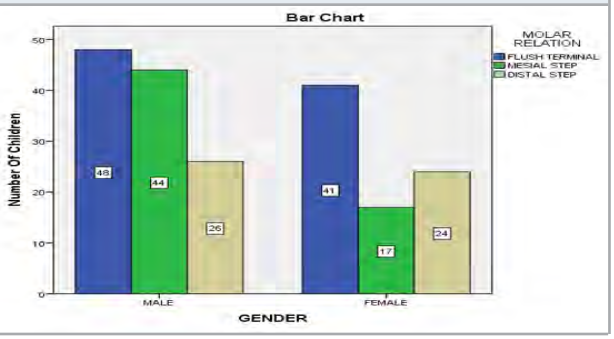
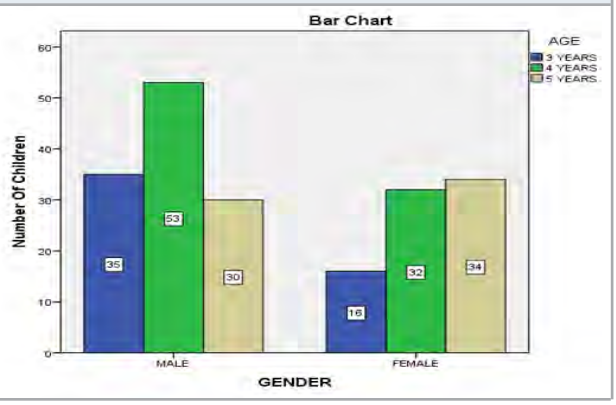


Figure 5: depicts the association between gender and age of children with different types of malocclusion. From the graph we can infer that male children of age 4 years showed the maximum number of malocclusions(53). P value obtained was 0.044 (p<0.05). Hence statistically significant.



The occlusion of the primary dentition is completely established by 3 years of age and lasts till about 6 years of age when the first permanent tooth starts erupting (Farsi and Salama, 2009). Better understanding of the association between morphological aspects of the primary dentition and its transition to permanent dentition provides the possibility of predicting the final permanent occlusion (Dutra et al., 2009). It is very crucial for clinicians in order to plan early interceptive treatment. Early treatment would reduce the percentage of permanent teeth extractions and also reduce overall treatment period as well as increase the likelihood of gaining better aesthetic and functional results(Ngan and Fields, 1995). The predominant primary molar relation is flush terminal plane followed by mesial and distal step (Baume, 1950; Boyko, 1968; Otuyemi et al., 2003; Farsi and Salama, 2009). The flush terminal plane was found to be the most common molar relation and considered ideal for transition to class 1 in permanent dentition (Bishara et al., 1988; Anderson, 2007).

In the present study majority of children exhibited flush terminal molar relation (44.5%). Similarly in a study conducted by Madhuri Vegesna et al., it was reported that the majority of children had flush terminal molar relations by 80.3% (Vegesna, Chandrasekhar and Chandrappa, 2014). In a study conducted by C. H. Sriram et al., it was reported that bilateral flush terminal plane were more prevalent in children (Sriram et al., 2012). A study conducted by Najat Ma Farsi reported that 80% of the children had a flush terminal plane molar relationship (Farsi and Salama, 2009). In another study conducted by Sapna Hegde et al., with a dissimilar finding it was reported that 50% of children had mesial step as the most common type of molar relationship (Hegde et al., 2012).

In yet another study with dissimilar findings it was reported that distal step was more prevalent in primary dentition(Al-Sehaibany and Aljubour, 2018). In the present study it was found that there is an association between gender and the type of malocclusion. Flush terminal was more prevalent in both the genders P value 0.043 (p value<0.05), statistically significant. In a previous study conducted by Madhuri Vegesna., with a similar finding reported that there is a significance between gender and type molar relation (p<0.05). In a study conducted by Daya Srinivasan et al., it was reported that there is no significance between gender and type of malocclusion (p>0.05). Similarly in another study conducted by Vijayakumar Anu et al., with a dissimilar finding it was reported that there is no association between gender and type of malocclusion (p value 0.066).

CONCLUSION

Within the limits of the study, flush terminal plane was the most common primary molar relation.Flush terminal was more prevalent in male children which was statistically significant. Early preventive and interceptive

measures are necessary to reduce the prevalence of future developing malocclusion and further adverse effects.

ACKNOWLEDGEMENTS

This research was done under the supervision of the Department of Research of Saveetha Dental College and Hospitals. We sincerely show gratitude to the corresponding guide who provided insights and expertise that greatly assisted the research.

Conflicts of Interest: There are no conflicts of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-441-444

BBRC
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Analysis of Salivary pH Before and After Intake of Sugary Drinks – An In vitro Study

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ABSTRACT

Diet is a primary aetiological factor for enamel erosion and dental caries. This study was undertaken with the aim of assessing the effect of selected locally available beverages on salivary pH amongst college students. This study comprised of a study population of 20 subjects divided into two groups. Test beverages were fruit drinks and carbonated beverages. Salivary pH was measured before and after consumption of the sugary drink. Mean difference between baseline pH and pH after consuming sugary drinks was calculated. It was found that salivary pH decreased for all the beverages immediately after consumption. Sharp decline was observed in the pH value after consumption from 7.15 to 5.5 in the case of carbonated drinks and from 7.15 to 5.45 in the case of fruit drinks. Even when liquid sugars cleared rapidly from the oral cavity, they had a significant cariogenic potential due to the decline in salivary pH. Hence, it is always advised to minimise the consumption of beverages with high sugar content, especially amongst children and young adults to maintain a healthy and caries-free oral cavity.

KEY WORDS: CARBONATED BEVERAGES, FRUIT DRINKS, SALIVARY PH, ENAMEL EROSION, DENTAL CARIES, SUCROSE.

INTRODUCTION

Oral health is defined by WHO as "being free of chronic mouth and facial pain, oral and throat cancer, oral sores, birth defects such as cleft lip and palate, periodontal disease, tooth decay, and exodontia, and other diseases and disorders that affect the mouth and oral cavity. Dental health has often been viewed in isolation from the general bodily health. History suggests that in the earlier days dental health professionals focused largely on local reparative treatment of oral disease. However, modern-day dentistry places increased emphasis on oral disease prevention and recognizes the importance of the interrelationship between the etiological factors and the health of the teeth and oral tissues along with the general health of the body (Çetinkaya and Romaniuk, 2020). It is well known that a good diet is essential for the development and maintenance of healthy teeth. Diet is a prime aetiological factor for dental caries and enamel erosion. Nutritional status has a huge impact on the development of the teeth and the host's resistance to many oral conditions, including periodontal diseases and oral cancer (Moynihan, 2005).

Saliva plays a major role in the maintenance of oral health. Saliva is one of the most important factors which provides a defensive mechanism in the oral cavity. In a healthy oral cavity, saliva contains glycoproteins, antimicrobial enzymes, and basic electrolytes which protect the oral mucosa. (Humphrey and Williamson, 2001; Renke, 2016).

ARTICLE INFORMATION

*Corresponding Author: vishnupriya@saveetha.com
Received 24th July 2020 Accepted after revision 20th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/177

Saliva is also important for digestion, bolus formation, taste, protection of the teeth, and antimicrobial effects The normal pH of saliva ranges from 6.7 to 7.4 but as bacteria in the mouth break down the carbohydrates, they release acids such as lactic acid, butyric acid, and aspartic acid which remarkably reduce the pH value of saliva. When the pH level in the oral cavity goes below the critical pH value (pH = 5.5) the acids present begin to break down the enamel on teeth. The longer the teeth are exposed to low salivary pH levels, the more likely is the development of dental caries and periodontal diseases (Demirci, Tuncer and Yuceokur, 2010).

Physical state of food plays a very important role in its cariogenic potential. Liquid sugars, such as those found in soft drinks and milk drinks, pass through the oral cavity fairly quickly with limited contact time or adherence to tooth surfaces. It is because of their characteristic readiness to flow, little tendency to disperse, and relatively high incompressibility. Solid sugars get stuck to the teeth surface due to their property of adherence. The longer the tooth is exposed to sugar, the longer the bacteria will act on sugars and produce acid thus leading to the development of dental caries. Sugars present in hard candies, breath mints, lollipops, and popsicles, dissolve slowly and thereby have extended exposure time in the oral cavity (Shaw, 1992) .

Over the last few decades, a trend of declining dental caries in developed countries and an increased caries prevalence in developing countries has been observed. India too has seen the increasing trend similar to that in the latter group of developing countries and the trend might continue in the future as a result of growing globalization (Demirci, Tuncer and Yuceokur, 2010). Globalization in turn is bound to increase the availability of processed and packaged food items. The association between diet, particularly sucrose, and dental caries has been well-documented in many ecological reports. The most susceptible age group to dental caries is the 17–25 years' age group (Demirci, Tuncer and Yuceokur, 2010). Hence, the following study was undertaken with the aim of assessing the effect of selected locally available beverages with high sugar content on salivary pH amongst college students in the age group of 17 - 25 years.

MATERIAL AND METHODS

The study was carried out in Saveetha Dental College and Hospitals, Chennai, Tamil Nadu. 20 randomly selected undergraduate students Saveetha Dental College and Hospitals, Chennai, were examined. The subjects were selected on the basis of the following inclusion and exclusion criteria.

- Inclusion Criteria:

1. Subjects belonging to 18–22 years of age.
2. Subjects who had a healthy, caries-free, oral cavity with a DMFT score = 0.
3. Subjects who were not suffering from any systemic illness.

- Exclusion Criteria:

1. Students who did not give informed consent.
2. Students who were using tobacco or alcohol in any form.
3. Subjects who were using any systemic medication at the time of study or in the period of the last 15 days prior to the study.
4. Students who were suffering from any systemic illness.

All the study subjects were similar with respect to their age, dietary habits, oral hygiene measures, and other lifestyle factors which might have a significant effect on the study results. The time of the day was standardized for the collection of all the saliva samples.

Ethical Clearance: Before carrying out the present study, ethical clearance was obtained from the institutional ethical clearance board. Before the start of the study, the purpose and methodology of the study were explained to each of the students and informed consent was obtained from each.

Study Design: Unstimulated salivary sample was collected for each subject two hours after their breakfast. After the collection of baseline salivary samples (before the consumption of test beverage), the study subjects were given a beverage to drink and stimulated saliva samples were collected immediately after test beverage consumption. The study subjects were given two different beverages to drink for subsequent days and subsequent salivary samples were collected. The subjects were divided randomly into two groups : Group A and Group B. Mango fruit drinks were given to Group A consisting of 10 subjects randomly selected and carbonated beverage was given to Group B. 50 ml of the beverages were given to the participants.

Collection of Salivary Samples: Stimulated saliva after consumption of test beverage was collected under resting conditions in a quiet room in order to reduce any stressful conditions. The saliva from the subjects was collected in a sterile calibrated container through a sterile funnel. The salivary pH was directly estimated using universal pH indicator paper strips [MERCK pH indicator paper] for both the samples and compared. The recording of the data was done on a pro forma containing details on the general information, uptake of the selected test beverage of each study subject and group of the subject. To minimize bias or errors in the data, an independent observer, blinded to the study's aim, recorded all the pH values.

RESULTS AND DISCUSSION

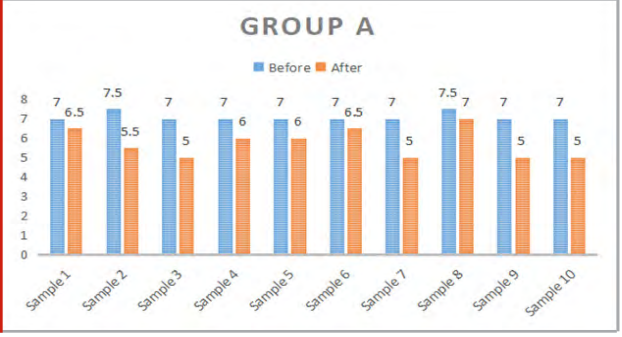
Acidified sugar-containing packaged fruit juices have shown to be cariogenic and erosive in rats (Hans et al., 2016). Juices contain several sugars and non-volatile organic acids. Glucose and fructose are considered to be less cariogenic than sucrose, but dental plaque formed in the presence of a mixture of these two sugars leads to a decrease in the microhardness of the enamel. Packaged

juices contain excessive amounts of added sugar i.e., sucrose, which is highly cariogenic and increases susceptibility to dental caries. From this study, we observe that there is a significant drop in the mean pH value (pH=5.45) after consumption of fruit drink from the baseline pH value (pH= 7.15) (table 1). These findings are in concordance with literature by Rinki et al and Sudhanshu et al (Sudhanshu, 2010; Hans et al., 2016).

Table 1. Table Showing Group A samples and their salivary pH before and after consumption of mango drink.

Sample	Before	After
Sample 1	7	6.5
Sample 2	7.5	5.5
Sample 3	7	5
Sample 4	7	6
Sample 5	7	6
Sample 6	7	6.5
Sample 7	7	5
Sample 8	7.5	7
Sample 9	7	5
Sample 10	7	5
Mean	7.15	5.45

Graph 1: This Bar Graph shows Group A samples and their salivary pH before and after consumption of mango drink. X- axis denotes the samples and Y- axis represents the pH of saliva. Blue colour represents the pH of saliva before consumption of mango drink and Orange represents the pH of salivary sample after consumption. From this graph it is evident that there is a significant decrease in the pH of the saliva samples after consumption of mango drink.

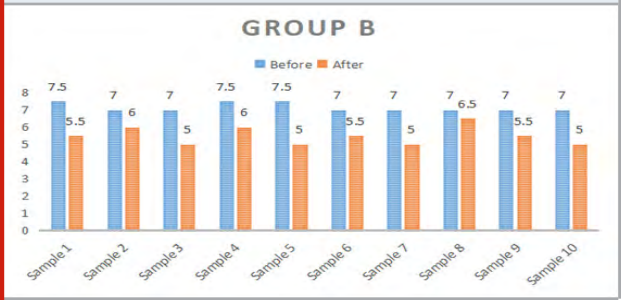


The probable reason for the immediate drop in salivary pH after consumption in this study could be that the intrinsic acidity of fruit juices enabled it to be more able to combat salivary buffers. There may be a prolonged fall in the oral cavity pH due to the increased buffering capacity of fruit juices & the fluidness consistency of the pulp of the fruit. Though the amounts of fruit drinks consumed by the population may be insignificant, the presence of immature enamel, inability to clear the retentive substrate, and inadequate neuromuscular coordination and along with the deleterious methods of consumption, makes them susceptible to dental erosion (Lee and Wrolstad, 1988). Beverage markets have seen increased consumption of aerated drinks by teenagers and children, who account for 65% of total sales. Literature reveals that peer pressure, pleasure, and taste are reasons that lead children to consume these drinks (Nielsen and Popkin, 2004; Vartanian, Schwartz and Brownell, 2007).

Table 2. Table Showing Group B samples and their salivary pH before and after consumption of carbonated beverage.

Sample	Before	After
Sample 1	7.5	5.5
Sample 2	7	6
Sample 3	7	5
Sample 4	7.5	6
Sample 5	7.5	5
Sample 6	7	5.5
Sample 7	7	5
Sample 8	7	6.5
Sample 9	7	5.5
Sample 10	7	5
Mean	7.15	5.5

Graph 2: This Bar Graph shows Group B samples and their salivary pH before and after consumption of carbonated beverage. X- axis denotes the samples and Y- axis represents the pH of saliva. Blue colour represents the pH of saliva before consumption of carbonated beverage and Orange represents the pH of salivary sample after consumption. From this graph it is evident that there is a significant decrease in the pH of the saliva samples after consumption of carbonated beverages.



These changes have major implications for dental health. The number of sugar-containing beverages consumed and late-onset of oral hygiene measures correlate positively with plaque accumulation and caries prevalence in the primary dentition (Mattos-Graner et al., 1998; Habibian et al., 2001; Jerkovic et al., 2009). Soft drinks contain not only sugars but also different nonvolatile organic acids, and maybe a primary extrinsic etiological factor in the development of dental erosions (Rugg-Gunn et al., 1998; Moazzez, Smith and Bartlett, 2000; Al-Dlaigan, Shaw and Smith, 2001). Various host factors like salivary buffering capacity, and pH, can influence the extent of

dental erosion and demineralization (Tahmassebi and Duggal, 1996; Millward et al., 1997).

In the present study, the carbonated beverage contained carbonated water, sugar, caffeine, colouring agents, and acidity regulator as its ingredients. The quantity of sugar added is 10.6 g/100 g or 11 teaspoonfuls of sugar in 300 mL of the drink. It caused an instant decrease in salivary pH from 7.15 to 5.5. This is in agreement with the study proposed by Hans et al and Demir et al. This may be probably due to the fact that the carbonated beverage has increased intrinsic acidic content and sugar content in its composition which is responsible for its high cariogenic and demineralizing or erosive potential (Balappanavar, Sardana and Singh, 2013).

CONCLUSION

The erosive potential of sugary drinks must be dependent upon the immediate effect of the drink, the protective effect of saliva, the amount of residual drink after swallowing, the actual amount of sugar consumed, and the frequency of consumption. A single acidic attack is of minor importance but if repeated, the ability of saliva to buffer may decrease. Hence the main concern is the frequent usage of sugary drinks over time. If consumption is frequent enough and there are few or no protective factors, then this may be an aggressive factor that increases the caries prevalence in people. Within the limits of this study, it was observed that there was a significant decrease in pH of saliva after the consumption of both mango drink and carbonated beverage. Awareness camps, seminars, health education programs may be conducted to create awareness on deleterious effects of sugary drinks in oral cavity.

ACKNOWLEDGEMENTS

We sincerely thank Saveetha Dental College for rendering full support for my study.

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-445-448

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Research Communications

Rate of Canine Retraction and Anchor Loss During Individual Canine Retraction

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ABSTRACT

Aim:The aim of this study is to evaluate the rate of bodily movement of canine during individual canine retraction and the amount of anchor loss with two different methods- elastomeric chains and NiTi coil spring. Materials And Methods: Sample size calculated using GPower software was 14. The patient was randomised according to the lottery method and divided into two groups. Group A had elastomeric chains on the right side and NiTi coil spring on the left and Group B has elastomeric chain on the left and NiTi coil spring on the right side of the quadrant. Elastomeric chain was extended from the molar tube to the canine hook on one side. A 9 mm NiTi closed coil spring was extended from the first molar to the canine hook on the other side.The rate of canine movement and the anchor loss was measured from the intraoral scan done by 3Shape scanner. The scanned images were superimposed and the distance between the pre and post mesial tip of canine gave the distance moved by the canine. This divided by the number of months gives the rate of retraction. The pre and post canine retraction scanned models were overlapped over each other to measure the amount of anchor loss that occurred during the canine retraction. Results: The rate of canine retraction for elastomeric chains is 3.94±0.73mm and that for NiTi coil spring is 4.69±0.13mm. There was a statistical significant difference in the rate of canine retraction between NiTi coil spring and elastomeric chains at T0 and T3 (P value=0.02). The amount of mean anchor loss for elastomeric chain was 2.45mm with a standard deviation of 0.27 and the mean anchor loss for NiTi coil spring was 1.99mm with a standard deviation of 0.19 and was statistically significant between them. Conclusion: NiTi produced a faster rate of tooth movement than elastomeric chains. Elastomeric chains produced a significant amount of anchor loss when compared to NiTi coil spring.

KEY WORDS: CANINE RETRACTION, NITI COIL SPRING, ELASTOMERIC CHAINS, ANCHOR LOSS.

ARTICLE INFORMATION

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Received 5th Aug 2020 Accepted after revision 25th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/178

INTRODUCTION

In orthodontic treatment extraction is frequently required to correct crowding and to improve the facial profile and to retract the anterior teeth. The most frequently tooth extracted and the most ideal tooth for correction of bimaxillary protrusion is the first bicuspids. The 7mm gained after extraction in each quadrant is utilised for correction of crowding, proclination or for protraction of posterior teeth(Güray and Orhan, 1997). There are two methods of space closure: individual canine retraction followed by retraction of the incisors and en-masse retraction of the entire anterior segment. In individual canine retraction the canine in each quadrant is retracted to make full contact with the tooth distal to the extraction space and fastened to the posterior segment and made as one unit. This is followed by the retraction of the anterior incisor segment. With this method the load on the posterior segment is reduced, thus reducing any undesirable changes to the posterior teeth and reduces the chances of molars moving forward. However, the time needed for space closure is longer and the canines tend to tip and rotate more, thus requiring additional time and effort to relieve and realign the teeth.

Another school of thought is en-masse retraction where the entire anterior segment is retracted as a single unit. Application of optimal force values, continuously and simultaneously over the due threshold is sufficient to retract the canines and the incisors without causing any excessive anchor loss. It can be suggested that the force required to retract the anterior segment dissipates and are below the biological threshold level to cause substantial movement of any posterior segment (Graber et al., 1994). NiTi is a very common auxiliary used for retraction of anterior segment and can be activated to a much greater extent before permanent deformation and they are specially indicted in cases of large extraction spaces or if there are infrequent adjustment opportunities are present(Sharma et al., 2015). They deliver a continuous force till the end of the deactivation stage is reached. The advantage of these spring is that they can be easily placed and removed and do not need reactivation every appointment. But they are relatively unhygienic as compared to elastic modules(Sharma et al., 2015).

Our extensive research expertise ranged from epidemiological studies to randomised clinical trials that have been published in reputed journals (Charles et al., 2018; Chinnasamy et al., 2019; Felicita, 2017a, 2017b, 2018; Felicita et al., 2017; Korath et al., 2017; Krishnan et al., 2017; Pandian et al., 2018; Reddy et al., 2018). This knowledge was instrumental for us to study the rate of canine retraction and anchor loss during individual canine retraction. The aim of this study is to evaluate the rate of bodily movement of canine during individual canine retraction and the amount of anchor loss with two different methods: elastomeric chains and NiTi coil spring.

MATERIALS AND METHODS

Sample size calculated using GPower software was 14. Patients who were undergoing fixed orthodontic treatment in the department of orthodontics at Saveetha Dental College and Hospital, Chennai were taken for the study. The study was designed to be a split mouth randomised control trial. Patients selected for the study were undergoing fixed orthodontic treatment with 0.022 MBT bracket prescription who needed upper first premolar extraction as part of their treatment plan, and were on 0.019 x 0.025 inch stainless steel wire with second molar included and was at the end of levelling and aligning stage. Intra-oral scans were taken using a MEDIT scanner and digital models were analyzed using ORTHOANALYSER software.

Methodology: The patient was randomised according to the lottery method and divided into two groups. Group A had elastomeric chains on the right side and NiTi coil spring on the left and Group B has elastomeric chain on the left and NiTi coil spring on the right side of the quadrant. Elastomeric chains was extended from the molar tube to the canine hook on one quadrant and a 9 mm NiTi closed coil spring was extended from the first molar to the canine hook on the other side. The posterior segments were held together as one unit by ligating them together. The force generated was calibrated to 200Gms using a dontrix gauge.

Intra-oral models and photographs were taken every month till the canine space closed on either one side. The rate of canine movement and the anchor loss was measured from the intraoral scan done by 3Shape scanner. The scanned images were superimposed and the distance between the pre and post mesial tip of canine gave the distance moved by the canine (Fig 1&2). This divided by the number of months gives the rate of retraction. The pre and post canine retraction scanned models were overlapped over each other to measure the amount of anchor loss that occurred during the canine retraction (FIG 3&4).

Figure 1: Superimposition of pre and post camine retraction models

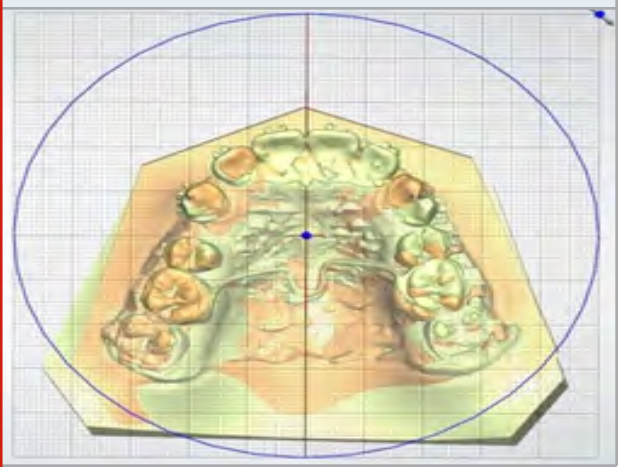


Figure 2: Measurement of camine movement

Figure 3: overlapping of pre and post camine retraction models for anchor loss on NiTi spring quadrant

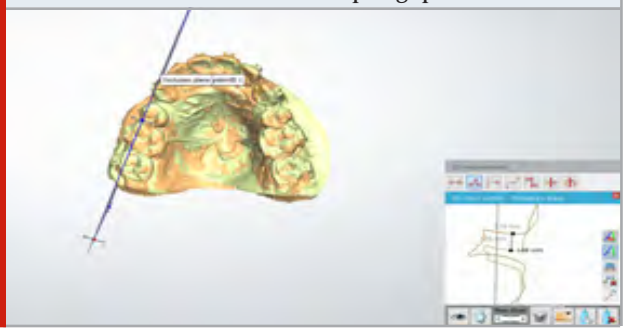
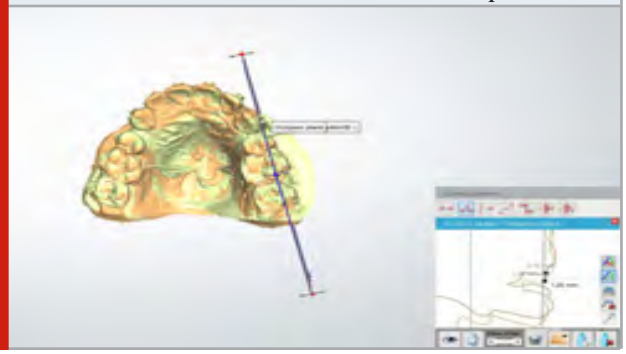


Figure 4: Overlapping of pre and post camine retraction models for anchor loss on elastomeric chain quadrant



RESULTS

The rate of canine retraction for elastomeric chains is 3.94±0.73mm and that for NiTi coil spring is 4.69±0.13mm. There was a statistical significant difference in the rate of canine retraction between NiTi coil spring and elastomeric chains at T0 and T3 (P value=0.02) (Table I). The amount of mean anchor loss for elastomeric chains was 2.45mm with a standard deviation of 0.27 and the mean anchor loss for NiTi coil spring was 1.99mm with a standard deviation of 0.19 and was statistically significant between them (P value= 0.04) (Table II).

Table 1. Mean and standard deviation of the rate of canine retraction with elastomeric chains and NiTi coil spring

variable	group	N	Mean in mm	Std dev	P
Distal mov	elastomeric chains	7	3.94	0.73	0.02
	NiTi	7	4.69	0.13	
P value less than 0.05 is significant					

Table 2: Mean and standard deviation of the anchor loss with elastomeric chain and NiTi coil spring

variable	group	N	Mean in mm	Std dev	P
Anchor loss	elastomeric chains	7	2.45mm	0.27	0.04
	NiTi	7	1.99mm	0.19	
P value less than 0.05 is significant					

DISCUSSION

In this study, statistically significant difference was noted in the two groups (elastomeric chains and NiTi coil spring) in the rate of canine retraction between T0 and T3 with the rate of canine retraction being more for NiTi coil spring compared to elastomeric chain (Table I). NiTi coil spring produced a faster rate of canine movement than elastomeric chains (Mohammed et al., 2018) which is in agreement to the present study. A faster tooth movement and a constant force applied by NiTi coil spring was also reported by Barlow et al in his systematic review(Barlow and Kula, 2008).

On evaluating the pre and post retraction records, a definite anchor loss was noted for both the groups with the statistically significant more anchor loss for elastomeric chains (p value of 0.04). However Chaudhari et al reported more anchor loss for NiTi coil spring compared to that of elastomeric chains(Chaudhari and (Daokar), 2015). Various anchorage considerations like transpalatal arch and also the latest method of using TAD's to minimise anchor loss. Studies done by Davis et al showed that implant supported retraction produced more canine retraction than conventional methods (Davis et al., 2018). Borsos et al suggested that anchorage can be reinforced by making the implant and the molars as one unit(Sharma et al., 2012).

CONCLUSION

- NiTi produced a faster rate of tooth movement than elastomeric chains
- elastomeric chains produced a significant amount of anchor loss when compared to NiTi coil spring.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-449-456

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Research Communications

Estimation of Fluoride in Different Types of Commercially Available Wine

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ABSTRACT

Winemaking or wineification is the production of wine, starting with the selection of the fruit, its fermentation into alcohol, and the bottling of the finished liquid. The history of wine-making stretches over millennia. Studies have shown that In terms of types of alcoholic drinks, the highest fluoride levels were determined in beers and wines, while the lowest levels were observed in vodkas. These data confirm the fact that alcoholic beverages need to be considered as a significant source of fluoride delivered into the body.The aim of the study is to estimate the amount of fluoride in different types of commercially available wine in India. Seven samples were collected from various sources in Chennai. The samples are Shiraz red wine, Merlot red wine, Chenin white wine, Chardonnay sauvignon blanc white wine, Rose wine, Sparkling wine and Fortified wine. The samples were collected using sterile containers in Chennai. Each sample was collected around 100 ml. and the fluoride testing was done by SPADNS APHA 23rd edition 2017 -4500 FBD. Only the two samples of red wine had 0.4 mg/L and 0.2 mg/L respectively and others had below detection level of fluoride where detection level is 0.1 mg/L.The present study shows that there is permissive amount of fluoride in some type and brands of wines commercially available in India. Even though it is in permissive amounts, and can be used as anti-cariogenic it can cause erosion if used excessively. Therefore wine drinking should be reduced or kept in minimal amounts.

KEY WORDS: WINE, FLUORIDE CONCENTRATION, WINERY, FLUOROSIS, OSTEITIS DEFORMANS, ALCOHOLIC DRINKS.

ARTICLE INFORMATION

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Received 1st Aug 2020 Accepted after revision 15th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/179

INTRODUCTION

It is surprising that the wine industry attracts so much attention, given its relative size. Vines cover less than 0.5% of the world's crop land and wine accounts for just 0.4% of global household consumption – but for millions of investors and hundreds of millions of consumers, the industry's products command intense interest, often bordering on obsession(Anderson, 2004) Wine is a unique commodity. Its production predates recorded history, as does the discovery of the healthful benefits of wine, now largely attributed to the antimicrobial activity of ethanol('A History of Wine as Therapy', 1964).

Throughout antiquity the conversion of grapes into wine was considered a gift from the gods and the best wines were thus reserved for the elite of society. The image of wine as a beverage of the affluent persists even today. Wine was also one of the first commodities to be bartered by early civilizations engaged in international trade. Then, as now, the most successful wine producers were those who grasped market forces of supply and demand, and whose products met the prevailing definition of quality. Today, wine is an integral component of the culture of many countries, a form of entertainment in others, and a libation of choice for advocates of its health benefits. Unlike many modern foods, wine's attractions rely not on bold consistent flavours, but upon a subtle array of shifting sensations that make its charm difficult to define. In essence, wine producers are selling a sensory experience to the consumer. Wine consumers in developed nations are typically prosperous, but wine is also consumed in impoverished areas where it is still safer to drink than the local water supply.

Regardless of the region in which the wine is produced or the economic status of the consumer, all wines are expected to be pleasant experiences for the imbiber. In past generations, the definition of quality was the preserve of the wine producer, and consumers who did not like a particular style of wine were often made to feel uncultured. But globalization and the accompanying rapid worldwide access to information has resulted in a more knowledgeable and empowered consumer with a more sophisticated understanding of product value and a discriminating demand for quality. The control of the definition of quality has thus shifted to the consumer. Success as a wine producer in the twenty-first century requires a thorough appreciation of human behaviour and product choice.

Whatever the explanation, the wine industry has come to realise that centre stage is a market-driven space and today's consumers vote with their wallets for those wine producers who offer a pleasurable and recognisable 'sensory experience'. They expect a safe product produced in an environmentally sustainable manner and enjoyable in all sensory aspects(Bisson et al., 2002). The terms quality and value are widely used in reference to wine; the International Standards Organisation defines quality as the 'degree to which a set of inherent characteristics fulfils requirements(Reynolds, 2010)

It is instructive to relate this definition to the different elements involved in the wine production chain. To the consumer who compares wines for purchase, fulfilling requirements is associated with the 'intrinsic' sensory quality of the wine, i.e. how the wine pleasures on appearance, the nose and the palate, as well as the perceived value(König, Unden and Fröhlich, 2009). Value is related to both intrinsic quality and image – the latter derived from many aspects such as how the wine is marketed, awards received, winery environmental sustainability record – and cost (Francis et al. 2005). Thus, a wine with delightful and recognisable sensory attributes and a high perceived image at a competitive price would be considered by consumers as high in value.

As far as consumers are concerned, the aroma and flavour of wine are among the primary characteristics that determine its quality and value(Swiegers et al., 2005). The aroma of wines is a unique mixture of volatile compounds originated from grape fruits (varietal aromas), secondary products formed during the wine fermentation (fermentative aromas) and ageing (post-fermentative aromas(Swiegers et al., 2005).The nature and amount of the synthesised volatile compounds depend on multiple factors, such as the nitrogen content of the must, the temperature of fermentation and the yeast strain(Molina et al., 2007; Hui and Özgül Evranuz, 2012)

These issues are complex, requiring producers to understand the latest developments in wide-ranging disciplines of science and technology. The present-day wine industry is focused on optimizing the attractiveness of the product . In the future, the industry will need to go beyond this, paying more attention to the extrinsic factors motivating product choice, while ensuring that production remains cost-effective and economically sound(Bisson et al., 2002). Fluorine is the third most abundant on earth. It cannot exist outside a controlled environment without combining with other compounds to form fluorides (Chouhan and Flora, 2010). Main source of fluoride in ground water is fluoride bearing rocks from which it gets leached out into the water.

Fluorides can occur in 3 forms namely calcium fluoride or fluorspar, apatite or rock phosphate and cryolite(Bhattacharya et al., 2008) It is harmful when it exceeds the permissible limit of 1.2 mg l–1 in water('International Standards for Drinking Water (3rd Edition): Pp. 70. Geneva, World HealthOrganization, 1971.90p', 1973). Low concentration of fluoride below 0.5 ppm causes dental caries(Clark, 1993; Acharya et al., 2008). Smaller quantities (<1.0 mg l–1) in drinking water are usually considered good to have a beneficial effect on the rate of occurrence of dental caries, particularly among children(World Health Organization, 1993; National Research Council et al., 2007; Gupta and Ayoob, 2016). While high concentrations above 1.5 mg l–1 may cause an endemic disease called dental fluorosis, intake of F– concentrations above 3.0 mg l–1 may cause skeletal fluorosis (Singaraja et al., 2014) On the contrary, change in water fluoridation policy to 0.5 ppm along with fluoridated toothpaste has resulted in a decrease in fluorosis without compromising the caries preventive effect(Nor et al., 2018).

Excess fluoride in wine is common in abroad and are potential to cause a new disease called periostitis deformans(Chitkara, Rackoff and Beltran, 2014) India is one of the 22 countries prone to fluorosis in the world. Dental fluorosis is a major endemic in 14 states and 150000 villages in India such as in Andhra Pradesh, Bihar, Gujarat, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh in India 62 million population are at risk of developing fluorosis by drinking high fluoride water. Fluoride in groundwater has been reported in various places across India especially in Andhra Pradesh, Chhattisgarh(Reddy et al., 2010; Dashavantha Reddy, Venkateswara Rao and Kancha, 2017) Studies have reported fluoride concentration in Andhra Pradesh and Tamil Nadu. In Tamil Nadu, fluorosis is reported to be in the districts of Dharmapuri, Erode, Salem, Coimbatore, Madurai, Vellore and Virudhunagar(Rao and Subba Rao, 2003; Kumar and John, 2011; kumar.R et al., 2014; Kumar and Preethi, 2017; Kumar, Pradeep Kumar and Vijayalakshmi, 2017; Maheswari et al., 2017).

As we are already a fluorosis endemic country it is necessary to estimate the amount of fluoride available in wine in India. We have successfully completed numerous epidemiological studies for the betterment of our community(Prabakar, John and Srisakthi, 2016; Kannan et al., 2017; Kumar and Preethi, 2017; Kumar, Pradeep Kumar and Vijayalakshmi, 2017; Prabakar, John, I. Arumugham, et al., 2018; Prabakar, John, I. M. Arumugham, Kumar and Sakthi, 2018; Prabakar, John, I. M. Arumugham, Kumar and Srisakthi, 2018; Vishnu Prasad et al., 2018; Harini and Leelavathi, 2019; Khatri et al., 2019; Manchery et al., 2019; Mohapatra et al., 2019; Neralla et al., 2019; Pavithra, Preethi Pavithra and Jayashri, 2019; Pratha and Prabakar, 2019; Shenoy, Salam and Varghese, 2019; Mathew et al., 2020; Samuel, Acharya and Rao, 2020). So in this research, we are estimating the amount of fluoride in different types of commercially available wine in India

MATERIAL AND METHODS

This is a cross sectional study studying the fluoride content in the commercial wines available in India. In the present study we have collected 7 wine samples to test for fluoride content in the second week of October 2018.

There are approximately 6 types of wine available with its own subtypes:

1. Red wine
2. White wine
3. Rose wine
4. Sparkling wine
5. Fortified wine
6. Dessert wine(The Australian & New Zealand Wine Industry Journal, 2007)

India has about 60 wineries and 123000 acres of land for vineyards. the most important companies of Indian vinery are chateau indage limited , grover vineyards and sula vineyards. As the dessert wine was only available in the northern part of India it was not included in the study. As red and white wine are the most consumed wine types, we have included two samples in each type of two different leading brands.

Sample collection:

1. Shiraz red wine
2. Merlot red wine
3. Chenin white wine
4. Chardonnay sauvignon blanc white wine
5. Rose wine
6. Sparkling wine
7. Fortified wine

The samples were collected using sterile containers in Chennai from three different places in the city. Each sample was collected around 100 ml. The samples were collected by cluster sampling technique.

Fluoride testing method: The samples are tested for fluoride by APHA 23rd edition 2017 -4500 FBD. It is done by SPADNS method . It is a colorimetric method and based on the reaction between fluoride and a zirconium dye lake. Fluoride reacts with the dye lake and leaves a portion of it into a colourless complex anion (ZrF62-) and the dye. As the amount of fluoride increases, the colour produced becomes progressively lighter. SPADNS solution used is sodium 2 (parasulfopenylazo)–1,8 dihydroxy -3,6 naphthalene disulfonate, zirconyl acid reagent prepared by adding HCl and Acid zirconyl – SPADNS reagent prepared by mixing equal volumes of SPADNS solution and zirconyl acid reagent. There is a reference solution prepared by adding 10 ml of SPADNS solution to 100 ml distilled water. Dilute 7 ml of con HCl to 10ml and add to diluted SPDNS solution. The procedure is done and colour development is measured by spectrophotometer to estimate the fluoride concentration.

RESULTS AND DISCUSSION

Out of 7 samples, only the two red wines showed detectable levels of fluoride but that was in a safe range. The Shiraz brand showed 0.4 mg/L and Merlot brand showed 0.20 mg/L fluoride concentration(table 1). The white wine, rose wine, sparkling wine and fortified wine are showing less than 0.1 mg/L of fluoride concentration. The Indian wine industry has been steadily developing over the last ten years. Wine is gradually becoming a part of urban Indian lifestyle. Domestic wine consumption touched more than 10 million litres in 2007, and may go up to 15 million litres for the current year, from a mere 1 million litres in 2001. Nearly 80% of the demand for wine centres in the following major cities of the country - New Delhi, Mumbai, Chennai, Kolkata, Pune and Bangalore. The consumption pattern is as follows: Mumbai (39%), Delhi (23%), Bangalore (9%) Goa (9%), whereas the rest of India has only 20% consumption. The overall consumption of wines in India is approximately 400,000 cases a year of which 85 percent are table wines and the remaining are the expensive varieties. Out of the 400,000 cases, about 50,000 cases are imported from various sources. Today, the consumption per head is roughly 0.0030 litre per annum(Rathore, 2006).

Fluoride is always known as a double edged sword because it has anti carious effects on teeth when consumed in normal range. While excess consumption leads to both skeletal and dental fluorosis. A new emphasis describes fluoride exposures as being either pre eruptive and post eruptive fluorosis. Post eruptive fluoride acts mainly by reducing demineralization and enhancing remineralization. Ingestion of fluoride before 3-4 years of age is critical to the possibility of fluorosis in the early erupting permanent dentition, including the maxillary incisors. Thus the damage is very often done before young patients have their first dental visit(Levy, 2003). Children who are exposed to excess fluorides from childhood show symptoms of fluorosis more than adults. Hence the fluoride problem in an area may not be decided on the fact that adults have good teeth with no discolouration.

Exposure to very high fluoride over a prolonged period of time results in acute to chronic skeletal fluorosis. Early stages start with pain in joints, muscle weakness, sporadic pain, chronic fatigue. which in later stages, calcification of bones happen, osteoporosis, and osteosclerosis in which bones become denser and develop abnormal structure. In advanced stages joints become completely weak and moving them becomes difficult. Unfortunately Skeletal fluorosis is usually identified in later stages only(Satpathy et al., 2014).National research council states that skeletal fluorosis might occur in people who have continuously ingested 10 to 20 mg of fluoride per day for over 10-20 years Other effects include low Hb level, deformities in RBC, thirst, headache, skin rashes, nervousness, neurological manifestations, nausea, abdominal pain, still births, male sterility etc. Further some authorities have reported that it may be impossible to achieve fluoride based caries prevention without some degree of fluorosis(Meenakshi, Meenakshi and Maheshwari, 2006).

In a study done by Bruno E. Trombella et al, maxmimum fluoride concentration of the white wine was 2.3 mg/L and red wine was 3.0 mg/L(Trombella et al., 2003) .In the present study the maximum fluoride concentration is 0.4 mg /L. In the present study, fluoride was present in permissive amount in red wines. Similar results have been obtained from studies done by Marta Goschorka et al the maximum fluoride concentration of wine was 0.1 mg/L(Goschorska et al., 2016),rees et al (Rees, Burford and Loyn, 1998)and the research on the concentration of fluoride in wines from canary islands(Martínez et al., 1998; Gómez et al., 2003). In the present study, maximum concentration of fluoride in white wines were below 0.1 mg/L whereas in a study by Soraya Paz et al, 0.34 was the maximum concentration of fluoride in white wine and 0.1 mg/L was in red wine respectively(Paz et al., 2017)

It is noteworthy that more than 70 % of the fluoride delivered into the body every day is contained in beverages, especially tea(Joshi et al., 2011). While anecdotal evidence exists regarding the problem of dental erosion in winemakers and others in the wine trade who are required to taste wines frequently, there has been negligible form documentation. One case of erosion in a winemaker has been reported ,but the magnitude of the problem has not been established. Regular exposure to fruit juices or soft drinks is well recognized as a cause of erosion and it may be anticipated that wine will have a similar potential due to its acid content. In a study of erosion, using human enamel, it was found that exposure to a Swiss white wine, at pH 3.7 for 20 minutes, resulted in a decrease of microhardness comparable to that caused by 50 mmol/L lactic acid(Lussi, Jäggi and Schärer, 1993).

The erosive capability of wine, as with other acidic drinks, will be determined by the individual pH value, titratable amount of base as well as the phosphate and fluoride content. The various wines made in different regions of the world have a range of acid contents and types as well as the amount of phosphate and fluoride present. Accordingly, there may be some variation in their potential to cause erosion although it most probably remains a feature with all wines. With the problem of dental erosion in winemakers apparently not being well documented, no appropriate management regimes have been widely established. Currently, there is no alternative to the grape juice and wine being tasted regularly throughout manufacture. The use of any alkaline mouth rinse after each tasting has the potential to alter taste acuity but it would seem useful to rinse with water on each occasion.

Topical fluoride rinses should have the ability to reduce enamel solubility and the use of a 0.05 per cent sodium fluoride rinse, at least daily, is advocated. Standard oral hygiene, using a fluoride dentifrice, is appropriate for these individuals but with advice not to brush excessively and to use a soft nylon toothbrush. In those cases where

erosive lesions are already present, restoration may be required for aesthetic reasons as well as for sensitivity. Glass ionomers, composites, fixed prostheses and dentine bonding agents have been advocated (Gallien, Kaplan and Owens, 1994). The excessive ingestion of fluoride in foods and drinks leads, to erosion of the enamel has been reported in various studies(Gray, Ferguson and Wall, 1998; Mok, McIntyre and Hunt, 2001; Piekarz et al., 2008; Amaral, Vettore and Leão, 2009).

Table 1. Shows the distribution of concentration of fluoride in all the study samples. Only Shiraz red wine and Merlot red wine had detectable levels of fluoride concentration. The white wine, rose wine, sparkling wine and fortified wine are showing less than 0.1 mg/L of fluoride concentration.It shows that red wine contains more fluoride than the other types of wine. But the concentration of these did not exceed the permissive level of fluoride intake per day.

S.No	Type of wine	F- concentration(mg/L)	Detectable Level
1	Shiraz red wine	0.40	0.1
2	Merlot red wine	0.20	0.1
3	Chenin white wine	Below Detectable Level	0.1
4	Chardonnay sauvignon blanc white wine	Below Detectable Level	0.1
5	Rose wine	Below Detectable Level	0.1
6	Sparkling wine	Below Detectable Level	0.1
7	Fortified wine	Below Detectable Level	0.1

Limitation of the study: During the process of wine making, the ground water of that particular area is added to dilute and ferment the wine. This can be a major determinant in fluoride concentration in wines prepared from various parts of the country. Another limitation of the study is lesser number of samples.

CONCLUSION

The present study shows that there is a permissive amount of fluoride in some type and brands of wines commercially available in India. But these data, as well as several reports by other authors, confirm the fact that alcoholic beverages need to be considered as a significant source of fluoride delivered into the body. Even though it is in permissive amounts, and can be used as anti-cariogenic it can cause erosion if used excessively and wine drinking should be reduced or kept in minimal amounts. As wine production has evolved from a cottage industry to global networks of consumer-aware producers, so has science. The challenges to scientists are the same as those to producers: to meet the demands of an inquiring public on issues that require an international and multidisciplinary approach.

ACKNOWLEDGEMENTS

Acknowledge all the staff of the department

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-457-463

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Diagnosis and Management of Cracked Tooth- Decision Analysis

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ABSTRACT

Cracked tooth refers to an incomplete fracture of a tooth that may involve the pulp. Both vital and non vital teeth can develop cracks. The causative factors include previous restorative procedures, excess occlusal forces, developmental conditions that result in the formation of weakened tooth structure, trauma, etc. Most commonly involved teeth are the mandibular molars mainly due to the wedging effect of the maxillary mesio-palatal cusp onto the central fissure of the mandibular molar. The crack can involve the crown or the root of the tooth or both. It may be limited to the enamel, may involve dentin or can extend upto the pulp also. Diagnosis of this condition becomes challenging due to varied clinical features. Common symptoms involve pain on releasing the bite due to snapping of the segments or due to independent movement of the fractured segments. The patient has difficulty in identifying the offending tooth and may give a history of numerous dental procedures being performed which fail to relieve pain. This write up deals with the classification, epidemiology, diagnosis and management of cracked teeth, evaluation of crack, nature of symptoms, determining the prognosis and using current, short and long term strategies for successful management.

KEY WORDS: CRACK TOOTH SYNDROME, TOOTH FRACTURES, SPLIT TOOTH, CRAZE LINE, CRACKED CUSP, BITE TEST.

INTRODUCTION

Crack is a line on the surface along which it has split without breaking apart while fracture is cracking or breaking of the material (Ellis, 2001; Banerji, Mehta and Millar, 2017). Cracked tooth has been defined as "A fracture plane of unknown depth and direction passing through tooth structure that, if not already involving, may progress to communicate with the pulp and or periodontal ligament" (Ellis, 2001).Cracks on the teeth range from craze lines on the enamel to a split tooth to the vertical root fracture. This condition mostly occurs in patients aged 30 years to 50 years with an equal frequency of occurrence in males and females (Hiatt, 1975; Snyder, 1976; Ellis, Macfarlane and McCord, 1999). The most commonly affected teeth are mandibular second molars, followed by mandibular first molars and maxillary premolars (Braly and Maxwell, 1981; Ehrmann and Tyas, 1990; Ellis, Macfarlane and McCord, 1999).While the crack tends to orient mesiodistally in most teeth, it is seen extending buccolingually in mandibular molars (Türp and Gobetti, 1996).

Two patterns of crack formation have been put forth. The first occurs when the crack develops centrally and

ARTICLE INFORMATION

*Corresponding Author: nivedhitha@saveetha.com
Received 30th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/180

follows the dentinal tubules to extend into the pulp, the second occurs when the crack is peripherally located resulting in cuspal fracture. When pressure is applied to such cracks, the fractured segments separate resulting in movement of dentinal fluid, stretching and stimulating the odontoblastic process, thereby stimulating the nociceptors in the pulp. Five types of cracked teeth have been identified by The American Association of Endodontists in a document titled "cracking the cracked tooth code". They are- craze lines, fractured cusp, cracked tooth, split tooth, vertical root fractures.

We have numerous highly cited publications on well designed clinical trials and lab studies (Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019; Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019). This has provided the right platforms for us to pursue the current study. Our aim is to review the various clinical features that help in the diagnosis of cracked tooth and also discuss the various protocols for its management.

Clinical Features: Cracked teeth show varied clinical signs and symptoms based on the position and extent of fracture (Ritchey, Mendenhall and Orban, 1957; Ehrmann and Tyas, 1990; Hasan, Singh and Salati, 2015). The patient gives a history of discomfort, pain on biting or on consuming cold beverages. 'Rebound pain' on releasing the bite after chewing fibrous food is the most common feature (Cameron, 1964).The patient may have difficulty identifying the affected tooth as there are no proprioceptive fibres in the pulp chamber. The tooth is normally not tender to percussion and vitality testing shows a positive response (Ehrmann and Tyas, 1990; Lynch and McConnell, 2002). This crack may result in chronic pulpitis due to microleakage of bacterial toxins. Cracks with pulpal involvement may result in pulpal and periodontal symptoms. On clinical examination, a cracked tooth may show extensive intracoronal restorations (Geurtsen, 1992). The patient may also give a history of extensive dental treatments followed by occlusal adjustments or replacement of restorations which failed to relieve the pain.

Diagnosis: Since cracked teeth present with variable signs and symptoms, it becomes challenging to diagnose the case. Early diagnosis helps in successful restorative management with good prognosis. Crack tooth syndrome can be misdiagnosed as acute periodontal disease, reversible pulpitis, dentinal hypersensitivity, galvanic pain, sensitivity due to microleakage following composite resin restorations, pain due to hyperocclusion or parafunctional habits and orofacial pain.

Dental History: A thorough dental history may point towards the diagnosis of cracked tooth syndrome. The patient may give a history of long term dental treatment with repeated occlusal adjustments and replacement of restorations that failed to relieve the pain. The patient may also give a history of parafunctional habits and may show sensitivity to cold (Chong, 1989; Geurtsen, 1992).Sharp pain on releasing the bite is an important finding.

Clinical Findings: Running a sharp straight probe into the margins of a heavily restored tooth may elicit a sharp pain indicative of an underlying crack. Exploratory excavation of a restoration can be done to reveal an underlying crack. Clinical examination may show the presence of wear facets on the occlusal surfaces of the tooth, localised periodontal defects (when crack extends subgingivally). Rubber dam can be used to isolate the tooth to be examined for better visualisation of the crack with a distinct background and keeping the area saliva free. Other clinical methods of diagnosis are:

- **Periodontal Probing:** Helps in differentiating between cracked tooth and a split tooth. Localised periodontal defect is indicative of fracture line extending subgingivally. Split tooth can be revealed by isolated deep probing. Split tooth indicates a poor prognosis (Cameron, 1976).
- **Bite Tests:** Patients are made to bite on various items such as toothpick, cotton roll, rubber abrasive wheels, orange wooden sticks or commercially available tooth sloth (Ehrmann and Tyas, 1990). Biting causes the fractures segments to separate. On releasing the bite, the segments snap together eliciting pain.
- **Radiographs:** Use of radiographs for the detection of cracked tooth is questionable as fractures propagate parallel to the film in a mesiodistal direction. Fracture lines can be captured on the radiograph when they are in a buccolingual direction. Radiographs are used to evaluate pulpal and periapical status to rule out other dental pathology (Türp and Gobetti, 1996).
- **Vitality Tests:** Cracked teeth usually show positive results to vitality testing (Stanley, 1969). The tooth may sometimes show signs of hypersensitivity to cold stimuli due to underlying pulpal inflammation.
- **Dye Test:** Stains like methylene blue or gentian violet are used to highlight the cracks (Goose, 1981). After staining the tooth, it is temporarily restored. On removal of the restoration after 2-5 days, staining of the crack can be seen. Disadvantage of this technique is weakening of the tooth due to crack propagation and compromise in esthetic restorations.
- **Transillumination:** It is a very important diagnostic aid in the detection of an incomplete crack or complete vertical root fracture (Davis and Overton, 2000). This involves cleaning of the tooth followed by application of fiber optic light source. Cracks will block transmission of light and sound teeth will allow transmission of light throughout the crown. Transillumination has to be used with magnification because transillumination used alone will dramatize all cracks to an extent that craze lines will end up

appearing as cracks (Homewood, 1998).
- **Microscopic Detection:** Use of a clinical microscope with a magnification range between 14x to 18x will help evaluate enamel cracks (Trushkowsky, 1991).

Ultrasound is also capable of detecting cracks in the tooth structure and is coming up as a diagnostic aid (Liu and Sidhu, 1995). Indirect diagnostic techniques for the detection of cracked tooth syndrome are by using copper rings, stainless steel orthodontic bands and acrylic provisional crowns (Ehrmann and Tyas, 1990). Another indirect diagnostic method put forth by Banerji et al was placement of composite resin over the tooth without etching and bonding. The patient experienced improvement in discomfort on biting as the composite resin acted like a splint (Davis and Overton, 2000). Optical coherence tomography is a non invasive imaging modality which is being used for the detection of cracks. It is more reliable, accurate and a safer alternative compared to X-ray radiography. This is a newly proposed technology for accurately detecting the cracks. The limitation of this technique is that it can be used for detection of cracks in the coronal portion in which laser light can be irradiated (Lubisich et al., 2010).

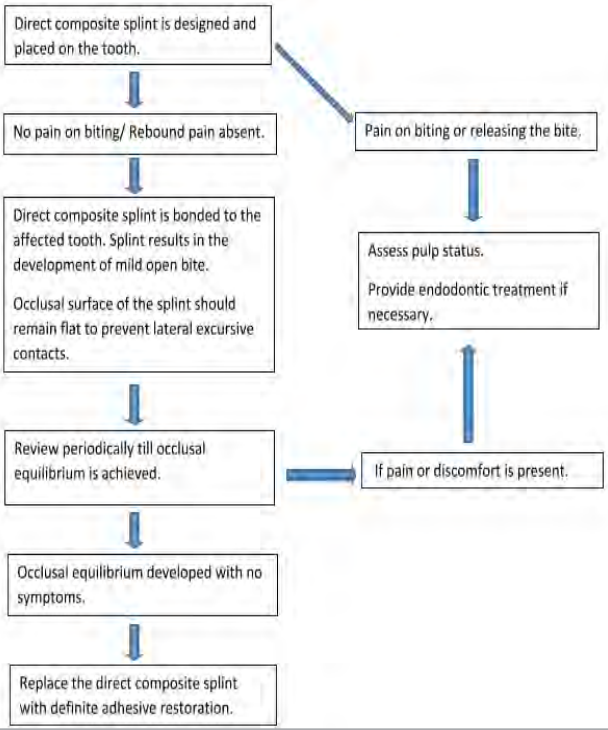
Management

A novel ultra conservative approach for the management of cracked tooth syndrome: This method involves the placement of bonded, direct supra coronal resin onlay restoration for the treatment of incompletely fractured teeth (Banerji, Mehta and Millar, 2017) [Figure1].

- Supra occlusal restoration prepared should be contoured flat to limit lateral loading.
- This non bonded composite splint has to be tried intraorally and confirmed for alleviation of symptoms of rebound pain from the diagnosed tooth.
- The tooth is cleaned and conditioned with 37% phosphoric acid prior to placement and curing of the composite resin.
- The occlusal surface of this restoration should result in slight disocclusion. Upon lateral excursion, posterior teeth are no longer in contact.
- Periodic evaluation is carried out every week.
- Once occlusion is equilibrated and no symptoms are present, the direct composite splint is replaced with definitive restoration.
- Further follow up is carried out to check for outcome.

This technique provides conservative, effective, predictable, efficient and economical approach for short to medium term management of cracked tooth syndrome. With the advent of CADCAM technology, these onlay splints can be designed chairside once the diagnosis of cracked tooth syndrome has been established. Different protocols have been advocated for the management of cracked tooth syndrome which involve removal of the fractured cusp followed by restoration of the defect, subtractive occlusal adjustment to splinting or immobilisation of the affected tooth (Banerji, Mehta and Millar, 2017) [Figure 2]. While removing the fractured cusp, care has to be taken as there is a risk of attenuation of the fracture plane. Subtractive occlusal disocclusion will not avoid flexing of the tooth on occlusal loading. Cusp reduction followed by restoration with an overlay will serve as an ideal treatment option.

Figure 1: Ultra conservative approach for the management of cracked tooth (Banerji et al 2017)



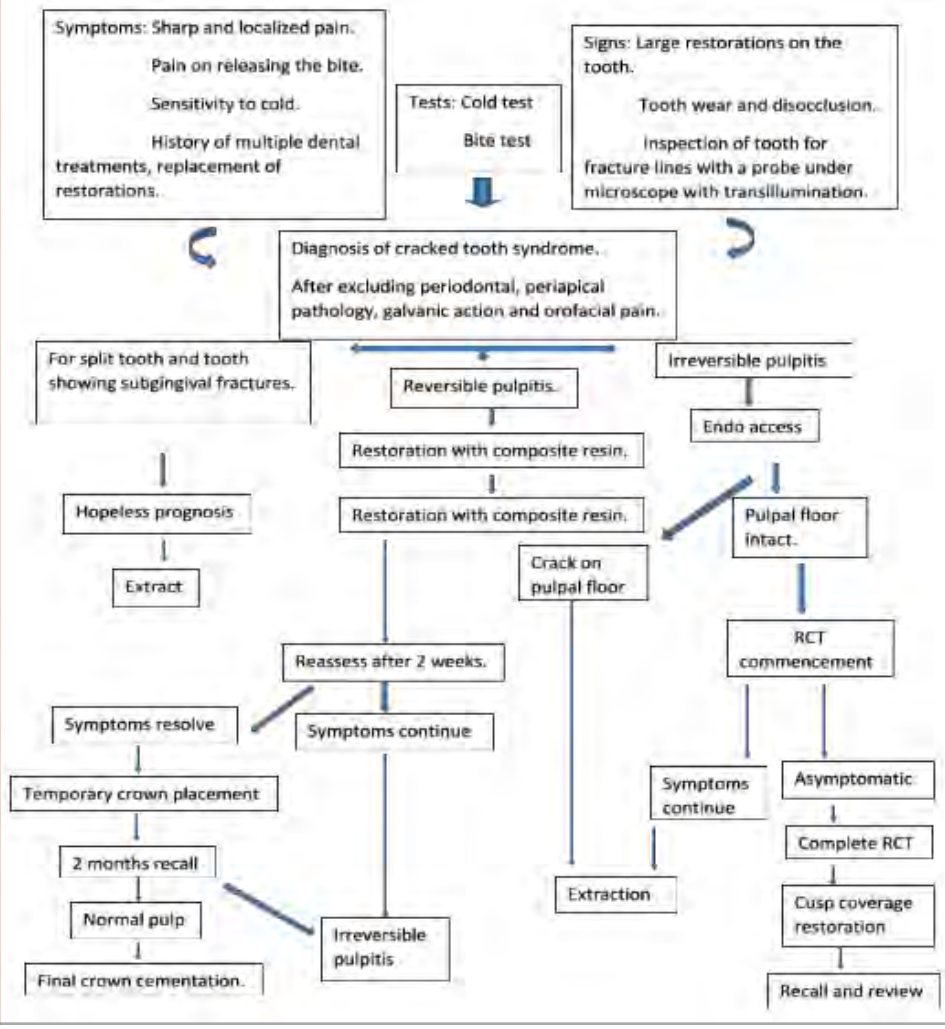
Immediate Management of Cracked Tooth syndrome: Unless the affected cusp has been separated off during removal of an existing restoration, acute management generally involves the use of immediate extra coronal circumferential splints (copper rings, orthodontic bands, provisional crowns) or by the application of direct intracoronal or extracoronal splints following tooth preparation (Ehrmann and Tyas, 1990; Clark, Sheets and Paquette, 2003) . Acute splints like copper rings and orthodontic bands when used, should be well contoured, adapted circumferentially and should not interfere with the occlusion (Ehrmann and Tyas, 1990).

Advantages of using acute splints are:
- They are economical
- Minimally invasive
- Provision for carrying out endodontic treatment when in situ.
- Disadvantages:
- Not always available with the practitioner
- Placement may cause discomfort
- Unesthetic
- Requires good skills and sound knowledge for correct placement.
- Causes food trapping within the bands.

Provisional crowns and inlays when used for splinting can provide effective means of immobilisation. Since the fabrication of these are time consuming, the delay can cause progression of the crack. Using these splints can cause pulpal trauma since the technique used is invasive.

Using intracoronal restorations in an incompletely fractured tooth will prevent independent movement of the fractured segments by anchoring the restoration to the cavity walls on either side of the fractured plane. It also helps in restoring intrinsic fracture toughness of the tooth.

Figure 2: Decision tree for diagnosis and management of cracked tooth



Adhesively retained silver amalgam restoration has been advised for successful management of cracked syndrome (Culjat et al., 2005).Some authors have even prescribed the use of direct resin bonded restoration for the same (Culjat et al., 2005; Banerji, Mehta and Millar, 2010). Intracoronal direct resin restorations have been proved less successful due to progressive breakdown of the adhesive interface with cyclical functional load. Cuspal contraction may also be seen as a result of polymerisation shrinkage which may result in further progression of the crack. Use of flexible polymer resins have been instituted for intracoronal restoration of an incompletely cracked tooth as it reduces contraction stresses and the risk of cusp fracture.

Long term management of cracked tooth syndrome: For a tooth with a crack that has extended into dentin, the fracture toughness of the tooth will have been reduced. Hence a restoration should be designed such that it provides both cuspal protection and limits the cuspal flexure (Banerji, Mehta and Millar, 2017). This is achieved by designing an onlay, overlay or crown (Hood, 1991; Imai et al., 2012). These restorations can be fabricated both by direct and indirect methods.

Direct Onlay Restorations: Direct onlays to treat incompletely fractured teeth can be formed using silver amalgam or composite resin (Davis and Overton, 2000; Opdam et al., 2008). With the advent of adhesively retained materials, silver amalgam overlays have been out of practice. Use of direct resin onlays have shown long term successful outcomes. It is esthetic and less invasive when compared to silver amalgam overlays(Opdam et al., 2008; Banerji, Mehta and Millar,

2010). Cusp reduction prior to the placement of resin restorations will reduce the leverage placed on it during occlusal loading and diverts the occlusal loads from the crack towards the axial walls contributing to longevity of the restoration.

Indirect Restoration: Provides superior mechanical properties within the oral cavity are requires less operator skills when compared to placement of direct onlay restoration (Azeem and Sureshbabu, 2018). The cusp angle should be reduced prior to the placement of occlusal coverage restorations to reduce the risk of lateral loading. The use of ceramic onlays to treat cracked tooth syndrome should be undertaken with caution because ceramic materials are brittle with increased tendency to fracture on loading. It has lower elastic modulus compared to composite resin which makes it absorb less compressive stresses when compared to composite resins. Hence it does not provide optimum shock absorbing properties, does not completely alleviate the pain and carries the risk of further crack propagation. Further intraoral adjustments with ceramics are also difficult.

Intraoral composite inlays provide good esthetics along with the merit of ease of adjustment and repair. The use of indirect composites has shorn long term successful outcomes. They also provide more conservative preparation when compared to full coverage restorations. However, full coverage crowns have been suggested to be the most suitable form of treatment for the management of cracked tooth syndrome. It provides resistance form that helps to dissipate occlusal forces over the entire prepared tooth as well as retention form that provides effective immobilisation.

Prognosis: Patients with cracked teeth have to be informed that the prognosis is questionable in order to prepare the patients for a potential failure since these fractures have a tendency to grow with time. The long term prognosis of cracked tooth is good when no crack is visible or the crack does not extend to the chamber floor and the tooth is rendered pain free by banding or placement of a temporary crown. In spite of a successful treatment, some cracks will continue to propagate resulting in a split tooth that requires extraction. Placement of cuspal reinforced restoration is certainly beneficial in many cases but does not guarantee success.

CONCLUSION

The patient with cracked tooth syndrome may present with varied signs and symptoms making the diagnosis challenging to a practitioner. A detailed dental history and a thorough clinical examination aids in the diagnosis of this condition. The most ideal technique for detection of this condition would be using transillumination under magnification. The earlier the condition is diagnosed, the easier it would be to treat and better would be the prognosis. This condition can be managed by either immobilization of the tooth, subtractive occlusal adjustment, reduction of the fractured crown or by providing intracoronal and onlay restorations. Recently, an ultra conservative technique of management has been proposed which uses supra occlusal restoration to disocclude the teeth.

Once occlusion is equilibrated, the supra occlusal restoration is replaced with a full coverage crown. Further studies have to be carried out to check the long term outcomes of this technique as well as to compare this technique with other alternative techniques in order to conclude any one as a superior technique. The prognosis of this condition depends on the severity and extent of the crack. More the subgingival extent of the crack, poorer the prognosis. The decision to save the cracked tooth by the practitioner comes from a thorough knowledge of this condition, proper diagnosis and skillful management.

ACKNOWLEDGEMENTS

Both the authors have equal contribution in bringing out this research work.

Conflicts of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-464-470

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Knowledge and Awareness About Different Layering Techniques of Composites and their Post-Operative Sensitivity Among Dental Students

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ABSTRACT

Esthetically pleasing restorations are much desirable in modern day conservative dentistry. Composite resins are currently the most popular tooth coloured restorative material. Despite excellent esthetic results, due to polymerization shrinkage they are prone to marginal leakage and thus sensitivity. To minimize the demerits, efforts are still made in terms of different layering techniques of composites. The aim of the study was to assess the knowledge and awareness about different layering techniques of composites and their post-operative sensitivity among dental students. A questionnaire comprising 10 questions were formulated with 5 questions relating to knowledge, 5 questions regarding awareness about different layering techniques of composites and their post-operative sensitivity. The questionnaire was then administered among 100 dental students including 50 male students and 50 female students. The responses were then subjected to statistical analysis. Frequency distribution and percentage and chi-square test were done to find the association between the response of each question with respect to gender.. The present study showed that even though the majority of students were aware about different layering techniques employed in composite restoration, the knowledge about specific techniques was still inadequate. Also, females had better knowledge and awareness as compared to males.

KEY WORDS: RESTORATION, ESTHETICS, COMPOSITES, SENSITIVITY.

INTRODUCTION

Patient expectations of esthetics have increased dramatically in the last decade. Introduction of polymerizing resins in the 1950s opened up new avenues for dentists and ever since remains one of the most popular treatments in dentistry. (Bohaty et al., 2013)

ARTICLE INFORMATION

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Received 24th July 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/181

Composite resins are currently the most popular of all tooth coloured restorative materials, which completely replaced silicate cement and acrylic resin as esthetic restorative material.

Composite restorative materials consist of a continuous polymeric or resin matrix in which a filler is dispersed. With the development of acid etch technique and dentin bonding agents, the marginal seal and bonding of composite to tooth structure has drastically improved, hence adding to the longevity of the restoration. (Cenci, Demarco and de Carvalho, 2005) Composite resins have several advantages. These are restorative materials that can bond well to the conditioned tooth surface. Being tooth colored, they are used to give natural appearance to the restored teeth. Tooth preparation for composite resin is very minimal when compared to amalgam

preparations and due to the bonding ; it reinforces the tooth improving its resistance form. (Coelho-De-Souza et al., 2008; Correa et al., 2012)

Despite recent improvements in adhesive dentistry, materials and esthetic demands of the patients have contributed to the frequent use of composite materials, post-operative sensitivity still remains a problem. (Gordan and Mjör, 2002) This complication is related to the polymerization shrinkage of the resin-based adhesive materials resulting in internal stress and gap formation, which are more prone to microleakage and post-operative sensitivity between the tooth and the material. (Opdam et al., 1998) previous studies have cited three most common reasons of postoperative sensitivity: polymerization shrinkage of the resin, microleakage around the margins of the restoration, and build-up of residual stress in the tooth after placement of direct composite restoration. (Deliperi and Bardwell, 2002; Tantbirojn et al., 2004; Kang et al., 2007; Arora et al., 2012)

Restoration placement techniques are universally recognized as a considerable factor in the modification of shrinkage stress. By maneuvering specific restorative techniques, stress resulting from constrained shrinkage may be scaled down. (Chandrasekhar et al., 2017) Administering the composite in layers instead of using a bulk technique is recommended to reduce shrinkage stress. Based on this theory, several layering techniques were developed which includes horizontal, vertical, oblique, stratified, split-increment, dual-shade, polychromatic layering techniques. (Tjan, Bergh and Lidner, 1992) It is widely accepted that incremental filling decreases shrinkage stress as a result of reduced polymerization material volume. Each increment is compensated by the next increment, and the effect of polymerization shrinkage is less damaging since only the volume reduction of the last layer can damage the bonded surface. (Giachetti et al., 2006)

Therefore, apart from selection of treatment and material, it is important to have knowledge about the techniques involved in material application. Literature search reveals studies assessing knowledge and awareness about different layering techniques of composites and their post-operative sensitivity among dental students are still lacking. We have numerous highly cited publications on well designed clinical trials and lab studies (Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019; Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019). This has provided the right platforms for us to pursue the current study. In lieu with the above, this questionnaire study has been designed to assess the knowledge and awareness about different layering techniques of composites and their post-operative sensitivity among dental students.

Table 1. Questionnaire to assess the knowledge and awareness about different layering techniques of composites and their post-operative sensitivity

QUESTIONS TO ASSESS KNOWLEDGE

1. Which layering technique utilizes different composite shades to replicate the layers of natural teeth?
a) Polychromatic layering technique
b) Bulk technique
c) Vertical layering technique
2. In which technique, series of wedge-shaped composite increments are placed and cured each increment?
a) Polychromatic layering technique
b) Oblique layering technique
c) Vertical layering technique
3. Do you think layering techniques are mostly used in posteriors?
a) Yes
b) No
4. What is the most common drawback of composite restorations?
a) Sensitivity
b) Pain
c) Dislodgement
5. What do you think as the most common reason for post operative sensitivity followed by composite restoration?
a) Polymerization shrinkage
b) Improper isolation during restoration
c) Due to the nature of material itself

QUESTIONS TO ASSESS AWARENESS

6. Are you aware about different layering techniques of composites?
a) Yes
b) No
7. Are you aware of the term C-factor?
c) Yes
d) No
8 Are you aware of the difference between vertical and stratified layering technique of composites?
a) Yes
b) No
9. Are you aware that incremental technique lowers the microleakage?
a) Yes
b) No
10. Are you aware of dual-shade layering technique?
a) Yes
b) No

MATERIAL AND METHODS

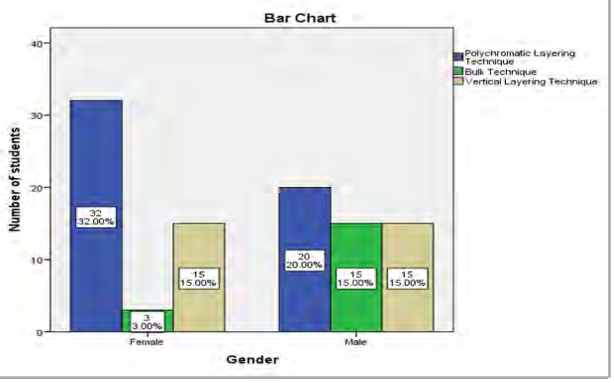
A questionnaire comprising 10 questions were formulated with 5 questions relating to knowledge, 5 questions

regarding awareness about different layering techniques of composites and their post-operative sensitivity. The study protocol was reviewed and approved by the Institutional Ethical Committee of Saveetha Dental College and Hospitals, Chennai. The questionnaire (Table 1) was administered among 100 dental students (50 males and 50 females) of Saveetha Dental College and Hospitals, Chennai. The responses were then subjected to statistical analysis using SPSS Software, Version 23. Frequency distribution and percentage were calculated for responses of the respondents. Chi-square test was performed to find the association between the response of each question with respect to gender. The level for a statistical significance was set at $p<0.05$. The results were demonstrated in the form of bar graphs.

RESULTS AND DISCUSSION

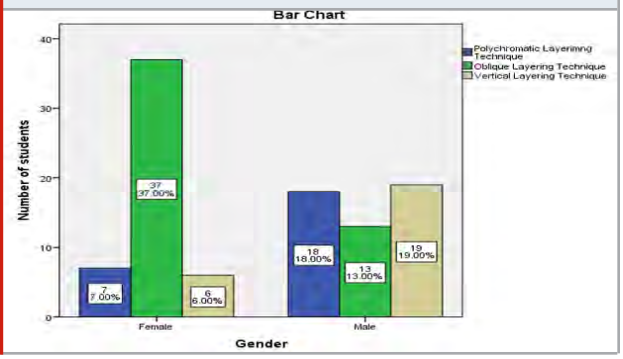
The present questionnaire study was conducted among dental students to assess the knowledge and awareness about different layering techniques of composites and their post-operative sensitivity. When knowledge was assessed among 100 study subjects, only 52% answered that polychromatic layering technique utilizes different composite shades to replicate the layers of natural teeth and 50% gave correct responses that series of wedge-shaped composite increments are placed and cured each increment in oblique layering technique. 67% of them thought layering techniques are mostly used in posteriors. 83% suggested sensitivity as the most common drawback of composite restorations; whereas pain and dislodgement were suggested by 7% and 10% respectively. Also, when a question regarding the most common reason for post operative sensitivity followed by composite restoration was asked; 78% opted polymerization shrinkage, 12% opted improper isolation and 10% opted nature of material.

Figure 1: Bar graph depicts association between gender and students response. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically significant (p=0.005). Females had better knowledge that polychromatic layering technique utilizes different composite shades to replicate the layers of natural teeth than males.



When awareness was assessed, 62% of them were aware about different layering techniques of composites and 60% were aware of the term C-factor. 75% of them were unaware of the difference between vertical and stratified layering technique of composites. Also, 10% of them were still unaware that incremental technique lowers the microleakage and 82% were unaware of dual-shade layering technique. The association between the response of each question with respect to gender was performed by chi-square test. (Figure 1-10) The success of a composite restoration depends on various clinical conditions like type of composite and bonding system, design of tooth preparation, method of filling the cavity (incremental/ bulk), time and type of finishing and polishing of composite restoration. Parpaiola AR et al suggested that the main cause of restoration replacement was composite shade discoloration (63.8%) followed by marginal staining (50%), unsatisfactory restoration anatomy (50%), marginal fracture (14.9%), painful symptoms (8.5%), fractured restoration body (4.3%), dental fracture (1.1%) and total displacement of the restoration (1.1%). (Parpaiola et al., 2009)

Figure 2: Bar graph depicts association between gender and students response. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically significant (p=0.000). Females had better knowledge that in oblique layering technique series of wedge-shaped composite increments are placed and cured each increment than males.



The composite resin contracts by about 1.5% to 5% and the mode of polymerization of composite resin is free radical polymerization.(Kwon, Ferracane and Lee, 2012) Significant polymerization shrinkage results in gap formation, secondary caries, marginal leakage and post-operative sensitivity. The layering technique of composite restoration has been recognized as the technique of choice to minimize polymerization shrinkage stresses. (Al-Negrish, 2002; Yamazaki et al., 2006) Literature search reveals numerous studies assessing knowledge towards composite restorations, factors affecting postoperative sensitivity of composite restorations among dental students and practitioners. (Sajad, Shafia and Sharma, 2018)(Pani et al., 2014; Akbar, 2015; Sajad, Shafia and Sharma, 2018) The present questionnaire study was conducted among 100 dental

students to assess the knowledge and awareness about different layering techniques of composites and their post-operative sensitivity.

Figure 3: Bar graph depicts association between gender and students response. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically significant (p=0.006). Females had better knowledge that layering techniques are mostly used in posteriors.

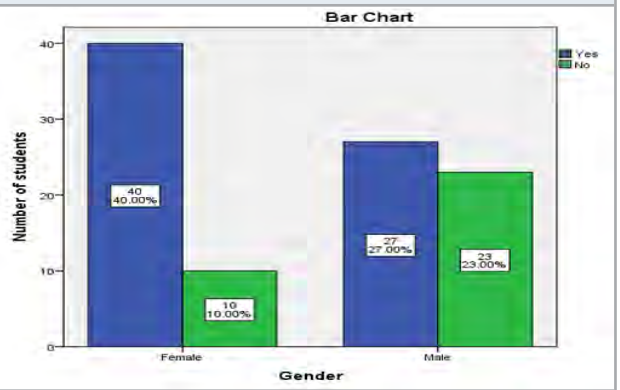
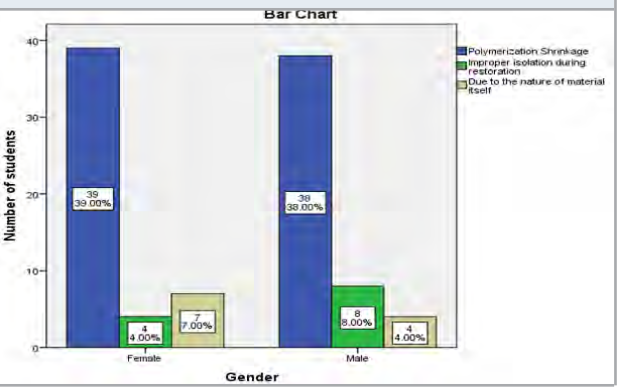


Figure 5: Bar graph depicts association between gender and number of students. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically not significant (p=0.339). However Females had better knowledge that polymerization shrinkage sensitivity is the most common reason for post operative sensitivity followed by composite restoration



In the present study, 83% suggested sensitivity as the most common drawback of composite restorations. This is in accordance with previous study among dental practitioners of the United Kingdom, by Gilmour AS et al, reported that 86% of them suggested postoperative sensitivity as the major issues related to composites. (Gilmour et al., 2009) Also, 78% opted polymerization shrinkage as the most common reason for post operative sensitivity followed by composite restoration in our study. This is in agreement with a previous questionnaire study by Akbar I et al to assess the knowledge and attitudes of general dental practitioners towards posterior composite restorations in northern Saudi Arabia, where

Figure 4: Bar graph depicts association between gender and number of students. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically not significant (p=0.176). However Females (45%) had better knowledge that sensitivity is the most common drawback of composite restorations.

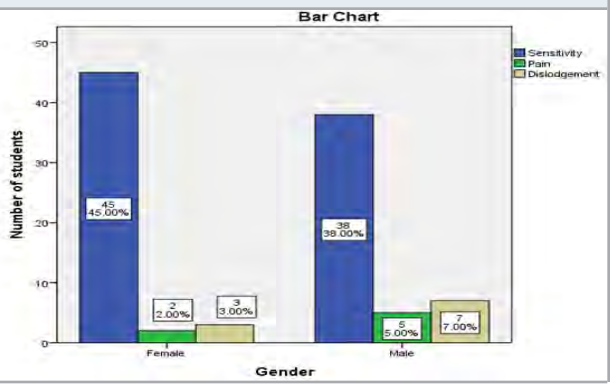
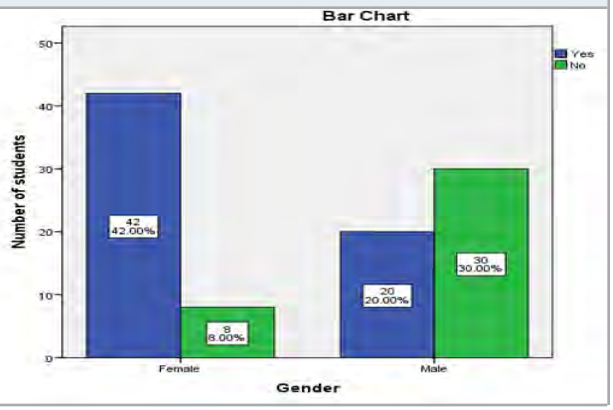


Figure 6: Bar graph depicts association between gender and number of student's awareness about different layering techniques of composites. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically significant (p=0.000). Females were more aware about different layering techniques of composites than males.



73% of them claimed polymerization shrinkage as an inherent problem with composites. (Akbar, 2015) When awareness was assessed in our study, 62% of them were aware about different layering techniques of composites and 60% were aware of the term C-factor. These findings are similar to a study among dental students by Pani SC et al. (Pani et al., 2014)

In the present study, 90% of them were aware that incremental technique lowers the microleakage. Sajad M in his questionnaire based survey among dental practitioners to assess knowledge and attitude towards composite restorations suggested that 95% of them preferred incremental technique for placement of composite. (Sajad, Shafia and Sharma, 2018) There are no studies in literature assessing the knowledge about layering techniques in composite restorations. To the

best of our knowledge, this is the first study to assess the same.

Figure 7: Bar graph depicts association between gender and number of student's aware about the term C-factor. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically not significant (p=0.221). When compared to males, females were more aware about the term C-factor.

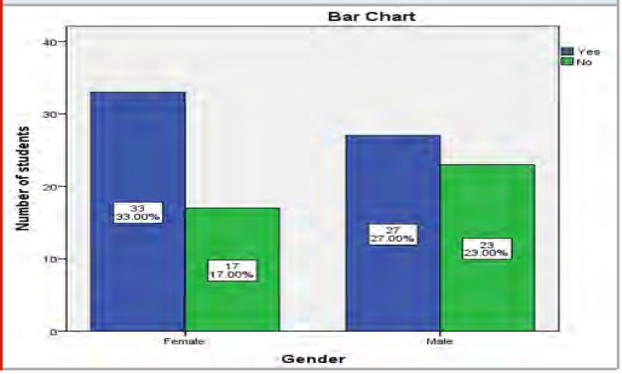
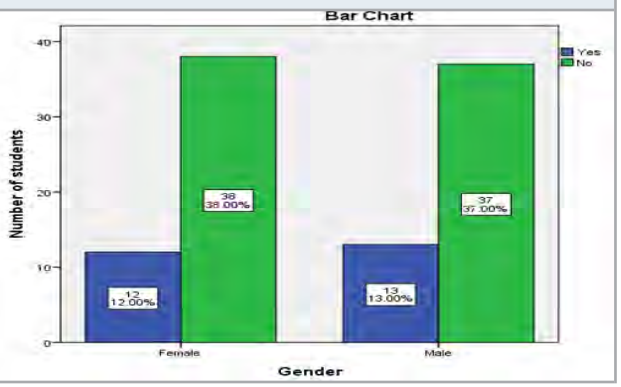


Figure 8: Bar graph depicts association between gender and number of student's aware about the difference between vertical and stratified layering technique of composites. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically not significant (p=0.817). When compared to males, females were more aware about the difference between vertical and stratified layering technique of composites.



CONCLUSION

The present study showed that even though the majority of students were aware about different layering techniques employed in composite restoration, the knowledge about specific techniques was still inadequate. Also, females had better knowledge and awareness as compared to males. Therefore, this study highlights that there is a need for continued education about the different layering techniques and its indications to avoid postoperative complications and to achieve better esthetics.

Figure 9: Bar graph depicts association between gender and student's awareness that the incremental technique lowers the microleakage. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically significant (p=0.046). When compared to males, females were more aware that the incremental technique lowers the microleakage.

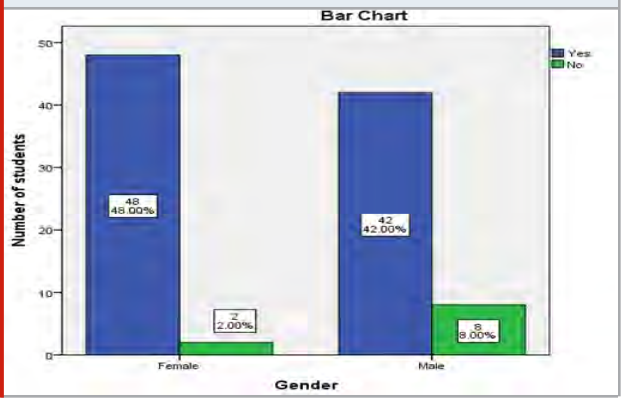


Figure 10: Bar graph depicts association between gender and awareness about dual-shade layering technique. X-axis represents gender and Y-axis represents the number of students. Chi-square test was done and found to be statistically not significant (p=0.603). When compared to males, females were more aware about dual-shade layering techniques.

ACKNOWLEDGEMENTS

The authors of this study would like to express their gratitude towards everyone who facilitated and enabled us to carry out this study successfully.

Conflict of Interest: There were no conflicts of interest as defined by the authors.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-471-476

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Knowledge, Attitude and Practice on CPR Among Dental Students

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ABSTRACT

Cardio Pulmonary Resuscitation (CPR) is one of the most important methods to save a person's life when they have undergone cardiac arrest. This is an emergency procedure that combines chest compression often with artificial ventilation which is used to supply continuous blood circulation to the brain and helps in breathing. CPR is majorly done due to medical emergencies but sometimes it was done due to dental emergencies too. There are possibilities where patients can undergo cardiac arrest in the dental chair and CPR could be a life saver. This study aims to assess the knowledge, attitude and practice on Cardiopulmonary Resuscitation among the dental students. This survey included 100 participants through survey monkey- an online survey. The participants' knowledge was analyzed by their responses to 10 questions which was selected pertaining to the topic, Cardiopulmonary Resuscitation. The result showed that even though most of them had good knowledge, it can be seen that they weren't confident enough to serve. Since most dental students lack practice and knowledge on CPR, there is a need for practise of CPR to the undergraduate students which helps them to gain more knowledge and improve in their career.

KEY WORDS: CPR, DENTAL STUDENTS, PRACTICE, BASIC LIFE SUPPORT, DENTAL EMERGENCIES.

INTRODUCTION

Basic life support (BLS) is a simple life saving method after a cardiac arrest. It is a very integrated method which involves ventilation and circulation until the cause is found and stopped (Alotaibi et al., 2016). Cardiac and respiratory arrest are the most common emergencies that doctors face in the hospitals in which complications and high death rate can be prevented by simple and clever technique (Devishree, Mahesh and Jain, 2018). The most common emergencies on dental chairs are syncope, postural hypotension, swallowed foreign bodies, anaphylaxis, cardiac arrest, bronchospasm, hypoglycemia and seizures (Ahamed and Kumar, 2016). Hence the dental practitioner should be a good communicator and be able to recognize the problems and also have an adequate knowledge of the medical emergencies and how to cope up with it (Haas, 2006). BLS consist of the following steps: initial assessment, airway maintenance, expired air ventilation (i.e.: rescue breathing; mouth-to -mouth ventilation) and at last chest compression (Somaraj et al., 2017).

Previous Studies on Basic Life Support were conducted on clinical students, dental interns, post graduate students

ARTICLE INFORMATION

*Corresponding Author: gayatri.physio88@gmail.com
Received 29th July 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/182*

and faculty which resulted that post graduate students and faculties having poor knowledge when compared to undergraduate students and dental interns. Lack of practice and knowledge on CPR can be the reason for dental faculties and postgraduate students (Gonzaga et al., 2003). Studies conducted on 6th year japan students resulted in 84% students not performing standard CPR. In Pakistan the students showed that significantly less students had skills on CPR. Study conducted on medical students showed that their knowledge on BLS was much shorter (Okonta and Okoh, 2015). In Saudi the female health college students were under presented and also they lack BLS knowledge and practice (Al-Mohaissen, 2017). It has also seen that more than half of the dental students were not able to perform cardiopulmonary resuscitation properly (Sharma et al., 2019).

Studies conducted for 126 dental interns and practitioners resulted in none having complete knowledge of BLS (Mohan et al., 2015). Previously our department has published extensive research on various aspects of physiological aspects (Harsha et al., 2015; Renuka and Sethu, 2015; Samuel and Devi, 2015; Swathy and Sethu, 2015; Choudhari and Jothipriya, 2016; Dave and Others, 2016; Fathima, 2016; Ilankizhai and Devi, 2016; Baheerati and R, 2018; R and Sethu, 2018; Shruthi and Preetha, 2018; A. J. Priya, Devi and Others, 2019; Iyer, Devi and Priya, 2019; J. Priya, Devi and Others, 2019; Timothy, Devi and Priya, 2019) this vast research experience has inspired us to research CPR. As the number of deaths increased due to lack of awareness about CPR, this study was aimed to assess the knowledge, attitude and practice of CPR among dental students and prevent such disasters from occurring.

MATERIAL AND METHODS

This cross-sectional study was conducted in Saveetha Dental College and Hospitals which was conducted by assessing responses to the 10 selected questions which was created pertaining to Cardiopulmonary Resuscitation. The survey was carried out among 100 dental college students. The aim of this study was explained in detail to the participants and a questionnaire was circulated through an online survey link where they had to submit their responses. Data was collected and analyzed in statistics.

RESULTS AND DISCUSSION

In the present study, 74% of the dental college students responded that they were aware of CPR and 26% were not aware (Figure 1). Figure 2 asks the students whether they had undergone CPR training where 55% had gone for the training and 45% didn't. Figure 3 showed that whether the students had given CPR to a patient before, only 12% of them had given and 88% hadn't. Figure 4 is the types of CPR and 50% of the students had chosen 3 types and 50% had chosen 2 types. In figure 5 shows who should lead the procedure, 54% chose anyone who has knowledge of CPR and 46% chose only a dentist. Figure 6 shows the posture of the patient to whom CPR to be given and students of 64% had chosen that placing a stool underneath, placing a cardiac board and 36% students chose there's no particular posture. Figure 7 showed the rate of CPR to be given, 46% students chose 60-70 per minute and 54% students chose 100-120 per minute. Figure 8 showed the ratio of chest compression famed ventilation where 39% of students chose options containing 10:20 and 61% of people chose 30:2. Figure 9 showing the percentage of CPR as medical emergencies in dental practice and 32% chose its 0.3% whereas 68% chose its 50%. 77% of students said that this survey was very helpful and 23% of people didn't benefit, shows in figure 10. There was an association between gender and posture of CPR to be followed in the dental chair, the percentage of CPR as a dental emergency (Figure 11, Figure 12).

Figure 1: Pie chart showing the percentage distribution of the student's awareness on CPR. Majority of the participants 74% have answered yes (red), 26% have answered no (blue).

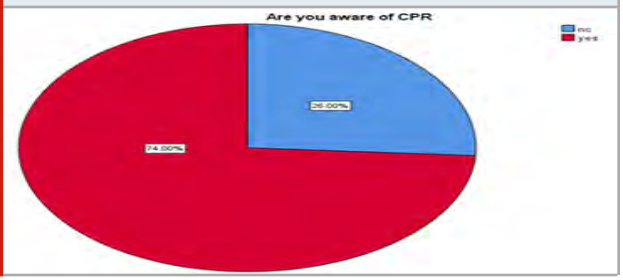


Figure 2: Pie chart showing the percentage distribution of students who have undergone CPR training. Majority of the participants 55% responded yes (red), 45% responded no (blue).

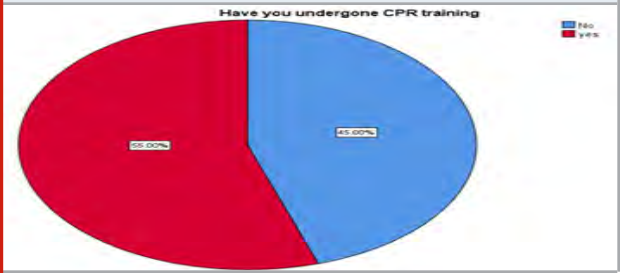


Figure 3: Pie chart showing the percentage distribution of student's experience on giving CPR. Majority of the participants 88% responded no (blue), 12% responded yes (red).

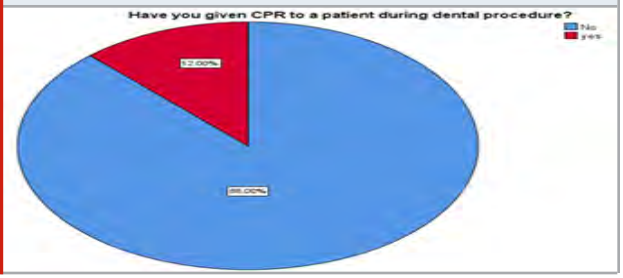


Figure 4: Pie chart showing the percentage representation of the participant's knowledge on types of CPR. Majority of participants 50% have answered 3 (red) and 50% have answered 2 (blue).

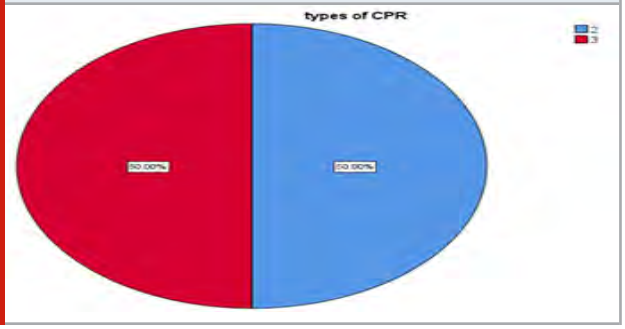


Figure 5: Pie chart showing the percentage distribution of the participants' knowledge on whom should lead the procedure. Majority 54% responded that anyone who has the knowledge (blue), 46% responded that only a dentist should lead (red).

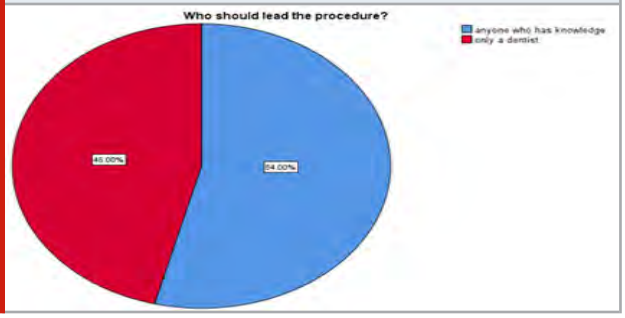
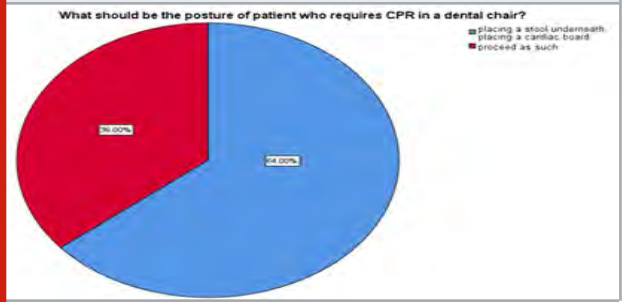


Figure 6: Pie chart showing the percentage distribution of student's knowledge on the posture of CPR on dental chair. Majority of the participants 64% responded that placing a stool underneath and using a cardiac board (blue), 36% responded to proceed as such (red).



Regina M. Carvalho et al stated the purpose of the spiral curriculum for revising the subject and also the assumption of confidence in students when they are more trained on basic life support. Undergraduate students visiting hospitals and giving Basic Life Support has helped them in improving the medical emergencies (Carvalho, Costa and Marcelo, 2008). The research resulted in there is lack of knowledge and practice which was also mentioned in AM Owojuyigbe et al where he stated the requirement of training in BLS (Owojuyigbe et al., 2015). Also in Mittal R Savaliya et al mentioned the need for training in management of medical emergencies (Savaliya, Vora and Gorynwala, 2016). Sangamesh et al stated that most of them were aware of BLS and had a positive attitude towards it (Sangamesh et al., 2017). Elanchelian et al also stated that there is a need for medical emergency training (Elanchezhiyan et al., 2013).

Figure 7: Pie chart showing the percentage distribution of student's knowledge on rate of CPR given. Majority of the participants 54% responded 100-120 per minute (blue), 46% responded 100-120 per minute (red).

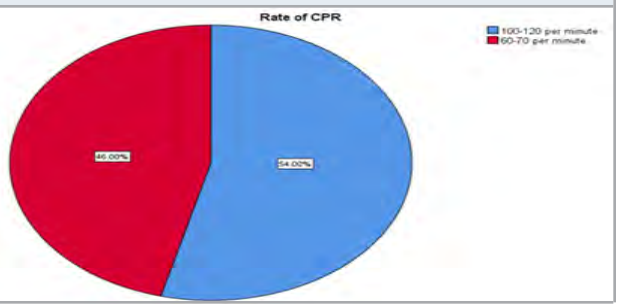


Figure 8: Pie chart showing the percentage distribution of student's knowledge on ratio of chest compression and ventilation. Majority of the participants 61% responded 30:2 (red), 39% responded 10:20 (blue).

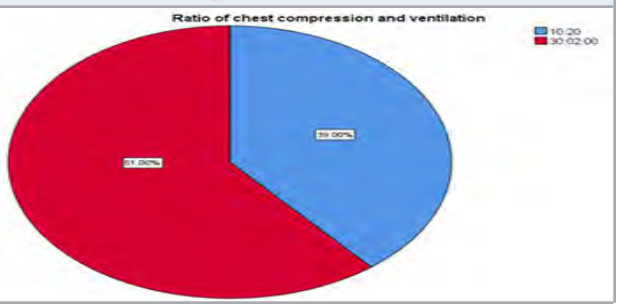
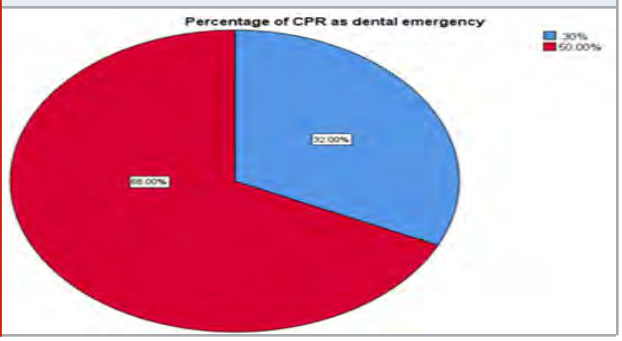


Figure 9: Pie chart showing the percentage distribution of student's awareness on percentage of CPR in dental practice. Majority of the participants 68% responded 50% (red), 32% responded 0.3% (blue).



Comparing with the result that Sudeep et al had obtained, more than 60% of the responders have scored below 50% (Sudeep et al., 2013). Dhage Pundalika et al mentioned that 57.9% had positive attitudes, 19% had good knowledge and 62.7% had average knowledge (Narayan

et al., 2015). Chew et al had stated that 29% mentioned to perform CPR under any circumstances of cardiac arrest, 69% said that they would call an ambulance and 16% of school teachers told that they would perform CPR (Chew et al., 2009). Ragava Sharma et al stated that all of the responders were aware of BLS and its usefulness, 44% of the medical interns scored less than 50% and 88% dental interns had poor knowledge (Sharma and Attar, 2012). Neha Baduni et al mentioned 25% were faculties, 14.42% were resident doctors and 30.77% were dental students. Among them none had good knowledge 26.96% has correct sequence neonates (Baduni et al., 2014). These previous studies and surveys had helped in understanding the lacunae and when compared to the survey done, it can be observed that similar results were obtained. This shows a lack of knowledge and practice of CPR and the need to increase the awareness among dental students.

Figure 10: Pie chart showing the percentage of student's thoughts on this survey whether it was helpful. Majority of the participants 77% responded yes (red), 23% responded no (blue).

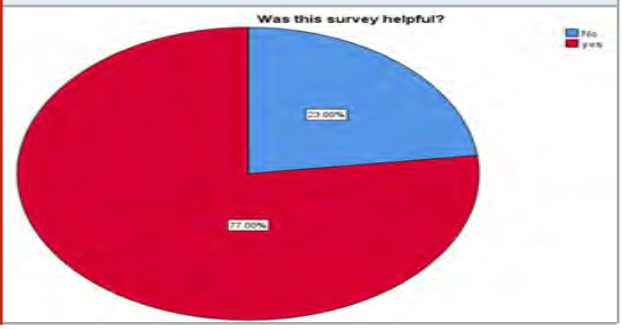
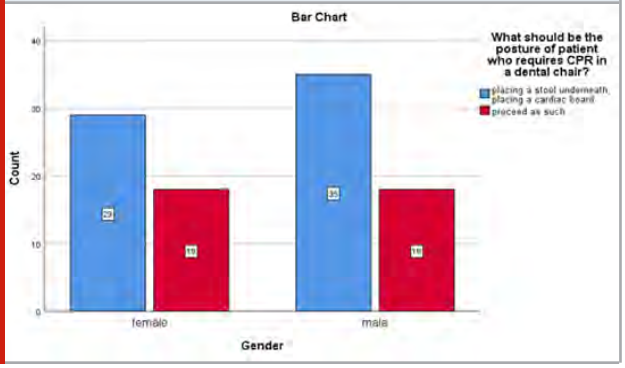


Figure 11: The bar showing the association between gender and the posture of CPR to be followed in the dental chair. X-axis represents the gender and Y-axis represents the number of respondes. Majority of the female participants have mentioned placing a stool and cardiac board underneath. p-value: 0.652 (>0.05) indicating statistically not significant.



CONCLUSION

From this survey, it is evident that the majority of them are aware about it but lack in practice. There is a need to increase the awareness among dental students thereby it can change their attitude where they become much more confident and increase their efficiency in practice.

Figure 12: The bar showing the association between gender and the percentage of CPR as a dental emergency. X-axis represents the gender and Y-axis represents the number of respondes. Majority of the male participants have responded 50% than female. p-value: 0.680 (>0.05) indicating statistically not significant.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the help and support rendered by the study participants for the accomplishment of the study.

Conflict of Interest: None declared.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-477-481

BBRC
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Knowledge and Awareness About Haemophobia and Trypanophobia Among Dental Patients in Saveetha Dental Hospital

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ABSTRACT

Haemophobia is generally defined as an irrational fear of blood. It is usually caused because of trauma experienced during childhood days. The basic symptoms of haemophobia includes sweating profusely, trouble in breathing, feeling nauseated around blood or injury, etc. Trypanophobia is the extreme fear of procedures involving needles or injections. This phobia can be learned or inherited. The main aim of the study is to assess the awareness about the haemophobia and trypanophobia among out-patients of Saveetha Dental College & Hospitals. A self administrated questionnaire comprising 10 questions was created with the help of a survey-planet website. A survey was created and was circulated among 100 dental patients and the responses were recorded in the form of graphs and pie charts. It was observed that trypanophobia & haemophobia were two prevalent fears persisting among almost all age groups. Almost 1/4th of the patients who were surveyed had negative childhood experiences related to blood and injections. From this survey, it is evident that haemophobia and trypanophobia may not seem to be very evidently observed among dental patients, it is important to treat and find a solution for such irrational fears.

KEY WORDS: HAEMOPHOBIA, TRYPANOPHOBIA, DENTAL PATIENTS, FEAR.

INTRODUCTION

Haemophobia and Trypanophobia are two different types of fears which are categorised as irrational kinds of fears. Haemophobia, commonly known as blood phobia, is an extreme, irrational and excessive fear of blood (Ditto et al., 2012). This is classified as a part of the subtype "blood-injection-injury" phobia (BII phobia). This sub-type also includes the other recurrent phobia, i.e., trypanophobia, otherwise known as fear of needles. Most types of specific phobias can cause an increase in heart rate & blood pressure. This can also instigate other symptoms like fainting on the sight of blood.

The blood-injection- injury phobia is found to be prevalent in only 3-4% of the general population (Wani et al., 2014). It has also been observed that this phobia occurs more often in younger age groups and less educated groups of the society (LeBeau et al., 2010). These phobic individuals, as a result, avoid hospitals, frequent dental check-ups and vaccinations, which can have adverse side-effects (Selvi et al., 2020). Both these phobias- haemophobia

ARTICLE INFORMATION

*Corresponding Author: gayatri.physio88@gmail.com
Received 30th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/183

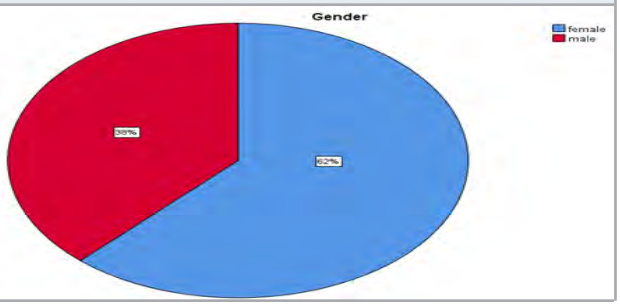
& trypanophobia are closely interconnected to dental phobia. The main root cause of these phobias is still not clearly understood. Researchers have identified that this may be an effect or outcome of genetic underpinnings or due to some traumatic experience that they must have been through in early stages of childhood (Page, 1994). Dental patients usually fear visiting dental hospitals due to the fear of being pricked by the doctor for application of local anaesthesia (Prabu, n.d.).

Symptoms exhibited by haemophobia and trypanophobia are roughly the same (Barlow and Ellard, 2018). The BII phobia involves symptoms such as turning pale, occurrence of profuse sweating, nausea and it might cause cardiac arrest in worst cases (Ayala et al., 2010). Various studies and researches conducted by our team (Fathima and Preetha, 2016)(Rj and R, 2016)(Iyer et al., 2019)(David et al., 2019)(Shruthi and Preetha, 2018) (Samuel and Devi, 2015) (Baheerati and Gayatri Devi, 2018)(Harsha et al., 2015)(Dave and Others, 2016)(Priya et al., 2019) (R and Sethu, 2018)(Swathy and Gowri Sethu, 2015)(Timothy et al., 2019). There is a lack in this current study. So the main aim of this study is to assess the awareness about the haemophobia and trypanophobia among out-patients in dental hospitals.

MATERIAL AND METHODS

This cross-sectional survey based-study setting was done through an online survey, among the dental patients of Saveetha Dental College. The usage of online surveys is time-saving & also involves a varied number of people. There were 100 participants involved in the survey. The sampling was done by the simple random sampling method. A questionnaire comprising 10 questions was posted on the online survey platform. The questionnaire validity checking was performed by consulting an expert. The data collection was done through Google forms and the data manipulation through MS Excel. The data obtained was plotted in the form of pie charts & bar graphs. Age and education were considered as independent variables whereas awareness about haemophobia and trypanophobia about it were in the list of dependent variables. Descriptive analysis and the correlation analysis by Chi square test was analysed using SPSS software.

Figure 1: The pie chart represents the distribution of gender. The red colour denotes male and blue colour denotes female. Majority of the participants were females (62%).



RESULTS AND DISCUSSION

In the present conducted study, the responses for each question were plotted and sketched in the form of pie-charts. The questions were basically categorised into three sub-parts: 4 general questions; 3 questions related to haemophobia; & 3 questions associated with trypanophobia. When enquired about the negative childhood experiences they have had with blood, 89% of the patients responded positively. Also, most of the patients have implied that they did not face any panic attacks or fear on the sight of needles, blood, or any other dental instruments placed ahead of them. 76% of the out-patients assume that these phobias are all irrational kinds of fear. In addition to that, the majority of the patients believe that this phobia can be treated.

Figure 2: The pie chart represents the distribution of fear of dentists among participants. Red colour represents yes and blue colour represents no. Majority of the participants have responded positively (63%).

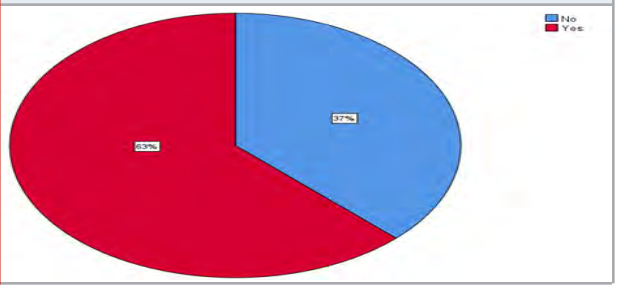
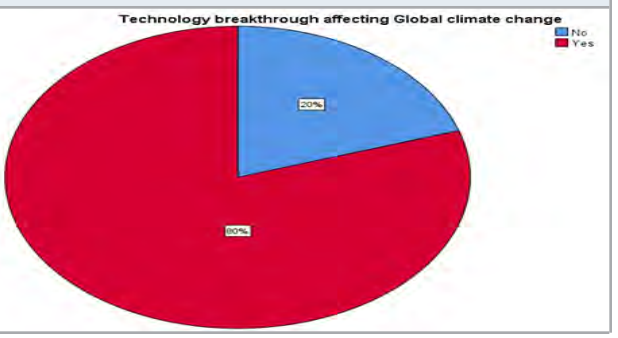


Figure 3: The pie chart represents the distribution of fear of extracting teeth among participants. Red colour represents yes and blue colour represents no. Majority of the participants have responded affirmatively (80%).



When inquired about the prevalence of fear of dentists among the participants,62% of females and 38% of males participated in this study (figure 1). 63% of the participants responded affirmatively (Figure 2). It was observed that 80% of the participants had fear of getting their tooth extracted (Figure 3). 85% of the dental patients feel dizzy on the sight of blood (Figure 4). 89% of the participants have had negative experiences related to blood in their childhood. (Figure 5). 76% of the respondents think that this phobia is an irrational type of fear (Figure 6). 70% of the participants of the survey have family members who are phobic to injections and

syringes (Figure 7). Majority of the participants have stated that they face anxiety or panic attacks on the sight of dental instruments or syringes (Figure 8). 63% of the dental patients assume that these types of phobias can be treated (Figure 9). The association between gender and the link between the prevalence of fear of dentists among patients was found, with the help of Chi square test. p is statistically more than 0.05, which is insignificant (Figure 10).

Figure 4: The pie chart represents the distribution of patients feeling dizzy on the sight of blood. Red colour represents yes and blue colour represents no. Most of the patients in the dental hospital have responded positively (85%).

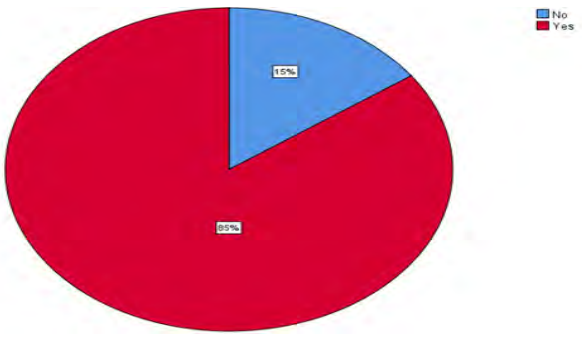


Figure 5: The pie chart represents the distribution of participants who had negative experiences related to blood during their childhood days. The red colour represents yes and blue colour represents no. Majority of the participants have responded positively (89%).

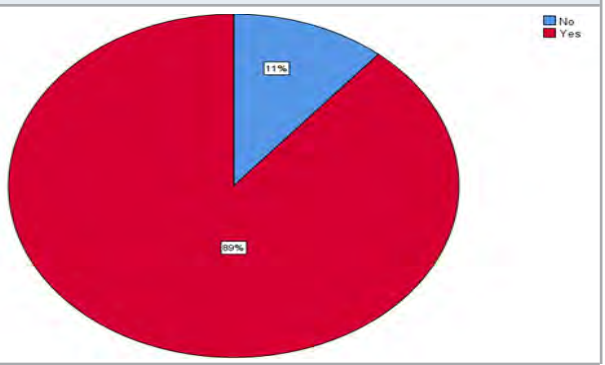


Figure 6: The pie chart represents the distribution of participants who think this fear is irrational or rational. The red colour represents irrational and blue colour represents rational. Majority of the participants have responded that this fear is irrational (76%).

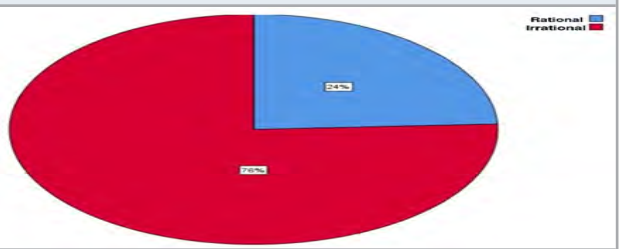


Figure 7: The pie chart represents the distribution of participants who have family members or friends who have fear of injections and syringes. The red colour represents yes and blue colour represents no. Majority of the patients have responded positively (70%).

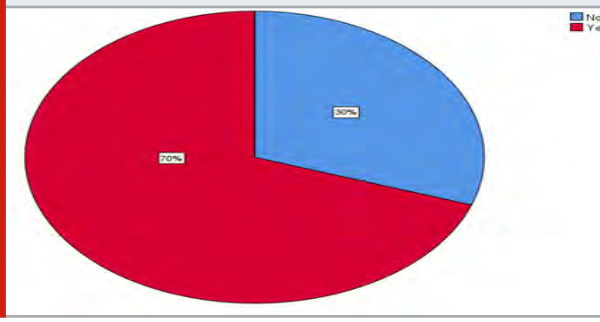


Figure 8: The pie chart represents the distribution of dental patients who face any anxiety or panic attacks on the sight of needles or injections. The red colour represents yes and blue colour represents no. Majority of the patients have responded positively (96%).

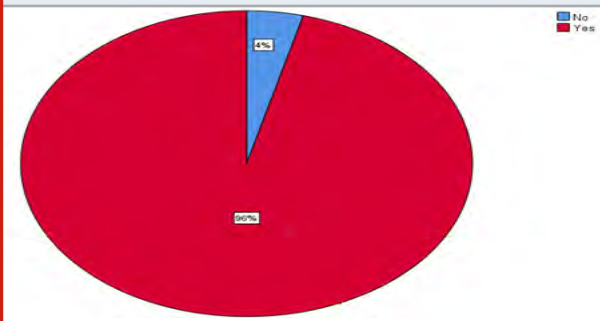
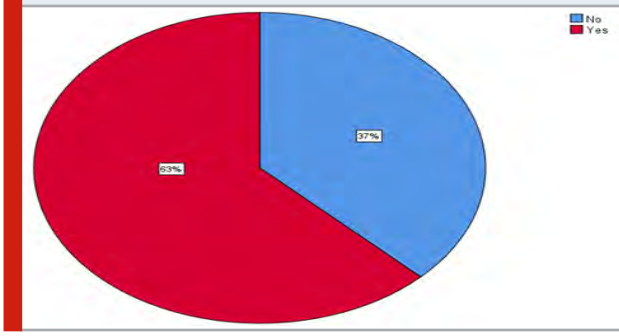


Figure 9: The pie chart represents the distribution of participants who think this phobia can be treated. The red colour represents yes and blue colour represents no. Majority of the patients have responded positively (63%).



Similarly, the association between gender and the dental patients who have had negative experiences with blood during their childhood was determined, and p is statistically more than 0.05 and hence is insignificant (Figure 11). When comparing the present study, some researchers and analysts had described the duration in which the phobia lasts (Bienvenu and Eaton, 1998). The lifetime prevalence of this phobia was only 3.5%.

Subjects with blood-injection-injury phobia had higher lifetime histories of fainting and seizures than those without. They also observed that prevalence of BII phobia was comparatively lower in elderly and higher in females and less-educated people.

Figure 10: The bar graph depicts the association between gender and the prevalence of fear of dentists among participants. The X-axis represents gender and Y-axis represents the number of responses. The blue colour code denotes no and red denotes yes. Females had more fear of dentists than males. Pearson chi square test shows p value is 0.847 (>0.05), which is statistically not significant.

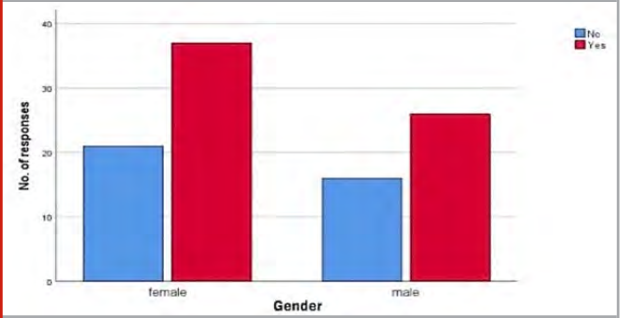
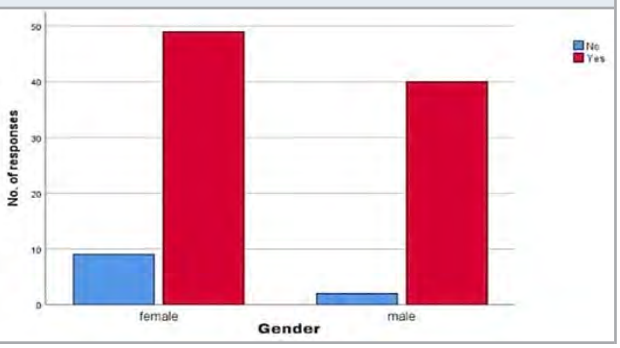


Figure 11: The bar graph depicts the association between gender and the dental patients who have had negative experiences with blood during their childhood days. The X-axis represents gender and Y-axis represents the number of responses. The blue colour code denotes no and red denotes yes. Females had more negative experiences related to blood than men. Pearson chi square test shows p value is 0.090 (>0.05), which is statistically not significant.



On the contrary, few others conducted research about the prevalence of blood and injection phobia among pregnant women (Lilliecreutz and Josefsson, 2008). They had observed that this phobia seemed to be relatively common and felt that it had to be recognised so as to avoid a great deal of discomfort and fear among pregnant women. Another study identified two phases of BII phobia, which is called a biphasic (or) a two-phase response of fainting (Agras et al., 1969). In the first phase, the phobic individual experiences anxiety, which leads to an increase in heart rate and blood pressure, which in turn causes the activation of the sympathetic nervous system. In contrast to this, the second phase results in a drop in heart rate, as mentioned before, or the vasovagal response, which is triggered by the vagus nerve as a part of the parasympathetic nervous system (Ritz et al., 2010).

CONCLUSION

From this survey, it revealed that prevalence of such fears is not much common among dental patients. Though it does not seem to be dreadful in the first place, it proves to be dangerous when present with other medical disorders.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the help and support rendered by the study participants for the accomplishment of the study.

Conflict of Interest: None declared.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-482-487

BBRC
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Awareness on Yoga and Pranayama Practice Among College Students- A Survey

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ABSTRACT

To create knowledge and awareness about yoga and pranayama practice among college students. Physical activities are running have been shown to improve mood and relieve stress. However, college students often have poor levels of physical activity. This was a survey based study and was conducted on an online forum, Survey Planet. A questionnaire based study with fifteen questions were circulated among college students.This survey was carried out among 100 college students. Data was summarised as the number and percentage.The results were obtained and statistically analysed through SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. The survey was conducted in the month of May, 2020. From this study, it was found that 50% of the students they never practiced yoga or pranayama in their life, so they are not aware know about the benefits of yoga, main reason for is due to lack of awareness about yoga and their busy work schedule plays a major role in their inactivity. Nearly, 30% of the college students have the habit of practising yoga and pranayama regularly , and still 70% of them are not aware about the benefits of practising yoga. From the survey it was also evident that ,males' perception towards yoga was different from females, where females preferred doing asanas in the morning, and males preferred meditation in the evening. Hence, it is important to create awareness among college students to develop the habit of practising yoga and pranayama to control their stress and other physical and mental ailments in an effective way.

KEY WORDS: YOGA, PRANAYAMA, COLLEGE STUDENTS, MEDITATION, STRESS.

INTRODUCTION

Yoga is a practice of uniting the mind and physical body as one. It combines breathing exercise, meditation, and physical positions. This combination is strongly believed to reduce many physical and mental ailments that are caused by stress. Participation of students in physical activity on a regular basis is one of the basic factors in maintaining proper health in modern society. Due to a sedentary lifestyle leading many health related issues, the prevalence of physical inactivity among college students calls for immediate action(Nguyen-Michel et al., 2006). Physical activity including yoga is a major key element in health improvements. The traditional expressions of yoga are firmly adapted and committed to the classic texts and expressed the concept of the eight limbs or other aspects of yoga.

Stress affects individuals mental health. It affects college students' mental, social, intellectual, physical health.

ARTICLE INFORMATION

*Corresponding Author: gayathri.sdc@saveetha.com
Received 23rd July 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/184*

College students will not always have the necessary stress overcoming skills and coping strategies. Physical activity is one coping strategy that is perhaps underutilized by many college students(Sharma, 2013). The mental and physical changes that express the efficacy of yoga to improve the stress management among college students have not been studied properly. Yoga reduces stress and eliminates negative effects among college students, improves mental health in them.

Yoga holds potential as a self-empowering, non pharmacological method for enhancing stress management, and wellness in college students(Sengupta, Chaudhuri and Bhattacharya, 2013). It was told that Pranayama training resulted in mental relaxation and decreased autonomic arousal, decreasing fluctuations at the time of isometric contraction(Vempati and Telles, 2002). It was found that it was a significant alteration in autonomic functions and mental status in both premenstrual phase when compared with postmenstrual phase among healthy females.

Yoga plays a major role in the management of hypertension, yoga together with relaxation, biofeedback, transcendental meditation, and psychotherapy, has been found to have a convincing antihypertensive effect(Anand, 1999). The mechanism of yoga and pranayama stimulate the blood pressure reduction and may contribute to beneficial effects on autonomic neurological function. Yoga asanas such as head up and head down tilt were found to be helpful in reducing hypertension. Many tests proved that improved renin angiotensin activity because of yoga practice. Yogic practice, through the restoration of baroreceptor sensitivity, caused a significant reduction in the blood pressure of patients who participated in yoga exercise(Brabant et al., 1986; Shetty, 2016).

It plays an important role in coronary atherosclerosis, Serum cholesterol levels show higher reduction as compared with control groups. It is evident in recent studies that yoga can control LDL cholesterol(Chitra, Krishna Reddy and Balakrishna, 2012) and hypertension. Revascularization procedures are required very less frequently in yoga practice. Follow up angiography after 1 year shows significantly more lesions regressed in yoga practice compared with control groups. Yoga exercise retards progression of atherosclerosis(Manchanda et al., 2003).

Obesity is a risk factor for many ischemic heart disease and hypertension. Yoga is very much helpful in the management of obesity. A study said that practicing yoga helped improvements in body weight(Chopra, 2012). Respiratory muscles are also similar to skeletal muscles. Yoga practice brings isometric contraction which increases skeletal strength. Breath holding techniques time depends on the amount of initial lung volume. Higher lung volume lowers the frequency and amplitude of the involuntary contractions of the respiratory muscles. Yoga practice results in an increase in maximum expiratory pressure, breath holding time after expiration, hand grip strength(Francina, 2010).

Yoga and pranayama practice plays a very major role in diabetic patients, Yoga is a simple and useful therapeutic modality that is considered as a beneficial therapy for non insulin dependent diabetes mellitus patients. In a population of diabetics who used to practice yoga regularly, there was a significant reduction in the effect of hyperglycemia in the oral glucose tolerance test curve. This experimental study showed that there was also a decrease in the need for oral hypoglycemic to maintain adequate blood sugar control in the population that practiced yoga(Jain et al., 1993).

Many studies have said women practicing yoga in their second trimester has significant reductions in physical pain. Women in their third trimester showed greater reductions in perceived stress and trait anxiety. From this, it is clear that yoga can be used to prevent or reduce obstetric complications(Beddoe et al., 2009).

Stress becomes a serious health issue nowadays because it affects physical and mental health of an individual. In yoga and pranayama activities such as relaxation, and exercise and meditation. As it appears as a good method to reduce stress and anxiety, yoga becomes a healthy measure to modulate stress response systems. This leads to decreasing physiological arousal such as low blood pressure, reducing heart rate. It has been said that individuals trained in yoga can achieve a state of deep psychosomatic relaxation associated with significant decrease in oxygen consumption within 5 min of practicing savitri pranayama(Nivethitha, Manjunath and Mooventhan, 2017).

Earlier reviews have reported that yoga is beneficial for people with cancer in managing symptoms such as fatigue, insomnia, mood disturbances and stress, and improving quality of life. Many cancer patients have experienced cancer related psychological symptoms, which includes stress(DiStasio, 2008). According to Carson's study of yoga for women with metastatic breast cancer,(Cohen et al., 2004) patients who practiced yoga longer are likely to experience relaxation themselves. Thus yoga and pranayama practice helps in maintaining an individual's total body mechanism in a proper state and also very helpful in controlling one's stress and anxiety to avoid mental problems.

Health experts told that after two months practicing pranayama medical students had reduced stress levels, and led to a decrease in stress score, highly significant, at the initial part of the study(Dhanvijay and Chandan, 2018). School-based yoga interventions may improve several factors that are relevant to academic performance, such as emotional balance, attentional control, cognitive efficiency, and a number of positive psychosocial outcomes(Cook-Cottone, Childress and Harper, 2019). Yoga brings together physical and mental disciplines that may help achieve peacefulness of body and mind(Thanalakshmi et al., 2020). Many studies revealed that both Yoga intervention and drug treatment helped hypertensives, but yoga intervention was the most effective(Preetha and Packyanathan, 2020).Thus,this

study has created knowledge and awareness about yoga and pranayama practice among college students.

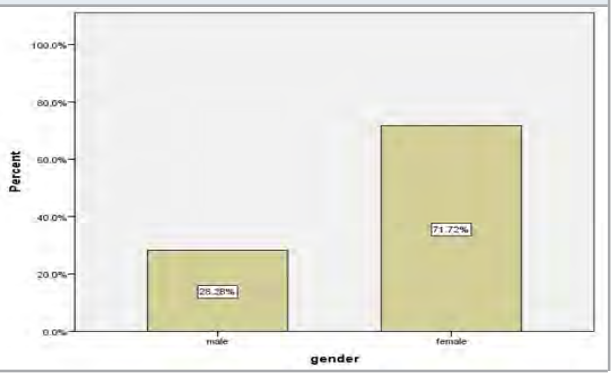
MATERIAL AND METHODS

The sample size of this study was 100 college students. The study group consists of 68 female and 29 male participants of age group between 17 to 25 years. The study was conducted in Chennai city. This was a questionnaire-based study. The survey questionnaire was prepared and administered through the survey planet to all participants. Participants volunteered for the survey and completed the survey link. The results were obtained and statistically analysed through SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. The survey was conducted in the month of May, 2020.

RESULTS AND DISCUSSION

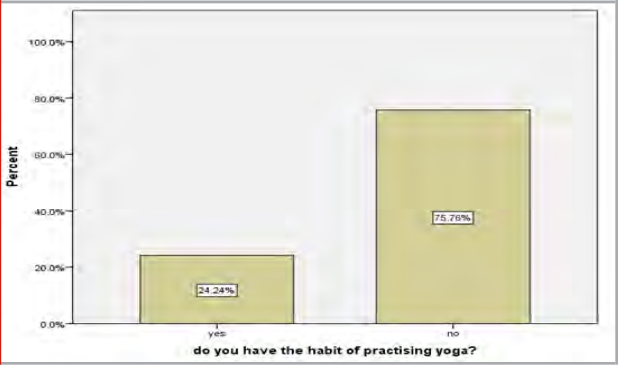
From this study it was observed that about 71.7% of females have the habit of practising yoga than males, males only 28.28% are used to practice yoga(fig 1). The main reason for more participation of females than males in yoga practice is most of the females are homemakers and they use their free time in practising yoga and they practised it as their regular habit and they used it more than males. In this study about 46% of them stated that they used to practice yoga because of their friends and family, while they chit chatting they used to talk about the benefits of yoga and pranayama, about 30% of them experienced yoga practice by attending public events and many public programs, about 24% of them knows yoga by Tv and magazines.

Figure 1: Bar chart depicting gender distribution of the participants. It shows 28.28% were Male, 71.72% were female who took the survey.



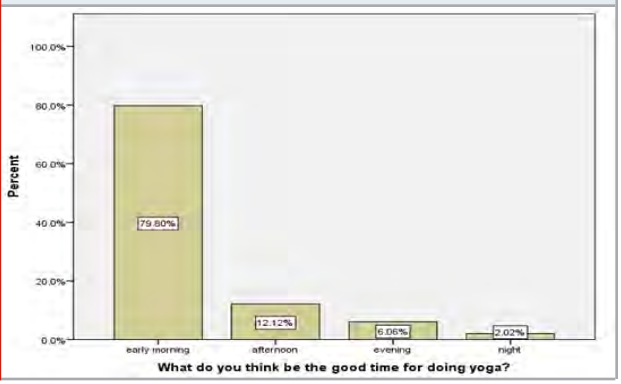
It was observed that about 75.7% of the participants did not have the habit of practising yoga the reason for this is most of them did not have the enough time for them to practice yoga in their busy schedule, about 24% of the participants have the habit of practising yoga cause they well known about the benefits of yoga and pranayama(fig 2). Yoga is very much important in maintaining stress and diet and it is very useful in preventing many cardiovascular problems, respiratory problems, and many other neurological problems.

Figure 2: Bar chart depicting distribution of yoga practice of the participants. It shows 24.4% of the participants have the habit of practising yoga, 75.76% do not have the habit of practising yoga.



About 79.8% of the participants stated that early morning is the best time for practising yoga, and 12% of those stated that afternoon is the best time to practice yoga, about 6% of them stated that evening is the best time to practice yoga(fig 3). In this study about 67% of them say that they did not purchase any specific clothing for doing yoga, about 33% of them have purchased specific clothing for doing yoga such as yoga mats, special clothings. About 74% of the participants have said that they consulted a professional therapist about yoga and 26% of them have not involved them in any consultation.

Figure 3: Bar chart depicting distribution of participants based on the good time of choice they feel to practice yoga . It shows 79.8% prefer early morning, 12% prefer afternoon, 6% prefer evening, 2% prefer night.



About 36% of them stated that yoga is good for the mind, 28% of them say that it is good for the body, 23% says that it helps in once fitness, 12% says that it is good for internal organs(fig 4). About 64% of them purchased a special yoga mat for their yoga practice, 36% of them did not purchase any yoga mat for their practice. About 51.52% of them stated that they have not practiced yoga in their lifetime, 21% of them says they have been practising yoga for past 10 years, 15% of them says that they have been practising yoga for past 5 years, 12% says that they have been practising yoga for past 15 years(fig 5).

Figure 4: Bar chart depicting distribution of participants based on the reason to practice yoga. 23.2% practise yoga for fitness, 28.2% practice yoga to keep body fit, 12% practice yoga as it is good for internal organs, 36.3% practice yoga as it is good for mind.

Figure 5: Bar chart depicting distribution of duration of yoga practice of the participants. It shows 15% of them practise yoga for 5 years, 21% of them practise yoga for 10 years, 12% of them practise yoga for 15 years, 51.5% of them never practiced yoga.

Figure 6: Bar chart depicting distribution of type of yoga practiced by the participants. It shows 34.3% of them do meditation, 20% of them do asanas, 6% of them do pranayama, 39.3% practice meditation, asanas, pranayama.

Figure 7: Bar chart represents the correlation of gender and habit of practising yoga. The X axis represents the question "do you have the habit of practising yoga?" and the Y axis represents the gender. Where the blue colour denotes "Male" and green colour denotes "Female". Females have the habit of practising yoga regularly than males . Chi square test was done and the association was found to be statistically significant (Pearson's Chi square value:80.331, p=0.00<0.05).

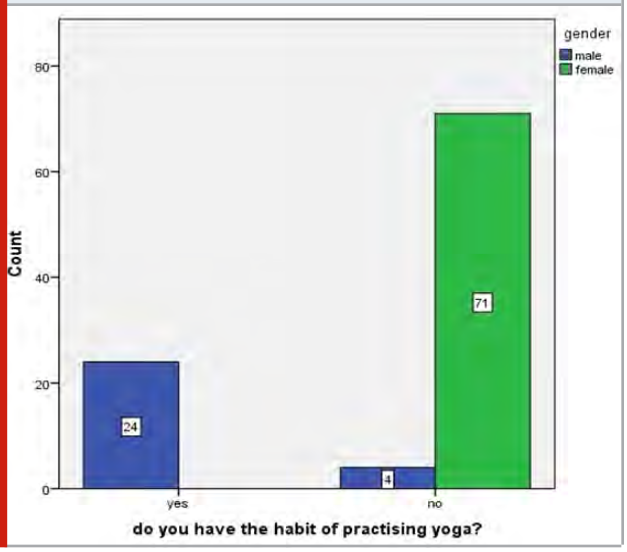
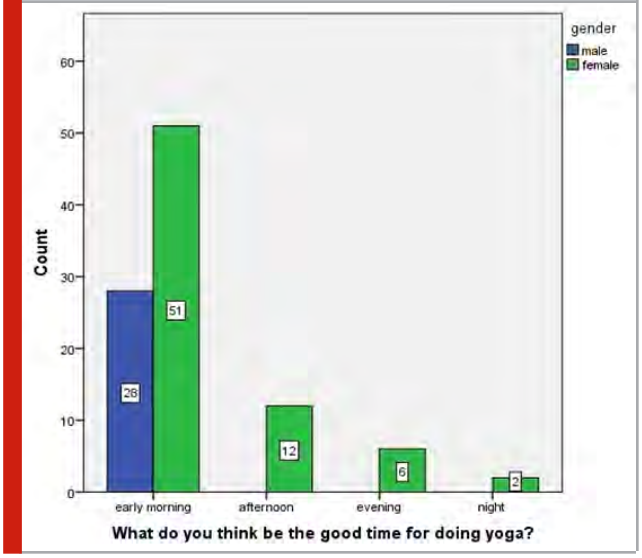
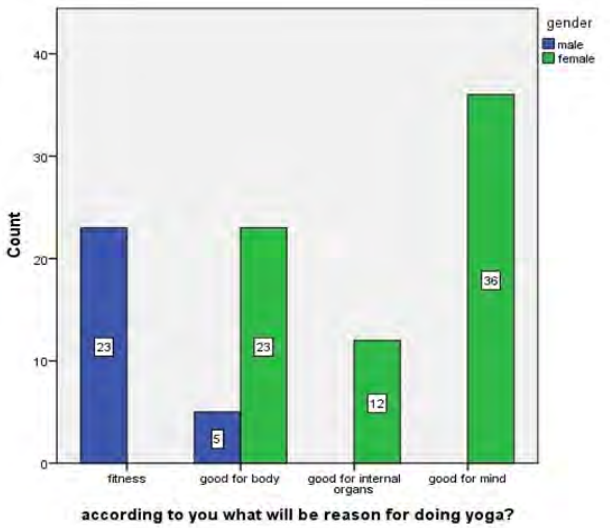


Figure 8: Bar chart represents the correlation of gender and habit of practising yoga. The X axis represents the question "what do you think would be the good time for doing yoga?" and the Y axis represents the gender. Where the blue colour denotes "Male" and green colour denotes "Female". Higher response for early morning yoga practice is seen among females. Chi square test was done and the association was found to be statistically significant (Pearson's Chi square value:9.884, p=0.02<0.05).



In this study 59% of the states that 1 hour is their daily yoga session, 19% used to practice yoga for 2 hours, 22% used to practice more than 2 hours daily. About 42% of them used to do meditation, 24% used to do asanas, 7% used to do pranayama, 27% used to practice all yoga practices such as meditation, asanas, pranayama(fig 6). About 78% of the participants are vegetarian and 22% of them are non vegetarian. About 60% maintain a healthy diet rest 40% of the participants are not maintaining a healthy diet. Females have the habit of practising yoga regularly than males and p value was found to be 0.00<0.05, statistically significant (figure 7). Higher response for early morning yoga practice is seen among females p value was found to be 0.02<0.05, statistically significant(figure 8). Males responded higher for fitness and higher response for good for mind is seen among females and p value was found to be 0.00<0.05, statistically significant(figure 9). Males have the habit of meditating, asanas are most commonly seen among females and p value was found to be 0.00<0.05, statistically significant(figure 10).

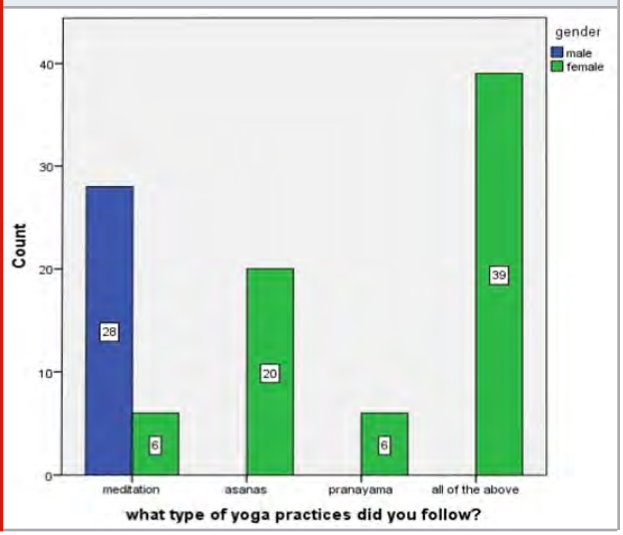
Figure 9: Bar chart represents the correlation of gender and habit of practising yoga. The X axis represents the question "according to you what will be the reason for doing yoga?" and the Y axis represents the gender. Where the blue colour denotes "Male" and green colour denotes "Female". Males preferred yoga for keeping them fit whereas the majority of females preferred yoga as it is good for mind. Chi square test was done and the association was found to be statistically significant (Pearson's Chi square value:78.752, p=0.00<0.05).



CONCLUSION

From this survey it was found that 74% of the participants did not have the habit of practising yoga, 33% stated that practising yoga is good for mind and soul. From the survey it was also evident that ,males' perception towards yoga was different from females, where females preferred doing asanas in the morning, and males preferred meditation in the evening. Yoga and pranayama

Figure 10: Bar chart represents the correlation of gender and type of yoga practice preferred by the participants. X axis represents the question "what type of yoga practice did you follow?" and the Y axis represents the number of male and female participants.Where the blue colour denotes "Male" and green colour denotes "Female". Males have the habit of meditating, whereas the majority of females prefer doing asanas. Chi square test was done and the association was found to be statistically significant (Pearson's Chi square value:74.640, p=0.00<0.05).



practice is very useful in maintaining a healthy lifestyle and to control cardiovascular, neurological, respiratory problems.The survey has created an awareness on the importance of practising yoga and pranayama among college students.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the help and support rendered by the Department of Biochemistry and the Management of Saveetha Dental College and Hospitals for their constant assistance with the research.

Conflict of Interest: None Declared.

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Knowledge and Awareness on the Importance of Tender Coconut Water-A Survey

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ABSTRACT

Tender coconut water is the clear liquid within a young fresh coconut. The benefits of coconut water includes reduced body heat, stomach pain and acts as digestive, applying in hair to promote hair growth. The aim of this study is to assess the knowledge and awareness of people about the importance of tender coconut water. A self-administered questionnaire comprising 10 questions was circulated to 100 people through an online google form. Before the study begins, the study detail was explained to the participants. The sample size of this study was 100. The data was collected and statistically analysed. In this study, 90% of the population were aware that tender coconut water hasn't had any effect on mental health and 10% of the population were unaware of it. Around 86% of the population were aware that tender coconut water contains antioxidant properties and 14% of the population were not aware that it contains antioxidant properties. The overall result was positive, most of them were aware of the importance of tender coconut water. This proves an outright positive result. Through this survey, the majority of people were aware of the importance of tender coconut water.

KEY WORDS: AWARENESS; BENEFITS, IMPORTANCE; POPULAR SPORTS DRINK ; TENDER COCONUT WATER..

INTRODUCTION

Tender coconut water is one of the popular sport drinks. Cold sterilization of tender coconut water was undertaken using hollow fiber ultrafiltration (Campos et al., 1996). The water from the tender coconut has a pleasant sweet taste and is a refreshing drink. The principal inorganic constituent of nut water is potash. Promoting use of tender nuts as a source of health drinks and nutrition food will open up new opportunities for improving profitability of coconut farming (Reddy, Das and Das, 2005). Coconut water (coconut liquid endosperm), with its many applications, is one of the world's most adaptable natural products. Coconut water is suppressed of many amino acids, nitrogenous compounds, inorganic elements, organic acids, sugars and their alcohols, vitamins, growth substances (Cytokines and auxins) and many other unknown components. Tender coconut water is rich in essential minerals, like, potassium, sodium and natural nutrients, like, polyphenol. Coconut water was evaluated as rehydration fluid in diarrhoea. This refreshing liquor is consumed worldwide as it is nutritious and good for health (Jayanti et al., 2010).

Coconut water is commonly used as a growth supplement in plant tissue culture. Previously our team conducted

ARTICLE INFORMATION

*Corresponding Author: gayatri.physio88@gmail.com
Received 29th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/185

numerous studies and reviews on upcoming topics (Samuel and Devi, 2015; Baheerati and Gayatri Devi, 2018,Fathima and Preetha, 2016, Rj and R, 2016, Harsha et al., 2015 , Dave and Preetha, 2016,Shruthi and Preetha, 2018). The broad applications of coconut water can be sustained by its rare chemical composition of sugars, vitamins, minerals, amino acids and phytohormones (Maciel, Oliveira and Silva, 1992). Chemical composition and biological properties of coconut water were extensively studied (Laorko et al., 2017). The biologically pure, tender coconut water helps to compensate fluids, electrolytes (potassium, calcium, and magnesium), and sugars lost from the body during heavy physical exercise. It is used as a blood plasma supplant as it is sterile and readily established by the body (Gajanayaka, no date). Tender coconut water contains excessively efficient against both gram- positive and gram-negative bacteria. The fresh coconut water has a shelf life of about 24 h (Reddy et al., 2005) and that can be enhanced by ultra-high temperature, pasteurization, refrigeration, freezing and microwave heating.

The tender coconut water has a strong tendency to undergo biochemical changes and spoilage, once the nuts are harvested from the tree. The use of coconut water resulted in longer sub-culturing time and the production of highly robust plants which were able to survive in greenhouse conditions. Tender coconut water has significant cardioprotective and antithrombotic effect in rats induced myocardial infarction. Tender coconut water showed potent hepatoprotective and antioxidant effects in carbon tetrachloride (CCl4)-intoxicated rats. Tender coconut water could inhibit and reverse high blood pressure, standardized antioxidant status and improve insulin sensitivity. Importance of tender coconut water reduces the body heat and stomach pain; acts as digestive; applying in hair to promote hair growth. Previously our team had conducted numerous studies and reviews on upcoming topics (Abigail et al., 2019; David et al., 2019 ,Choudhari and Jothipriya, 2016, Iyer, Gayatri Devi and Jothi Priya, 2019, Swathy and Gowri Sethu, 2015, R and Sethu, 2018 ,Timothy, Gayatri Devi and Jothi Priya, 2019) . The main aim of the study is to assess the awareness on the importance of tender coconut water among the population.

MATERIAL AND METHODS

A cross-sectional study was conducted with a self-administered questionnaire with a sample size of 100 participants comprising the general population. The questionnaire consists of questions that help in socio economic data, questions that help in providing awareness among the participants and also consist of the questions related to facts. The questionnaire was validated in the standard manner. Measures such as selection of participants randomly, steps to prevent asking irrelevant, placing restrictions over the participants are followed to minimise the sampling bias. The questionnaire was circulated using the online platform Google Forms. Descriptive analysis was carried out using the statistical software SPSS VERSION 2.0. The results were analyzed and represented in a pie chart.

Figure 1: Pie chart representing the percentage distribution of awareness among study participants regarding that tender coconut water has any effect on mental health. Minority of participants (10%) responded yes (blue), (90%) responded no (red) .

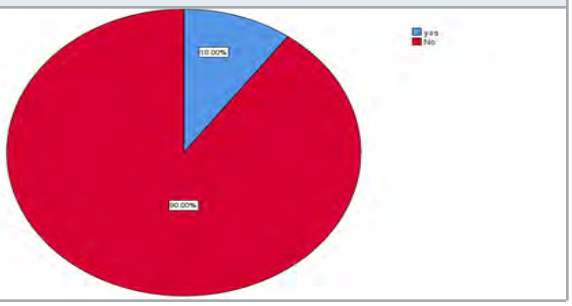


Figure 2: Pie chart representing the percentage distribution of awareness among study participants regarding that tender coconut water has any side effects. Majority of participants (85%) responded no (red) and (15%) responded yes (blue).

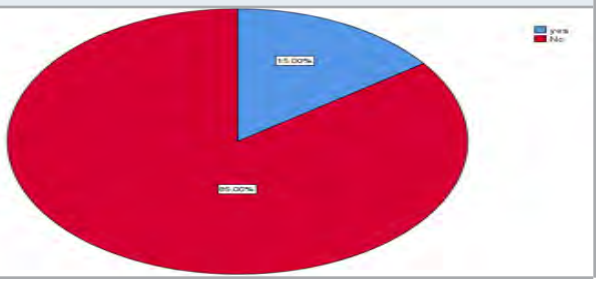
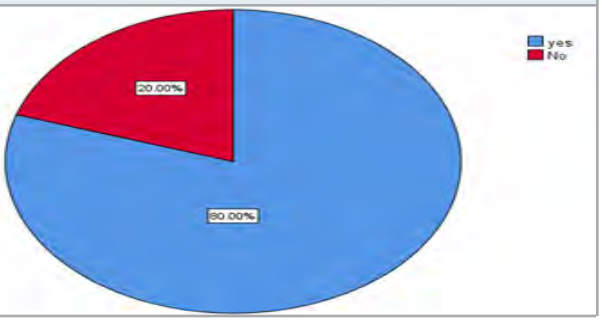


Figure 3: Pie chart representing the percentage distribution of awareness among study participants regarding whether over-drinking of tender coconut water leads to stomach upset. Majority of participants (80%) responded yes (blue) and (20%) responded no (red).



RESULTS AND DISCUSSIONS

In the present scenario, many of them were aware about the importance of tender coconut water. Majority 90% of the survey population were aware that tender coconut water hasn't had any effect on mental health (figure 1).

The similar findings were found in a previous study (Reddy et al., 2018). Around 85% participants were known that tender coconut water hasn't had any side effects (figure 2), which was similar to findings of the previous study (Ramaswamy and F, 2017). Around 80% of people were aware that over-drinking of tender coconut water leads to stomach upset (figure 3) which was similar to the statement proved in the previous study (V, Geetha and Bhavana, 2016). Around 65% of people were aware that the tender coconut water keeps blood pressure at normal range (figure 4) which was homogenous to the existing studies. 98% of the participants were aware that tender coconut water has an important role in blood pressure which was also stated by previous studies (Selvaraj et al., 2019).

Figure 4: Pie chart representing the percentage distribution of awareness among study participants regarding whether tender coconut water keeps blood pressure at normal range. Majority of participants (65%) responded yes (blue), (35%) responded no (red).

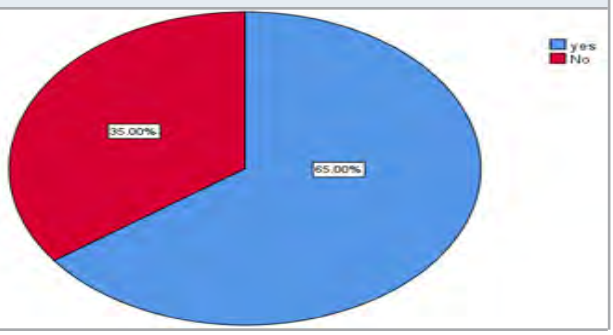
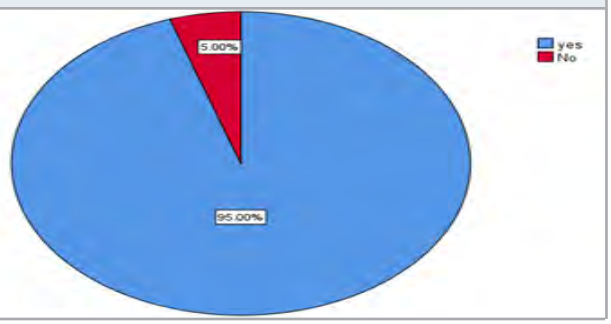


Figure 5: Pie chart representing the percentage distribution of awareness among study participants regarding whether tender coconut water reduced the stomach pain. Majority of participants (95%) responded yes (blue), (5%) responded no (red).



95% of participants were aware that reduced stomach -pain within 10mins (figure 5). which was similar to findings of the previous studies (Delfiya, Aniesrani Delfiya and Thangavel, 2016). 98% of participants were aware that tender coconut water reduced the body heat (figure 6). The similar finding was also found in a previous study(C et al., 2019). Around 70% of the participants were aware that taking tender coconut water in an empty stomach helps in kick-starting the metabolism (figure 7) shown by the previous study (C et al., 2019; Chutia et al., 2019). 94% of participants were aware that drinking tender coconut water helps in digestion (figure 8) which was proved by previous study (Chattopadhyay et al., 2013). Majority 86% of participants were aware that tender coconut water has antioxidant properties (figure 9), which was similar to the statement proved in the previous study(Prathapan and Rajamohan, 2011).

Figure 6: Pie chart representing the percentage distribution of awareness among study participants regarding whether tender coconut water reduced the body heat. Majority of participants (98%) responded yes (blue), (2%) responded no (red).

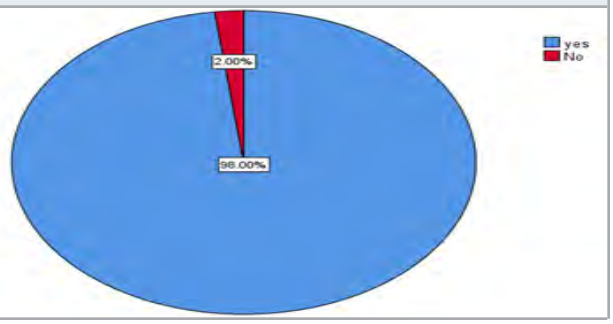


Figure 7: Pie chart representing the percentage distribution of awareness among study participants regarding whether taking tender coconut water in empty stomach helps in kick-starting the metabolism. Majority of participants (70%) responded yes (blue), (30%) responded no (red).

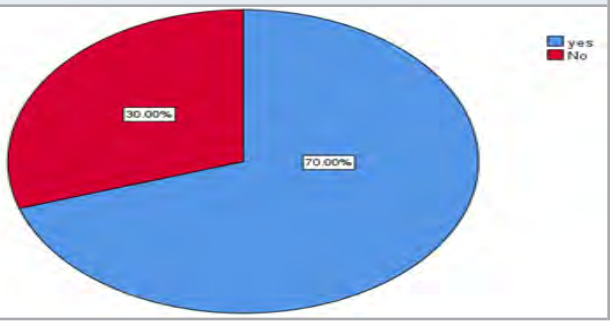


Figure 8: Pie chart representing the percentage distribution of awareness among study participants regarding whether drinking tender coconut water helps in digestion. Majority of participants (94%) responded yes (blue), (6%) responded no (red).

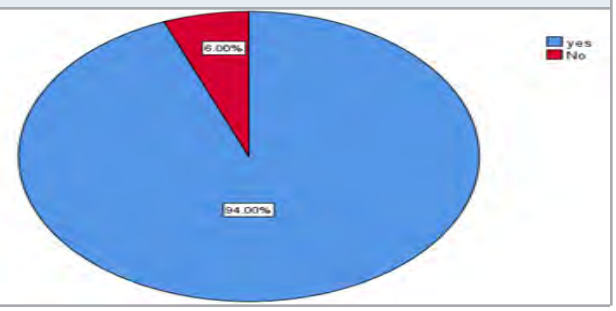


Figure 9: Pie chart representing the percentage distribution of awareness among study participants regarding whether tender coconut water has antioxidant properties. Majority of participants (86%) responded yes (blue), (14%) responded no (red).

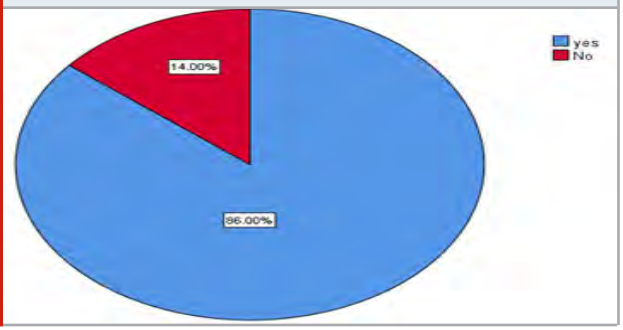


Figure 10: Pie chart representing the percentage distribution of awareness among study participants regarding whether tender coconut water helps to prevent kidney stones . Majority of participants (60%) responded yes (blue), (40%) responded no (red).

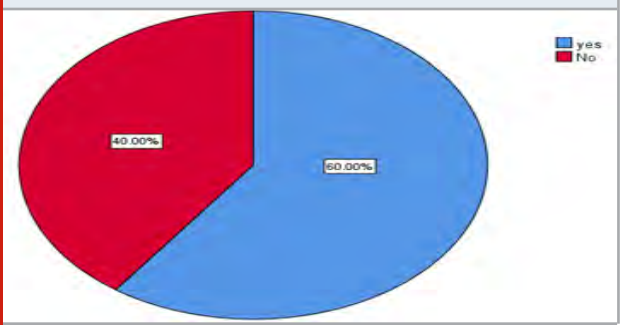
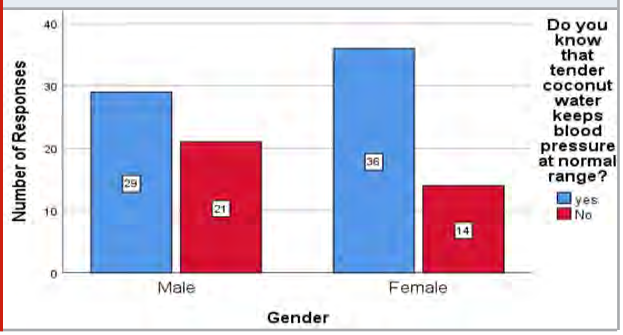
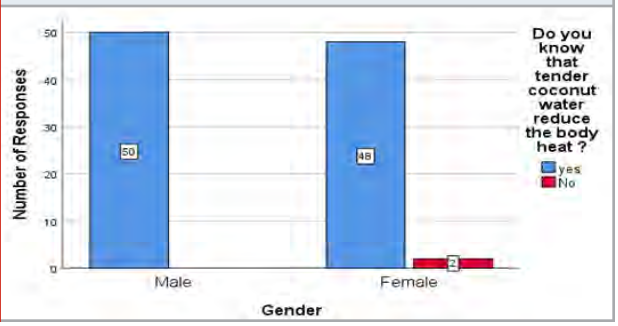


Figure 11: Bar chart represents association between gender and awareness of tender coconut water keeps blood pressure at normal range. X-axis represents gender and Y-axis represents the number of participants who were aware (blue) and not aware (red). Out of 65 participants who were aware, 36 participants constituted females and 29 participants constituted male. Females were more aware than males. Pearson's Chi-Square: 0.826, p value: 0.042 (< 0.05) hence statistically significant.



Around 60% of the participants were aware that tender coconut water helps to prevent kidney stones (figure 10), which was similar to the statement proved in the previous study (Zulaikhah and Wibowo, 2018). (figure 11). In this study, association between gender and awareness like tender coconut water keeps blood pressure at normal range was done using Chi-Square test. Out of 65% of the participants were aware, females were more aware than males (figure 12). Association between gender and awareness of the tender coconut water reduces the body heat as done using Chi-Square test. Out of 98% of the participants were aware, males were more aware about the tender coconut water reducing the body heat than males.The future scope to assess awareness about the importance of tender coconut water among the population.

Figure 12: Bar chart represents association between gender and awareness of tender coconut water reduces the body heat. X-axis represents gender and Y-axis represents the number of participants who were aware (blue) and not aware (red). Out of 98 participants who were aware, 50 participants constituted males and 48 participants constituted females. Males were more aware than females. Pearson's Chi-Square: 0.826, p value: 0.153 (>0.05) hence not statistically significant.



CONCLUSION

Based on this survey, it is evident that the majority of the participants were aware about tender coconut water importance. This study may help the people to gain knowledge on tender coconut and they tried to take regularly in order to maintain healthy life

ACKNOWLEDGEMENTS

We thank Saveetha Dental College for providing us the support to conduct the study.

Conflict of Interest: All the authors declare no conflict of interest in the study.

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Awareness on Pet Hygiene Among Pet Owners- A Survey

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ABSTRACT

Nowadays, humans show interest towards taming pets. Most of the pet owners are not aware of the proper hygiene practices to be followed while taming a pet, which leads to various health complications to the pet as well as the owner. The aim of this study is to assess the awareness of pet hygiene among pet owners.A questionnaire was prepared about pet hygiene and was uploaded through surveyplanet. A total of 100 participants who own a pet have taken the survey. The results were obtained and statistically analysed through SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. The survey was conducted in the month of May, 2020..From the survey , it was evident that dogs were the most prevalent type of pet seen in most households(65%). In a question regarding the pets bath cycle, 63% of the participants bathe their pets once in 15 days, 26% of the participants bathe their pets once in 30 days, 7% of the participants bathe their pets once in 2 months and 4% participants bathe their pets very rarely. 79% of the pet owners comb their pets.57% participants reported that their pets had hairfall. 83% of the participants toilet trained their pets. Even though pet owners are taking enough precautions, they are also taking risks by making their pets sleep with them, licking them. This survey has created awareness on the do's and don'ts when having a pet, improper hygiene of the pet may lead to illness of the pet as well as the owner.

KEY WORDS: PET; HYGIENE; INFECTION; BITE MARKS.

INTRODUCTION

Pet ownership is common today. Although the population varies by each region, studies indicate that in most of the countries the majority of household's own pets. Cats and dogs were frequently owned pets, but other species were also reported(Slater et al., 2008; Perrin, 2009; Murray et al., 2010).Animal ownership and interaction isn't discouraged by healthcare professionals, as various studies have found out that the mental and physical perks of pet ownership and companionship(Friedmann and Son, 2009), seen mostly among children(Poresky and Hendrix, 1990; Melson, Schwarz and Beck, 1997), the elderly(Raina et al., 1999) and immunocompromised individuals such as in AIDS patients(Carmack, 1991; Conti et al., 1995; Castelli, Hart and Zasloff, 2001). Pet ownership could have positive effects on human health.

ARTICLE INFORMATION

*Corresponding Author: gayathri.sdc@saveetha.com
Received 24th July 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/186

Benefits ranged from higher survival rates from myocardial infarction(Friedmann et al., 1980; Anderson, Reid and Jennings, 1992), a reduced risk of asthma and hypersensitivity reaction in children exposed to pet allergens(Nafstad et al., 2001; Ownby, Johnson and Peterson, 2002) during the primary year of life, a reduced risk of cardiovascular disease and better physical and psychological wellbeing in community dwelling older people(Friedmann et al., 1980; Anderson, Reid and Jennings, 1992; Headey, 1999). Companionship with pets could be an important factor for proper mental health and well-being (Saunders et al., 2017). Bonding with pets provides benefits to those with psychological problems by offering emotional support .

Pet ownership is a modifiable environmental factor because it's our choice to own pets or not. A recent study showed that the human–dog interaction through dogs' human-like gazing behavior increased human oxytocin , which has received increasing attention for its role in promoting positive social behavior and stress regulation, and its potential as a therapeutic intervention for addressing various aspects of psychiatric disorders(Endo et al., 2020). There are also things which are caused by pets such as people can contract a cornucopia of diseases, including brucellosis, roundworm, skin mites, E. coli, salmonella, giardia, ringworms, and cat-scratch fever and pets are second only to late-night noise as a source of conflict between neighbors(Herzog, 2011). All these benefits can be maintained only if we maintain our pet hygiene. Nowadays, people with pets are increasing day by day and people are not aware of the complications of not maintaining proper pet hygiene. This survey aimed at evaluating and creating awareness on pet hygiene among pet owners.

MATERIALS AND METHODS

Study Design: A survey was conducted among 100 pet owners ,to evaluate their knowledge and awareness on pet hygiene. The participants did the survey voluntarily. Ethical approval and informed consent from the participants were obtained. The study was conducted in the month of may, 2020.

Survey Instrument: The survey instrument which was a questionnaire was prepared after extensive review of the existing literature. The questionnaire was reviewed and amendments were made to improve clarity of the questions to eliminate ambiguous responses. The questionnaire consisted a total of 12 questions. The questionnaire was shared to the participants using online survey platform.

Data Analysis: Only completed surveys were taken for analysis and the incomplete ones were eliminated. The statistical test used is descriptive statistics. All the responses obtained were tabulated and reliability of the data was checked. The statistics done using SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant.

RESULTS AND DISCUSSION

A total of 100 pet owners have answered the survey. In a question pertaining to the type of pet owned commonly, dogs were the most prevalent type of pet seen in most households(65%) (Figure-1). In a question regarding the pets bath cycle, 63% of the participants bathe their pets once in 15 days, 26% of the participants bathe their pets once in 30 days, 7% of the participants bathe their pets once in 2 months and 4% participants bathe their pets very rarely(Figure-2). 79% of the pet owners comb their pets(Figure-3). Bathing and combing are done to avoid ticks and fleas on pets so that when in contact with pets, it doesn't get transmitted, ticks and fleas cause skin and hair disorders in both the pet and humans(Traversa, 2013). 57% participants reported that their pets had hairfall (Figure-4). 83% of the participants toilet trained their pets (Figure-5).

Figure 1: Pie chart showing distribution of responses to the question "What pet do you own" with Dog- 65% being the majority of responses followed by Cat-17%, Rabbit- 6%, Bird- 5% and Others- 7%. Blue colour indicates dog, green indicates cat, yellow indicates rabbit, purple indicates bird and red indicates others

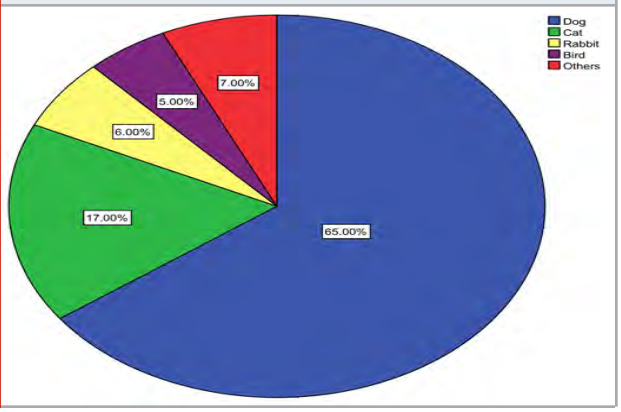


Figure 2: Pie chart showing distribution of responses to the bath cycle of the pets with Once in 15 days - 63% being the majority of responses, Once in 30 days-26% followed byOnce in 2 months- 7% and Very rarely-4%. Blue colour indicates once in 15 days, green indicates once in 30 days, yellow indicates once in 2 months and purple indicates very rarely.

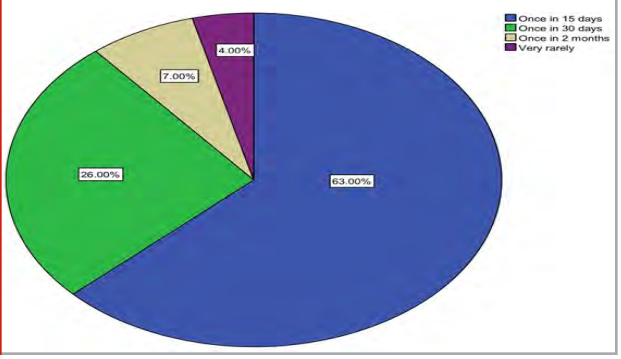


Figure 3: Pie chart showing distribution of responses regarding combing of pets in which majority of respondents -79% responded yes and 21% dint comb . Blue colour indicates Yes and Green colour indicates No.

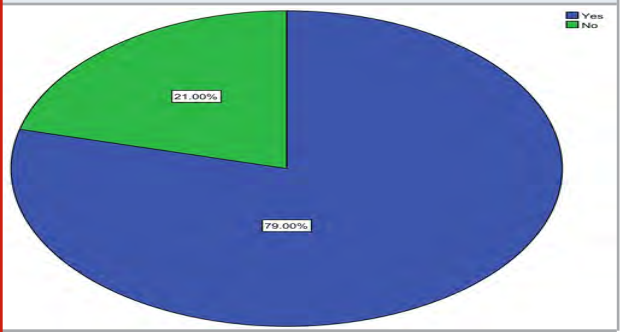


Figure 4: Pie chart showing distribution of responses regarding hair fall seen among pets in which majority of respondents - 57% responded yes and 43% said no. Blue colour indicates Yes and Green colour indicates No.

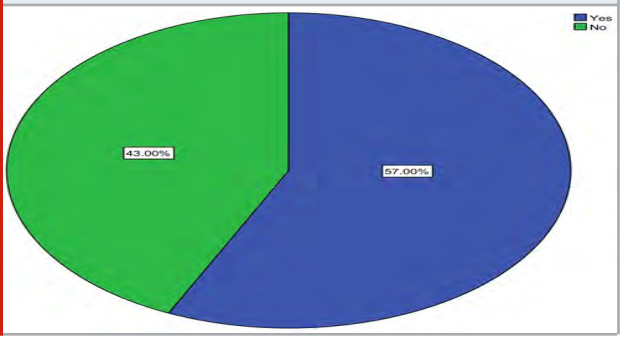
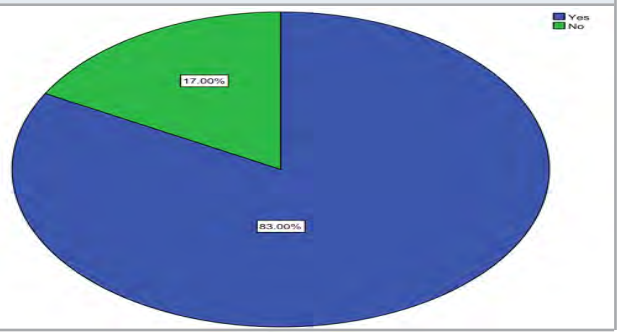


Figure 5: Pie chart showing distribution of responses regarding toilet training in pets in which majority of respondents - 83% responded yes and 17% said no. Blue colour indicates Yes and Green colour indicates No.



The next question was about whether the pets slept with the owners in which 67% of the participants responded yes and 33% said no(Figure-6). 64% of the pets lick their owners(Figure-7). Almost 65% of pets sleep with their owners and licking them can further increase pet associated disease risks(Mani and Maguire, 2009; Patronek and Slavinski, 2009). In a question related to health, 60% of the participants take their pets to the veterinarian once in a month, 26% of participants have taken their pets to the veterinarian once in 2 months, 11% participants have taken their pets to the veterinarian once in 6 months and 3% participants have never taken their pets to the veterinarian(Figure-8). The next question was about the vaccination of the pet in which 81% have answered yes and 19% have responded no(Figure-9). Vaccination against vector borne disease can save the lives of pets and humans(de la Fuente et al., 2015).

Figure 6: Pie chart showing distribution of responses regarding whether pets sleep with their owners in which majority of respondents - 67% responded yes and 33% said no. Blue colour indicates Yes and Green colour indicates No.

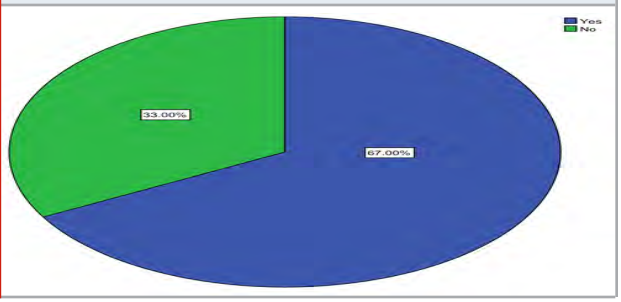


Figure 7: Pie chart showing distribution of responses regarding whether pets lick their owners in which majority of respondents - 64% responded yes and 36% said no. Blue colour indicates Yes and Green colour indicates No.

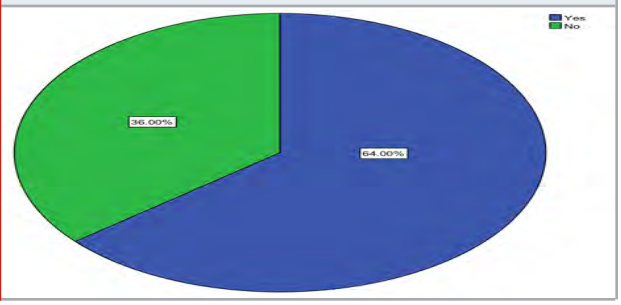


Figure 8: Pie chart showing distribution of responses to the question " How often do you take your pet to the veterinarian" with Once in a month - 60% being the majority of responses followed by Once in 2 months -26%, Once in 6 months- 11% and Never-3%. Blue colour indicates once in a month, green indicates once in 2 months, yellow indicates once in 6 months and purple indicates never.

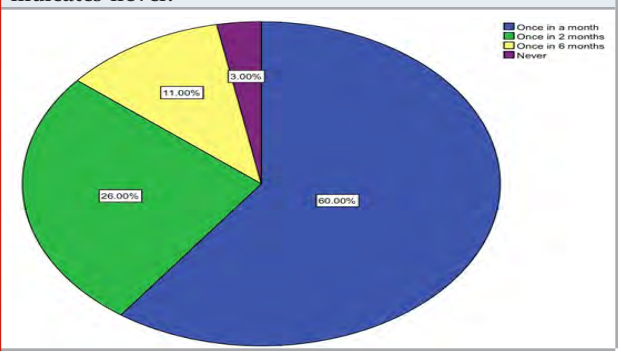
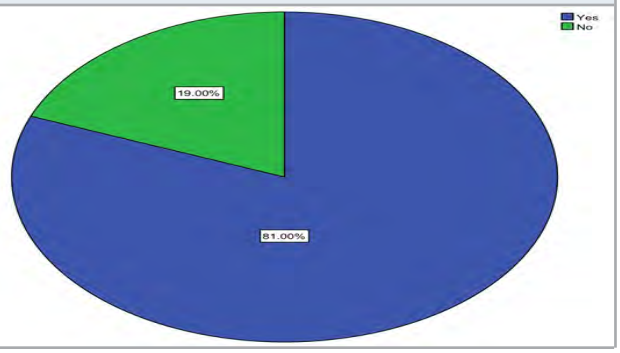
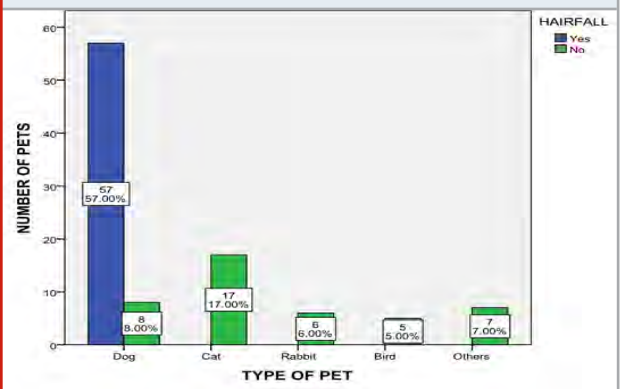


Figure 9: Pie chart showing distribution of responses regarding vaccination in pets in which majority of respondents -81% responded yes and 19% said no. Blue colour indicates Yes and Green colour indicates No.



Vaccination can even save the person from any bite from the pet so that there won't be any complications like painful disfiguring wounds, infection, altered function of the affected area, and rarely death. Animal scratches can also have important physical consequences depending on the area of the body affected(Westgarth et al., 2008). Dog and cat bites are common among pet owners which are the main sources of bacterial infections. The most common bacteria transmitted by cat and dog bites are Pasteurella multocida and Pasteurella canis but the oral cavity of dogs and cats contains lots of different microorganisms which are potentially pathogenic which can be found in every animal(Damborg et al., 2016). These infections can be avoided or the chances of getting these infections decreases if the pet is vaccinated(Monath, 2013). Correlation was done between the type of pet and hairfall seen with p=0.000(p<0.5) which is statistically significant showing that hairfall was most highly seen in dogs (Figure-10).

Figure 10- Bar graph showing association between type of pet and hairfall seen among pets. X-axis represents the type of pet and Y- Axis represents the number of pets . Blue color indicates 'yes' to hair fall and green indicates 'no' to hair fall. Dogs were the only pets to have the complaint of hairfall than any other pets and it was statistically significant.Chi square test was done showing chi square value=71.377 with p=0.000(p<0.5) which is statistically significant.



CONCLUSION

There are many health benefits associated with owning a pet. With pets, the owners get the opportunity to walk, socialize and relieve stress. Pets can also help manage the loneliness and depression among the owners.At the same time, if the owners don't take care of their pets hygiene, it can also lead to serious health hazards both for the pet and the owner. Thus a proper awareness has to be created on maintaining pet hygiene and its importance among the owners.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the help and support rendered by the Department of Biochemistry and the Management of Saveetha Dental College and Hospitals for their constant
assistance with the research.

Conflict of Interest: Nil

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-499-504

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Knowledge and Awareness About the Effect of Lemon Water Among Dental Students

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ABSTRACT

Lemon water is simply the juice of lemon mixed with water. Lemon water has become a popular morning beverage due to its excessive benefits and its properties. Lemon has antioxidant properties and it is usually consumed to reduce weight, maintaining skin tone and to optimise mood and memory. Over consumption of lemon water also has its own effect. The main aim of this study is to assess the awareness level on the effects of consumption of lemon water. A self administered questionnaire was prepared and distributed among 100 participants through an online survey. The study population included dental students. The data were then collected and analysed using SPSS and represented in pie charts and barcharts.Enamel erosion is the main effect of over consumption of lemon water. About 83% of dental students were aware that the acidic nature of enamel causes tooth erosion due to over consumption. Majority of the dental students were aware of the effect of lemon water and its cause. This survey is evident that the dental students third year students were more aware of the effects of overconsumption of lemon water on teeth. The consumption of lemon water among them on a regular basis is also less.

KEY WORDS: LEMON WATER, ENAMEL EROSION, ACIDIC NATURE, DENTAL STUDENTS, AWARENESS.

INTRODUCTION

Lemon is an important medicinal plant of the family Rutaceae. It is cultivated mainly for its alkaloids which have anti cancer and anti bacterial potential (Dhanavade et al., 2011). Lemon water is simply the juice from lemon mixed with water. Lemon juice has many important properties like it has protective activity against urolithiasis (Touhami et al., 2007). The lemon water blend also has an antioxidant potential (Gironés-Vilaplana et al., 2012). Apart from this lemon water consumption helps in reducing weight, maintaining skin tone and optimising mood and memory. Lemon and lime juice concentrates provide more citric acid per litre than any other citrus fruits (Penniston et al., 2008). These fruits with citric acid have erosive nature which affects the tooth surface especially enamel (Hooper et al., 2007). The erosive potential is also determined primarily by the ph and decrease in presence of salivary proteins. But overexposure of citric fruit water like lemon water on the tooth surface leads to monumental increase of enamel erosion (Jensdottir et al., 2006).

Earlier studies were made on the relationship between food habits and tooth erosion in Malaysian university students but this study mainly included acidic foods and

ARTICLE INFORMATION

*Corresponding Author: gayatri.physio88@gmail.com
Received 29th July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/187*

drinks (Manaf et al., 2012). Studies were also made on the dietary behaviour and awareness of dental erosion in adults in southern China to know whether they are aware of the causes of dental erosion (Chu, Pang and Lo, 2010). Studies on other citric fruit juices like orange juice was made which has less citric acid concentration than lemon. The orange juice significantly reduced surface hardness of enamel. The study confirms the erosive potential of acidic drinks people should be aware of (Wongkhantee et al., 2006). Study done by Ravi Gupta et al showed the attitude of students on drinking soft drinks which are also acidic like lemon water (Gupta et al., 2015). The results evident that the students showed early signs of erosion and caries and they are aware of the effects.

Most of the studies have analysed the awareness of people about the effect of soft drinks and other citrus fruit juices but they have not analysed lemon which has the highest citric acid content. Research was done to measure the clinical erosion due to single aetiology agents in a short period of time and confirmed the erosive potential of orange juice(West et al., 1998). There were no previous studies which analysed the erosive nature of lemon water specifically.

Previously our team had conducted numerous research (Choudhari and Jothipriya, 2016),(R and Sethu, 2018),(Fathima, 2016),(Shruthi and Preetha, 2018),(Renuka and Sethu, 2015), (Timothy, Gayatri Devi and Jothi Priya, 2019)survey based studies (Iyer, Gayatri Devi and Jothi Priya, 2019),(David et al., 2019),(Priya, Devi and Others, 2019),(Ilankizhai and Devi, 2016),(Swathy and Sethu, 2015) and review based studies (Dave and Preetha, 2016),(Baheerati and Gayatri Devi, 2018),(Samuel and Devi, 2015),(Harsha et al., 2015). Now we are focussing on epidemiological surveys. The idea for this survey stemmed from the current interest in our community. Thus the aim of the study is to assess the knowledge and awareness on lemon water among dental students.

MATERIAL AND METHODS

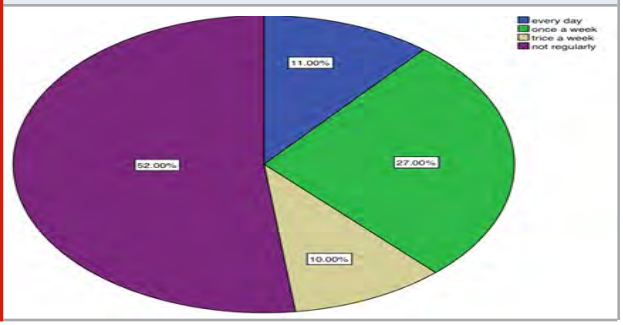
This is a cross sectional survey based study and a set of questionnaires was prepared based on knowledge and awareness about lemon water. It was circulated among dental students through an online survey planet software. The sample size chosen for the study was 100. Before starting the survey a detailed explanation of study was shared to the participants. Once the participants completed filling the survey, the data was collected, compiled and arranged in a systematic manner and analysed in terms of frequencies in SPSS using chi square test. The confidence interval was found to be 95% and statistical significance of p value < 0.05 .

RESULTS AND DISCUSSION

Enamel erosion is the main effect of over consumption of lemon water. Due to the acidic nature of lemon, the enamel starts to slowly erode and most of them are aware of this . From the responses about 70% of them do not consume lemon water while only 30% of them consume at morning or night (figure1). When they were asked about their frequency of consuming lemon water, 11% of them consume everyday, 27% of them consume once a week, 10% of them consume everyday and 52% of them do not consume regularly (figure 2). So most of them do not consume regularly which is good for their teeth. When they were asked why they think people drink lemon water, about 44% said to lose weight , 22% said they consume it as a health drink, 18% said they consume due to vitamin c deficiency and about 16 % said it improves skin tone (figure 3).

Figure 1: Pie chart depicting the response to the prevalence of drinking lemon water on a regular basis of the study participants, where blue represents yes and green represents no. Majority of 70% of the participants responded that they do not drink lemon water on a regular basis.

Figure 2: Pie chart depicting the response to the frequency of drinking lemon water of the study participants, where blue represents everyday, green represents once a week, beige represents thrice a week and purple represents not regularly. Majority of 52% of the participants responded that they consume lemon water not regularly.



About 90% of the dental students are aware that the acidic nature of lemon affects the surface of the teeth (figure 4). About 83% were also aware that the enamel of the teeth gets affected due to over consumption of lemon water (figure 5). About 83% of the students were also aware that enamel erosion is the most common effect of overconsumption of lemon water (figure 6). When they were asked suggestions on how to prevent it about 43% suggested to reduce consumption of lemon water and 43% suggested to drink it with a straw so that the teeth are not exposed to the acidity of lemon water and about 14% suggested to stop drinking lemon water (figure 7).

The association between the year of study of the study participants and their awareness on lemon water was done using chi square test. The association between year of study and awareness on the advantage of drinking lemon water was done using chi square test (p value = 0.001) which was statistically significant. Majority of first year students were aware of the advantages of lemon water (figure 8).

Figure 3: Pie chart depicting the response to the awareness on advantage of drinking lemon water of the study participants, where blue represents to lose weight, green represents as a health drink, beige represents to improve skin tone and purple represents not regularly. Majority of 44% of the participants responded that the main advantage of lemon water is that it helps in losing weight.

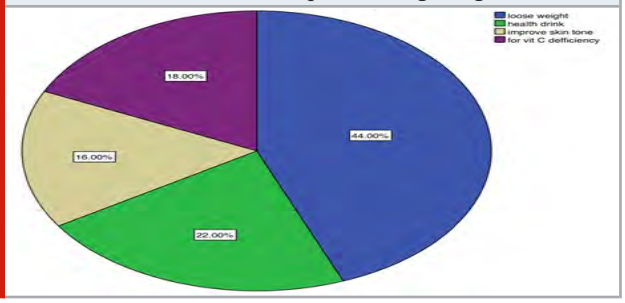
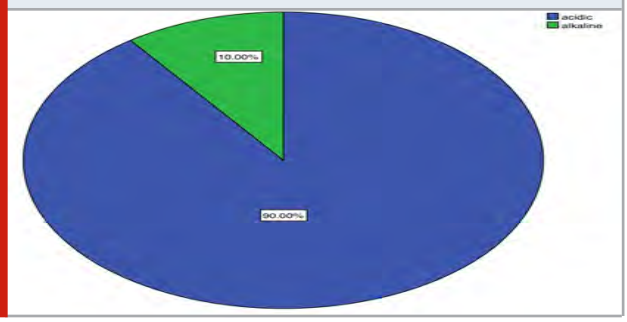


Figure 4: Pie chart depicting the response to the awareness on the nature of lemon water that affects the teeth of the study participants, where blue represents acidic and green represents alkaline. Majority of 90% of the participants responded that the acidic nature of lemon water affects the teeth surface.



The association between year of study and awareness on the nature of lemon water that affects the teeth was done using chi square test (p value = 0.157) which was statistically insignificant. Majority of third year students were aware of the nature of lemon water that affects the teeth (figure 9). The association between year of study and awareness on the part of teeth that gets affected due to over consumption of lemon water was done using chi square test (p value = 0.351) which was statistically insignificant (figure 10). Majority of third year students were aware of the part of the teeth that gets affected due to over consumption of lemon water.

Previous studies were based on the awareness of children and adults about the enamel erosion, their effects and how to prevent it. These studies did not highlight the causes of enamel erosion. Most of the studies were based on the benefits of lemon as like examining the treated lemon for its feasibility of fluoride ion removal from aqueous environment (Tomar, Prasad and Kumar, 2014). Apart from pH of the food substances, chemical, behavioural and biological factors are also responsible for erosion (Lussi, Jaeggi and Zero, 2004). Studies have proved that overconsumption of citrus fruits is correlated to frequency of dental erosion (Künzel, Cruz and Fischer, 2000). The research studies were based on the effect of mixture of fruits with lemon in study regarding the effect of fruit infused water on blood glucose levels in young men (Ali et al., 2016).

Figure 5: Pie chart depicting the response to the awareness on the part of teeth that gets affected due to over consumption of lemon water of the study participants, where blue represents enamel, green represents dentine and beige represents pulp. Majority of 84% of the participants responded that the enamel gets affected due to over consumption of lemon water.

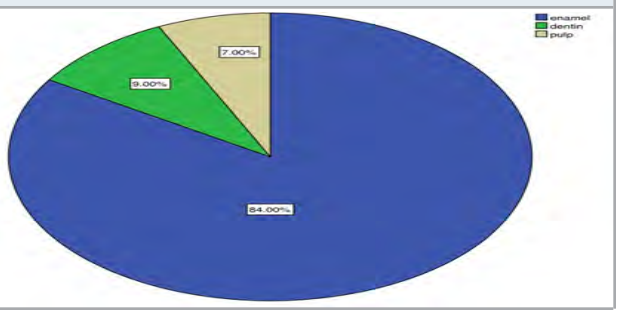
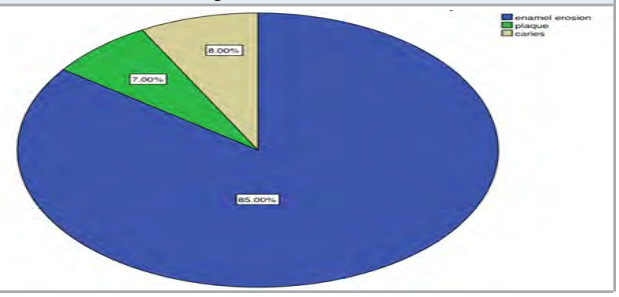


Figure 6: Pie chart depicting the response to the awareness on the effect on teeth due to over consumption of lemon water of the study participants, where blue represents enamel erosion, green represents plaque and beige represents caries. Majority of 85% of the participants responded that the enamel erosion is the important effect due to over consumption of lemon water.



Studies have also proved the decrease in surface hardness due to acidic juice (Ren, Amin and Malmstrom, 2009). These articles are not done specifically for lemon instead lemon was a component in the mixture of citrus fruits. The present study highlights the awareness specifically about lemon water and its effects among dental students. This study on awareness about lemon water among dental students is specifically about lemon water and

its effect on tooth surface and to know how far dental students are aware of it . The important limitation of the study is that it is done on a small study population and is not done on a varied population instead it is restricted to only dental students. Further extensive studies on large and varied study populations can give us precise results about the awareness and knowledge on lemon water among people.

Figure 7: Pie chart depicting the response to the awareness on the ways to prevent enamel erosion due to consumption of lemon water of the study participants, where blue represents reduced consumption of lemon water, green represents use straw to drink and beige represents stop drinking lemon water. 43% of the participants responded to reduce the consumption of lemon water and 43% responded to use a straw to drink lemon water to prevent exposure of lemon water on teeth.

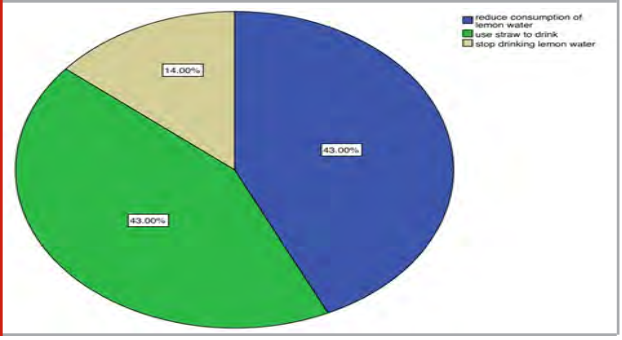


Figure 8: Bar chart representing the association between year of study and awareness on the advantage of drinking lemon water of the study participants, where blue represents to lose weight, green represents a health drink, beige represents improved skin tone and purple represents vitamin C deficiency. X axis represents year of study and Y axis represents number of responses. The association between year of study and awareness on the advantage of drinking lemon water was done using chi square test (p value = 0.001) which was statistically significant. Among 100 dental students, the majority of first year students were aware of the advantages of lemon water.

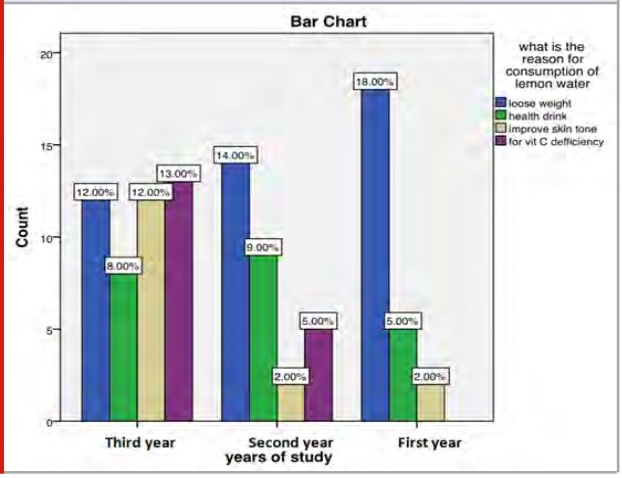


Figure 9: Bar chart representing the association between year of study and awareness on the nature of lemon water that affects the teeth of the study participants, where blue represents acidic and green represents alkaline. X axis represents year of study and Y axis represents number of responses. The association between year of study and awareness on the nature of lemon water that affects the teeth was done using chi square test (p value = 0.157) which was statistically insignificant. Among 100 dental students, the majority of third year students were aware of the nature of lemon water that affects the teeth.

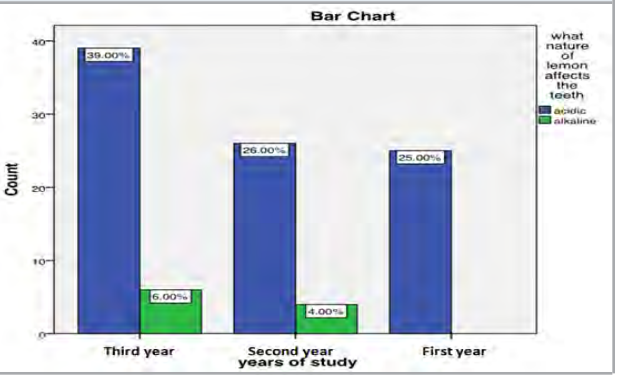
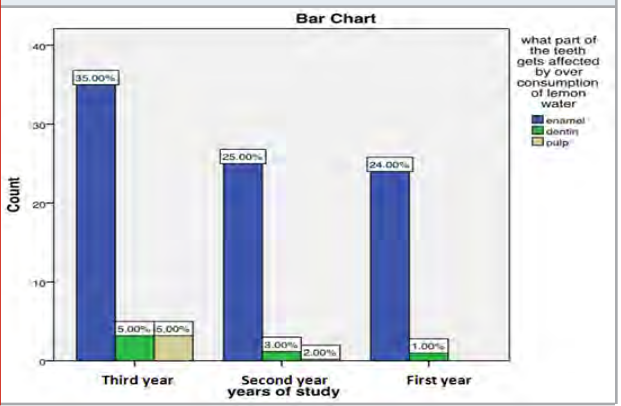


Figure 10: Bar chart representing the association between year of study and awareness on the part of teeth that gets affected due to over consumption of lemon water of the study participants, where blue represents enamel, green represents dentine and beige represents pulp. X axis represents year of study and Y axis represents number of responses. The association between year of study and awareness on the part of teeth that gets affected due to over consumption of lemon water was done using chi square test (p value = 0.351) which was statistically insignificant. Among 100 dental students, the majority of third year students were aware of the part of the teeth that gets affected due to over consumption of lemon water.



CONCLUSION

Enamel erosion is the common dental disease among this generation. Lemon water also serves as a cause for enamel erosion. From the survey it is clear that most of the students are not consuming lemon water on a regular

basis . Those who are consuming are also aware of the effect of lemon water on tooth surfaces. The present study concludes that dental students have a proper knowledge and awareness of lemon water .

ACKNOWLEDGEMENTS

The author would like to thank the study participants for their participation and kind cooperation throughout the study

Conflict of Interest: The author declared that there was no conflict of interest in the present study.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-505-510

BBRC
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Errors in Tooth Preparation for Complete Veneer Crowns

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ABSTRACT

Full-crown restoration is a common accomplishment in restorative dentistry and some dentists believe that so many crowns are mounted instead of more modest restorations. The explanations for the widespread use of full crowns are clear. Third-party billing agencies usually routinely bill for full crowns, but frequently refuse payment for more limited restorations such as inlays and onlays, or pay the premium for amalgam restoration. Whatever the causes, the hallmark of teeth-restorative dentists that are mostly carious or otherwise worn down is full-crown reconstruction. Many problems in tooth preparations for full crowns emerge immediately in any conversation with dental laboratory owners and working laboratory technicians regarding the adequacy of tooth preparations. As observed in dental laboratories, crown preparations for teeth often have numerous shortcomings which limit the ability of laboratory technicians to provide their dental clients with optimum service. The aim of the study is to find the errors in tooth preparation, categorise it and study their prevalence.

KEY WORDS: ERRORS,TOOTH PREPARATION,CROWNS.

INTRODUCTION

The form of prepared teeth and the amount of tooth structure removed are important contributors to the mechanical, biologic, and aesthetic success of the overlying crown or fixed partial denture. (Ozdemir et al., 2007) Therefore, it is important to develop clinical guidelines that can be used to optimise success in fixed prosthodontics. Errors in following these guidelines will lead to compromise in the longevity and placement of these prosthesis.(Ayad, Maghrabi and Rosenstiel, 2005) (Jain and Dhanraj, 2016).

Occlusal reduction, axial reduction, taper, finishing line, and undercuts in axial walls influence the consistency of planning for extra coronal restorations. Goodacre et al. reviewed medical preparedness recommendations and recommended nine science standards to guide the preparation(Goodacre, Campagni and Aquilino, 2001). This has been proposed to be 10-20 degrees as an optimal minimum angle of occlusal convergence. Suggested to be 3 mm for incisors and premolars and 4 mm for

ARTICLE INFORMATION

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Received 4th Aug 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/188

molars is the minimal occluso-cervical dimension for 10 percent-20 per occlusal convergence. For all metals, 1 mm and 2 mm respectively, for metal ceramics and for all semi-translucent ceramic processes, axial and occlusal cuts are 0.5 mm to 1 mm long. The shape of the prepared teeth and the volume of tooth tissue removed are significant contributors to mechanical , biological, and cosmetic efficiency of the overlying crown or fixed partial dentures.

Therefore it is important to develop clinical guidelines which can be used to improve performance in fixed prosthodontics. Errors in following these instructions can influence the durability of these prostheses and their positioning. The quality of the planning for extra coronal restorations is influenced by occlusal reductions, axial contraction, taper, finish line and undercuts in axial walls. Goodacre et al provided instructions for the clinical preparation and suggested nine basic principles to guide the preparation. It has been proposed that the mean occluso cervical scale is 3 mm for incisors and premolars, and 4 mm for molars.

The axial and occlusal cuts are 0.5 mm and 1 mm deep in all metals, 1 mm and 2 mm respectively, in metal ceramics and all semi-translucent ceramic systems. Given the stringent standards set for teeth training, laboratory technicians are still facing difficulties in this area. Errors in tooth preparation were established as a second laboratory problem immediately upon insufficient impression. The occurrence of dental planning issues over a long period of time. Such skills may be difficult to obtain, or there may be a lack of credit hours to teach this subject, or there may be no direct communication between the dentist and the laboratory technician. The problem has been the area of focus for several investigations which evaluated tooth preparation to see how much it is far from the ideal.(Christensen, 2007a) (Christensen, 2007b)

Failure in tooth preparation was identified as a second laboratory challenge immediately after impression was inadequate(Buchanan, 2000). The persistence of the problems of tooth preparation over a long period of time is remarkable and the occurrence of the same defects is doubtful given the documents. It may be that these skills are difficult to learn, or there is a shortage of credit hours in teaching this subject, or there may be no clear contact between the dentist and the technician in the laboratory. This question was the focus of many investigations which assessed the preparation of the tooth to see how far it is from the ideal.

These studies targeted preparations done by dental students, teaching staff, general practitioners, residents and prosthodontists, and different results have been reported. Most previous studies focused on one aspect of tooth preparations mainly taper, and few studies incorporated other aspects of tooth preparation in addition to taper. The study targeted preparation done by dental students(Mack, 1980; Noonan and Goldfogel, 1991; Dorriz et al., 2008; Selvan and Ganapathy, 2016), teaching staff(Patel, Wildgoose and Winstanley, 2005), general practitioners(Enechi, 2004), residents(Nordlander et al., 1988) and prosthodontics(Arnetzl and Dornhofer, 2004) and different results have been reported. Most previous studies focused on one aspect, ie- taper, and a few studies incorporated other aspects of tooth preparation, in addition to taper(Sato et al., 1998).

Most of these were carried out in Europe, North America and Asia. Very little information is available concerning the ability of dentists in India to prepare teeth for full veneer crowns. There are many studies which followed the performance of dental students in tooth preparation for fixed prosthodontics during their pre-clinical course and efforts for accurate evaluation of their preclinical work were done. The aim of this study is to evaluate the quality of tooth preparation for complete veneer casting restorations performed by dental students in their Chennai, India.

MATERIAL AND METHODS

The study setting was a clinical setting which involved casts of patients sent to dental technicians for fabrication. The approval of SRB of Saveetha Dental College and patient approval to use their casts was seeked. The number of people involved in the study was one, ie- the analyser. This was an in vitro study and proper sampling was done to minimalism sampling bias. The sampling method was a convenient sampling technique from a trimmed stone model. The number of casts studied was 100. This, although, was a pilot study and further studies will larger sample size and more quantitative will be taken. At the end, the data was verified by the Department of Prosthodontics. The inclusion criteria was single unit crowns, and the exclusion criteria was multiple missing, or fixed partial dentures.

RESULTS

Tooth preparation is one of the key reasons affecting a restaurant's sustainability. A lot of facets of tooth preparation were analyzed in the present report. In this research, greater care was taken as described in the section on materials and methods to ensure adequate seating of the analysis casts impression on the working casts to remove or reduce any inaccuracies in the seating. We have tried to identify and discuss the major challenges into preparation noted by laboratory technicians and confirmed by dentists.

Figure 1 shows that reduction of about 44% of the casts under study were done correctly, whereas 32% were over-reduced. A minority of 24% casts were under reduced. Figure 2 illustrates the iatrogenic damage caused to the adjacent tooth due to incorrect method of tooth preparation. A little above half the samples (56%) showed no iatrogenic damage, whereas in the remaining 44% iatrogenic damage was present. Figure 3 throws light on the definition of finish lines of the tooth preparation. A majority of 66% were well defined finish lines, and only 34% were not well defined.

Figure 1: Reduction of about 44% of the casts under study were done correctly, whereas 32% were over-reduced. A minority of 24% casts were under reduced.

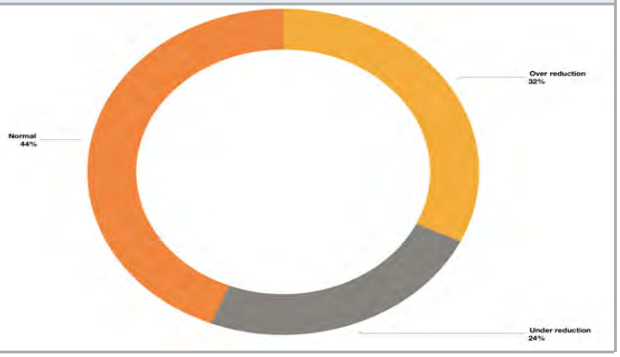


Figure 2 : Iiatrogenic damage caused to the adjacent tooth due to incorrect method of tooth preparation. 56% showed no iatrogenic damage, whereas in the remaining 44% iatrogenic damage was present.

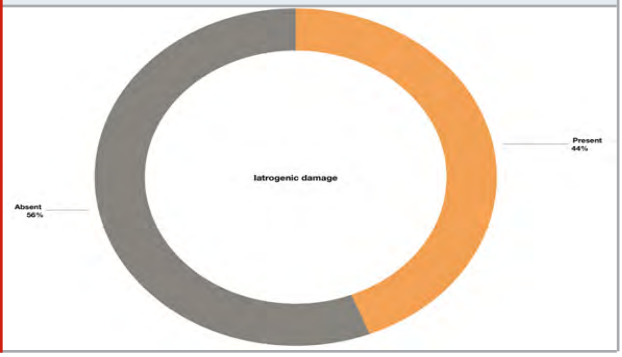


Figure 3 : Definition of finish lines of the tooth preparation. A majority of 66% were well defined finish lines, and only 34% were not well defined.

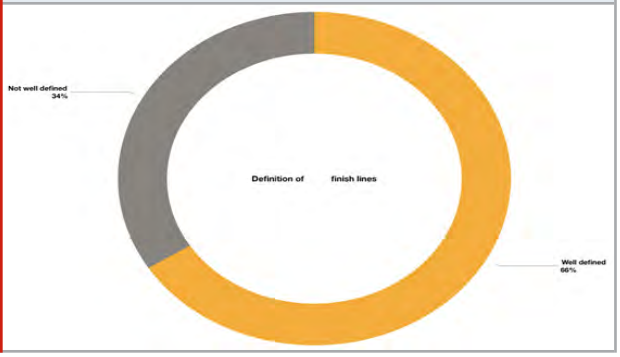


Figure 4 evaluates the taper, and 3/5ths of the casts (60%) have proper taper, but in 40% taper is absent. Figure 5 shows that a little over half, 51% have irregular tooth surfaces after tooth preparation, whereas 49% have regular surfaces. Figure 6 illustrates that there are equal number of casts with presence and absence of functional cuspal bevel, ie- 50% each. Figure 7 demonstrates that 52% of the dies had secondary retention features present, whereas in 48% they were absent. Figure 8 states that a majority of 68% had undercuts absent, and only 32% had unwanted undercuts present. In figure 9, it is illustrated that a fair majority of 66% of the casts followed the correct path of insertion, whereas 34% had an incorrect path of insertion.

Figure 4 : 60% of the casts have proper taper, but in 40% taper is absent.

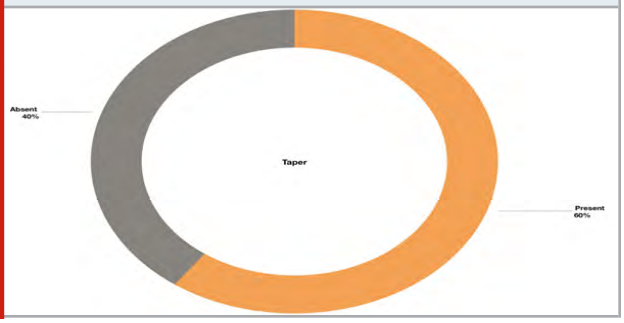


Figure 5: 51% have irregular tooth surfaces after tooth preparation, whereas 49% have regular surfaces.

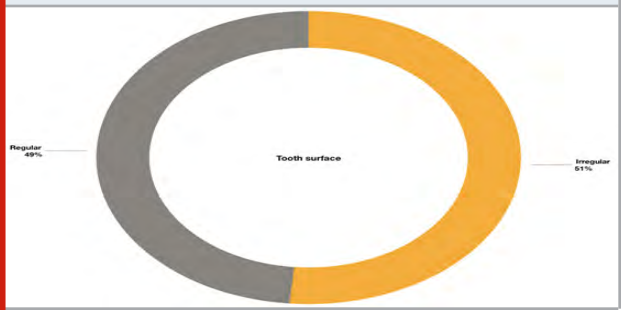


Figure 6: Equal number of casts with presence and absence of functional cuspal bevel, ie- 50% each.

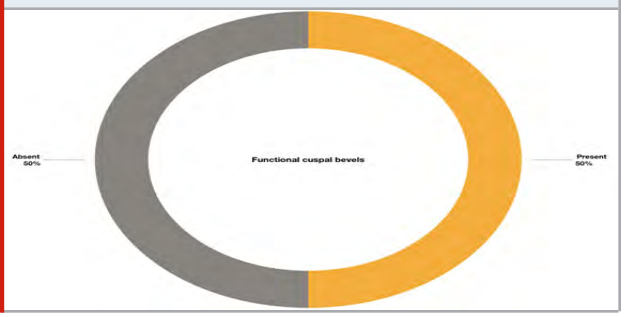


Figure 7 : 52% of the dies had secondary retention features present, whereas in 48% they were absent.

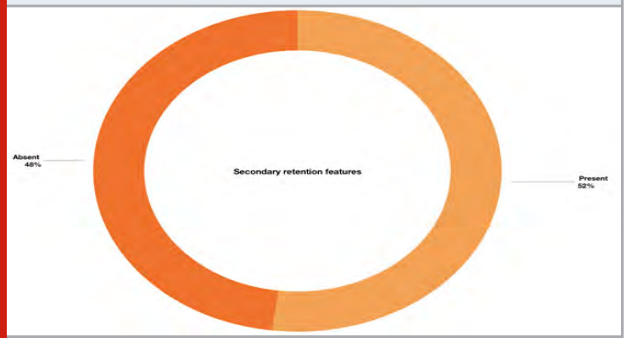


Figure 8 : 68% of the dies had undercuts absent, and only 32% had unwanted undercuts present.

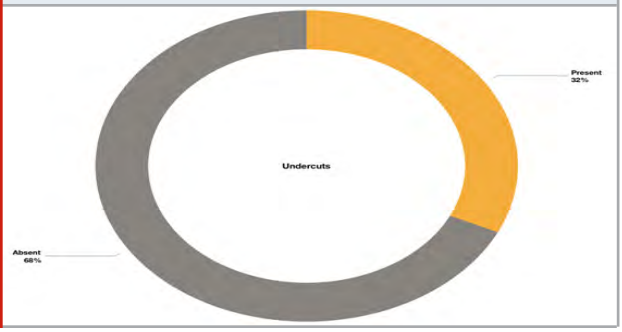
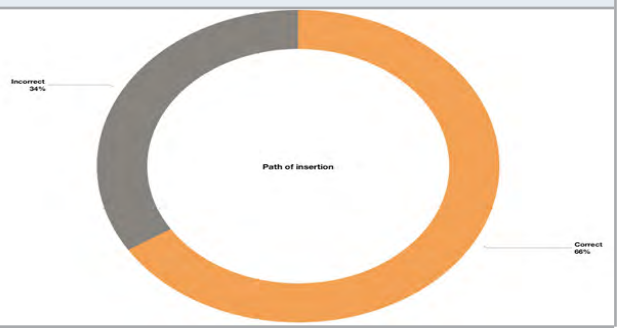


Figure 9: 66% of the casts followed the correct path of insertion, whereas 34% had an incorrect path of insertion.



DISCUSSION

Failures not unusual in complete veneer crowns. Unfortunately one or two such failures are sufficient to discourage the clinician from fully using the material. The defects that occur during tooth preparation due to mistakes are solely the dentist 's fault and can be effectively prevented by taking proper treatment. Good working knowledge, good clinical judgment in the selection of cases and execution of the planned treatment will guarantee success. Knowing the material properties to a large degree and keeping up with the latest developments and new creativity would help minimize chairside time and still help us produce consistent results with good care.

Although the students have the concepts of tooth preparation fresh in their mind it appears that the lack of clinical experience is the primary cause of the large taper in their preparations as most of the preparations in the present study were their first clinical case, so getting a large taper may not be surprising. Some dentists use small, rounded, tapered, or flame-shaped diamonds to reduce the medial, distal, lingual, and even facial walls of crown prepared dentures. It minimizes tooth density and builds feather edge margins. Although this method of preparation is suitable for all metal restorations, it is not appropriate for metal ceramic and all-ceramic crowns, because it leaves inadequate thickness for both substructure and veneering ceramics.

Inadequate axial tooth preparation forces technicians to make over contoured crowns and compromise both the esthetics and self-cleansing design. (Christensen, 2007a) The failure to use such diamond burs could have led to inadequate tooth reductions in the study. This problem could have been eliminated by using adjustable clearance tabs to test for sufficient occlusal minimization.(Adams, 2004). It could also have occured because of the dentist 's inherent fear of exposure to pulp. These fears may be allayed by knowledge of tooth anatomy and sound clinical judgement. Copious spray of water should be used during the process of preparing a tooth. The occlusal reduction for the restoration should have indentations where the original tooth anatomy had indentations. (Smith et al., 1999).

Finish line should be well defined, that is, no sharp line or point angle should be present. Leaving behind sharp line angles and point angles in the preparation can result in major fit issues and time-consuming appointments at the cementation time. For finishing margins diamond burs are not recommended. Also the super-fine burs create a rough finish. The surface roughness which they produce is directly proportional to the bur grit grains. Tungsten carbide burs, offering a cleaner range, prove to be stronger in the end. The ideal surface smoothness is produced by a tungsten carbide finish bur (20,000 rpm) Failure to use the required armamentarium cloud have led to sharp line angles from possible sites for all ceramic(Ganapathy and Sathyamoorthy, 2016) restoration which lead to fracture stimulation.

The solution to this is to round all of the straight line and point angles at the time of preparation. Bevelling of margins or creating a feather edge margin is contra indicated for all-ceramic preparation. To fabricate and all-ceramic restoration over bevelled finish lines is nearly impossible(Kissov and Chalashkanova, 2001). For pressable ceramics(Ranganathan, Ganapathy and Jain, 2017) , shoulder is required for strength at the margins because marginal areas bear much more support of the crown in function. This is because the best adaptation of the crown is at the cervical aspect(Kiliçarslan et al., 2004). For all ceramic sure, chamfer is preferred as the metal used, that is alumina or zirconia are inherently strong and do not require bulk of material for strength as is true for conventional ceramics.

The main reason for deciding on this methodology was to get a wide overview of all the aspects of tooth preparation at once. We could then analyze as to which parameter deviated at most. The advantage of this study lies in its wider spectrum of parameters. In a study by Noonan (Noonan and Goldfogel, 1991), the convergence angle was found to be related ro the taper of the cast. And most of the casts had accurate taper, which is in keeping with our results. The degree of preparedness taper has long been the focus of controversy. Until the invention of resin cements, the dentist had to rely in large measure on a strong retentive method to hold the crown in place. Today the situation has changed for the

resin cements. It is no longer considered essential to reach near parallel surfaces, as these cements bond very tightly to the surface of the tooth. But the taper of the prepared tooth from the long axis of the tooth should not exceed 8 or 10 degrees. By using cements which do not bind to the tooth surface, it seems appropriate to make the arrangements more parallel. (Goodacre, 2004)

The degree of taper to prepare the tooth has long been a debatable subject. Before the invention of resin cements , the dentists had to rely primarily on good retentive form to hold the crown in place(Prakash, Ganapathy and Mallikarjuna, 2019). The scenario is different today, with resin cement. It is no longer considered critical to achieve a near parallel surface, since the cements bond very well to the tooth surface (Leles and Compagnoni, 2001). Investigating a die has verified that it is very difficult in practice to get theoretical values of the convergence angle(Leempoel et al., 1987). Studies on the students' taper found that mean taper ranges ranged from 11 ° to 27 °. The mean taper of clinical anteriors(Jain et al., 2018) was 31.6° buccolingually and 16.8° mesiodistally, and the clinical posteriors was 16.8° buccolingually and 22.4° mesiodistally(Rafeek et al., 2006).

The presence of undesired undercuts is frequently observed due to complicating clinical factors such as poor visibility and access. It hinders the entire cast restoration position, which may result in the need to recontour the prepared tooth to create a new impression. If such undercuts are left unattended, they must be blocked by laboratory technicians before the reconstruction is finished. We contribute to bad internal component match and potentially decrease restore retention (Marghalani, 2016). Retentive grooves, undercuts, channels, and retentive pins are used to increase the bond to dentin that bonding agents produce. In a study by The main limitation of this study was that it was a pilot study carried out for an overview of understanding this topic. The errors were studied qualitatively, instead of quantitatively. Thus, the accuracy might not be at par with what metric analysis could have given. Visual estimation errors might have led to inaccuracy in the results.

Thus, tooth preparation is one of the main factors that influence the longevity of the restoration. The quality of preparation for extracoronal restorations is affected by occlusal reduction, axial reduction, taper, finishing line and undercuts in axial walls. Incorrect tooth preparation can severely compromise the retention, aesthetics, strength and service potential of subsequently placed crowns. Thus, more rigorous awareness and training programmes need to be initiated to address this.

The success of a fixed prosthodontic treatment can be determined by disciplined preparation of the tooth. This can fix, replace and adjust the dentition components to enhance the function, esthetics and health of the hard and soft tissues. Under this study's constraint, it may be argued that the taper the dental students obtained was greater than was suggested in the dental literature. Given the rise in taper there were no new improvements to enhance retention. As contrasted with the standard, occlusal and axial reductions were considered appropriate. While discontinuity was not unusual, most arrangements had straight and consistent finishing lines. Preparations were majorly smooth, with less irregularities or sharp angles.

A mental image of the design of the artificial crown and the anticipated occlusion must precede the reduction in the structure of the dent. In addition to mathematical principles related to the preparation of the tooth, the operator will consider the importance of the burs, the patient's location and his own location, the rests of the hand and finger and the level of reduction in order to ensure a good preparation of the tooth.In future, this study can be carried out with a larger sample size. It can include and compare full veneers with multiple missing units and fixed partial denture tooth preparations. The study can also compare the errors individually among each year of undergraduate students.

CONCLUSION

The main recommendations of this study were to increase the duration of the preclinical course, and the clinical practice of tooth preparation should be given more emphasis. Long-term clinical studies are required to fully assess the longevity of complete veneered restorations in order to see the less than ideal taper influence on the success of these restorations.

ACKNOWLEDGEMENTS

The authors are thankful to Saveetha Dental College for providing a platform to express our knowledge.

Conflict of Interest: The authors declare no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-511-516

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Awareness on Social Anxiety Disorder Among College Students - A Survey

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ABSTRACT

Mental illness is an often ignored risk factor in many of the daily life situations. There are many types of mental illness such as depression, anxiety, bipolar disorder, OCD etc. Among these a type of anxiety known as social anxiety is common especially among young adults. Most of it goes undiagnosed and eventually leads to severe complications in the future such as destructive thoughts and self harm and potentially leading to death. It is a questionnaire based online survey. There were 100 participants in which all of them were college going students .12 questions were asked based on social anxiety disorder .The results were obtained and statistically analysed through SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. This survey has helped 58 % of the students to realize that they might be suffering from social anxiety. From the survey, it was evident that there were many students who were experiencing mild to moderate symptoms but they were unaware of the disorder.Thus, the survey has created an awareness on social anxiety syndrome among college students. There are over 1 million people suffering from social anxiety every year and there should be still many more that are left undiagnosed. Many might be experiencing symptoms like panic attacks even in simple situations so it is important to create awareness about social anxiety disorder in order to help these people to improve their mental health and lead a better life.

KEY WORDS: DEPRESSION, DISORDER,MENTAL HEALTH, PANIC, SOCIAL ANXIETY.

INTRODUCTION

According to WHO, Health can be defined as a state of physical, mental and social well-being in which diseases are absent. However people often overlook the importance of mental health especially in the new millennial(Menninger et al., 1959),(Kendler, 2014). All these can be considered as a mutual triad where the absence of any one of these health can result in affecting the whole well-being. Therefore mental health is as important as physical health and being able to identify one's state of mental health should be fundamental. Epidemiological surveys revealed variable results in the western and european populations probably due to differences in the techniques used to ascertain the diagnosis, however it is clear that social anxiety disorder is one of the most common mental illnesses with a prevalence of 32%(Kessler et al., 2005). Although both the gender seek treatment for mental illness equally, community surveys indicate that women are somewhat more likely to have the condition(Kessler

ARTICLE INFORMATION

*Corresponding Author: gayathri.sdc@saveetha.com
Received 28th July 2020 Accepted after revision 30th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/189*

et al., 2005). Population rates of social anxiety disorder in children have been conducted in several countries with an average of 11.1% higher in males(Kessler et al., 2005; New Zealand. Office of the Prime Minister's Science Advisory Committee, 2011).

There are various mental illnesses such as (Leonard, 2000) (Frazer and Murphy, 1999)depression, (Schou, 1979; Belmaker, 2004) bipolar disorder and social anxiety disorder(Kaye et al., 2004) (Menninger et al., 1959) (Kendall and Hedtke, 2006). Anyone can suffer from mental or emotional health problems, social anxiety disorder being one of the many. Many people experience it at least one time in their lifetime and almost one in five will suffer from a diagnosable social anxiety disorder. Yet despite how common social anxiety disorder is many people make no efforts to improve their own or other's situation. Previous studies on social anxiety disorder and its existing period has reported an average of 19 years , where the disorders could range from panic disorder without agoraphobia, panic disorder, PTSD and OCD(Bruce et al., 2005; Kessler et al., 2005; New Zealand. Office of the Prime Minister's Science Advisory Committee, 2011) . Comparing adult and child surveys together, it is noted that a significant number of people who develop social anxiety disorder in adolescence may recover before reaching adulthood(Pine et al., 1998).

As to the reason why there is no effort being made, it can be considered there is poor knowledge of the consequence or even the presence of such a problem. We often ignore the warnings and red flags or (LeDoux, 2000)(Goddard et al., 2010)emotional messages that tell us or others something is wrong and try to shrug it off. There are some who try to distract themselves from the actual problem with even dangerous things like drugs, alcohol or self-destructive behavior(Malenfant, 2003) (Blachly, 1969). All the frustration, anger, sadness are bottled up hoping that the situation will resolve on its own leading to giving up, and sometimes eventually their lives too.

Social anxiety disorder is a common type and can exist in simple life situations like meeting new people, job interviews, stage fear, eating publicly or in even extreme cases even drinking water can cause social anxiety(Grilo, Masheb and Terence Wilson, 2001)(Wilson et al., 2007). There is fear of being judged(American Psychiatric Association, 2000)(Baker et al., 2002),humiliated and rejected(Cooksey, 1996)(Bryant, Fieldhouse and Bannigan, 2014). No one knows what causes them but having apt knowledge and educating and creating awareness to other especially the youth can be helpful in minimizing the problem worldwide and helping the person individually(Hofmann and DiBartolo, 2014).

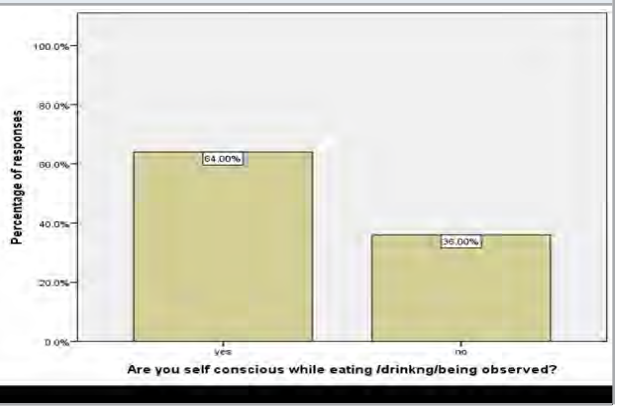
MATERIAL AND METHODS

Study Design: A survey was conducted among 100 college students from various universities,to evaluate their knowledge and awareness on social distress , factors causing and its cure. The participants did the survey voluntarily. Ethical approval and informed consent from the participants were obtained. The study was conducted in the month of may, 2020.

Survey Instrument: The survey instrument which was a questionnaire was prepared after extensive review of the existing literature. The questionnaire was reviewed and amendments were made to improve clarity of the questions to eliminate ambiguous responses. The questionnaire consisted a total of 12 questions. The questionnaire was shared to the participants using online survey platform.

Data Analysis: Only completed surveys were taken for analysis and the incomplete ones were eliminated. The statistical test used is descriptive statistics. All the responses obtained were tabulated and reliability of the data was checked. The statistics done using SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant.

Figure 1: Bar graph showing the distribution of participants based on their response about self consciousness. X axis represents the question "Are you self conscious while eating / drinking /being observed?" and the Y axis represents the percentage of response .64% of them feel conscious while eating or drinking and 36% were not conscious.



RESULTS AND DISCUSSION

From the survey, When asked if they were self conscious while eating or drinking or being observed 64% of the participants said yes (figure 1). About 27% try to avoid meeting new people and 42% of the participants accepted that they avoid new people sometimes(figure 2). 53% were afraid of being judged by others(figure 3).About 23 % felt nauseous or sick at social events and 20% at times felt nauseous however the majority of the study population does not feel any of these symptoms.Majority of the students(60%) have agreed that they do not have any problem having eye contact while conversing with people.(figure 7).

28% of the study participants tremble or sweat when somebody even looks at them.53% of them have accepted that they were the ones who usually start the conversation(figure 8) and more than 53% avoid going

to public gatherings. Surprisingly, 55 % have openly discussed their insecurities to their close friends and family and 19 % sometimes discuss it with their friends and family(figure 10). Almost 73% have felt lonely or sad when surrounded by people. There were a total of 64 students who were self conscious while eating or drinking or being observed. This shows that people can be affected even in simple lifestyle events and habits like eating. It could be fear or embarrassment of eating in a certain way that could be viewed as inappropriate for the individual. According to Takuya , it can also be correlated with shape and weight concerns especially for young girls.

Figure 2: Bar graph showing the percentage distribution of responses from the participants based on their opinion to meet new people. X axis represents the question "Do you avoid meeting new people?" and the Y axis represents the percentage of response .27% of the participants avoid meeting new people, 31% denied it and a majority of 42% avoid meeting new people at times.

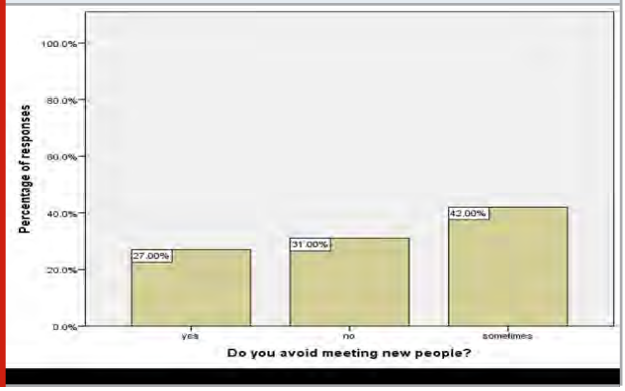
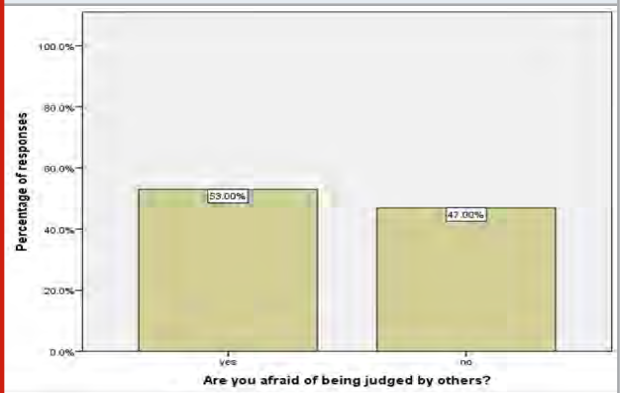


Figure 3: Bar graph showing the percentage distribution of responses from the participants about being judged by other people. X axis represents the question "Are you afraid of being judged by others?" and the Y axis represents the percentage of response . 53% of them felt afraid of being judged by others.



Many students were having trouble conversing with new people or avoiding meeting new people or public gatherings. While sometimes it may be due to simple

Figure 4: Bar graph showing the percentage distribution of responses from the participants about feeling lonely or sad . X axis represents the question "Have you ever felt lonely or sad even when surrounded by people?" and the Y axis represents the percentage of response .43% of them felt lonely or sad.

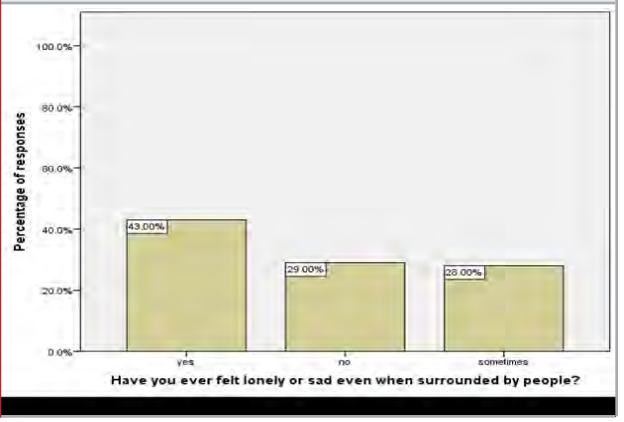
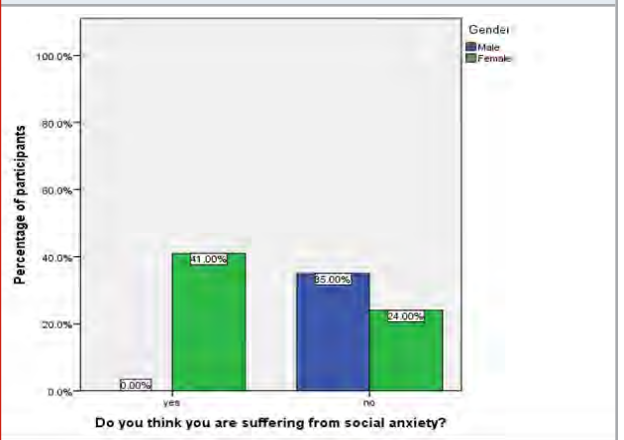


Figure 5: Bar graph depicts the association between Gender and participants who feel that they might suffer from social anxiety .X axis represents the question 'Do you think you are suffering from social anxiety' and Y axis represents the percentage of participants. Blue color denotes males and green color denotes females. Majority of (41%) female participants felt that they were possibly suffering from social anxiety more than males.Pearson chi square test was done and p value= 0.0012(p<0.005), statistically significant.



reasons like just considering it a time waste sometimes people have felt pressured to answer questions about personal lives or any unwanted conversation. Some people just prefer to stay at home and not socialize. Sometimes the fear of public speaking can cause brain freeze in certain individuals. They could start sweating or feel nauseous indicating a severe type of social phobia. More than 73 students feel embarrassed when passing a comment on them and 53 of them are afraid of being judged. While it is absolutely normal to feel like this when they are in a competition or somewhere where judging is a part of it,which is not a concern. However

feeling sick even when at a simple comment could be an indication of social anxiety. Some even sweat and tremble when someone looks at them, they could be having a panic attack. Some have even felt lonely even when surrounded by others. At this point they already have a feeling of isolation even though they are actually not.

Figure 6: Bar graph depicts the association between Gender and the opinion of participants who felt embarrassed when someone passed a comment on them .X axis represents the question 'Will you feel embarrassed when someone passes a comment on you?' and Y axis represents the participant's opinion for the same. (Blue) denotes males and (green) denotes females. Majority of (46%) female participants felt embarrassed when someone passed a comment on them than the male participants.. Pearson chi square test was done and p value= 0.034($p<0.005$), statistically significant.

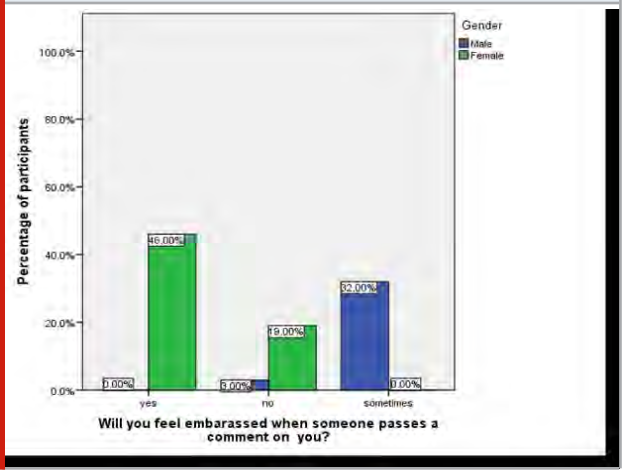


Figure 7: Bar graph showing the distribution of participants based on their response about the opinion of having eye contact while conversing. X axis represents the question "Do you make a little/no eye contact while conversing with people?" and the Y axis represents the percentage of respons.60% of the participants do not have any problem having eye contact while conversing with people.

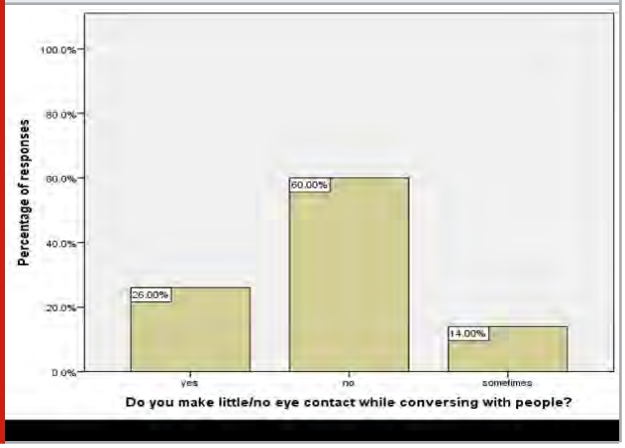


Figure 8: Bar graph showing the distribution of participants based on their response on having experienced symptoms like trembling or sweating when somebody even looks at them. X axis represents the question "Do you tremble or sweat when somebody looks at you?" and the Y axis represents the percentage of response . 72% of the participants experienced trembling or sweating when somebody even looked at them.

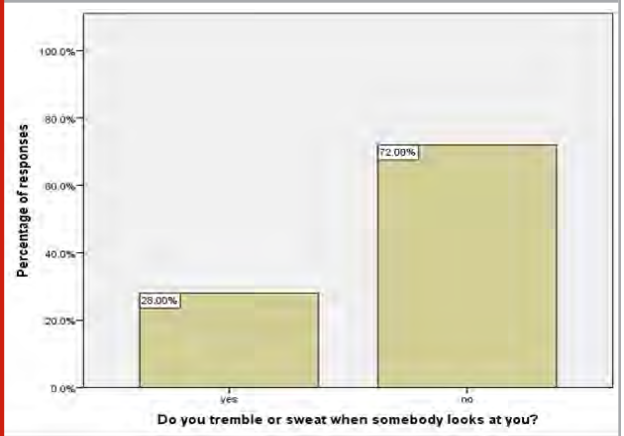
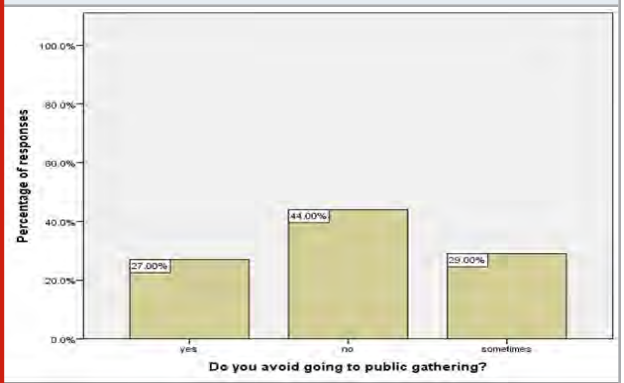
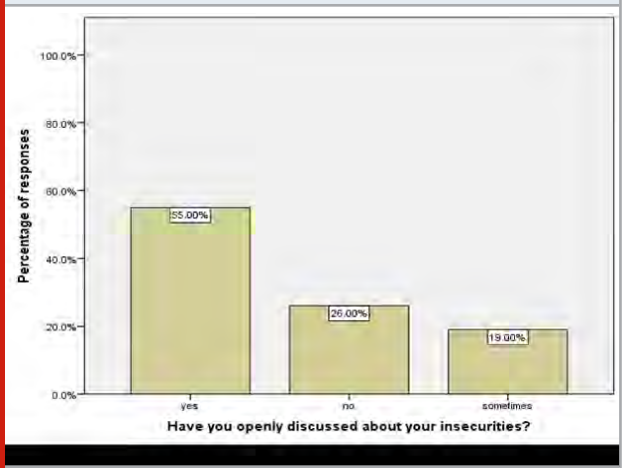


Figure 9: Bar graph showing the distribution of participants based on their response to avoid public gatherings. X axis represents the question "Do you avoid going to public gatherings ?" and the Y axis represents the percentage of response. 27% of the participants avoided public gathering.



Around 58 students have realized they might be suffering from social anxiety. This shows that there is no awareness about mental health and its ill effects. Parents and teachers play a pivotal role in shaping students' lives mentally as well. They should be able to recognize the signs and not be afraid to give the child treatment that could be lifesaving in certain situations. There are many ways to help people who are suffering like cognitive therapy, talking in groups and certain medications. There are many call guidelines all over the world where people listen to their problems.

Figure 10: Bar graph showing the distribution of participants based on their response about discussing their insecurities to their close friends and family. X axis represents the question "Have you openly discussed your insecurities?" and the Y axis represents the percentage of response. Many of the students (55%) have agreed to openly discuss insecurities and inferiority to their loved ones.



CONCLUSION

Social anxiety is the third most common mental disorder especially affecting young adults. Often many fail to diagnose mistaking it as part of growth spurt. In some cases it could potentially lead to individuals having self harms and suicidal thoughts. Many might be experiencing symptoms like panic attacks even in simple situations.From the survey it was very much evident that the majority of women exhibited the symptoms of social distress than the male participants. This survey has created an awareness about social anxiety disorder in order to help people improve their mental health and lead a better life.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the help and support rendered by the Department of Biochemistry and the Management of Saveetha Dental College and Hospitals for their constant assistance with the research.

Conflict of Interest: There is no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-517-526

BBRC
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Research Communications

Probiotics in Prevention of Dental Caries – A Literature Review

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ABSTRACT

Dental caries is a microbial disease induced by oral biofilm containing Streptococcus mutans, leading to destruction of tooth structure. With better understanding of the Ecology and microbiology of the oral cavity and with the advent of Minimal Invasive Dentistry, there has been a shift in the treatment modalities of caries. Recently probiotics have been used extensively to promote a healthy oral flora. This review article aims to promote a better understanding of the probiotic strains, their mechanism of action and the various modes of delivery available. An electronic search was also performed using databases such as Google scholar, PubMed, Science direct and Scopus. Comparisons of different searches were carried out to delete the repeated studies. The articles published in any language other than English were excluded. Several studies proved that Probiotics can influence the caries balance locally through a direct contact with oral tissues and systemically through the gastrointestinal tract. Most of the probiotic strains currently available have been proved safe and promote both general and oral health. There are limited clinical trials with widely different study designs and target population. Also there is lack of evidence, regarding sustainability of the effect of Probiotics.

KEY WORDS: BIFIDOBACTERIA, CARIOGENIC BACTERIA, DENTAL CARIES, LACTOBACILLUS, PROBIOTICS, REPLACEMENT THERAPY, STREPTOCOCCUS MUTANS..

INTRODUCTION

The oral cavity is a very intricately balanced homeostatic chamber. Opportunistic bacteria take over, when the immune system is suppressed. Although usage of fluorides, chemoprophylactic agents and other preventive measures has led to a dramatic decline in dental caries, the ability to control the actual infection has been limited. The concept of microbial ecological change as a mechanism of preventing dental disease is an important era in dentistry. Replacement therapy in adjunct with early colonisation of effective probiotics in the oral cavity helps in establishing a healthy oral microbiome(Teughels et al., 2008). The Food and Agriculture Organisation and World Health Organisation defined Probiotics in 2001, as "Live microorganisms which when administered in adequate amounts confer health benefits on the host"(Meurman and Stamatova, 2007).

We have numerous highly cited publications on well designed clinical trials and lab studies (Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019;

ARTICLE INFORMATION

*Corresponding Author: nivedhitha@saveetha.com
Received 22nd July 2020 Accepted after revision 26th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/190

Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019). This has provided the right platforms for us to pursue the current study.

This review on the Effect of Probiotics in the prevention of dental caries was done to have a better understanding of the novel probiotic strains and their specific mechanism of action in colonisation of oral cavity and inhibiting the adherence and metabolism of cariogenic microflora. The main caries initiator streptococcus mutans has been studied extensively and various genetic modifications have been incorporated to alter its pathogenicity. The various studies done using different probiotic strains and the vehicles of probiotic delivery have been compiled to facilitate understanding of advancements in probiotic usage. Various studies were done to check for the efficacy of early colonisation of Probiotic bacteria in improving the general immune system of the individual. With advent of PCR and other molecular diagnostic methods, newer Probiotic strains with better safety and efficacy have been characterised and used.

MATERIAL AND METHODS

An electronic search was also performed using databases such as Google scholar, PubMed, Science direct and Scopus using keywords such as probiotics, probiotic bacteria, dental caries, cariogenic bacteria, Streptococcus mutans, Lactobacillus which were used as isolated or in combinations using different Boolean operators. Comparisons of different searches were carried out to delete the repeated studies. Then abstracts of all available articles were examined. All studies, which studied probiotic strains with relevance to oral health were included in the study. The articles published in any language other than English were excluded.

History: The term PROBIOTIC, meaning "for life", is derived from a Greek language. The concept of Probiotics was 1st proposed by Nobel Laureate Elie Metchnikoff in 1908(Mercenier, Pavan and Pot, 2003; Tannock, 2003). Ferdinand Virgin first introduced the term "probiotic" differentiating it from antibiotics. In 1965, Lilly and Stillwell mentioned that probiotics contain bacteria that are capable of producing substances that stimulate the growth of other bacteria. Man and Spoering in 1974, discovered that fermented yoghurt reduced serum cholesterol. In 1984, Holocombh et al identified Bifidobacterium. WHO IN 1994 described Probiotics as the next most important step in the immune defense mechanism following antibiotic resistance.

Criteria For Probiotic Bacteria: Any microorganism that is found to be beneficial to the host can be considered as a probiotic only if the genus and species can be identified and characterized according to Internationally accepted methods. The organism has to succeed in various in vitro, animal and clinical trials to check for its pathogenicity.

The FAO and WHO have recommended that probiotics strains can be characterized by their

- Spectrum of antibiotic resistance
- Metabolic and hemolytic activities
- Ability of toxin production
- Pathogenicity in immunosuppressed animal models
- The resistance pattern of probiotic strains should be studied to avoid transfer of antibiotic resistance genes through lateral gene transfer (Duncan, 2003)
- Should be able to create a favourable environment by modulating ph and enhancing action on the oxidation reduction potential, thus preventing establishment of pathogenic bacteria.

Characteristics of Novel Probiotic Strains

- Should be non-toxic and non- pathogenic
- Should be microbiologically characterized
- Contain a large number of viable cells
- Remain viable during storage and use
- Should have been subjected to Randomised Control Trial
- Should be stable in acidic and alkaline environment

Benefits of Probiotics in General Health: Bacterial colonisation begins right from the birth of the infant. The adequate establishment of the intestinal flora after birth plays a crucial role in the development of the Innate and Adaptive immune system. The newborn infant's gestational age, mode of delivery and diet influences this initial colonisation. Neonates who are born by caesarian delivery, preterm, exposed to prenatal and perinatal antibiotics show a delay in intestinal commensal probiotic bacterial colonisation. Breast fed infants are found to have Bifidobacteria predominant colonisation , whereas formula fed infants have equal colonization with Bacteroides and Bifidobacteria species(Yoshioka, Iseki and Fujita, 1983; Penders et al., 2006). The infants are exposed to the bacterial components from their mother during feeding. They might acquire few commensals during the early days of life. This process is termed as "Bacterial imprinting"(Perez et al., 2007).

Some of the Probiotic effects on General health are as follows:

- Probiotics play a major role in balancing gut flora
- Increased resistance to infectious diseases (Perdigon et al., 1995; Fuller, 1997) (Perdigon et al., 1995; Fuller, 1997; Arunachalam, Gill and Chandra, 2000)
- Alleviates Lactose intolerance (McDonough et al., 1987)
- Lowers the serum cholesterol by bile salt deconjugation (Fuller, 1997)
- Reduction in allergy and respiratory infections (Hatakka et al., 2001)

- Balances the immune response of the individual resulting in control of Inflammatory Bowel Syndrome
- Prevention of antibiotic associated diarrhea, gastritis ,vaginal and urogenital infections.
- It lowers the mutagenic and toxigenic reactions in the gut which predisposes to colon cancer.
- Alleviates food allergy symptoms in infants by immunomodulation
- Produces vitamins and other nutritional factors.

The predominantly used Probiotics mainly belong to two genera, Lactobacillus and Bifidobacterium species. There are more than 100 species of Lactobacillus that have been identified like Lactobacillus acidophilus, Lactobacillus brevis, Lactobacillus casei, Lactobacillus rhamnosus and Lactobacillus salivarius. They are capable of producing digestive enzymes capable of metabolizing proteins and carbohydrates. Lactobacillus species help in synthesis of vitamin B, vitamin K, and also helps in the breakdown of bile salts. Next to Lactobacilli, Bifidobacteria are probiotics commonly used for improving microflora of newborn and breastfed children. However the levels of Bifidobacteria decrease gradually after weaning and are replaced by potentially pathogenic bacteria.

Role of Probiotics in Oral Health: The oral cavity houses a great diversity of microbial species and each surface of the oral cavity is covered by numerous bacterial communication systems. Keigser et al., reported the presence of more than 1000 species of bacteria which may be in planktonic state or integrated into biofilms. (Keijser et al., 2008) The most common probiotic strains in the oral cavity include Lactobacillus and Bifidobacterium.

The probiotics helps in reducing the pathogenic oral microflora and has the following effects in the oral cavity:

- Helps in prevention of Dental caries.
- Promotes periodontal health.
- Prevention of candidiasis.
- Reduction of Halitosis(Stecksén-Blicks, Sjöström and Twetman, 2009)

Mechanism of Action of Probiotic Bacteria in Prevention of Dental Caries: Dental caries are multifactorial in origin and the most commonly involved organisms are Streptococcus mutans as the initiator and Lactobacilli as secondary invaders which results in caries progression. The process of tooth decay ensues by the progression of adhesion, co-aggregation and secondary colonisation. The biofilms are important mediators that encourage adhesion. In-vitro studies have assessed adhesion by measuring the attachment of bacteria to saliva coated hydroxyapatite (HA) and oral epithelium (Stamatova et al., 2009). Among Probiotic strains Lactobacillus rhamnosus GG exhibited highest values of adhesion, comparable to those of the early tooth coloniser Streptococcus sanguis(Gilliland and Kim, 1984).

S.mutans is the most common organism that leads to the development of caries(Nikawa et al., 2004; Beighton, 2005). S.mutans is an acidogenic bacteria and it rapidly metabolizes carbohydrates resulting in lowering of pH in the oral cavity that leads to disturbance in hemostasis in the oral microbial community(Hedberg et al., 2008).

- Probiotic bacteria inhibits biofilm formation by competing with pathogenic bacteria for adhesion sites, nutrients and growth factors.
- Interfere in metabolism of substrates by pathogenic bacteria.
- They are capable of producing antimicrobial substances such as organic acids, hydrogen peroxide, mutacin, bacitracin, Lactase, bacteriocin, biosurfactants and fatty acids for antagonizing the pathogens.(Meurman, 2009)
- The antimicrobial substances produced by the Probiotics are more effective in acidic than in alkaline medium. Lactobacillus salivarius produces a bacteriocin called salivacin 140, Lactobacillus plantarum produces plantaricin 423, Lactobacillus reuteri produces reuterin and reutesilin and Lactobacillus acidophilus produces acidocin J1229.
- To have a beneficial effect in the oral cavity, probiotics should form a biofilm that acts as a protective lining for oral tissues against oral diseases.
- Probiotics affects the structural integrity of the pellicle layer. They lower the levels of salivary agglutinin which is essential for the adhesion of Streptococcus mutans to the tooth surface.
- Probiotics also lower the peroxidase levels thus improving the antibacterial activity of saliva. They lead to changes in oral pH and redox potential.
- Selection pressure on developing microflora towards colonization by less pathogenic species.
- Prevent plaque formation by neutralizing free electrons.
- Stimulate non specific immunity and modulate humoral and cellular immune response
- Enhances host immune response by production of IgA and defensins.
- Decreases production of matrix metalloproteinases.
- Leading to inactivation of probiotic bacteria by mechanisms of Aggregation and coaggregation.

Probiotics should be installed in the oral cavity for a specified period of time in order to exhibit its actions. They should adhere to the dental tissues for them to establish a cariostatic effect and thus should be part of biofilm to fight against the cariogenic bacteria(Hatakka et al., 2001; Grudianov, Dmitrieva and Fomenko, 2002). The development of levels of secretory immunoglobulins in saliva of newborns was studied under physiological conditions and after artificial colonisation with non-pathogenic, probiotic bacterial strain of Escherichia coli. The early colonization of E.coli would activate the immune system to produce specific antibodies and immunoglobulins(Vancíková et al., 2003). Thus it

was proved by various studies that early colonisation of infants with Probiotic bacteria had a significant improvement in the overall immune system. Lactobacilli are known to play an important role in the maintenance of human health by simulating a native immunity and protection against infection of the pathogenic bacteria (Gill and Prasad, 2008).

Table 1. Commonly used Anti-cariogenic Probiotic strains and their specific actions

Probiotic strains	Mechanism of action
Lactobacillus reuteri	Co-aggregation(Jørgensen et al., 2017) Secretion of 2 bacteriocins namely, reuterin and reutericyclin. Inhibits cytokine secretion that initiates inflammation. Reduces dental plaque and gingivitis. (Stecksén-Blicks, Sjöström and Twetman, 2009; Schlagenhauf et al., 2016) Reduces pro-inflammatory cytokines in GCF.
Lactobacillus salivarius WB21	Improves periodontal clinical parameters in smokers (Shimauchi et al., 2008)
Lactobacillus species (Gruner, Paris and Schwendicke, 2016)	Reduces ability of candida albicans to form biofilms on dentures (Ujaoney et al., 2014) Helps in synthesis of vitamin K and also helps in breakdown of bile salts. They help in enhancing innate and acquired immunity as well as inhibition of pro inflammatory mediators. Lactobacillus and Bifidobacteria inhibit the growth of streptococci and candida species. Co-aggregate Streptococcus mutans.
Lactobacillus rhamnosus GG (Schwendicke et al., 2014) and Lactobacillus paracasei (Chuang et al., 2011)	Antagonizes S.mutans and Porphyromonas gingivalis.
Lactobacillus rhamnosus GG (ATCC 53103)	Inhibitory effect on the growth of Streptococcus sobrinus in an agar overlay technique.
Lactobacillus salivarius WB21	Significantly decreased plaque index and probing and pocket depth.
Lactobacillus reuteri ATCC 5573, Bifidobacterium DN - 173 010 by Caglar et al	Significant reduction of S.mutans(Caglar, Kargul and Tanboga, 2005)
S.mutans strain BCS3-L1	Produces an antimicrobial peptide called mutacin 1140 against pathogenic S.mutans(Chen and Wang, 2010)
S.mutans with gtfC gene mutation	Inhibits production of extracellular glucan which is an important extracellular matrix component in oral biofilms.
S.salivarius M18 (strain Mia) by Suzuki and Nicholas et al (Heng et al., 2011)	Interaction with epithelium (Manning et al., 2016) Broad spectrum inhibitory activity against streptococcal pathogens (Kumada et al., 2009)

Subjects without caries are colonised by Lactobacilli, which possess a significantly increased capacity to suppress the growth of Streptococcus mutans compared to subjects with arrested or active caries(Simark-Mattsson et al., 2007). Lactobacillus rhamnosus GG and Lactobacillus reuteri have the unique property of reducing the cariogenic Streptococcus mutans counts, thus suggested widely for prophylaxis of caries. Lactobacillus species strain GG is an effective probiotic as it produces organic acids, hydrogen peroxide, bacteriocins and adhesion inhibitors against Streptococcus species (Silva et al., 1987). L.rhamnosus strains, L.paracasei F19 and L.reuteri do not ferment sucrose and are relatively safe probiotic strains in caries- prophylaxis.

Table 2. Commercially available products for local delivery of Probiotics.

Name of the commercial product	Strains present	Probiotic actions
New Evora kids Oral Probiotic Chew	Streptococcus oralis strain KJ3 Streptococcus uberis strain KJ2 Streptococcus rattus strain JH145	Maintenance of dental and gingival health between professional visits
Plidenta Pro-t-action toothpaste	Lactobacillus paracasei	Co-aggregation of cariogenic S.mutans

Various Studies Done Using Probiotic Bacteria: Keller et al had shown that Lactobacilli displayed co-aggregation activity(Table 1) and inhibited growth of pathogenic strain of mutans streptococci(Keller et al., 2011). Meurman et al in 2005, demonstrated that consumption of milk on a regular basis containing Lactobacillus rhamnosus GG strain reduced initial carious lesions in kindergarten children. Nase et al and Cagler et al showed that administration of Lactobacillus reuteri ATCC 55739 OR Bifidobacterium DN 173010 induced significant reduction of S.mutans in saliva.(Table 1). Hillman et al introduced a non acid producing S.mutans strain that produces a bacteriocin active against other S.mutans strains into the oral cavity to replace the naturally occuring cariogenic strains. Hillman et al studied that JH 145, a variant of S.rattus was able to colonise tooth surfaces readily compared to S.mutans (Table 2). Thus S.rattus JH 145 had potential for use as probiotic in prevention of dental caries.(Hillman et al., 2009)

Petti et al reported that yoghurt containing *S.thermophilus* and *L.bulgaricus* had selective bactericidal effects on streptococci of mutans group. Nikawa et al in 2004, reported that consumption of yoghurt containing lactobacillus reuteri over a period of 2 weeks have shown in reduction of S.mutans in saliva upto 80%(Nikawa et al., 2004). Cagler et al (2006) by a comparative study, demonstrated a reduced S.mutans level in patients receiving fluid or tablet probiotic forms(Caglar, Kargul and Tanboga, 2005). He also found a significant reduction in the streptococcus mutans count after the administration of xylitol enriched chewing gums. Hang et al reported that S. salivarius M18(formerly strain Mia) exhibited broad spectrum activity against several streptococcal pathogens, notably S.mutans.(Table 1)

Glavina et al., studies the effect of yoghurt containing *Lactobacillus rhamnosus* ATCC 53103-LGG on reducing the *Streptococcus mutans* and Lactobacillus species salivary counts in children. (Glavina et al., 2012). 12) Petersson et al found that the regular consumption of probiotic reverse primary root caries in older individuals(Petersson et al., 2011). Koll- Klais et al (2005) studied various strains of lactobacilli and found inhibitory action of 69% strains on the growth of S.mutans and 82% strains inhibited the growth of P.gingivalis(Kõll et al., 2008). Ahola et al., 2002 performed a study on adults by administering them cheese containing L.rhamnosus GG and L.rhamnosus LC 705 for 3 weeks and a significant reduction in the level of streptococcus mutans was noted.(Ahola et al., 2002). Hedayati -Hajikand et al., found that the combined use of chewable tablets with ProBiora3 (combination of S.uberis, S.oralis KJ3 and S.rattus JH145) and the daily use of fluoride toothpaste decreased early demineralization of the enamel, but had no effect on carious lesions.

Comelli et al, 2002 encouraged the selection of non-pathogenic dairy bacterial strains that were able to decrease the cariogenic potential of dental plaque. Specifically they found that Lactococcus lactis NCC2211 can be incorporated into a biofilm and is capable of modulating the growth of Streptococcus sobrinus OMZ176 (Comelli et al., 2002). Montalo et al., (2004) studied the probiotic strains of L.sporogenes, L.bifidum, L.bulgaricus, L.thermophilus, L.acidophilus and demonstrated increased counts of lactobacilli with significant decrease in levels of streptococcus mutans (Montalto et al., 2004). Hatakka et al., (2007) did a study and concluded that Lactobacillus rhamnosus GG and Propionibacterium JS reduced risk of high yeast counts and hyposalivation. The bacterium W.cibaria 110, which was isolated from fermented fish in Thailand, has been shown to produce the bacteriocin Weisselicin 110, which prevents colonisation of certain gram positive bacteria(Srionnual et al., 2007).

Gruner et al, 2016 systematically reviewed the dental benefits of probiotics and concluded that the current evidence was not sufficient to recommend probiotics for managing dental caries, but suggested as supportive therapy for gingivitis or periodontitis(Gruner, Paris and Schwendicke, 2016). Montalto et al, 2004 did a randomised clinical trial and stated that the probiotic treatment could increase lactobacilli counts(Montalto et al., 2004). Amez et al suggested treatment with probiotics as bacteriotherapy that reduced the colony forming units of streptococcus mutans.(Seminario-Amez et al., 2017). Hu et al and Mundula et al, studied that the probiotics had a favourable effect in treating oral candidiasis(Hu et al., 2019)(Mundula et al., 2019).

Vehicles for Probiotic Supplements: Probiotics are generally isolated from healthy humans or they are derived from fermented food. The contact between plaque and the probiotic should be long enough for enhanced actions of probiotic bacteria. Thus ideal vehicles for the delivery of probiotics and time of contact of probiotics to oral surfaces is pivotal in achieving optimum probiotic effects. In food technology, dairy products containing probiotic lactobacilli in combination with prebiotics are currently developed, which may be useful as a symbiotic functional food(Corcoran et al., 2004). Evaluation of a suitable vehicle for probiotic administration is very essential for improving efficacy of probiotic action. Most naturally occuring Probiotics are found in fermented dairy products. Milk acts as a buffer to the acid produced. Milk itself contains calcium, calcium lactate and other organic and inorganic compounds that are anticariogenic and reduce the colonisation of cariogenic pathogens.

Probiotics are incorporated into food products and available in various forms as follows:

- Added to a beverage or food in the form of cultural concentration.
- Inoculated into prebiotic fibres
- Inoculated into milk or milk based products such as milk, yoghurt, kefir and cheese.
- Non- dairy products such as powder, capsule, gelatin tablets are packed with commercially prepared probiotics.

Nadelman et al, systematically reviewed the effect of dairy products containing probiotics and stated that it could support prevention of dental caries(Nadelman et al., 2018)Milk and cheese have been widely used as vehicles for probiotic delivery and they have added advantage of having casein phosphopeptide which has a major role in "biomineralization". Cheese was thought to have more local effect as it cleared more slowly from mouth than milk. Caglar et al administered L.reuteri ATCC 55730 in capsule and straw forms in young adults for 3 weeks and raised the possibility of a systemic effect along with a local effect (Table 1). Yli-Knutilla studied the colonisation of Lactobacillus rhamnosus GG in the oral cavity in a 14 day trial period and observed that there was less substantive effect in the oral cavity since it lasted only for one week(Table 1).

Safety Concerns in Probiotic Bacteria: Probiotic bacteria should be non-pathogenic, should not have any growth promoting effects on pathogenic bacteria, should not be able to transfer the antibiotic resistant genes and should be capable of maintaining a stable and healthy oral microflora. The safest probiotic species include Lactobacilli, bifidobacteria and lactococci. Bifidobacteria are evaluated and are considered safe for use in baby formulas(Saavedra et al., 2004). Most commonly used Probiotics are acidogenic and have the capability to dissolve hard structures of the tooth namely, enamel and dentin. (Toi, Mogodiri and Cleaton-Jones, 2000). When lactobacilli are administered orally, they establish themselves in the oral cavity and their mechanism of action should not support formation of caries.

Many lactobacilli strains are resistant to vancomycin, which raises the concern regarding the possible transfer of such resistance to more pathogenic organisms, particularly enterococci and staphylococcus aureus. Probiotic organisms like Enterococcus, Bacillus and other spore forming bacteria are not regarded as safe probiotics due to increased risk of bacteremia and endocarditis development(Snydman, 2008).

Newer Approaches In Probiotic Usage: Interference with signaling mechanism: Several pathogenic properties of S.mutans are regulated by a quorum sensing mechanism involving Competence Stimulating peptide(CSP) as the signalling molecule. Addition of high concentration of CSP can induce death of S.mutans(Snydman, 2008; Chen and Wang, 2010).

Targeted antimicrobial therapy via a novel STAMP technology: Indiscriminate killing of all the microbes by conventional antimicrobials disrupts the ecological balance of indigenous microbiota. Eckert et al formulated a new class of antimicrobials called Specifically Targeted Antimicrobial Peptides (STAMP).

- Specific binding to selected pathogens facilitates the specific action of probiotics(He et al., 2009).
- The targeting moiety provides binding to a selected pathogen and facilitates the targeted delivery of an antimicrobial peptide.
- Recombinant DNA technology has been used to delete gene encoding lactate dehydrogenase in BCS3-L1(Table 1) making it unable to produce lactic acid. This effector strain secrete mutacin 1140 that inhibits all pathogenic strains of S.mutans (Chen and Wang, 2010)

Future Trends In Probiotic Therapy

- Probiotics can be used as passive local immunization against dental caries. Systemic immunization with a multivalent vaccine , L. rhamnosus GG was chosen as a vehicle to harbor IgG because of its wide range of health benefits in humans and animals.
- High titres of antibodies against human cariogenic bacteria, S. mutans and S. sobrinus, were produced in bovine colostrum by a vehicle of fermented milk (Wei et al., 2002)

- Probiotic bacteria like E.coli if colonized early in new born may stimulate immune response to produce antibodies and immunoglobulins
- Advances in Biomedical engineering is necessary to develop systems that deliver bacteria to the host, which include encapsulation of probiotics to rehydrate at specific sites and encasing prebiotics in nano- aggregates thus providing protection in the gastric environment, ensuring delivery at a pH of 7.4
- Capsules coated with biosensors that can ascertain the favorable conditions for release of probiotics are on the horizon in molecular research.
- In food technology, dairy products containing natural Probiotics like Lactobacilli are combined with prebiotics to be used as symbiotic functional food(Corcoran et al., 2004)
- Studies are also being extensively made in the field of Oncology, regarding the use of Probiotics to counteract the serious systemic infections that occur in immunosuppressed patients undergoing long term chemotherapy.

RESULTS AND DISCUSSION

The various studies included clearly demonstrate that most probiotic strains commonly used are as safe as commensals. Thus, the Probiotics can influence the caries balance locally through a direct contact with oral tissues and systemically through the gastrointestinal tract. Recent advances in vehicles of probiotics have facilitated the use of probiotics among all common people. This review of literature would help the dentist, in understanding the properties and mechanism of action of probiotics better and help in initiating further systematic studies with controlled clinical trials in order to establish probiotics as preventive therapy for dental caries

CONCLUSION

The control of oral biofilm using Probiotics has been used as a preventive strategy to dental caries. Some of the beneficial Probiotic strains are found to indigenous part of healthy oral microbiota which encourages a lot of researchers to use Probiotics as a part of Bacteriotherapy in management of Dental caries. Probiotics can influence the oral cavity and the caries balance locally through a direct contact with oral tissues and systemically through the gastrointestinal tract.

Most of the probiotic strains currently available have been proved safe and promote both general and oral health. Early colonization of Probiotics in infants has gained a lot of popularity in developing a healthy oral microbiome. As the composition of biofilm in infants is immature, it has been suggested that an intake of probiotic bacteria, early in life could lead to permanent colonization, but still studies needed to support this assumption. Probiotics that are able to deliver new and novel therapeutics are emerging with site specificity and well defined efficacy and termed as “designer probiotics”.

Limited clinical trials, widely different study designs and target population and lack of knowledge of sustainability of the effect of Probiotics are some of the drawbacks encountered in the usage of Probiotics in Dental therapeutics. Multi-disciplinary approach combining the fields of Dentistry, Biomedical Engineering along with Genetic technology is needed to identify the most safe and effective Probiotic strains and administer optimal administration regimes.

ACKNOWLEDGEMENT

Both the authors have equally contributed to the study.

Conflicts of Interest: There are no conflicts of interest

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-527-532

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Awareness on Recent Advances in Materials Used in Maxillofacial Prosthesis Among Undergraduate Dental Students - A Cross Sectional Survey

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ABSTRACT

The aim of this study was to assess the awareness on recent advances in materials used in maxillofacial prosthesis among dental students. Maxillofacial deformities are embarrassing to patients and may negatively affect their physical and physiological health, potentially resulting in serious psychiatric, familial and social problems. Maxillofacial prosthesis have an impact on the patient's quality of life. Several materials, techniques and clinical approaches have been used for maxillofacial prosthesis. So this study aims at evaluating the awareness on recent advances in materials used in maxillofacial prosthesis among undergraduate students of saveetha dental college. A set of 10 questionnaires was framed and an online survey was conducted among Saveetha dental college students using survey planet.100 students have taken the survey and the results were statistically analysed from the responses. From the results, 57% of students were not aware about the recent advances in materials for maxillofacial prosthesis. 59% students were aware of silicone block polymer but 57% were not aware about its properties. 53% students were not aware about polyphosphazenes. 56% were not aware about A-2186 (Factor 11) and silphenylenes. 78% students agree that the future of maxillofacial prosthesis depends on the development of new materials. Hence, the study draws attention that the students are not aware about recent advances of materials used in maxillofacial prosthesis. We need to create more awareness by seminars, CDE programs and hands on lectures on recent advances in maxillofacial prosthesis.

KEY WORDS: RECENT ADVANCES; MAXILLOFACIAL; A-2186; POLYPHOSPHAZENES; SIL PHENYLENES.

ARTICLE INFORMATION

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Received 5th Aug 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/191

INTRODUCTION

Since the sixteenth century, any surgical imperfections have been reestablished by prosthetic substitutions built from an assortment of materials(Anusavice, Shen and Ralph Rawls, 2014). Maxillofacial prosthetics is defined as that branch of prosthodontics concerned with restoration and replacement of both of stomatognathic and associated facial structures by artificial substitutes that may or may not be removed('The glossary of prosthodontic terms', 2005). It envelops prosthetic restoration of patients with oral or facial absconds which might be normally obtained or may result from malady or injury. A number of materials are accessible and have been utilized for creation of maxillofacial prosthesis.

These incorporate wood, wax, metals and as of late polymers. Polymers and elastomers are the pillar of current maxillofacial prosthetic recreation(S et al., 2015). Polymethylmethacrylate, polydimethylsiloxane and polyether urethanes have been tried and utilized in satisfying the need for materials that will be biocompatible, strong, shading stable and effectively manipulated (Lontz, 1990). The new materials have shown some great properties yet in addition some disappointing insufficiencies. Up 'till now, a material has not developed that doesn't have unwanted qualities. Much exertion has been consumed as of late in contemplating existing materials with expectations of improving their insufficiencies.

The success of the prosthetic rehabilitation of the facial defect is limited by mechanical and physical properties of the material selected for that purpose(Alqutaibi, 2015).Commonly used materials for construction of facial prosthesis include but not limiting to: Acrylic resins and its copolymers, vinyl polymers, polyurethane elastomers, and silicone elastomers, unfortunately none of them fulfill all the ideal requirements for a satisfactory prosthesis(Alqutaibi, 2015). In general, the ideal material for extra oral prosthesis include: Biocompatible not irritating the surrounding tissues, yet it should be strong enough about the periphery to endure, be translucent, lightweight, easy to process, and easy to manipulate prior to processing(Maller, Karthik and Maller, 2010). It should be resistant to various chemicals such as ether and oils and to sunlight, heat, and cold (Taylor, 2000).

Ideal physical and mechanical properties of the maxillofacial materials include High edge strength, high elongation, high tear strength, softness, compatible to tissue, and translucent (Chalian and Phillips, 1974). Ideal processing characteristics of the maxillofacial materials include Chemically inert after processing, ease of intrinsic and extrinsic coloring with commercially available colorants, long working time, no color change after processing, reusable molds and Retain intrinsic and extrinsic coloration during use(Chalian and Phillips, 1974; Moore et al., 1977). Ideal biological properties of the maxillofacial materials include Non-allergenic, cleansable with disinfectants, color stability, inert to solvents and skin adhesives, and resistance to growth of microorganisms.(Chalian and Phillips, 1974; Stansbury and Antonucci, 1992)

Face is the patient's contact with the world and it forms the physical basis for personal recognition. As the father of Indian surgery Sushrutha Samhitha said hundreds of years ago, "the love of face is next only to the love of our life and thus the mutilated cry for help." Thus, people having severely disfigured or missing parts of the maxillofacial skeleton or the face in particular come for a normal appearance by artificial restorations to us. Today, with the improved knowledge, skill, materials and technique in the dentistry, it has become easy to rehabilitate oral, and facial defects with the maxillofacial prosthesis.The UG students should be aware of recent advancements in materials and even technologies used for maxillofacial prosthesis so more research can be carried out to develop new treatment techniques and assess outcomes have improved treatment strategies.

Previously our department has published extensive research on various aspects of prosthetic dentistry('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about we planned to pursue research on awareness on recent advances in materials used in maxillofacial prosthesis among dental students. In this study we asked the students about some of the recent advances in materials like silicone block polymers, polyphosphazenes,A-2186 (Factor 11), silpheniles and their properties to assess the awareness on recent advances in materials used in maxillofacial prosthesis among dental students .

MATERIAL AND METHODS

This cross sectional survey was conducted among dental undergraduate students from December 2019 to April 2020. consisting of 10 questions (Table 1) which were passed on to the samples using survey planet to the sample size of 100 dental undergraduate students. The measure taken to minimize sampling bias was the technique of stratification and randomisation. The Institutional Review Board of Saveetha Institute of Medical and Technical Sciences, Chennai, India in January 2020 , was granted the ethical permission and approval for the project (SDC/SIHEC/2020/0619-0320). Total number of participants of the survey was 100. All of the participants were ensured to have answered all 10 questions in the questionnaire and none of the participants were excluded from the study. Hence, 100 responses were analysed.The survey included the students who were attending clinical rotations and excluded the students in their preclinical years.

Dental undergraduate students (3rd years,final years and interns), Saveetha dental college were the target participants of the study. The results were statistically analyzed through pie-charts and percentage analysis were obtained.

Table 1. Questionnaire as follows

Q1. Are you aware of recent advances in materials used in maxillofacial prosthesis? A. Yes B. B)No
Q2. Are you aware of silicone block copolymers ? A)Yes B)No
Q3. Are you aware that silicone block copolymers are more tear resistant and have potential to support bacterial and fungal growth than silicone elastomers? A) Yes B) No
Q4.Are you aware of polyphosphazenes? A. Yes B. No
Q5.Are you aware that polyphosphazens are used as a resilient denture liner besides maxillofacial prosthesis? A. Yes B. No
Q6.Are you aware of A-2186 (Factor 11) a recently developed material? A. Yes B. No
Q7.Did you know when A-2186(Factor II) when subjected to environmental variables did not retain its improved properties ? A. Yes B. No
Q8.Are you aware of silphenylenes? A. Yes B. No
Q9 Are you aware of the property of superior coloration of silphenylenes which feel like skin in maxillofacial prosthesis ? A. Yes B. No
Q10.Do you agree that the future of maxillofacial prosthesis depends on the development of new materials and techniques? A. Yes B. No

RESULTS AND DISCUSSION

In this study 57% students were not aware of recent advances in materials used for maxillofacial prosthesis (Figure 1). 59% students are aware of silicone block copolymer (Figure 2) but 57% are not aware of its properties (Figure 3). 53% students were not aware about polyphosphazenes(Figure 4).59% students were not aware that polyphosphazenes are used as a resilient denture liner besides maxillofacial prosthesis (Figure 5).56% students were not aware of A-2186 (Factor 11) (Figure 6). 62% students didn't know A-2186 (Factor II) when subjected to environmental variables did not retain its improved properties (Figure 7). 56% students were not aware about sil phenylenes (Figure 8). 60% students were not aware of the property of superior coloration of silphenylenes which feel like skin in maxillofacial prosthesis (Figure 9). 78% students agree that the future of maxillofacial prosthesis depends upon development of new materials and techniques (Figure 10).

Figure 1: It was seen that 57% students were not aware of recent advances in materials used in maxillofacial prosthesis.

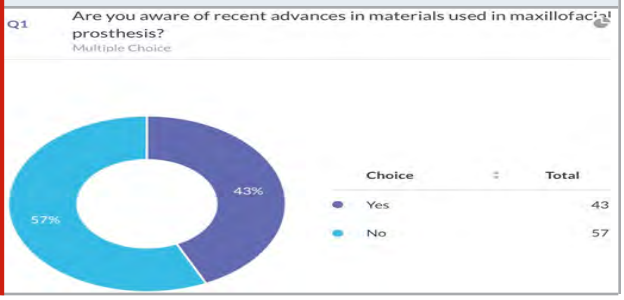


Figure 2: It was seen that 59% students were aware of silicone block copolymer

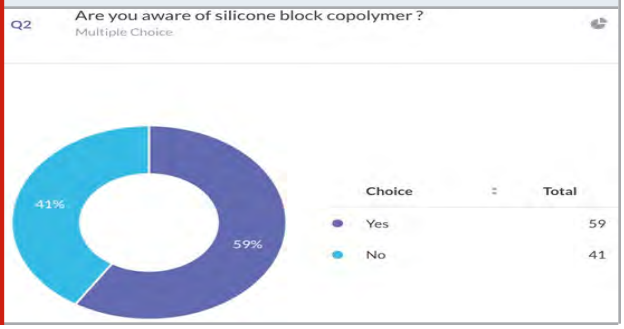


Figure 3: It was seen that 57% students were not aware about the properties of silicone block copolymer that they are more tear resistant and have the potential to support bacterial and fungal growth.

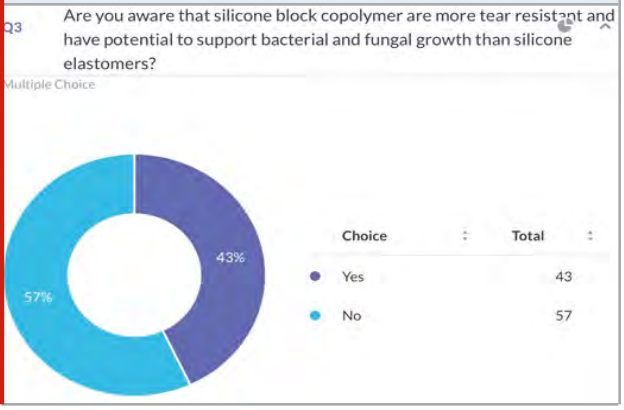


Figure 4: It was seen that 53% were not aware about polyphosphazenes

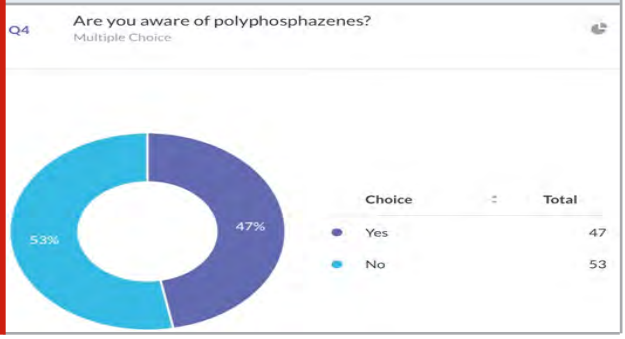


Figure 5: It was seen that 59% students were not aware that polyphosphazenes can be used as a resilient denture liner besides maxillofacial prosthesis.

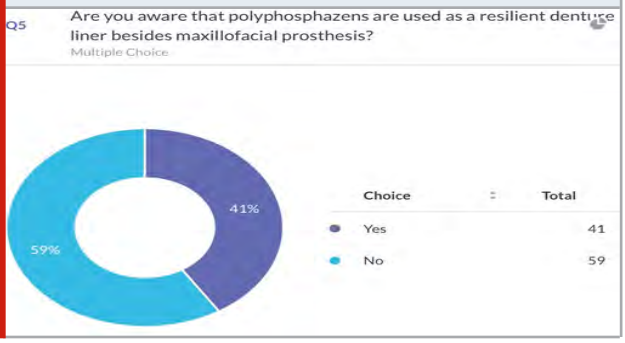


Figure 6: It was seen that 56% students were not aware of A-2186(Factor 11) which is a recently developed material.

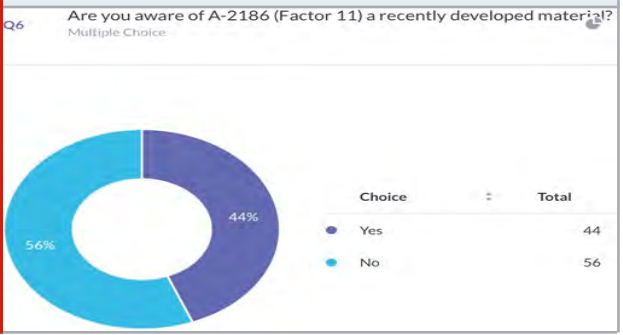


Figure 7: It was seen that 62% students were not aware that Factor II when subjected to environmental variables did not retain its improved properties

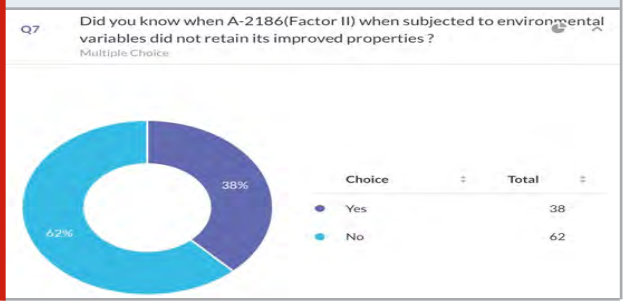


Figure 8: It was seen that 56% students were not aware about silphenylenes

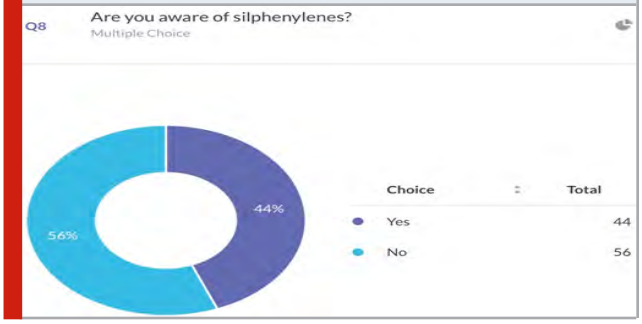


Figure 9: It was seen that 60% students were not aware of the property of superior coloration of silphenylenes which feels like skin in maxillofacial prosthesis

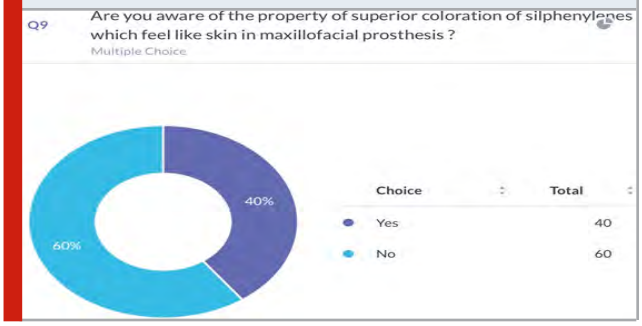
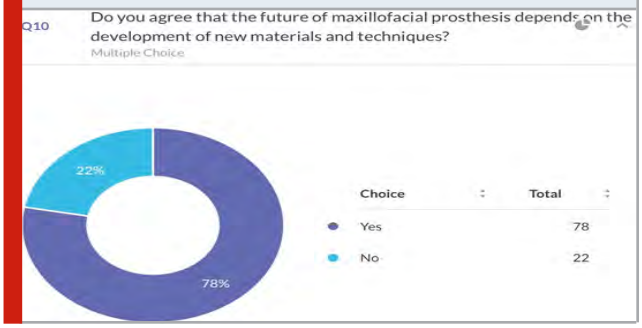


Figure 10: It was seen that 78% students agree that the future of maxillofacial prosthesis depends upon development of new materials and techniques



In this study 57% students were not aware of recent advances in materials used for maxillofacial prosthesis.59% students were aware of silicone block copolymer but 57% were not aware of its properties. It has been introduced to improve some of the weaknesses of silicone elastomers (e.g. decreased tear strength, low percent elongation and its susceptibility to bacterial growth)(El-Kenawy and Ahmed, 2015). It is more tear resistant and has potential to support bacterial and fungal growth than silicone elastomers. Blocks of polymers other than siloxane are positioned with the traditional siloxane polymers in an attempt to modify the current physical properties of conventional silicone (Polyzois, Winter and Stafford, 1991).

An example of this is the intertwining of polymethyl methacrylate into the chains of siloxane (Tsai et al., 1992). The improvement of the bioadhesive properties of elastomeric polydimethylsiloxane (PDMS) coatings is reported. This can be achieved by a surface modification which consists of the incorporation of block copolymers containing a PDMS block and a poly [2-(dimethylamino) ethyl methacrylate] (PDMAEMA) block in a PDMS matrix. Observations highlight the significant role of hydrophilic groups in the surface modification of silicone coatings(Kalinova, Mincheva and Dubois, 2014).

53% students weren't aware of polyphosphazenes. Polyphosphazenes fluoroelastomer has been developed for use as a resilient liner and has the potential to be used as a maxillofacial prosthetic material. Modifications of physical and mechanical properties of these elastomers may be needed to satisfy the requirements for fabrication of maxillofacial prosthesis (Gettleman et al., 1985). Researchers in New Orleans dealt with maxillofacial prosthesis, have found that compounding polyphosphazenes with little or no fillers and decreasing the ratio of acrylic to rubber yields a softer rubber, with a HDA of 25, similar to human skin(Mitra et al., 2014).56% students were not aware of A-2186(Factor 11).

A-2186, which is made by modification of the polymer chain had greater tear resistance, tensile strength, a larger percentage of elongation and also proved to be softer at the surface than HTV silicones and many other RTV silicones. It also demonstrated absence of cytotoxicity in the cell culture tests(Polyzois, Hensten-Pettersen and Kullmann, 1994).Sara M. Zayed et al concluded that the incorporation of surface treated SiO2 nanoparticles at concentration of 3% enhanced the mechanical properties of A-2186 silicone elastomer(Zayed, Alshimy and Fahmy, 2014). 56% students were not aware about sil phenylenes.Siphenylenes are siloxane copolymers that contain methyl and phenyl groups. They are formulated as a pourable, viscous, room-temperature vulcanizing liquid. In tactual response, silphenylene elastomers feel more like skin. These polymers are transparent even when reinforced with silica fillers.

These polymers possess many desirable properties of RTV silicones, including biocompatibility and resistance to degradation on exposure to ultraviolet light and heat. In addition, they exhibit improved edge strength, low modulus of elasticity and colourability.It has a property of superior coloration which feels like skin in maxillofacial prosthesis(Bansal, Khindria and Kansal, 2009; Deba, Yunus and Tamrakar, 2012; Mahajan and Gupta, 2012). 78% students agreed that the future of maxillofacial prosthesis depends on the development of new materials.Ideal requisites for maxillo-facial materials are: 1. Materials used should be biocompatible.2. Flexibility should be flexible at temperatures from 4.4°C to 60°C.3. Color and Translucency: Color should blend with the adjacent skin as close as possible. 4. Chemical and environmental stability. 5. Thermal conductivity: Poor conductor of heat. 6. Ease of processing and ease of duplication. 7. Weight should be light and easily retained in position and be comfortable to the patient. (Reddy et al., 2015).

Limitations: The limitations of this study was, it included students from only one university and it was a short term survey, no association was made between the year of study of undergraduates and knowledge and awareness of recent advances in materials used in maxillofacial prosthesis.

Future Scope: Future scope can be a further study which takes into account a large population from various ethnicities. We can even include the post graduates and dental practitioners in a further study.

CONCLUSION

According to this survey, students were not aware about the recent advances in materials used in maxillofacial prosthesis. More awareness has to be created by conducting seminars, CDE programs and by giving hands-on lectures about recent advances in materials used in maxillofacial prosthesis.

ACKNOWLEDGEMENTS

The authors would like to acknowledge all the participants who took up the survey.

Conflict of Interest: There are no conflicts of interests to declare.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-533-537

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Awareness on Health Problems Among Business Process Outsourcing Employees- A Survey

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ABSTRACT

Business process outsourcing (BPO) is at present suffering high consistent misfortune which is offering a disturbing hint to many outsourcing associations. BPO is the one division where we can discover an increasing number of workers turnover for different reasons. India in the ongoing years has indicated enormous advancements in the zones of communication, power and programming improvements. In spite of this, the business has ordinarily made more worry among its workers, letting them to confront a great deal of physical, mental and moral related issues.This was a survey conducted in an online forum,survey planet. It was a questionnaire based survey. A set of 10 questions to assess symptoms of health problems faced by business process outsourcing employees. The results were obtained and statistically analysed through SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. The survey was conducted in the month of May, 2020.44% of the total study population preferred the job due to its less qualification criteria and frequent headache is the most common problem encountered by the employees. Males suffered with more health problems than females. The study mainly focuses on various health problems experienced by outsourcing employees.

KEY WORDS: BPO (BUSINESS PROCESS OUTSOURCING), HEALTH PROBLEMS, EMPLOYEE ISSUES, HEALTH RELATED STRESS.

INTRODUCTION

The Business Process Outsourcing (BPO) industry was set up in India just over the most recent 15 years and is quickly extending. The evaluated turnover of the BPO division by March 2008 was around US$10.9 billion (Kshetri and Dholakia, 2009). BPO is regularly sorted as back office outsourcing, which includes inside business capacities, and front office outsourcing, client related administrations. The workers at the call community need to tune in, watch, and talk all the while without a break. Whimsical working hours alongside stationary employment that requests sitting on a seat for extended periods every day, perusing prescripted discussions on the telephone unendingly may bring about musculoskeletal and psychologic strain. Long working hours, lasting night shifts, absence of social and family connections,

ARTICLE INFORMATION

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Received 23rd July 2020 Accepted after revision 27th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

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NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/192

unbelievably high work targets, loss of personality, combined with high extra cash at a youthful age may incline the BPO representatives to various types of reliance, including tobacco (Sudhashree, Rohith and Shrinivas, 2005).

Recent years have seen an enormous and developing population of talented youthful experts working in generally new fields like IT-ITES explicitly ITES or business process outsourcing (BPO) enterprises (Kesavachandran et al., 2006). These fields request odd working hours and continuous move changes. The impact of these on typical working of the human body is a field that is frequently overlooked. NASSCOM's overview demonstrates that around 4.5 million representatives are working in BPO and related areas. Sixty-five percent of the workers in the BPO industry are guys (Cruse et al., 2001). Long working hours, whimsical timings, long travel time, work pressure, and lacking breaks have consistently been the components causing worry among the BPO representatives. Any normal BPO representative places in 11–12 hours of work for every day and on occasion it arrives at 14 hours if there should be an occurrence of organizations that encourage additional time.

Changes of sharpness and subjective effectiveness have been recommended in individuals whose circadian rhythms are disturbed, for e.g., night or shift workers (Rouch et al., 2005). Many examinations have revealed an assortment of unfavorable natural, mental, and social impacts of shift work and other atypical work routines on the workers. For example, consequences for a wide arrangement of wellbeing and prosperity segments have been watched, including rest, eating, conduct, neuropsychic and cardiovascular capacities, menstrual cycle, work mishaps, non-attendance, and many others (Costa, 1996). Long working hours, lack of sleep, sporadic dietary propensities, and so forth., which are basic to these businesses may negatively affect subjective execution in typical human beings (Elovainio et al., 2009).

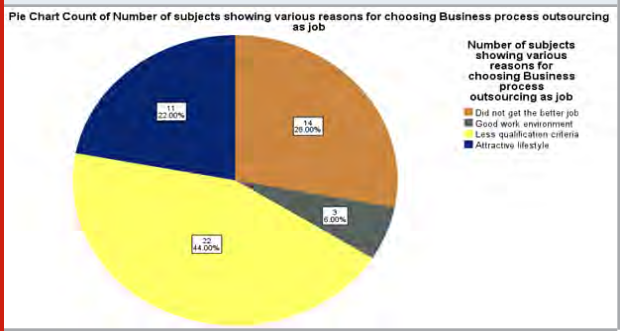
Despite the fact that tobacco is seriously harmful to wellbeing, its utilization is generally pervasive in all the areas of Indian culture. As per the consequences of the National Family Health Survey-3 (NFHS-3) led in 2005-2006 in which enquiries on tobacco use were surveyed in women and men , in the age groups between 15-19 years and 15-54 years, individually, the commonness of tobacco utilize was 57% among men and 10.8% among women. Women commonly used smokeless types of tobacco (Chawla and Sondhi, 2011).

The aim of the present study is to create awareness on the health problems encountered by BPO employees in india. Although much has been discussed the enormous open doors made by the BPOs in the developing countries, very little has been expressed in regards to the difficulties looked by these associations, especially as to the wellbeing and security given that are extraordinarily to this new and creating segment. Tending to these issues and making a solid workplace would be a success win circumstance for the two businesses and representatives.

Table 1. Age and Gender distribution of study population.

	Number of participants	Percentage
Gender		
Male	29	58%
Female	21	42%
Age		
20-30 years	30	60%
31-40 years	20	40%

Figure 1: Pie chart showing frequency and percentage distribution of reasons for choosing business process outsourcing as a job. Brown colour denotes participants who did not get a better job, grey denotes participants who preferred business process outsourcing job due to its good environment, light yellow colour denotes participants who preferred the job due to its less qualification criteria, and navy blue colour denotes the participants who preferred the job due to attractive lifestyle. The most common reason for choosing the job was due to its less qualification criteria (44%).



MATERIAL AND METHODS

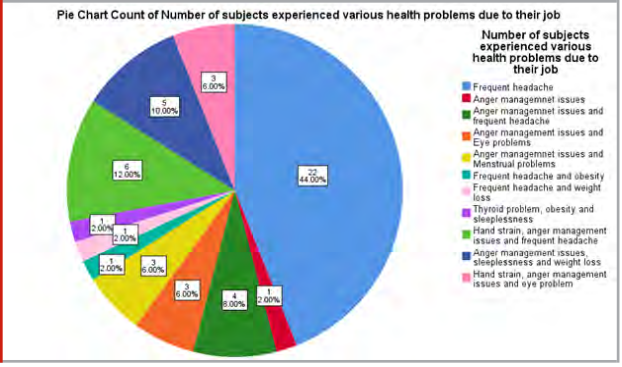
This study was conducted in an online setting. A sample size of 50 participants who are working in the business process outsourcing sector of different age groups and gender took part in the survey. Ethical approval was given by the Institutional Review Board. The study was designed to analyse health problems encountered by BPO employees. The questionnaire consists of self-structured standard questions pertaining to the health problems commonly experienced by BPO employees. The questionnaire was circulated through an online survey portal. Measures are taken to minimise bias by randomisation of parameters. Questions are pretested. Homogenisation and replication of experiment and cross verification with existing studies were done to improve the quality of the study. The necessary data which included gender, age, impact on quality of life, various

health problems were obtained from the responses and subjected for further analysis. Statistical analysis was performed using SPSS software version 23.0 and Chi square test was used to compare differences between gender and age to find correlation.

RESULTS AND DISCUSSION

The study sample consisted of 50 BPO employees, about 58% of the participants were male and 42% were females. Among 50 participants, 60% of the population belonged to age group between 20-30 years and 40% of the population belonged to age group between 31 to 40 years (Table 1). The reasons for choosing BPO jobs are due to its less qualification criteria (44%), followed by attractive lifestyle (22%), and 28% of the participants did not get a better job and 6% of the population opted for this job due to a good work environment (Figure 1).

Figure 2: Pie chart showing frequency and percentage of various health problems experienced by the participants due to their job. Light blue colour denotes participants who experienced frequent headache, red colour denoted participants with anger management issues, green colour denotes participants with anger management issues along with frequent headaches, orange colour denotes participants with anger management issues along with eye problems, dark yellow colour denotes participants with anger management issues along with menstrual problems, etc.. The most commonly encountered health problem in the study population is participants frequently experiencing headache(44%).



The various health problems encountered by the BPO employees are frequent headache(44%) followed by combination of health problems like hand strain, anger management issues and frequent headache(12%), anger management issues, sleeplessness and weight loss (10%), anger management issues and frequent headache (8%), anger management issues and menstrual problems along with eye problems in 6% of the population and equal percentage of 2% is accounted for health problems like anger management issues, frequent headache along with obesity, frequent headache along with weight loss,and thyroid problem along with obesity and sleeplessness (Figure 2). The association between gender and various health problems encountered by BPO employees when analysed it showed male predilection with a p value .288 which is statistically not significant (Figure 3). The correlation between gender and various health problems encountered by the BPO employees when analysed showed that higher incidence of health problems is more in the age group between 20 to 30 years.

Figure 3: Barchart shows the association between gender and various health problems experienced by the business process outsourcing employees. X axis represents gender and Y axis represents number of subjects experiencing various health problems due to their job. Light blue colour denotes participants who experienced frequent headacheThe incidence of health problems was more in males than females.Where the majority of both males and female participants suffered headache. Chi square test was done and association was found to be statistically not significant. Pearson chi square, p value =.288(p>0.05 statistically not significant).

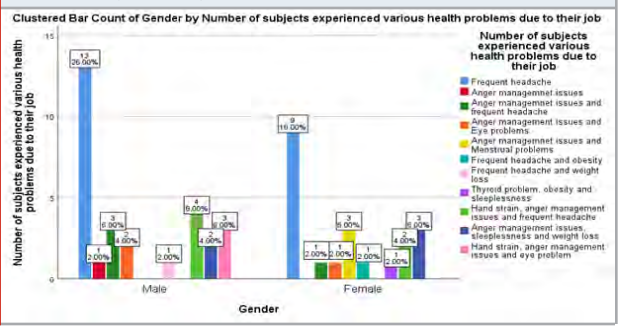
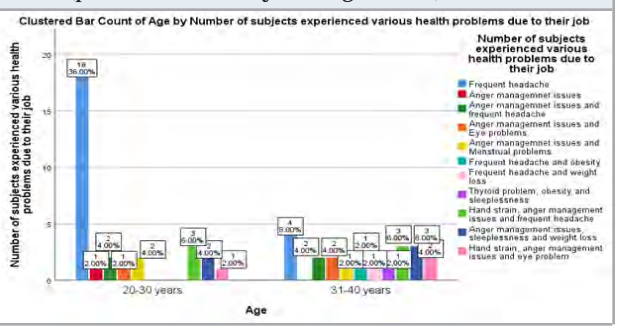


Figure 4: Barchart shows the association between age and various health problems experienced by the business process outsourcing employees. X axis represents age and Y axis represents number of subjects experiencing various health problems due to their job. Light blue colour denotes participants who experienced frequent headache. The incidence of health problems was more in age group between 20 to 30 years than in age group between 31 to 40 years.Majority of 20-30 years old suffered from headache. Chi square test was done and association was found to be statistically not significant. Pearson chi square, p value =.246(p>0.05 statistically not significant).



In the present study the main reason for opting BPO jobs are due to its less qualification criteria. The evolving ways of life (20%), demand for luxury, high paid salary for the employees with less qualification (40%) are the main reasons for the young graduates to choose the business

process outsourcing jobs (Chavan and Potdar, 2011) this study was conducted in India by Chavan is in consensus with the present study. However, another study stated that a good work environment is the major criteria for choosing BPO jobs by the youth (Insha, Rodrigues and Chavan, 2018) (Suri and Rizvi, 2008). This could be due to the fact that surveys are conducted in different geographic locations which lead to the differences to the present study. The study conducted in Delhi showed that 30% of the participants of their study opted for the BPO jobs due to the reason that participants did not get a better job of their desire leading to the preference of BPO jobs ,the frequencies of the present study goes in hand with the previous literature (Suri et al., 2007).

The study reveals that various health issues encountered by BPO employees are hand injury , frequent headaches, eye problems, weight loss, sleep deprivation , obesity, menstrual problems, thyroid problems. Among all, headache is most commonly experienced by the BPO employees in this study . In the previous studies the medical history of BPO employees showed predominance of musculoskeletal problems followed by headache, sleep problems, eye problems have been the common health issues among the BPO employees in association with gender males(70%) are more affected than females(40%) (Suparna, Sharma and Khandekar, 2005) (Moher, Hey and Lancaster, 2005) . This may be due to the fact that the study population showed that males population is higher in the BPO sector when compared to the females which is similar to the present study.The age of employees in BPOs with high incidence of health problems in other studies varied between 22-30 years (Kesavachandran et al., 2006) (Shah, Reddy and Hegde, 1999) , which is in support to the present study.

In this survey the limitations included due to less quantitative data. Geographic limitations of the survey which are limited only to the South Indian population. In future study can be done involving a large number of participants from different ethnicities for better results. Research should focus on improving quality and addressing new questions such as mechanism, developmental time factor and relevance of risk factors. Thus the survey serves as evidence and adds to the consensus.

CONCLUSION

Within the limitations of the study, we can conclude that 44% BPO employees had frequent headaches followed by combinations of health problems. Males are prone to have more health problems than females in the BPO sector and the most commonly affected age group is between 20 to 30 years. BPOs are very interested in earning huge money with a lot of strain in the work and the most common reason in preferring BPO jobs where less qualification criteria being the main reason. Awareness on health education, preventive and creative measures has to be taken to overcome health problems.

ACKNOWLEDGEMENTS

The author would like to thank the study participants for their participation and kind cooperation in the study.

Author Contributions: Author 1 (Lasya Genji), carried out the survey collecting data and drafted the manuscript after performing the necessary statistical analysis. Author 2 (Dr. Gayathri.R) aided in conception of the topic, has participated in the study design, statistical analysis and has supervised in preparation of the manuscript.

Conflicts of Interest: None declared.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-538-543

BBRC
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Research Communications

Social Acceptance of HIV Positive Child

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ABSTRACT

The Human immunodeficiency virus (HIV) is a causative agent of acquired immunodeficiency syndrome is an important public health threat worldwide. India is the second-largest country containing a larger number of people affected by AIDS. HIV related stigma and discrimination is present in a tremendous amount in society. Since the first cases of the human immunodeficiency virus (HIV) infection were identified, the number of children infected with HIV has also risen dramatically in developing countries as a result of an increased number of HIV-infected women of childbearing age. This survey was conducted to assess the acceptance of HIV positive children in society. A questionnaire-based online survey was conducted among the general population in South India. A total of 100 participants with an age of 20 or above took part in the survey. Participants in this survey are voluntary and no incentives or motivation were given to the participation. They were also instructed about the questionnaire before the administration of the survey. The survey questionnaire covered all the aspects of pediatric HIV and stigma in our society. All the data from the survey responses were collected and were subjected to statistical analysis. A total of 100 individuals participated in the survey. The participant's ages range from 20 to 60 years of age. The majority of the participants (75%) were females. Thirty-three percent of our participants denied treating a Pediatric HIV child as a normal child. Twenty-four percent blamed HIV infected children for their illness. Sixty-two percent showed their reluctance to allow their children to play with HIV-infected persons. Even Though 80% agree to help those children in some way. Among the participants, 22% feel that persons infected with HIV should feel ashamed of themselves. Nearly 86% of people expressed their view that HIV infected children should undergo proper treatment and care. A great number of people (78.8%) wish that they should be treated in a good way in society. This study concluded that children affected by HIV should be treated in a good way in society. The society must be able to accept the affected children and there should be a proper awareness of pediatric HIV. It is important that the children should not be blamed or feel ashamed for their illness. Parents and caregivers should take responsibility and provide care.

KEY WORDS: CHILDREN, HIV, INFECTION, SOCIAL ACCEPTANCE.

ARTICLE INFORMATION

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Received 21st July 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

Clarivate Analytics

crossref

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/193

INTRODUCTION

The Human immunodeficiency virus (HIV) is a causative agent of acquired immunodeficiency syndrome is an important public health threat worldwide (Weiss, 1993) . HIV infection in India was identified in 1986 and it was estimated that there are more than 5.134 million people infected with HIV infections by the year 2006 (Solomon, Solomon and Ganesh, 2006). India is the second-largest country containing a larger number of people affected by AIDS. HIV related stigma and discrimination is present in a tremendous amount in society (Reyes-Estrada, Varas-Díaz and Martínez-Sarson, 2015). Since the first cases of the human immunodeficiency virus (HIV) infection were identified, the number of children infected with HIV has also risen dramatically in developing countries as a result of an increased number of HIV-infected women of childbearing age (Creek et al., 2009). Most of the affected children acquire HIV from mother-to-child HIV transmission that happened during birth, pregnancy or breastfeeding (John-Stewart et al., 2018).

Globally, it was estimated that in the year 2008, there were about 2.1 million children below 15 years affected by HIV. It was estimated that India has an overall prevalence of 0.31% (Belman, 1992). By the year 2013 around 3.2 million children were living with HIV infections all over the world (Bain, Nkoke and Noubiap, 2017). Children account for 7% of all the new HIV infections (Mehta et al., 2016) . Maternal to child transmission is the most common cause (more than 90%) of pediatric HIV (Organization and Others, 2009). A major factor that distinguishes HIV/AIDS from a chronic or terminal illness is the stigma. Too often many HIV infected children and their families have a "conspiracy of silence" and shame associated with AIDS (Faithfull, 1997) . Despite significant advances in HIV treatment and care, children continue to be born with HIV infection mostly due to parent to child transmission. Various factors influence the control of pediatric HIV includes low health service utilization, poor drug adherence, delayed infant diagnosis, a discriminatory attitude of health providers, and loss to follow-up and poor coordination in managing continuum of care (Ghadrshenas et al., 2013).

Table 1. Responses of the participants

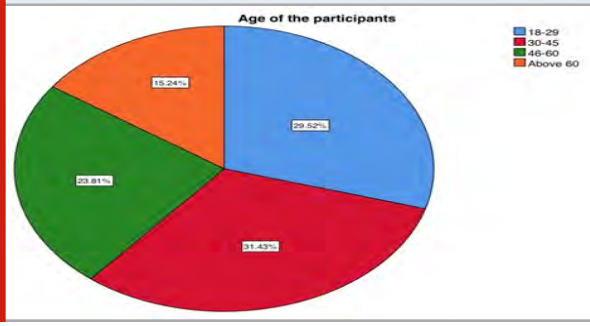
Questions	Responses were given	Percentage
Are you aware of the term HIV	Yes	96.2%
	No	3.8%
Is HIV a viral infection	Yes	88.5%
	No	11.5%
Are you aware of the term pediatric HIV	Yes	61.5%
	No	38.5%
Do you know any child with pediatric HIV	Yes	30.8%
	No	69.2%
Do you treat HIV positive child as a normal child	Yes	67.3%
	No	32.7%
HIV infected child should be blamed for their illness	Yes	24%
	No	76%
Will you allow your child to play with an HIV infected child	Yes	62.5%
	No	37.5%
Would you like to help an HIV positive child	Yes	79.8%
	No	20.2%
If you get to know that your close friend child is infected with HIV will you keep the same relationship with him/her	Yes	71.2%
	No	28.8%
Should HIV infected persons feel ashamed	Yes	21.2%
	No	78.8%
Should HIV infected child get treated by doctors	Yes	85.6%
	No	14.4%
Should HIV infected child be treated a good way in society	Yes	78.8%
	No	21.2%
Will you allow an HIV positive child to study in your child school	Yes	72.1%
	No	27.9%
Would you like to talk or play with HIV positive child	Yes	76.9%
	No	23.1%

Strengthening the existing health system and effective strategies would bring a significant reduction in the incidence of pediatric HIV (Towle, 2009). The chronic medical conditions in the pediatric population pose a range of potential psychosocial challenges not only to the child but also to the family members and health care providers. Previously our department has published extensive research on various aspects of prosthetic dentistry (Ashok et al., 2014; Venugopalan et al., 2014; Ashok and Suvitha, 2016; Ganapathy et al., 2016; Selvan and Ganapathy, 2016; Subasree, Murthykumar and Others, 2016; Vijayalakshmi and Ganapathy, 2016; Ajay et al., 2017; Ganapathy, Kannan and Venugopalan, 2017; Jyothi et al., 2017; Ranganathan, Ganapathy and Jain, 2017; Basha, Ganapathy and Venugopalan, 2018; Kannan and Venugopalan, 2018; Duraisamy et al., 2019; Jain, Nallaswamy and Ariga, 2019), this vast research experience has inspired us to research about social acceptance of HIV positive children among the general population. This survey was conducted to assess the acceptance of HIV positive children in society.

MATERIAL AND METHODS

A questionnaire-based online survey was conducted among the general population in South India. A total of 100 participants with an age of 20 or above took part in the survey. Participants in this survey are voluntary and no incentives or motivation were given to the participation. They were also instructed about the questionnaire before the administration of the survey. The survey questionnaire covered all the aspects of pediatric HIV and stigma in our society. All the data from the survey responses were collected and were subjected to statistical analysis.

Figure 1: Pie chart representing the age of the participants, 29.52% were in the age group of 18-29, 31.43% were in the age group of 30-45, 23.81% were between 46-60 age group and 15.24% are above the age of 60



RESULTS AND DISCUSSION

A total of 100 individuals participated in the survey. The participant's ages range from 20 to 60 years of age (Figure 1). The majority of the participants (75%) were females (Figure 2). Among the participants, 96.2% were aware of the term HIV occurring in adults (Figure 3). However, only 61.5% know about Pediatric HIV (Figure 5). Around 88% of the participants know that HIV is a viral infection (Figure 4). When asked about the cause of HIV in children 12.5% specified mother to child transmission, 14.5% listed unsterilized syringes, 4.8% specified transfusion of HIV positive blood and a majority 68.3% specified all the above-mentioned reasons (Figure 6). Thirty-three percent of our participants denied treating a Pediatric HIV child as a normal child.

Figure 3: Pie chart showing the awareness of HIV occurring in adults, 96.19% are aware whereas 3.81% are not aware of it.

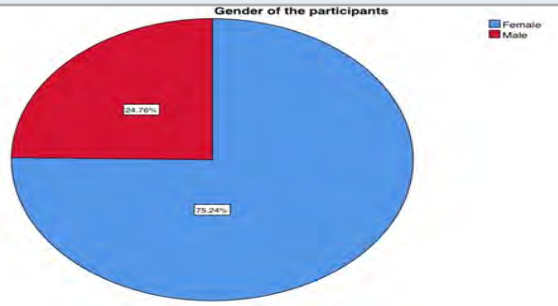


Figure 4: Pie chart showing whether respondents are aware that HIV is a viral disease, 88.57% are aware whereas 11.43% are not aware of it.

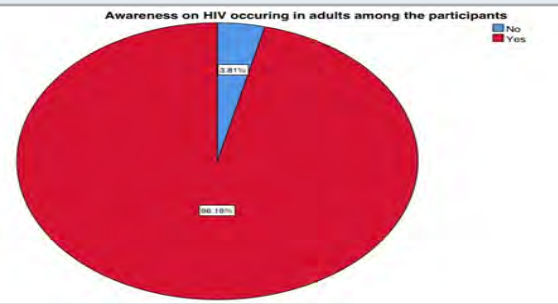
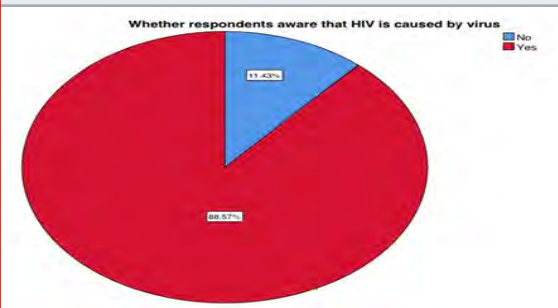


Figure 5: Pie chart representing the awareness of HIV occurring in adults, 61.90 are aware whereas 38.10% are not aware of it.



Twenty-four percent blamed HIV infected children for their illness. Sixty-two percent showed their reluctance to allow their children to play with HIV-infected persons. Even Though 80% agree to help those children in some way (Figure 7). Among the participants, 22% feel that persons infected with HIV should feel ashamed of themselves. Nearly 86% of people expressed their view that HIV infected children should undergo proper treatment and care. A great number of people (78.8%)

wish that they should be treated in a good way in society (Figure 8). However (27.9%) do not agree to allow them to study in their child's school. Allover (76.9%) would like to play and talk with Pediatric HIV children. (Table1)

Figure 6: Pie chart representing the reason for HIV in children responded by our participants, 14.29% think HIV can be acquired through unsterilized syringes, 13.33% believe HIV transferred to child from mother during birth, 4.76% believe through transfusion of HIV positive blood and majority 67.62% mentioned all the above-mentioned ways.

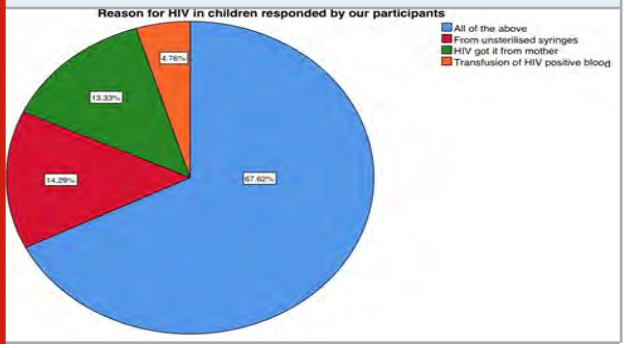


Figure 7: Pie chart showing the responses for whether participants supports HIV positive children, 80% of the participants help HIV positive children and 20% of the participants shows a lack of concern.

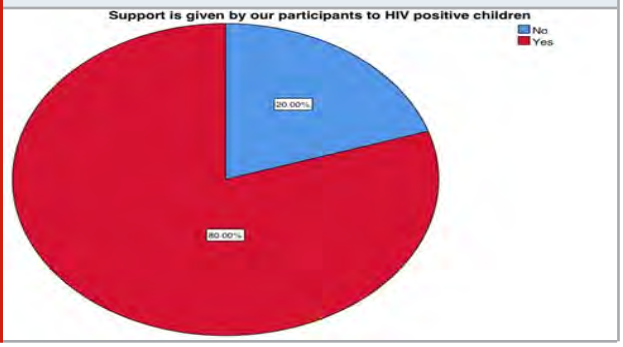


Figure 8: Pie chart showing the acceptance of HIV positive children among the participants, a majority 79.05% shows the acceptance and the rest 20.95% are not showing the acceptance.

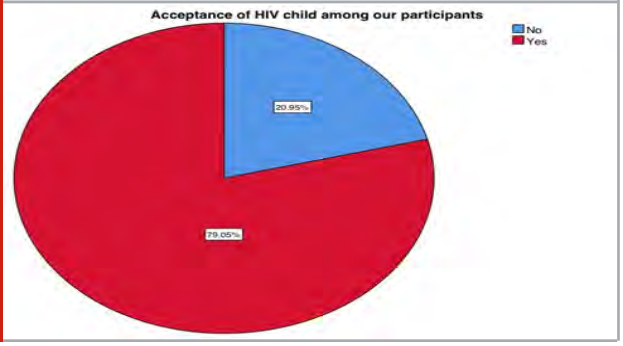


Figure 9: This bar graph represents the association between the age of the participants and awareness of HIV occurring in adults among the participants. X-axis represents the age of the participants and Y-axis represents the number of participants who have awareness of HIV occurring in adults. All of our participants who participated in the age group of 46-60 and the group of people above 60 age showed complete awareness. Whereas 1.90% are unaware of the age group of 18-29 and 30-45. This was found to be statistically significant. Pearson Chi-square value = 2.671a and P-value =0.045, P=<0.05.

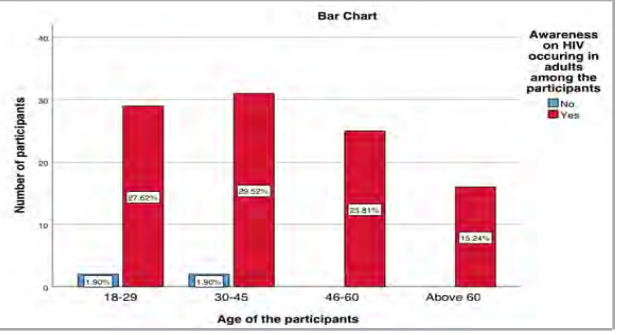
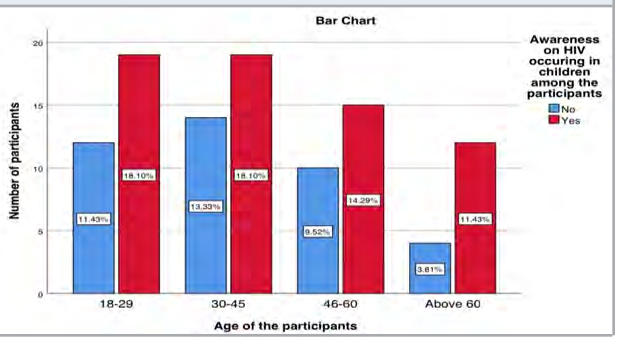


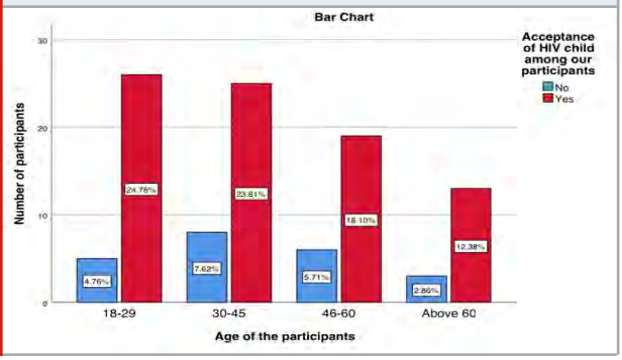
Figure 10: This bar graph represents the association between the age of the participants and awareness of HIV occurring in children (Paediatric HIV) among the participants. X-axis represents the age of the participants and Y-axis represents the number of participants who have awareness of HIV occurring in children. Participants in the age group of 30-45 showed a higher rate of lack of awareness (13.33%) in comparison with other age groups. This was found to be statistically insignificant. Pearson Chi-square value = 1.469a and P-value =0.068, P=>0.05.



The present study designed to assess the social acceptance of HIV positive children among the general population. In our study, 22% of the participants feel that persons infected with HIV should feel ashamed. In contrast, a previous study showed half of the participants 50% agreed that people living with HIV should be ashamed of themselves and were liable for bringing HIV to the community (Dahlui et al., 2015).In our study, 80% of them expressed their view to help Pediatric HIV children. Similar to a previous study that showed a majority 90% like to help HIV persons (Jain et al., 2017). Our study results showed that the majority of the participants

mentioned that the main cause of Pediatric HIV is maternal to child transmission. In comparison, 97% aware of mother to child transmission is the main cause of HIV in infants in a previous study (Coulibaly et al., 2016).

Figure 11: This bar graph represents the association between the age of the participants and the acceptance of HIV children among our participants. X-axis represents the age of the participants and Y-axis represents the acceptance of HIV children among our participants. Participants in the age group of 30-45 showed a higher rate of lack of acceptance (7.62%) in comparison with other age groups. Participants in the age group of 18-29 showed a higher rate of acceptance (24.76%) in comparison with other age groups. This was found to be statistically significant. Pearson Chi-square value = 0.838a and P-value =0.048, P=<0.05.



Despite feeling comfortable to help and interact with an HIV-infected person, they still carry the fear of feeling ashamed if they are diagnosed with HIV. Although awareness of pediatric HIV infection among participants is significant, some misconceptions related to the moment of transmission in HIV-exposed children persists. These misconceptions and less awareness about pediatric HIV brings about stigma and less acceptance of HIV infected children in society. Some methodological limitations of this study such as a small sample, the study population may affect the generalizability of the results.

CONCLUSION

This study concluded that children affected by HIV should be treated in a good way in society. The society must be able to accept the affected children and there should be a proper awareness of pediatric HIV. It is important that the children should not be blamed or feel ashamed for their illness. Parents and caregivers should take responsibility and provide care. They must acknowledge the disease as soon as possible and take measures in saving the child. They must give confidence to their children about their recovery and the society must also not emotionally disturb them. Thus it is important that pediatric HIV children should not be considered separately or to be neglected in the society.

ACKNOWLEDGEMENTS

The authors are thankful to Saveetha Dental college for providing a platform to express our knowledge.

Conflict of Interest: The authors declare no conflict of interest.

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-544-550

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Knowledge, Attitude and Practice on the Aesthetic Management of Anterior Teeth Among Dental Undergraduates

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ABSTRACT

Aesthetic management of the anterior teeth is of much importance in the day to day practice of a dentist. In a dental practice, esthetic demand for the anterior teeth is a common complaint put forth by the patients, which is caused by either caries, malformation, anatomic alteration, discoloration/staining as well as hypoplastic defects. The aim of this study is to assess the knowledge, practice and awareness of dental undergraduate students on aesthetic management of anterior teeth. A survey was conducted amongst the undergraduate students in Saveetha Dental College and Hospitals. The questionnaire was prepared and circulated among the undergraduate students. Results were analysed and compared using the SPSS Statistical Software by doing both the frequency tests and correlation tests. A total of 130 students participated in this study of which 28 (21.5%) were third years, 35 (26.9%) were final years and the remaining 67 (51.5%) were interns. The association between year of study and their frequency of doing aesthetic anterior teeth management showed statistical significance (p=0.00). Overall, undergraduates of Saveetha Dental College showed a good level of knowledge and awareness in regards to the aesthetic management of anterior teeth.

KEY WORDS: AESTHETIC, ANTERIOR TEETH, KNOWLEDGE, AWARENESS, COMPOSITE, VENEERS..

ARTICLE INFORMATION

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Received 4th Aug 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/194

INTRODUCTION

In recent years, dentistry has seen a notable growth in the emphasis of elective treatment for better aesthetics. As a practice that revolves around the relationship between esthetics and the function of the masticatory components including the surrounding structures, esthetics have become the basis of surgical, restorative and corrective procedures. (Gordan, Abu-Hanna and Mjör, 2004)With the increase in demand of anterior teeth restorations as well as the heightened media emphasis for a better smile, aesthetics have become a priority for both patients and dentists. (Gordan, Abu-Hanna and Mjör, 2004; Ahmad, 2005b).

A pleasing appearance plays as an important factor of success for both an individual's personal and professional lives. (Gupta et al., 2016)(Ahmad, 2005b) An attractive or pleasing smile greatly influences the extent of attractiveness and personality that a person possesses. In a dental practice, esthetic demand for the anterior teeth is a common complaint put forth by the patients, which is caused by either caries, malformation, anatomic alteration, discoloration/staining as well as hypoplastic defects.(Moskowitz and Nayyar, 1995)

Aesthetic management of the anterior teeth is of much importance in the day to day practice of a dentist. Anterior dental esthetics can be grouped into facial, dental as well as gingival components. Facial esthetics specifically includes the integration of an individual's facial features and the use of dental restorations with that of the existing skeletal and soft tissue features. The purpose of doing so is to boost desirable qualities or acts as a method to distract attention away from undesirable abnormalities. (Ahmad, 2005b)On the other hand, dental esthetics comprises the shape, size, colour, position of teeth and their inter and intra arch relationships. The relationship between these extraoral and intraoral components have an affect on the dental treatment provided. Thus, appropriate knowledge on its relation and its subsequent application towards the practice plays a significant role in providing a quality dental treatment. (Ahmad, 2005a)

The aim of this study is to assess the knowledge, practice and awareness of dental undergraduate students on aesthetic management of anterior teeth. The purpose being that by determining the degree of their understanding, a better form of practice can be integrated into their daily practice in the future. Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about the knowledge, attitude and practice on the aesthetic management of anterior teeth among dental undergraduates.

MATERIAL AND METHODS

Study Setting: This cross-sectional study was done among undergraduate students (includes third years, final years, interns) of Saveetha Dental College and Hospitals. A total of 130 students participated in this study.

Study Subjects: A total of 130 students participated in this study of which 28 (21.5%) were third years, 35 (26.9%) were final years and the remaining 67 (51.5%) were interns.

Methodology: A survey was conducted through an online standard questionnaire with 15 multiple choice questions sent via a Google Form application. The questionnaire consisted of questions about the knowledge, awareness and practice regarding aesthetic anterior teeth management. Adequate time was provided to fill the questionnaire. The responses of the students were recorded, analysed for flaws, checked for completeness and were taken up for assessment.

Statistical Analysis: After data was collected and coded, the statistical analysis was done using IBM SPSS Statistical Software package (Version 23.0). All the frequency tests were carried out and the Chi-square test was done at a significance level.

RESULT AND DISCUSSION

A total of 130 students participated in the study, which consisted of 89 (68.5%) females and 41 (31.5%) males. [Figure 1] The students included 28 (21.5%) third years, 35 (26.9%) final years and the remaining 67 (51.5%) interns. [Figure 2] When enquired about whether they commonly practice aesthetic anterior managements, 43 (33.1%) participants admitted that they do, 66 (50.8%) participants admitted that they somewhat do and 21 (16.2%) admitted that they do not. [Figure 3].

Figure 1: This pie chart depicts the gender of the undergraduate students. 68.5% of the respondents were females. 31.5% of the respondents were males.

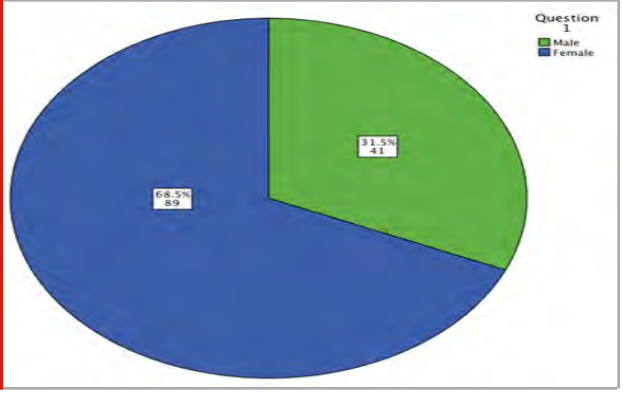


Figure 2: Pie chart showing responses to the question among the undergraduates based on their year of study. 21.5% of the respondents were third years. 26.9% of the respondents were final years. 51.5% of the respondents were interns.

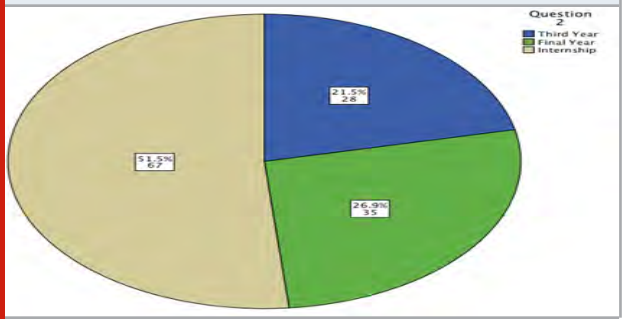


Figure 3: Pie chart showing responses to the question, "Do you commonly do aesthetic anterior teeth management during your practice?". About 50.8% of the respondents stated that they commonly practice aesthetic anterior teeth management.

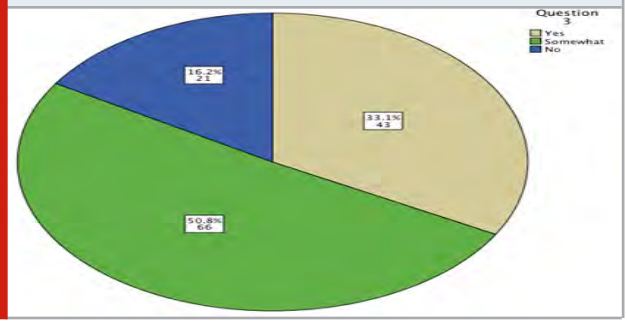
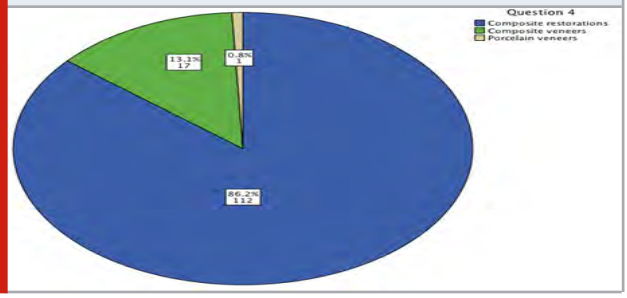


Figure 4: Pie chart showing responses to the question, "Which type of aesthetic management are you most confident in doing?". About 86.2% of the respondents stated that they were most confident in composite restorations.



In regards to the type of aesthetic management that they are most confident in doing, 112 (86.2%) participants agreed that it was composite restorations, 17 (13.1%) participants agreed that it was composite veneers and only 1 (0.8%) agreed that it was porcelain veneers. [Figure 4] When questioned about the importance of rubber dam usage during anterior composite restorations, 79 (60.8%) participants believed that is it necessary, 43 (33.1%) participants believed that it is somewhat necessary while 8 (6.2%) participants agreed that it is not necessary. [Figure 5] In terms of shade selection, 77 (59.2%) participants agreed that it should be done before the placement of anterior restorations, 43 (33.1%) participants were unsure that it should be done before while 10 (7.7%) believed it not to be so. [Figure 6].

Figure 5: Pie chart showing responses to the question, "Is the usage of rubber dam required during anterior composite restorations?". About 60.8% of the respondents agreed that rubber dam is necessary in anterior composite restorations.

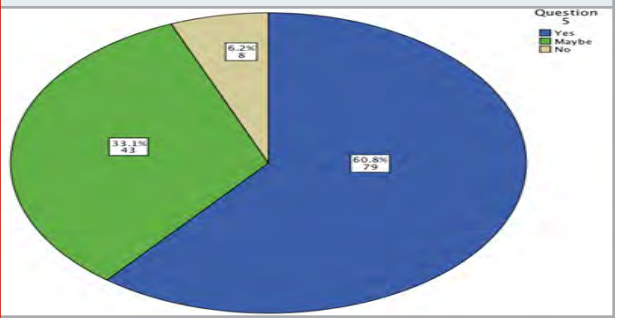


Figure 6: Pie chart showing responses to the question, "Is shade selection done before the placement of anterior restorations?". About 59.2% of the respondents believed that shade selection should be done before the placement of anterior restorations.

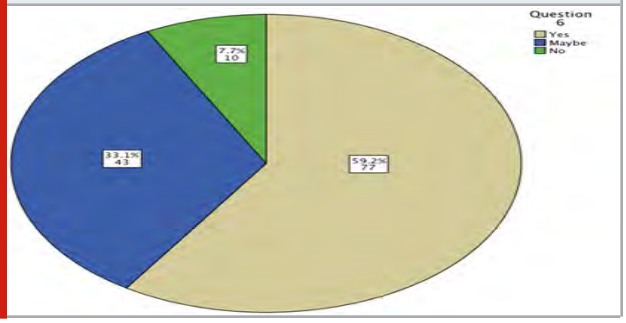
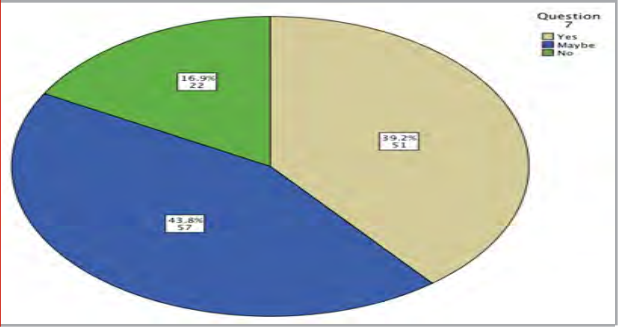


Figure 7: Pie chart showing responses to the question, "Is composite resin the best choice for anterior restorations?". About 43.8% of the respondents agreed that composite resin is the best choice for anterior restorations.



When questioned on whether composite resin is the best choice for anterior restorations, 51 (39.2%) participants agreed that it was the best choice, 57 (43.8%) were unsure about the statement while 22 (16.9%) participants agreed

that it was not the best choice. [Figure 7] Analysation of which type of composite was preferred for anterior aesthetic restoration found that 26 (20.0%) agreed that it is microhybrid composite, 57 (43.8%) participants agreed that it is microfilled composite, 17 (13.1%) participants agreed that it is nanofilled composite while the remaining 30 (23.1%) didn't know which was the best. [Figure 8].

Figure 8: Pie chart showing responses to the question, "Which type of composite is preferred for anterior aesthetic restorations?". About 43.8% of the respondents agreed that microfilled composite is the most preferred.

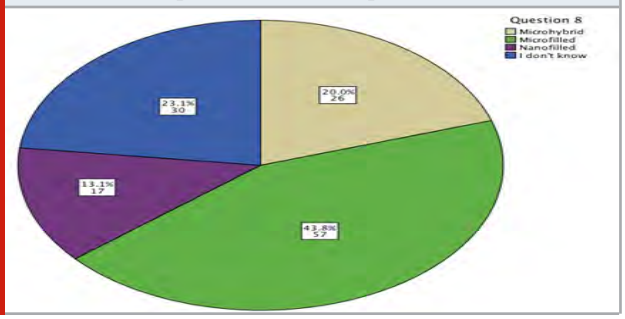


Figure 9: Pie chart showing responses to the question, "Are you aware of the 'natural layering concept' in direct composite restorations?". About 64.6% of the respondents stated that they were not aware of the 'natural layering concept'.

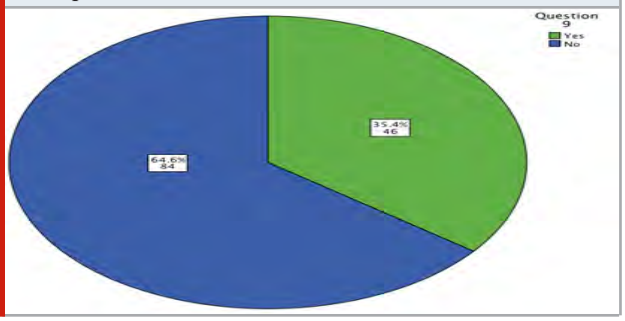
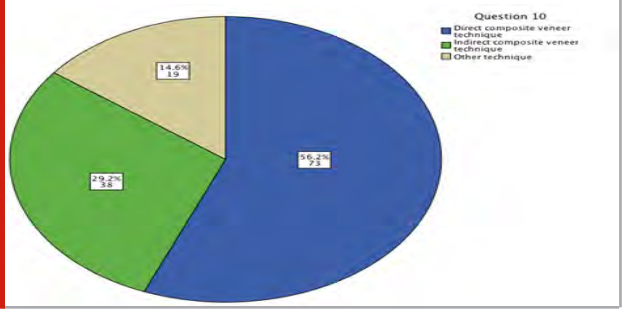
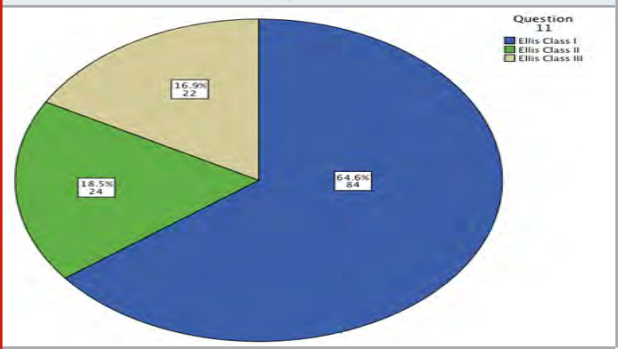


Figure 10: Pie chart showing responses to the question, "In cases of midline diastema, which method is usually preferred?". About 56.2% of the respondents agreed that in midline diastema, direct composite veneer is the preferred option.



Assessment on their awareness about the natural layering concept showed that 46 (35.4%) admitted that they were aware of the concept while 84 (64.6%) participants admitted that they were not aware of the concept. [Figure 9] In cases of midline diastema, 73 (56.2%) believed that direct composite veneer is the preferred method while 38 (29.2%) participants believed it to be indirect composite veneer technique and 19 (14.6%) participants believed it to be other techniques. [Figure 10] When inquired about in which clinical situation would direct veneers are preferred, 84 (64.6%) participants agreed that it was Ellis Class I, 24 (18.5%) participants believed it to be in Ellis Class II cases while 22 (16.9%) participants agreed that it was Ellis Class III. [Figure 11].

Figure 11: Pie chart showing responses to the question, "In which clinical situation is direct veneers usually preferred?". About 64.6% of the respondents stated that direct veneers are usually preferred in Ellis Class I cases.



In regard to their personal usage of LED light for composite restorations, 97 (74.6%) participants admitted that they primarily use it while 33 (25.4%) participants admitted that they did not primarily use it. [Figure 12] When questioned about the time period in which finishing and polishing should be done, 71 (54.6%) participants agreed that it should be done immediately, 41 (31.5%) participants agreed that it should be done within 24 hours while 18 (54.6%) participants believed it should be done within 7 days. [Figure 13].

Figure 12: Pie chart showing responses to the question, "Do you primarily use LED light for curing composite restorations?". About 74.6% of the respondents primarily use LED light for composite restorations.

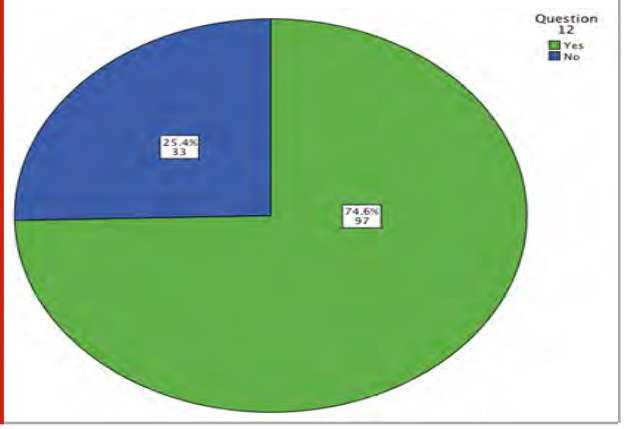
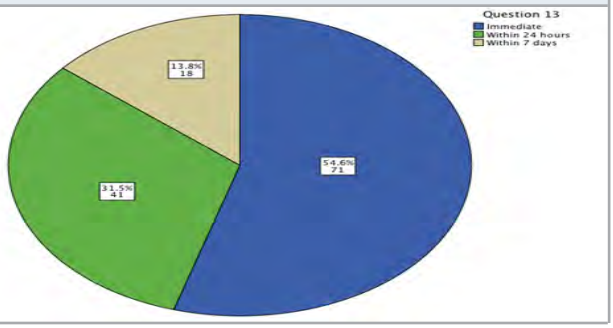


Figure 13: Pie chart showing responses to the question, "When is the time period in which finishing and polishing should be done?". About 54.6% of the respondents agreed that finishing and polishing should be done immediately.



Analysation of the reason composite resins and porcelain materials are generally preferred in aesthetic procedures showed that 54 (41.5%) participants stated it was the high endurance to stretching, breaking and chemicals while 24 (18.5%) participants stated that it was because of the low rate of abrasion to the opposite teeth and 52 (40.0%) participants agreed that these materials have higher transparency. [Figure 14] Overall, 81 (62.3%) participants admitted that they need more knowledge on aesthetic management for anterior teeth management while 49 (37.7%) participants believed that it was not necessary. [Figure 15].

Figure 14: Pie chart showing responses to the question, "Why are composite resins and porcelain materials generally preferred in aesthetic procedures?". About 41.5% of the respondents agreed that it is preferred for its high endurance to stretching, breaking and chemicals.

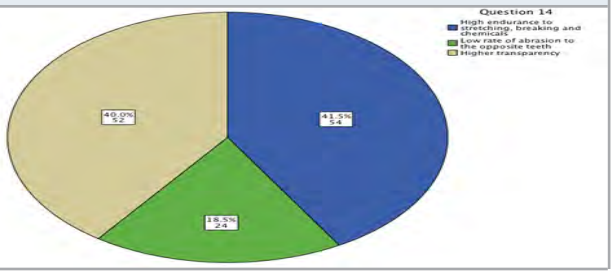
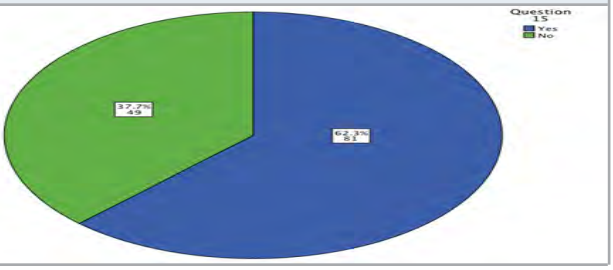
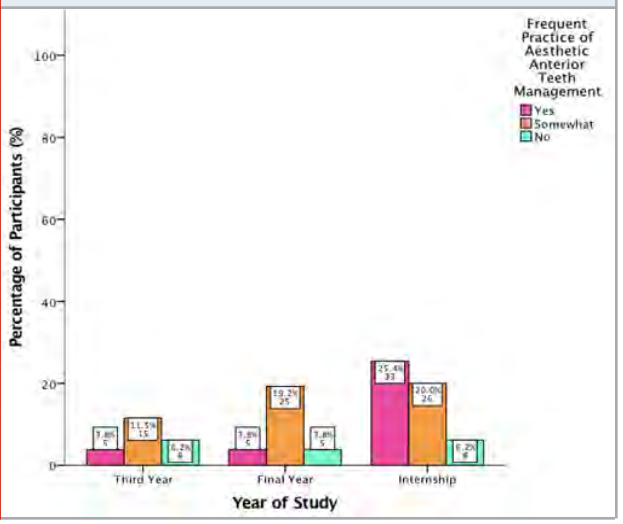


Figure 15: Pie chart showing responses to the question, "Do you think you require more knowledge on aesthetic management for anterior teeth?". About 62.3% of the respondents believed that they need more knowledge on the aesthetic management for anterior teeth.



When the year of study was correlated with their frequency of doing aesthetic anterior teeth management, it showed statistical significance between the two (p=0.00). Interns have been shown to practice more aesthetic treatments for the anterior teeth. [Figure 16].

Figure 16: Bar chart showing comparison of responses based on the year of study to the question, "Do you commonly do aesthetic anterior teeth management in your practice?". X-axis represents the year of study and Y-axis represents the percentage of participants. There is a significant correlation between the year of study and their frequency in practicing aesthetic anterior teeth management (Chi-square test; p-value=0.00-significant). Interns have been shown to practice more aesthetic treatments for the anterior teeth.



The study was conducted to assess the knowledge about anterior aesthetics management among undergraduates. Majority of the participants agreed that rubber dam is necessary especially for anterior teeth restorative procedures. When rubber dam is used, it provides a drier field of operation, which in turn prevents moisture contamination that has been known to impair particularly adhesive procedures. (Baldissera et al., 2013) Although it is deemed necessary, its application further increases the complexity of the restorative technique and the patient's chair time as well as the price of the restorations. (Lima et al., 2009) However, many studies have stated that the usage of rubber dams have greatly influenced the longevity of the restoration. (Baldissera et al., 2013).

According to this study, the majority of participants believed that microfilled composite is the most efficient in aesthetic restorations. Microfilled composite was developed in such a way that it produces a smoother surface and its similarity to the enamel helps increase the aesthetic appearance of the teeth. (Barbosa et al., 2005) On the other hand, nanohybrids are actually a newer developed material that have shown to provide even more advantages when compared to microhybrid composites. (Moraes et al., 2009; Saunders and Saunders, 2009).

More than half of the participants are not aware of the 'natural layering concept'. Natural layering concept is considered a relatively simple yet effective method of producing highly aesthetic direct restorations. This concept embraces an optical and anatomical characteristic that more accurately represents natural teeth. It follows two basic steps which includes the selection of dentin chroma in the cervical area and the selection of enamel tint.(Oral Health-, 2007) In this study, most of the participants primarily use LED lights for curing composite restorations. LED units require less monitoring as it is able to stabilize the irradiance for a prolonged duration. Compared to QTH units, this alternative requires mandatory monitoring which needs to be performed weekly. (Saunders and Saunders, 2009) (Hao et al., 2015)

CONCLUSION

Within the limits of the study, undergraduates of Saveetha Dental College showed a good level of knowledge and awareness in regards to the aesthetic management of anterior teeth. Overall, they have shown a profound interest in learning more about this topic and implementing it in their practice.

ACKNOWLEDGEMENTS

The study was supported by Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Science, Chennai.

Conflict of Interest: There were no conflicts of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-551-554

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Morphometric Analysis of Locations, Shape and Variations of Spine of Sphenoid and its Clinical Importance

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ABSTRACT

The sphenoid bone is the unpaired bone in the cranium.It is present in the middle of the skull and it is an important surgical site. It is butterfly shaped with wings on either side that includes a greater wing and lesser wing of sphenoid. It has various attachments and foramina associated with it.The posterior part of greater wing projects like a triangular process called as sphenoidal spine which is the origin for sphenomandibular ligament.The aim is to study the morphometry of the location, shape, and variations of the spine of sphenoid and its clinical importance in different skulls of the south indian population.For this 30 adult dry human skulls of unknown sex of south indian origin were obtained from the Department of Anatomy, Saveetha Dental College, Chennai, Tamilnadu, India. All skulls were serially numbered from 1 to 30. In each skull, the shape of the spine of the sphenoid was observed and recorded. The distance of the spine from the tip of mastoid process and tip of the articular tubercle were measured on both the right and left sides of the skull using digital Vernier calipers. All data were tabulated and statistically analysed.The range of distance between the spine of sphenoid and the articular tubercle is found to be about 20.17-29.32mm(left) and 20.16-29.19mm(right) and the distance between the spine of the sphenoid and the mastoid process is found to be around 29.17-32.7mm(left) and 29.27-32.79mm(right). It is found that about 6.6% of spine is sharp, 46.6% is rounded in both left and right side, 26.6% is blunt on left side and 23.3% on the right side and about 20% on left and 23.3% on the right side were pointed type. The purpose of this study is to verify the morphometric variations in the location, shape of spine of sphenoid in different dry skulls of south indian and to find out its applications in various surgical procedures.

KEY WORDS: SPINE OF SPHENOID, MASTOID PROCESS, ARTICULAR TUBERCLE, SHAPE OF SPINE OF SPHENOID.

INTRODUCTION

The sphenoid bone is one of the eight bones that are present in the cranium. The sphenoid bone is a complex structure with a complicated embryologic origin. It is centrally located within the base of the skull and articulates with almost every bone in the skull and face. The sphenoid bone contains multiple foramina that includes foramen rotundum, foramen ovale, foramen spinosum, Canaliculus innominatus, emissary sphenoidal foramen and fissures accommodating numerous vessels and nerves (Kuta, John Kuta and Laine, 1993). It is an unpaired pneumatic bone located at the skull base and it is placed between the frontal and ethmoid bones in front basi occiput and petrous part of temporal bone behind and the squamous part of temporal bone on each side and it is butterfly shaped with two wings on either

ARTICLE INFORMATION

*Corresponding Author: yuvarajbabu@saveetha.com
*Received 5th Aug 2020 Accepted after revision 30th Sep 2020
*Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/195

sides. Sphenoid bone has both intramembranous and endochondral ossification. Sphenoid bone has a body, a pair of lesser wings, greater wings and pterygoid processes (Yanagi, 1987).

Sphenoid bone has many important foramina in which foramen ovale is one among the largest openings in the skull that transmits nerves through it (Nivethitha, Yuvaraj Babu and Mohanraj, 2018). It transmits various structures like mandibular nerve, emissary vein, accessory middle meningeal artery and lesser petrosal nerve (Kuta, John Kuta and Laine, 1993; Murugan and Saheb, 2014). Sphenoid bone is non pneumatized and contains only red marrow at birth. The sphenoidal air sinus is located at the base of the skull. Many complicated anatomical structures are related to this sinus, like the cavernous sinus, pituitary gland, optic nerve and chiasma, internal carotid artery, pterygoid canal, pterygopalatine ganglion and, sphenopalatine artery. The symptoms are referred to these structures rather than involving the sinus (Wyllie, Kern and Djalilian, 1973), because of its deep-seated anatomy, this sinus does not usually present with nasal symptoms such as nasal obstruction or rhinorrhea (Fooanant et al., 2017)(Yune, Holden and Smith, 1975). The sinus shows variations in size, pneumatization, the pattern of septations. The pneumatization can extend into the greater wing of sphenoid, pterygoid process, clivus (Hewaidi and Omami, 2008).

Spine of the sphenoid bone is a small pointed projection which projects downward from the junction of posterior and squamosal borders of the greater wing. The spine has the following attachments that includes three ligaments, two muscles and the spine is related to important structures on its medial and lateral sides. The three ligaments includes Sphenomandibular, anterior ligament of malleus, pterygospinous and the muscles includes tensor veli palatini, tensor tympani it is related to other important structures which includes chorda tympani nerve and auditory tube, medially and auriculotemporal nerve laterally (Agarwal, Agarwal and Pant, 2018). The anterior ligament of the malleus and the spheno-mandibular ligament are attached to the intervening spine of sphenoid, it may be conjectured that this spine also develops from the Meckel's cartilage the pull of these two ligaments in different directions may lead to different lengths and shapes of spine that can lead to pressure on the important anatomical structures related to both sides of the spine.

With a rich case bank established over 3 decades we have been able to publish extensively in our domain (Abdul Wahab et al., 2017; Eapen, Baig and Avinash, 2017; Patil et al., 2017; Jain and Nazar, 2018; J et al., 2018; Marimuthu et al., 2018; Wahab et al., 2018; Abhinav et al., 2019; Ramadorai, Ravi and Narayanan, 2019; Senthil Kumar et al., 2019; Sweta, Abhinav and Ramesh, 2019). The present study focuses on the morphometric study of shape and location spine of the sphenoid bone from standard anatomical landmarks.

MATERIAL AND METHODS

30 adult dry human skulls of unknown sex of south indian origin were obtained from the Department of Anatomy, Saveetha Dental College, Chennai, Tamilnadu, India. All skulls were serially numbered from 1 to 30.In each skull, the shape of the spine of the sphenoid was observed and recorded. The distance of the spine from the tip of the mastoid process (Figure 1) and tip of the articular tubercle were measured on both right and left sides of the skull using digital Vernier calipers. All data were tabulated and statistically analysed.

Figure 1: Measurement of Distance of Spine of sphenoid from tip of mastoid process

RESULTS AND DISCUSSION

The range of distance between the spine of sphenoid and the articular tubercle is found to be about 20.17-29.32mm(left) and 20.16-29.19mm(right) and the average value and standard deviation for the distance between spine of sphenoid and articular tubercle is about 22.13±2.12 mm on left and 22.07±2.12 mm on right side. The range of distance between the spine of the sphenoid and the mastoid process is found to be around 29.17-32.7mm(left) and 29.27-32.79mm(right) and it was quite distant when compared to articular tubercle and the average and standard deviation is 30.66±1.12 mm on left and 30.56±1.10 mm on right side (Table 1).

The shape of the spine of the sphenoid is tabulated in (table 2). From the obtained data it is found that about 6.6% of the spine is sharp, 46.6% is rounded in both the sides, 26.6% on the left side and 23.3% on the right side are blunt shaped and about 20% on the left and 23.3% on the right side was pointed.

Spine of sphenoid attachment, its location, shape, variations and its clinical importance should be very well known for surgeries from cranial aspect. There were limited information about spine of sphenoid in many articles hence we took interest and in nearly 30 skulls were measured with the distances from articular tubercle and mastoid process were measured from both right and left sides .Its shape was also counted in 30

skulls and was converted into percentage and tabulated. While in a study by Gargs , as there is scarcity of data on the length, shape and direction of spine of sphenoid and to study the variations in shape of the spine as any variations can lead to the compression of the nerves and structures related to it. Garg measured Sixty-six areas of thirty-three dry skulls and the length, shape, direction of the spine was noted (Garg, 2006).

Table 1. Range and average distance of spine of sphenoid from articular tubercle and tip of mastoid process on right and left side

Distance between spine of sphenoid and	LEFT		RIGHT	
	Range(mm)	Average (mm)	Range(mm)	Average (mm)
Articular tubercle	20.17-29.32	22.132.12	20.16-29.19	22.072.12
Mastoid process	29.17-32.7	30.661.12	29.27-32.79	30.561.10

Table 2. Different shape of spine of sphenoid in percentage on right and left side

Shapes	Left	Right
Sharp	6.6%	6.6%
Rounded	46.6%	46.6%
Blunt	26.6%	23.3%
Pointed	20.0%	23.3%

The length of the spine of the sphenoid varied from absence or minimally projecting spine, to a long spine. The shape of the spine of the sphenoid varied from a pointed or rounded structure to a broad plate of bone. The spine was positioned downward but the tilt was in every direction. In Our study the majority of the spine evaluated were rounded 46.6%, followed by blunt spine 26.6%, Pointed spine 20% and 6.6% of the spines were sharp. We were not able to find articles trying to locate the position of spine from anatomical landmarks, so our study was conducted to locate the spine of sphenoid from the articular tubercle and mastoid process on the right and left side. There was no statistical significance in between right and left sides. The sphenoid was located at a distance 22.10 +2.12mm from articular tubercle and 30.61 + 1.11mm from mastoid process.

CONCLUSION

This study helps to determine the location, shape and variations of the spine of sphenoid bone in relation to various anatomical structures like articular tubercle, mastoid process. The landmarks described could be identified and applied in various clinical scenarios thereby decreasing the risk of failures and complications during treatment. Our research provides morphometric data of the sphenoid's spine, its location and shape which could be valuable for surgeons to plan for the cranial base surgeries.

ACKNOWLEDGMENTS

We acknowledge the Department of Anatomy, Saveetha Dental College for allowing us to use the bones from their collection for this study.

Conflicts of Interest: There were no conflicts of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-555-558

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Evaluation of Dimensional Stability of Different Solvents for Alginate

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ABSTRACT

Alginate impression materials are easy to use, less expensive, with quick setting time and are the most commonly used material for dental impressions. However there has not been any research into different solvents which can be used along with alginate.The aim of the study is to determine the dimensional stability alginate when mixed with different solvents as part of impression making.40 samples were fabricated in total among the four groups. The grouping was done randomly with different solvents such as water, water with glucose, water with glucose and starch and saline.Once the samples were obtained, with the help of a vernier calliper the diameter and thickness of the cylinder is measured. A stopwatch was maintained and the measurements were repeated after every four minutes by the same practitioner. On analysing the dimensional variations that was observed, it was noted that water along with glucose and starch had minimal dimensional changes and proved better than conventionally used water as well. Within the limits of the present study it is evident that the newly developed solvent for alginate has better dimensional stability than conventionally used solvents which shows a statistically significant result using ANOVA (p=0.007), However, dimensional stability is not the only property that is needed from an impression material and hence this paves way for further studies in the same which can improve the quality of care that is administered to the entire society.

KEY WORDS: DIMENSIONAL CHANGES, ALGINATE, SOLVENTS.

INTRODUCTION

Alginate dental impression materials were introduced into dental practice at about 1940(Nallamuthu, Braden and Patel, 2012) . Since their introduction they have been used extensively in dentistry for various purposes as one of the group of so-called 'elastic' impression materials, with well documented advantages and disadvantages (Craig and Powers, 2002; Van Noort, 2002; Kenneth J. Anusavice, Shen and Ralph Rawls, 2012)as well as certain developments. Alginate has further found widespread application in ophthalmic surgery (Mathews et al., 2000) and in estimating wound size in case of general surgery (Plassmann, Melhuish and Harding, 1994).

The term 'elastic' which is used to describe alginate however is something of a misnomer as alginates are considered to be visco-elastic materials with rubber-like compliance. Since their inception, there have been numerous of publications on a their mode of usage as well as their properties (Buchan and Peggie, 1966; Murata et al., 2004; Frey, Lu and Powers, 2005; King et al., 2008; Lawson, Burgess and Litaker, 2008; Walker et al., 2010). However, they have been almost exclusively used only on commercial products. Cook (Cook, 1986) investigated the effect of certain substances on properties, by using commercially available impression materials and analyzing them for parameters to explain the results of a number of physical tests. Morris (Morris, 1986)

ARTICLE INFORMATION

*Corresponding Author: sumathifelicita@saveetha.com
Received 30th July 2020 Accepted after revision 19th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/196

studied the chemical structure of alginate polymers to investigate the role of individual components in alginate impression materials and the effect of these components on physical properties, formulations have to be produced with time.

Alginate impression materials are easy to use, less expensive, with quick setting time. The setting time can be controlled with the temperature of water used. They are mildly flavored. Their disadvantages include less accurate reproduction of details as compared with elastomeric impression materials, poor dimensional stability, and that they are messy to work with. Water has been used as the solvent for alginate since the introduction of the material and there has not been any research that has been done to determine other solvents for alginate as an impression material.Our extensive research expertise ranged from epidemiological studies to randomised clinical trials that have been published in reputed journals (Felicita, 2017a, 2017b, 2018; Felicita, Thirumurthi and Jain, 2017; Korath, Padmanabhan and Parameswaran, 2017; Krishnan, Pandian and Rajagopal, 2017; Charles et al., 2018; Pandian, Krishnan and Kumar, 2018; Reddy et al., 2018; Chinnasamy et al., 2019). This knowledge was instrumental for us to study the solvents for alginate. The aim of the study is to determine the dimensional stability of alginate when mixed with different solvents as part of impression making. .

MATERIAL AND METHODS

A mould was fabricated with the help of a putty index with a 5cm radius, for fabricating the alginate samples. 40 samples were fabricated in total among the four groups. The grouping was done randomly with different solvents such as water, water with glucose, water with glucose and starch and saline. These solvents were chosen for the present study based on a previous study which assessed the patient's perception towards the different solvents. Once the solvent was chosen, alginate was manipulated appropriately by a single practitioner to eliminate the operator bias. Two minutes after the mixture had set, the sample was removed from the mould.

Figure 1: Image shows depiction of the diameter of the constructed structure

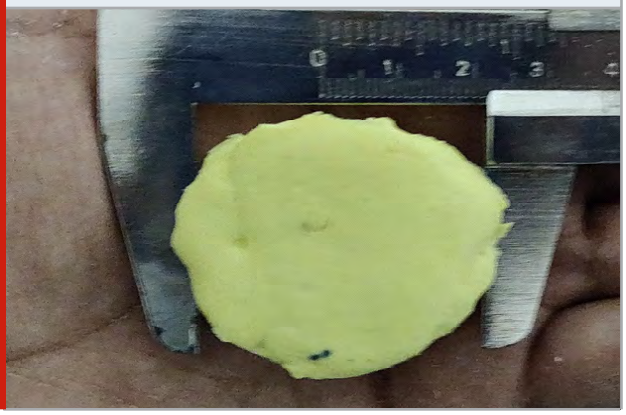
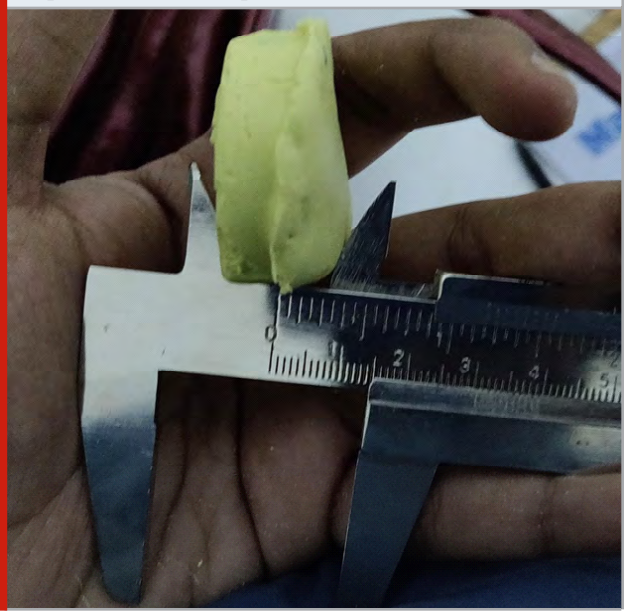


Figure 2: Image shows measurement of thickness with the help of a vernier calliper.



Once the samples were obtained, with the help of vernier callipers the diameter and thickness of the cylinder is measured. A stopwatch was maintained and the measurements were repeated after every four minutes by the same practitioner. The readings were then tabulated and the values were tabulated. ANOVA test was done to compare the outcome between the four groups at different time intervals with the level of significance set at $p \leq 0.5$.

RESULTS AND DISCUSSION

When the samples were assessed for dimensional stability within the time duration, changes in both the axis were recorded and the same was tabulated and subjected to statistical testing. The mean difference from both the axis under the different time intervals are tabulated in Table 1

From Table 1 it is evident that there are dimensional changes that are occurring irrespective of the solvent that is being used but an important factor that is to be identified from the table is that the degree of change in volume changes as per the solvent. At the end of 20 minutes, probably the maximum amount of time that an impression will be left outside before pouring the cast, the solvent with maximum amount of dimensional change is water with glucose which is one of the novel solvent that has been introduced in the present study. On the other hand it is also observed that the least dimensional distortion is observed with water in combination with glucose and starch which is also a solvent that was introduced in the present study. There is lesser distortion than that is observed with water. There is a statistically significant $p=0.007$ ($p<0.05$) reading on the benefit of these solvents than to conventional solvents using t test.

Impression materials should be accurate and remain dimensionally stable until cast in a gypsum product. Accuracy is the ability to reproduce a true measured value, and dimensional stability is the ability to maintain accuracy across time. The processes that influence alginate dimensional stability are expansion due to water absorption (imbibition), shrinkage due to evaporation of water and syneresis (continued reaction of the sol). The first two processes depend primarily on storage conditions, and syneresis is affected by the proprietary constituents of the alginate (Buchan and Peggie, 1966).

Table 1. Table shows the change in dimensions of alginate with time while using different solvents. All values are measured in mm^3

Time Interval	Water	Water with Glucose	Water with Glucose and Starch	Saline	Significance
4 Minutes	0.10±0.003	0.14±0.007	0.08±0.001	0.12±0.002	p=0.007
8 Minutes	0.18±0.002	0.20±0.003	0.12±0.003	0.16±0.004	
12 Minutes	0.22±0.003	0.23±0.002	0.20±0.005	0.23±0.001	
16 Minutes	0.29±0.008	0.28±0.004	0.23±0.002	0.27±0.005	
20 Minutes	0.32±0.006	0.35±0.005	0.29±0.004	0.31±0.002	

Water in an alginate gel is either free or bound. The free water is trapped among the filler particles and is susceptible to volumetric increases or decreases as a result of evaporation or imbibition. The amount of water lost through evaporation may be regained through imbibition (Hohlt and Phillips, 1956). One may speculate that movement of free water is explained easily, but nothing could be further from the truth. Nallamuthu and colleagues (Nallamuthu, Braden and Patel, 2006) explained that water loss depends on diffusion kinetics, decreases in entropy and changes in Gibbs free energy. Furthermore, complex osmotic pressures and gradient changes existing between the gel, sol and environment are specific for different alginate materials depending on proprietary ingredients (Saitoh et al., 2000). Bound water syneresis is the result of a rearrangement of cross-linked alginic polymer chains to a more stable configuration, resulting in exudation of the formerly bound water.

This water movement may occur rapidly even in 100 percent humidity. Using nuclear magnetic resonance spectroscopy and moisture sorption isotherms, Fellows and Thomas (Fellows and Thomas, 2009) proposed that alginate with a higher ratio of calcium to sodium lose water more rapidly than do alginate with a lower ratio of calcium to sodium even though they exhibit greater dimensional stability. In addition, these authors (Fellows and Thomas, 2009) observed improved dimensional stability with alginates that contain higher ratios of filler to alginic polymer and lower-weight molecular polymer chains.

Chromatic alginates such as Cavex Color Change contain additives that control the pH. The initial mix of chromatic alginate usually is alkaline, with a pH approximating 11 that decreases to near neutrality when set. The influence of these additives on dimensional stability has not been examined, to our knowledge, but it may have a beneficial role. With the above discussion it is evident that there are various factors that can influence the dimensional stability of alginate, further studies are to be performed to improve the amount of data that is available, this in turn would improve the quality of care and perception of patients towards dental practice.

CONCLUSION

Within the limits of the present study it is evident that the newly developed solvent for alginate has better dimensional stability than conventionally used solvents. However dimensional stability is not the only property that is needed from an impression material and hence this paves way for further studies in the same which can improve the quality of care that is administered to the entire society.

ACKNOWLEDGEMENTS

We sincerely thank Saveetha Dental College for rendering full support for my study.

Conflict of Interest: Nil

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-559-564

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Knowledge and Awareness About Esthetic Procedures in Periodontics Among Undergraduate Dental Students

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ABSTRACT

The current level of awareness on beauty has driven a higher demand for aesthetic dentistry. The shape, position and appearance of the gingival tissue influences the aesthetics of the smile. Various techniques for gingival deformities have been introduced in recent years to meet the aesthetic needs of the patient with functional requirements. The aim of this study was to evaluate the knowledge and awareness about esthetic procedures in periodontics among undergraduate dental students. A 7-item questionnaire was prepared and circulated through an online portal among undergraduate dental students. A total of 100 students took up the survey among which 28 students were males and 72 students were females. The results obtained from the survey were tabulated, analysed and represented graphically using SPSS software (Version 23). Frequency distribution and percentage and chi-square test were done. In the present study, 86% of the undergraduate students were aware of gummy smile, 72% were aware of black triangle and 90% were aware of gingival hyperpigmentation. However, the knowledge on the treatment modalities for such conditions were inadequate. 48% were not aware of the treatment options for gummy smile, 42% were not aware of various gingival depigmentation techniques. Also, females had more knowledge and awareness as compared to males. This study emphasizes the need for more awareness about the esthetic procedures in periodontics must be created among undergraduate dental students.

KEY WORDS: ESTHETICS; AWARENESS; GINGIVA; SURGICAL PROCEDURES.

INTRODUCTION

The current level of awareness on beauty has driven a higher demand for aesthetic dentistry. Aesthetic dental procedures and periodontal treatment have become inseparable. In the past, the aim of periodontal treatment was directed more at preservation care and periodontal health restorations. However, the need to improve appearance in the recent years has increased the demand for aesthetic procedures in periodontics. (Jhamb, 2014) Assessment of gingival esthetics is of critical importance in patients with high lip line, where the gingival margins are clearly visible, as well as for patients with high esthetic demands.(Rufenacht, 2000) Treatment modalities for developing gingival harmony may involve periodontal surgeries.

Gingival recession presents as soft tissue pathology with various etiological factors and with a high prevalence in association with age.(Shkreta et al., 2018) Gingival recession is defined as an exposure of the root surface

ARTICLE INFORMATION

*Corresponding Author: mebingeorgem.sdc@saveetha.com
Received 3rd Aug 2020 Accepted after revision 24th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/197

of the teeth as a result of apical migration of the gingival margin beyond the cementoenamel junction. (Gorman, 1967; Winders, 1971; Gartrell and Mathews, 1976) Periodontal surgery involves intrusion or extrusion techniques. Excess gingiva can be corrected by resection periodontal surgeries like gingivectomy or crown lengthening procedures Gingival recession can be corrected by additive periodontal surgical procedures like tissue grafts, guided tissue regeneration, etc. (Palmer, 1990; Tarnow, 1992; Prato, 2000; Periodontology, Research and Science and Therapy Committee of the American Academy of Periodontology, 2005)

There are various other aesthetic concerns like gingival hyperpigmentation, black triangle, etc. Open gingival embrasures are known as black triangles. It is a state of disappearance of the interdental papillae which serves as a biological barrier for the periodontal structures underneath. It also has an important role in aesthetics. The gingival colour also contributes to a beautiful smile. (Grover et al., 2014) Excessive deposition of melanin on the supre basal layers of epithelium leads to gingival pigmentation. Various depigmentation techniques have been employed in the recent years. (Patil et al., 2015)

Previously we have worked on plenty of topics in periodontology (Ramesh, Ravi and Kaarthikeyan, 2017; Ravi et al., 2017; Arjunkumar, 2018; Gajendran, Parthasarathy and Tadepalli, 2018; Jain and Nazar, 2018; Kavarthapu and Thamaraiselvan, 2018; Ramesh et al., 2018, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Kaarthikeyan, Jayakumar and Sivakumar, 2019; Kavarthapu and Malaiappan, 2019; Murthykumar, Arjunkumar and Jayaseelan, 2019; Vijayashree Priyadharsini, 2019). Now we are planning to work on the knowledge and awareness on esthetic procedures in periodontics among undergraduate dental students.

Table 1. Questionnaire to assess the knowledge and awareness about esthetic procedures in periodontics.

S.No	Questions	Options
1.	Are you aware of gummy smile?	a. Yes b. No
2.	What is the commonest treatment of choice for gummy smile?	a. Gingivectomy b. Flap Surgery
3.	Are you aware that lip repositioning is done to correct unesthetic gummy smile?	a. Yes b. No
4.	Are you aware of the term black triangle?	a. Yes b. No
5.	What do you think is the etiology of black triangle?	a. Recession b. Bone loss c. Angulated root d. All of the above e. Not aware
6.	Are you aware of gingival depigmentation?	a. Yes b. No
7.	What are the gingival depigmentation methods you are aware of?	a. Chemical method b. Scalpel surgical technique c. Gingival abrasion d. All of the above e. Not aware

MATERIAL AND METHODS

The present study was a questionnaire based study. A 7-item questionnaire was prepared (Table 1) and circulated through an online portal among undergraduate dental students. A total of 100 students took up the survey among which 28 students were males and 72 students were females. The results obtained from the survey were tabulated, analysed and represented graphically using SPSS software (Version 23). Frequency distribution and percentage was calculated. Then the chi-square test was done to find out the association between the responses with respect to gender.

RESULTS AND DISCUSSION

The present study was to evaluate the knowledge and awareness about esthetic procedures in periodontics among undergraduate dental students. A total of 100 undergraduate dental students took up the survey among which 28 were male students and 72 were female students. When the awareness of gummy smile was analysed, 21% of the male respondents were aware of gummy smile and 65% of female respondents were aware of it. [Figure 1] When the common treatment option for gummy smile was analysed, 17% of the male respondents responded as gingivectomy and 11% responded as flap surgery. Among the female respondents, 52% responded as

gingivectomy, 20% as flap surgery. [Figure 2] When the awareness on lip repositioning technique for unesthetic gummy smile was analysed, 19% of the male respondents were aware of it while 9% were not aware. 65% of the female respondents were aware and 7% were not aware of it. [Figure 3]

Figure 1: Bar graph showing the association between gender and awareness of gummy smile. X axis represents the gender and Y axis represents the number of respondents who were aware and not aware of gummy smile. Majority of the female respondents (65%) were aware of gummy smile. Association between gender and awareness of gummy smile was statistically significant. (Chi-square test; p=0.048)

Figure 2: Bar graph showing the association between gender and awareness about the common treatment option for gummy smile. X axis represents the gender and Y axis represents the number of respondents who were aware and not aware of the common treatment option for gummy smile. Majority of the female respondents (52%) were aware that gingivectomy is the common treatment option for gummy smile. However, association between gender and awareness about the common treatment option for gummy smile was not statistically significant. (Chi-square test; p=0.264)

When the awareness of the term black triangle was analysed, 16% of the male respondents were aware and 12% were not aware. Among the female participants, 57% were aware of it while 15% were not aware of it. [Figure 4] When the awareness on etiology of black triangle was analysed, 6% of male respondents were aware of all the causes while 11% were not aware of it. Among the female respondents, 39% were aware of all the causes while 15% were not aware of the causes. [Figure 5] When the awareness on gingival depigmentation technique was analysed, 25% of male respondents were aware of it while 3% were not aware. Among female respondents, 65% were aware of it and 7% were not aware of it. [Figure 6] When the awareness on various gingival depigmentation methods were analysed, 5% of male respondents were aware of all the techniques while 11% were not aware of it. Among the female respondents, 17% were aware of all the techniques while 31% were not aware of it. [Figure 7].

Figure 3: Bar graph showing the association between gender and awareness about lip repositioning technique for unesthetic gummy smile. X axis represents the gender and Y axis represents the number of respondents who were aware and not aware of lip repositioning technique. Majority of the female respondents (65%) were aware of the lip repositioning technique. Association between gender and awareness about lip repositioning technique for unesthetic gummy smile was statistically significant. (Chi-square test; p=0.006).

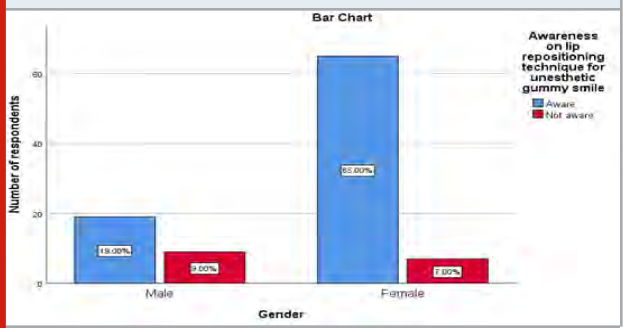
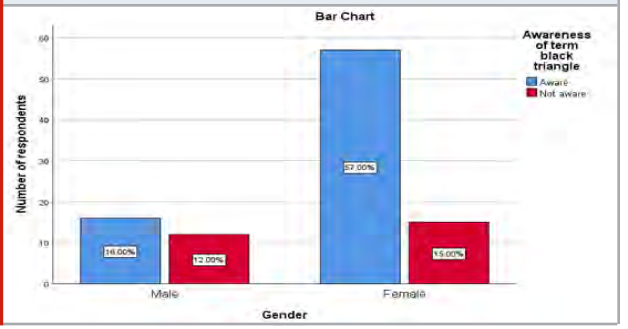


Figure 4: Bar graph showing the association between gender and awareness about the term black triangle. X axis represents the gender and Y axis represents the number of respondents who were aware and not aware of black triangle. Majority of the female respondents (57%) were aware of the black triangle. Association between gender and awareness about the term black triangle was statistically significant. (Chi-square test; p=0.026).



Cosmetic expectations have increased with time and patients are more concerned with gingival esthetics and smile designing in the recent years. Numerous procedures provide solutions to various esthetic deformities of the gingiva. The mucogingival defects include excessive gingiva, gingival recession, hyperpigmentation, etc.

It can result in various conditions like black triangle, gummy smile, gingival hyperpigmentation, etc. Usually gingivoplasty, a resective gingival surgery is recommended. Recently techniques like lip repositioning, laser treatment have been introduced for correcting gummy smile.(Gonçalves et al., 2017)

Figure 5: Bar graph showing the association between gender and awareness about the etiology of black triangle. X axis represents the gender and Y axis represents the number of respondents who were aware and not aware of the etiology of black triangle. Majority of the female respondents (39%) were aware of all the etiology of black triangle. Association between gender and awareness about the etiology of black triangle was statistically significant. (Chi-square test; p=0.004)

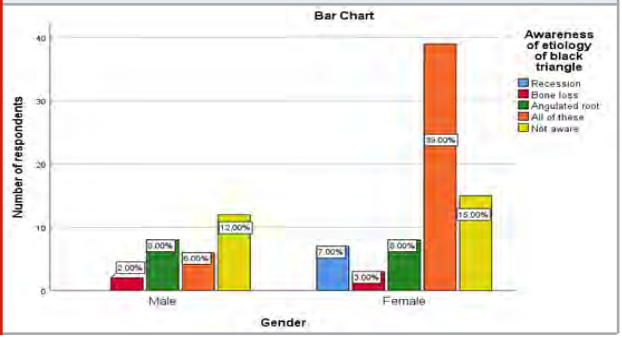
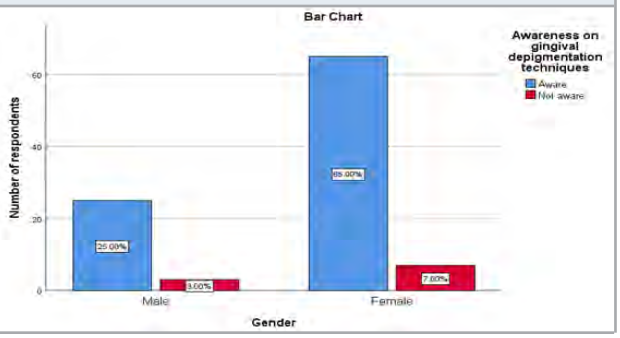
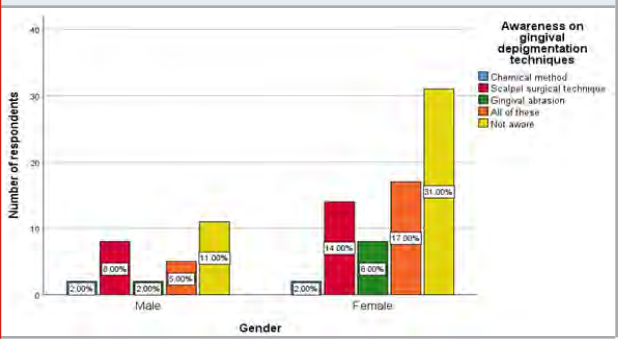


Figure 6: Bar graph showing the association between gender and awareness about gingival hyperpigmentation. X axis represents the gender and Y axis represents the number of respondents who were aware and not aware of the gingival depigmentation technique. Majority of the female respondents (65%) were aware of gingival depigmentation technique. However, association between gender and awareness about gingival depigmentation technique was not statistically significant. (Chi-square test; p=0.882)



Loss of interdental papilla results in a condition called black triangle. One of the aesthetic difficulties in treatment of black triangle is related to its ability to restore the missing papilla in the maxillary anterior portion. (Lubis, Nasution and Zulkarnain, 2018) Various conditions like recession, bone loss, angulated root, triangular crown, aging, midline diastema have been reported to cause black triangle. (Al-Zarea et al., 2015) Various surgical and non surgical techniques are available to treat black

Figure 7: Bar graph showing the association between gender and awareness about gingival depigmentation techniques. X axis represents the gender and Y axis represents the number of respondents who were aware and not aware of the gingival depigmentation techniques. Only 17% of the female respondents were aware of all the gingival depigmentation techniques. Association between gender and awareness about gingival depigmentation techniques was not statistically significant. (Chi-square test; p=0.660)



triangle, Surgical approach includes pedicle graft, envelope type flap, etc.(Ozenci, no date)

Gingival appearance is a component for an attractive smile. Gingival hyperpigmentation can occur due to deposition of melanin pigment. ('Surgical Gingival Depigmentation: A Case Report', 2012) Various depigmentation techniques have been introduced in the recent years. It includes surgical scalpel technique, bar abrasion method, electrosurgery, cryosurgery, laser , chemical exfoliation, etc. (S. et al., 2013; Hosadurga et al., 2017)

In the present study, 86% of the undergraduate students were aware of gummy smile, 72% were aware of black triangle and 90% were aware of gingival hyperpigmentation. However, the knowledge on the treatment modalities for such conditions were inadequate. 48% were not aware of the treatment options for gummy smile, 42% were not aware of various gingival depigmentation techniques.

CONCLUSION

From this study we can conclude that the majority of the students were aware of the gingival conditions like gummy smile, black triangle, gingival hyperpigmentation. However, many students were not aware of the various treatment modalities available for those conditions. Also, females had more knowledge and awareness as compared to males. This study emphasizes the need for more awareness about the esthetic procedures in periodontics must be created among undergraduate dental students.

ACKNOWLEDGEMENTS

The authors of this study would like to express their gratitude towards everyone who facilitated and enabled

us to carry out this study successfully.

Conflict of Interest: None declared.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-565-569

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Comparison of Tensile Strengths of Welded Orthodontic Tubes Using Electrical Resistance and Argon Laser Welding

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ABSTRACT

The aim of this study was to compare the tensile strength of orthodontic tubes welded by conventional electrical resistance welding and argon laser welding procedures. Twenty specimens of molar tubes were divided into two groups (n=10); group 1; electrical resistance welding, group 2; argon laser welding. The tensile strengths were measured using an INSTRON universal testing machine. Statistical analysis was performed using the SPSS software. Independent t test was done to compare the variables.The means and standard deviations of tensile strength for the groups were calculated. The mean tensile strength value of electrical resistance welding was 387.35+/-114.49 and that of argon laser welding was 492.10+/-151.99.There was no statistical significant difference between the two groups although argon laser showed higher values in terms of tensile strength. (P value - 0.099) In conclusion, argon laser welding had higher tensile strengths when compared to electrical resistant welding but not statistically significant.

KEY WORDS: LASER WELDING, ELECTRICAL RESISTANCE WELDING, TENSILE STRENGTH, ORTHODONTIC BANDS..

INTRODUCTION

Bands in orthodontics have been in use for more than 100 years(Weinberger, 1926) Although bondable buccal tubes have gained popularity, a large number of Orthodontists still use bands with buccal tubes attached to them. The mode of attachment of these buccal tubes are important because the tensile strength of this attachment would determine failure of the attachment leading to considerable delay in orthodontic treatment.

ARTICLE INFORMATION

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Received 2nd Aug 2020 Accepted after revision 28th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/198

In orthodontics, there are several ways by which attachments or auxiliaries can be joined. These include, Brazing, Soldering, Welding, Electrical resistance welding, Laser welding, Tungsten inert gas welding, etc. Although several methods of joining attachments have been proposed, resistance spot welding and soldering have been the most commonly used procedures. Soldering involves the use of a filler material between two closely approximated components and is a technique sensitive procedure. Welding on the other hand is a simpler procedure and involves the passage of current through resistant weldmates to achieve fusion. Due to its simplicity, welding is more commonly used(Pattabiraman et al., 2014).

Laser welding also offers other benefits such as high mechanical strength, reduced distortion due to a narrow heat affected zone, least contamination with oxide free part, faster process time, corrosion resistant joint, and no galvanic effect due to welding without third material.

In addition, laser welded joints proved to be superior as compared to a soldered one in terms of biocompatibility. It is also reported that laser welding remaining with the joint behaves to be 100% hypoallergenic, non-reactive and insoluble in oral environment(Perveen, Molardi and Fornaini, 2018). Laser welding of other attachments to orthodontic wires have been studied and have shown sufficient strength of the joint without altering the material properties and hence shown clinical efficacy. (Solmi et al., 2004). Both laser and Tungsten Inert Gas welding are solder-free alternatives to joining metal Tungsten inert gas welding has a lower investment cost and is comparable with laser welding..(Bock et al., 2008). There is no reported study in literature that compares laser welding and resistance spot welding methods in terms of tensile strength for attaching buccal tubes to molar bands.

Previously our team has done extensive research that ranged from epidemiological studies to randomised clinical trials that have been published in reputed journals.(Felicita and Sumathi Felicita, 2017a, 2017b) (Felicita and Sumathi Felicita, 2018)(Felicita et al., 2017)(Korath, Padmanabhan and Parameswaran, 2017) (Krishnan, Pandian and Rajagopal, 2017)(Charles et al., 2018)(Krishnan, Pandian and Kumar, 2018)(Reddy et al., 2018)(Chinnasamy et al., 2019). This knowledge was instrumental for us to study the tensile strength of welded orthodontic tubes using argon laser welding and electrical resistance welding. The aim of this study was to compare the tensile strength of orthodontic tubes welded by conventional electrical resistance welding and argon laser welding procedures

MATERIAL AND METHODS

A total of 20 new metal bands were used to which 20 buccal tubes were welded with electric resistance spot welding (n = 10) and laser welding (n = 10). Standardized orthodontic band to buccal tube configuration was used. The type of buccal tube and band used are shown in figure 1. Twenty molar bands were embedded into standardized acrylic blocks and the buccal tubes were welded onto them using Electrical spot welding and Argon Laser welding. The fracture strength measurement of different welding methods was carried out using an INSTRON universal testing machine. During the test, the loading was continued until the welded joint broke into two pieces. Additionally, the tensile test was terminated when the gap between pieces reached 2 mm even if no fracture occurred.The determined tensile strength was then tabulated and compared. Statistical analysis was performed with the SPSS software and an independent t test was done to compare the variables.The means and standard deviations of tensile strength for the groups were calculated.

Welding procedures :
Group 1 : The buccal tube was taken and welded to the molar band by electrical resistance welding as in figure 2.
Group 2 : The buccal tube was taken and welded to the molar band by argon laser welding as shown in figure 3.

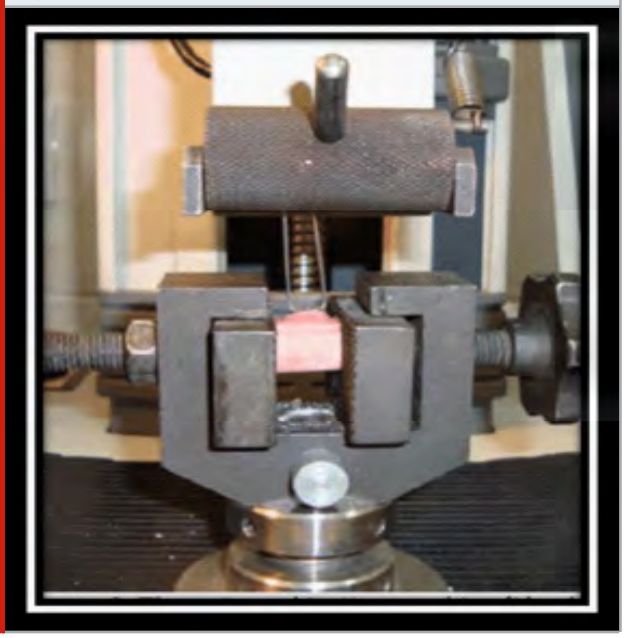
The tensile bond strength was calculated using a universal testing instron machine as shown in figure 4.

Figure 1: Orthodontic Molar Tube

Figure 2: Electrical resistance welder

Figure 3: Argon Laser welder

Figure 4: Molar tube held in the INSTRON machine



RESULTS AND DISCUSSION

The tensile strength of the electrical welding group and the laser welding group have been tabulated in Table 1 and Table 2 respectively. The mean, standard deviation and standard error have been tabulated in Table 3. The mean tensile shear strength value of electrical resistance welding was 387.35 +/- 114.49 and that of argon laser welding was 492.10+/-151.99. There was no statistical significance between the two groups although argon laser showed higher values in terms of tensile strength. Figure 5 shows the mean and standard deviation of the two groups. It is inferred that the Argon laser Welding has a higher mean tensile strength than Electrical resistant welding, but it was not statistically significant. P value - 0.099 (P>0.05)

Table 1. Tensile strengths of electrical resistant welding - Group 1

Electrical Resistance Welding Group:1	Tensile Strength [Mpa]
1	313.54
2	432.55
3	345.36
4	567.356
5	603.64
6	267.66
7	345.65
8	278.1
9	356.89
10	362.76

Table 2. Tensile strengths of Argon Laser welding - Group 2

Argon Laser Welding Group:2	Tensile Strength [Mpa]
1	498.3
2	522.11
3	478.56
4	623.16
5	768.54
6	438.09
7	513.56
8	196.24
9	348.78
10	533.67

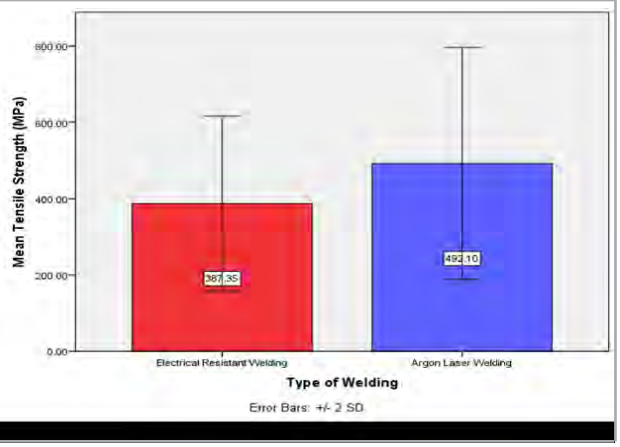
Table 3. Descriptive Statistics of the tensile strengths of the tested welded molar tubes.

Groups		N	Mean	Std. Deviation	Std. Error Mean
Tensile Strength	ELECTRICAL RESISTANT WELDING	10	387.35	114.49	36.20
	ARGON LASER WELDING	10	492.10	151.99	48.06

Molar bands have been one of the most important components of fixed orthodontic treatment. Buccal tube positions play an important role in delivering force vectors. Although, preformed bands have been used commonly now, the advantage of being able to change force vectors due to differential positioning of buccal tubes remains.The use of buccal tube positioning to prevent extrusion of molar teeth and to alter buccal tube positioning for class II dental finish cases are known and hence the need for attaching buccal tubes through different welding methods seems to be of utmost importance. No studies till date have assessed the tensile strengths of buccal tubes attached to bands with electrical spot welding and laser welding. Hence this study was

conducted with the aim of comparing the two common methods of welding buccal tube attachments. This study was conducted on 10 samples each, welded by electrical spot welding and Argon laser welding respectively. The result of an independent t-test showed no statistical significance among the two groups although the values were higher for the Argon laser welding group. (P value - 0.099)

Figure 5: Bar graph showing the mean tensile strength scores (MPa) and the standard deviation of the two groups. (Electrical resistant welding and Argon laser welding). The X-axis represents the two types of welding used and the Y-axis represents the mean tensile strength of the two groups in MPa. An independent t-test was done and it was inferred that the Argon laser Welding has a higher mean tensile strength than Electrical resistant welding, but it was not statistically significant. P value - 0.099 (P>0.05).



Conventional methods of joining buccal attachments like soldering have been largely replaced by methods such as electrical spot welding and laser welding due to their lesser toxicity and ease of use. Previous studies have been conducted on attachment to orthodontic wires using different methods of welding , testing their tensile bond strength and other characteristics of attachment. (Nascimento et al., 2012)(Iijima, Brantley, Yuasa, Muguruma, et al., 2008)(Iijima, Brantley, Yuasa, Kawashima, et al., 2008). Conclusions from these studies have shown that both these types of welding show desirable characteristics with lasers being more clinically efficient due to concentrated areas of heating but have been used less due to factors considering affordability. Sessini et al(Sestini et al., 2006) compared in vitro toxicity of resistance spot welding, laser welding and soldering and found highest toxicity for silver soldering and good tolerance for resistance welding and laser welding. In some studies, laser welded joints showed greater mechanical resistance than that achieved by traditional welding.(Fornaini et al., 2010)

Laser Beam Welding (LBW has advantages such as a corrosion resistant technology without solder, it eliminates any galvanic effect because the weld is done with the parent metal without the introduction of additional metals, little or no heat transfer to the local structures increasing the versatility of the technology, and more accurate than the conventional soldering techniques and it is a non-contact welding method. In laser welding, laser light is focused on small regions, applying high energy to these areas in a very short amount of time. Heating is mainly focused at the point of application; therefore the surrounding areas do not damage.These would be the added advantages in favour of laser welding along with the results of this study. The limitations of this study include a small sample size, and hence, future studies with a larger sample size would provide more accurate results. Parameters other than the tensile strength could be assessed for a comprehensive analysis.

CONCLUSION

From this study, it can be concluded that there is no difference in the tensile strength between electrical resistance welding and argon laser welding of orthodontic buccal tubes to molar bands.

ACKNOWLEDGEMENTS

I would like to record my deep sense of gratitude to my research supervisor Dr. Ravindra Kumar Jain, Reader, Department of Orthodontics, Saveetha Dental College and Hospitals, Chennai for his inspiring guidance and encouragement with my work during all stages. There was an equal contribution from all the authors.

Conflict of Interest: There is no conflict of interest.

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Dental
Communication

Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-570-573

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Anatomical Observation and Morphometric Study of Acetabulum in South Indian Population

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ABSTRACT

The acetabulum is a cup shaped portion of the hip bone, that articulates to the femoral head of the femur bone. The acetabulum and the femur bone together forms the bony structure of the hip joint. The main function of acetabulum is that it allows us to walk, run and move freely. Fractures are one of the most common problems that are seen in acetabulum. The excess growth of acetabulum causes the femoral head and the acetabular socket to pinch the labrum of acetabulum resulting in excess pain and decreased range of mobility. The treatments of acetabular fractures can be done through non surgical and surgical methods. The aim of the study is to do the anatomical observation and morphometric study of acetabulum in the south indian population. In the present study, 40 dry hip bones were collected from Anatomy Department of Saveetha Dental college and Sri Ramachandra Medical college, out of which 20 hip bones were of males and 20 hip bones were of females which were pre recorded in the department. These hip bones were collected to analyse two parameters, diameter of acetabulum and width of the notch of the acetabulum. The data that was obtained were analysed and standard deviation values were obtained for both the parameters. These values were plotted in the form of bar graphs.This study concludes that the diameter and the notch of acetabulum was found to be greater in males than females.

KEY WORDS: MORPHOMETRIC, ACETABULUM, NOTCH, DIAMETER.

INTRODUCTION

The acetabulum is a deep cup shaped structure that encloses the head of the femur at the hip joint. Acetabulum is a combination of three bones of the pelvis- ilium, pibis, ischium. The crescent surface is the superior surface of acetabulum. It is lined with hyaline cartilage and is the only part that controls the femoral head. The acetabular fossa is a deep depression in the floor of the acetabulum that is not lined by hyaline cartilage and does not come in contact with the femoral head.

One of the most weight bearing joints of the body is the hip joint. Hence the knowledge of its morphometric and anatomical features of acetabulum is required for complete mechanics of acetabulum (Dhindsa, 2013). The anatomical features of the acetabulum helps during distinguishing of male and female acetabulum. Female acetabulum are usually smaller as compared to male. Diameter of those acetabulum is relatively larger in male than females (Indurjeeth et al., 2019).

Acetabular measurements or dimension is crucial to diagnose various diseases that are related to the hip

ARTICLE INFORMATION

*Corresponding Author: sangeethas.sdc@saveetha.com
Received 4th Aug 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

*Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/199*

joint which also helps to check the recovery of patients and to access the stability of the hip joint (Sachdeva et al., 2019). These measurements of acetabulum are also helpful during surgical procedures for acetabular reconstruction using materials such as spikes and screws during fixation (Dhindsa, 2013). Therefore acetabulum plays an important role in walking, running or moving freely. It is the major joint for locomotion.

Previously we have done so many morphological and morphometric studies (Krishna and Babu, 2016), (Nandhini et al., 2018), (Subashri and Thenmozhi, 2016), (Keerthana and Thenmozhi, 2016), (Pratha et al., 2016), (Hafeez and Others, 2016), (Choudhari and Thenmozhi, 2016), (Kannan and Thenmozhi, 2016) that led us to conduct study over the past 5 years. This vast research experience has inspired us to do an anatomical observation and morphometric study of acetabulum in the South Indian population.

MATERIAL AND METHODS

The study was done by using 40 dry human pelvic bones 20 of males and 20 of females from the Anatomy department of Saveetha dental college and Sri Ramachandra medical college Chennai, India. The damaged and fractured bones were not used in the study. The measurements of the pelvic bones were done using a vernier caliper. The values for the two parameters – diameter and notch of the acetabulum were measured in millimetre .The data were tabulated ,analysed and represented by a bar graph.

RESULTS AND DISCUSSION

The results obtained from present study shows that the average diameter of acetabulum of male was found to be 48.70mm and the average diameter of acetabulum of female was 46.38mm. The average width of the acetabular notch of male was found to be 25.23mm and for female was 23.24mm. The results clearly show that males have a larger diameter and width of acetabular notch when compared to the females. This difference is due to the variation in their body and developmental structure.

Figure 1: Shows the diameter of the acetabulum measured using a vernier caliper.

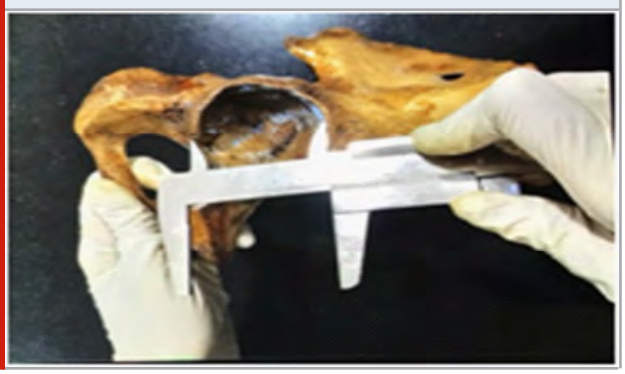


Table 1. Tabular column representing the average/mean values of diameter and width of acetabular notch of males and females.

Average	Male	Female
Maximum diameter of acetabulum	48.70mm	46.38mm
Width of acetabular Notch	25.23mm	23.24mm

Figure 2: Bar chart representing the association of gender and maximum diameter of acetabulum. X- axis represents gender and Y- axis represents maximum diameter of acetabulum in mm.where (Red) "Male" and (blue) "Female". Standard deviation was done for maximum diameter of the acetabulum. Standard deviation of males was 48.7+/- 1.53 for females was 46.4+/- 1.08. Males had larger diameter of acetabulum when compared to females.

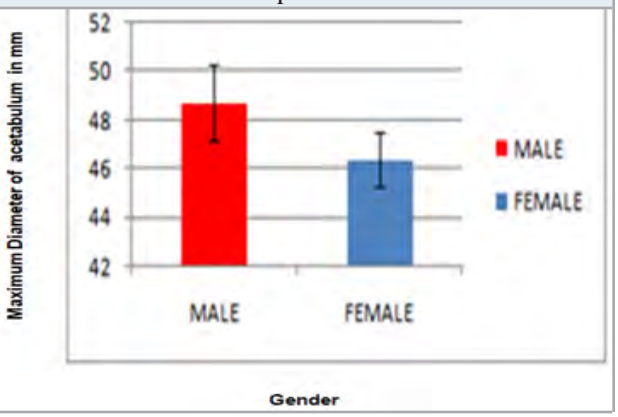
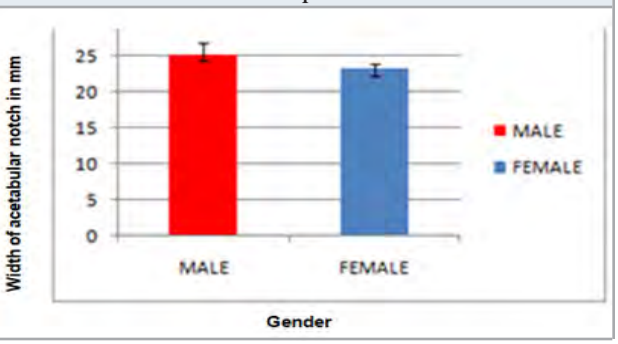


Figure 3: Bar chart representing the association of gender and width of acetabular notch. X- axis represents the gender and Y- axis represents the width of the acetabular notch in mm ,where (red) "Male" and (blue) "Females". Standard deviation was done for width of acetabular notch. Standard deviation for males was 25.23+/- 1.59 and for females was 23.24+/- 0.72. Males had a larger width of acetabular notch when compared to females.



Diameter of acetabulum is the maximum horizontal distance between the margins of the acetabular cavity. Depth of acetabulum is the maximum vertical distance from the edge of the acetabulum of deepest point in

acetabular cavity. According to the study done by Guru Sharan, the mean diameter of acetabulum was found to be 5.13cm on the right side and 5.03cm on the left side (Dhindsa, 2013). The depth (mean) was found to be 2.67cm on the right side and 2.64cm on the left side. The value of volume of acetabulum without labarum was 31.5 cm3 and with labarum was 41.1cm3 of unknown sex were done in the study by Babu. (Babu et al., 2018)

In the study done by Sridharan , they found that all the parameters were relatively larger in male than female. The vertical diameter of the female was 4.8cm and male was 5.2cm. Antero-Posterior diameter of the female was 4.8cm and male was 5.2cm (Sridharan et al., 2019). The mean diameter of the acetabulum was found - 49±3.5mm right and 48.06±5.65mm left. They also found that 93.3% of acetabular bone is pointed in anterior and it was lunate shaped posterior end and 1.7% - bones of both anterior and posterior were pointed (Sreedevi et al., 2017). In the study they found that the depth 11.8±2.9mm – male whose average age was found to be 47.5±17.5mm and for females 55.6±18.5mm – 11.4±2.5mm (Senol, 2017). The results obtained in the study by Nayak were – the diameter of the acetabulum was found to be 4.53±0.37cm – right side and 4.41±0.39 left side. Volume – 36.3±9.84m – right side and 30.12±7.05 left side (Nayak et al., 2017).

The mean weight of the right hip bone was 131.61gm and on the left hip bone – 119.66gm. The Coxal Index was 74.59 on the right side and 73.32 on the left side (Nayak et al., 2017). They found out that there was more strength of the skeletal element on the right hip bone (Kausar et al., 2018). Based on our study it was found that the average diameter of male was 48.70 and the average diameter of females was 46.38. The average notch of male was 25.23 and the average notch of females was 23.24. It is seen that a male's pelvis is heart-shaped, whereas the female's pelvis is oval in Shape. -The male pelvis is narrower and taller and the female pelvis is shorter and wider. A wide pelvis usually increases the capacity of the birth canal and by reducing the risk of labor (Warrener et al., 2015). Widening of the hip bones occurs during the female puberty process. The hormone estrogens cause widening of the pelvis during sexual differentiation. This is why females have wider hips that permit childbirth. The male pelvis is generally taller and narrower. It is mainly adapted to fit a more massive and sturdy body architecture (Leong, 2006).

CONCLUSION

The anatomical parameters of the acetabulum are of immense importance to people who are likely to be orthopaedic surgeons. The present study concluded that the diameter and width of acetabular notch is higher in males than females. Even though the females have broader pelvis than males there was not much difference in the acetabulum . Further study can be done on various parameters of acetabulum for precise clinical correlation. These measurements help to fulfil the need for verifying the validity of various surgical procedures under practise. These parameters are also important for forensic experts.

ACKNOWLEDGEMENTS

The authors would like to thank the study participants for their participation and kind cooperation throughout the study.

Conflicts of Interest: The authors declare that there were no conflicts of interest in the present study.

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Biosc.Biotech.Res.Comm. Special Issue Vol 13 No (8) 2020 Pp-574-581

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Awareness On Recent Advances in Gingival Retraction Materials During Impression Making Among Undergraduate Dental Students - A Questionnaire Survey

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ABSTRACT

The aim of this survey was to create an awareness on recent advances in gingival retraction materials during impression making. A set of 10 questionnaires were circulated among the undergraduate (UG) students of Saveetha Dental College which was done in an online forum Survey planet to avoid discussion and false results, thereby no bias is evidenced in this study. A response of 100 UG students was collected and datas were entered to an Excel sheet followed by statistical analysis done in SPSS by IBM. The statistical test used is Chi-square test. From the survey we obtained that 66% of the students who attended the survey were third year students, 11% final years and 23% were CRRI. 80% of them were aware of recent advances in gingival retraction materials during impression making, 77% were aware of retraction cord, 76% were aware of the disadvantage of retraction cord, 78% were aware of the time consumption of retraction cord, 69% were aware of gingifoam, 70% were aware of Expasyl paste, 66% of were aware of Comprecap, 69% were aware of magic foam, 59% of them use Comprecap, 75% of them were aware of the expense of advanced materials. There was a significant association between the awareness of recent advances in the gingival retraction materials and year of study ($p<0.05$). The study concluded that UG students were aware of the recent advances in gingival retraction materials used in impression making which should be used in their daily clinical practice.

KEY WORDS: EXPASYL; GEL-CORD; GINGIFOAM; MAGIC FOAM CORD; MERCOCEL.

ARTICLE INFORMATION

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Received 1st Aug 2020 Accepted after revision 29th Sep 2020
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Thomson Reuters ISI Web of Science Clarivate Analytics USA and Crossref Indexed Journal

NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)

Online Contents Available at: http//www.bbrc.in/
Doi: http://dx.doi.org/10.21786/bbrc/13.8/200

INTRODUCTION

Gingival retraction is a reversible lateral and vertical deflection of the marginal gingiva away from the tooth which was an important and mandatory procedure while fabricating indirect restorations. They are frequently placed in the gingival sulcus for aesthetic and functional reasons. Hence, that must be reproduced accurately in the impression making and any failure results in a compromised marginal integrity, recurrent caries or gingival inflammation and periodontal breakdown(Rosenstiel, Land and Fujimoto, 2006).Gingival retraction's goals included adequate bulk flow of material should flow into the sulcus inorder to accurately record margin details and to prevent impression material from the sulcus of the gingiva, also to record the unprepared tooth surface apical to the finish line (Donovan and Chee, 2004). The minimum lateral retraction should be 0.2 mm, a small amount of impression material may flow beyond the prepared margin.

Displacement cords were supplied in three designs, namely, twisted cords, braided cords, & knitted cords, its selection is determined by the operator's preference since it usually brings about the desired Gingival displacement. Major disadvantages are its high expenses, thickness of the paste which makes it difficult to express into the sulcus and big metal tips for interproximal areas(Ayo-Yusuf, Driessen and Botha, 2005). Another system on the docks is the matrix impression system, a three-impression procedure which uses three viscosities of impression technique and attempts to overcome the deficiencies of the older systems to incorporate its best features(Hansen, Tira and Barlow, 1999).

Gingitrac(Chao et al., 2017) is a gingival-retraction paste system which is a preloaded syringe with paste which can be applied around the margins. This paste contains aluminum sulfate as an astringent and a hemostatic agent can be applied prior to its use. For single tooth use, a cap is used to apply pressure, after application of paste. Magic foam cord (Wassell et al., 2018) is another new non-hemostatic gingival-retraction system which was the first expanding vinyl polysiloxane material designed for retraction of the gingival sulcus without the potential traumatic and time-consuming packing of retraction cord. Mercocel (Ferrari, Cagidiaco and Ercoli, 1996) is a new retraction material that is used to displace gingival tissues without tissue damage before impression making. Merocel retraction strips are synthetic material consisting of polymer hydroxylate polyvinyl acetate which creates a net-like strip without debris or free fragment and its placement does not require use of local anesthesia which helps in careful management of the delicate gingival tissues with improved management of the treatment.

Racegel is another hemostatic agent that controls bleeding before and during impression-taking and crown placement. Due to its thermodynamic characteristics, its viscosity increases upon contact with the tissue, providing access to the gingival margin. The surgical techniques are Rotary curettage(Hobo, Shillingburg and Whitsett, 1976) which is performed on healthy tissue where the portion of sulcular epithelium is excised. Lasers were employed which causes tissue-coagulation facilitating hemostasis tissue removal and sulcular epithelium is removed. Commonly used soft-tissue lasers for gingival displacement include CO_2 lasers, diode lasers, erbium lasers, etc(Tao et al., 2018). Mechanical retraction techniques are contraindicated around implants, except when the patient's gingival shallow sulcus depth, thick gingival biotype(Bennani, Schwass and Chandler, 2008).

Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019)(Mahendran et al., 2017; S et al., 2017; V et al., 2017), this vast research experience has inspired us to conduct a survey about awareness on recent advances in gingival retraction materials during impression making. Thus, the study aimed in finding out the awareness of recent advances in gingival retraction materials during impression making among UG students.

MATERIAL AND METHODS

This study was done as a questionnaire survey which was done in December 2019 and answered by the UG students of the Saveetha Dental College. Students who were involved in the survey included third years, final years and CRRI (Interns). The survey involved completion of a predesigned questionnaire containing 2 sections with a total of ten questions. Set-1 questions were about the demographic details like their Name, gender and the year of study. Questionnaire was sent through an online forum Survey planet only to students practicing in clinics (Third years, Final years and CRRIs). Set-2 included questions about the awareness of recent advances in gingival materials during impression making, awareness on Retraction cord, Gingifoam, Expasyl paste, Compre cap, Magic foam, disadvantages of overpacking and awareness of recent advances in gingival retraction materials during impression making , also their expenses and were sent in an online forum Survey planet to avoid discussion and false results, thereby no bias is evidenced in this study. Age, Gender and the responses were considered as Inclusion criteria.

After applying inclusion criteria a data from 100 responses were collected and tabulated in an Excel sheet followed by statistical analysis done in SPSS by IBM. The statistical test used is Chi-square test. Association was done between the year of study and students awareness about the recent advances in gingival retraction materials

during impression making, Retraction cord, Gingifoam, Expasyl paste, Compre cap, Magic foam, disadvantages of retraction cord as its overpacking and awareness of recent advances in gingival retraction materials during impression making and their expenses.

The participants were asked to put the responses in the questionnaire on Survey planet. The completed questionnaires were carefully checked by the investigator.

Attachment I: Questionnaire:

Section I: Name –

Gender -

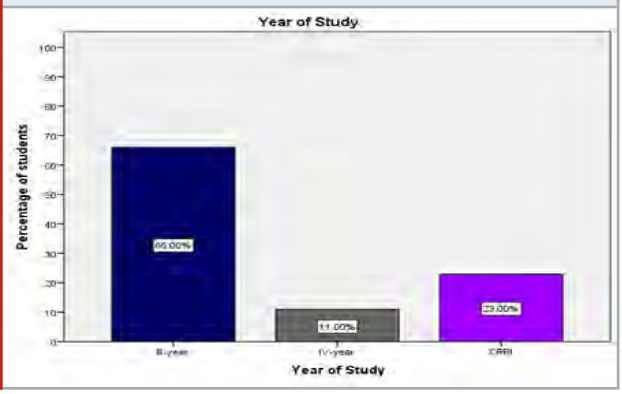
Year of study -

Section II : Questionnaire-(Table 1)

Table 1. Questions asked in survey planet with their choices and the percentage of responses by students

S.No	Questions	Choices	Percent
1.	Are you aware of recent advances in gingival retraction materials during impression making?	a)Yes b)No	80% 20%
2.	Are you aware of retraction cord ?	a)Yes b)No	77% 23%
3.	Do you think overpacking of retraction causes a major disadvantage ?	a)Yes b)No	76% 24%
4.	Is usage of retraction cord time consuming ?	a)Yes b)No	78% 22%
5.	Are you aware of gingifoam which works on the principle of dilation of the gingival sulcus by expansion?	a)Yes b)No	69% 31%
6.	Are you aware that expasyl paste which is used in retraction requires minimal time and force when compared to retraction cord?	a)Yes b)No	70% 30%
7.	Are you aware of the compre cap used in retraction technique in impression making?	a)Yes b)No	66% 34%
8.	Are you aware of the magic foam cord used that gives the best sulcus enlargement which can give the perfect impression?	a)Yes b)No	69% 31%
9.	What are the recent advances of gingival retraction you use in your daily practice ?	a) Magic foam b) Compre cap c) Expasyl	30% 59% 11%
10.	Do you agree that the recent gingival retraction method of impression taking is most expensive?	a)Yes b)No	75%

Figure 1: Bar graph shows the percentage of students who attempted the survey, where X-axis represents the Year of study and Y-axis represents the percentage of students who filled the survey. Out of which 66% (indigo) of them were third year students, 11% (gray) of them were final years and 23% (blue) of them were CRRI (Interns).



RESULTS AND DISCUSSION

From the survey we obtained that 66% of the students who attended the survey were third year students, 11% final years and 23% were CRRI (Figure-1). 80% of the students were aware of recent advances in gingival retraction materials during impression making of which 57% were third years which was higher comparatively with a significant association of year of study with awareness of recent advances in gingival retraction materials during impression making($p<0.05$)(Figure-2). 77% of the students were aware of retraction cord of which 54% were third years which was higher comparatively with a significant association of year of study with awareness on retraction cord ($p<0.05$) (Figure-3).

76% of the students were aware of the disadvantage of retraction cord of which 53% were third years which was higher comparatively with a significant association

of year of study with awareness on disadvantage of retraction cord as its overpacking (p<0.05)(Figure-4). 78% of the students were aware of the time consumption of retraction cord of which 56% were third years with a significant association of year of study with awareness on time consumption of retraction cord (p<0.05)(Figure-5). 69% of the students were aware of gingifoam of which 49% were third years with a significant association of year of study with awareness on gingifoam(p<0.05) (Figure-6).

Figure 2: Bar graph shows the association between the year of study of students and the awareness on recent advances in gingival retraction materials during impression making where, X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 80% of the students(blue) were aware of recent advances in gingival retraction materials during impression making, of which 57% were third years. Chi-square test was performed(Chi-square value-10.413a , p=0.005) which showed a significant association of year of study with awareness of recent advances in gingival retraction materials during impression making(p<0.05).

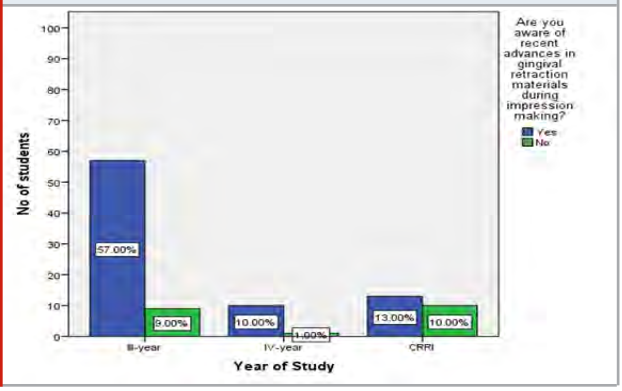


Figure 3: Bar graph shows the association between the year of study and awareness on gingival retraction cord where, X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 77% of the students(blue) were aware of retraction cord of which 54% were third years. Chi-square test was performed(Chi-square value - 7.513a,p=0.023) which showed a significant association of year of study with awareness on retraction cord (p<0.05).

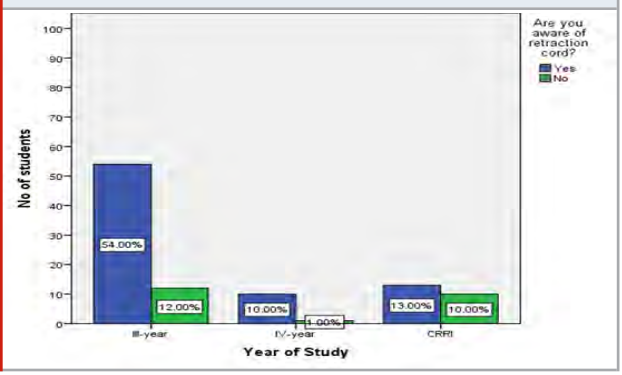


Figure 4: Bar graph shows the association between the year of study and awareness on disadvantage of retraction cord when it is overpacked, where X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 76% of the students(blue) were aware that the disadvantage of retraction cord is its overpacking of which 53% were third years. Chi-square test was performed(Chi-square value - 6.795a , p=0.033) which showed a significant association of year of study with awareness on disadvantage of retraction cord as its overpacking (p<0.05).

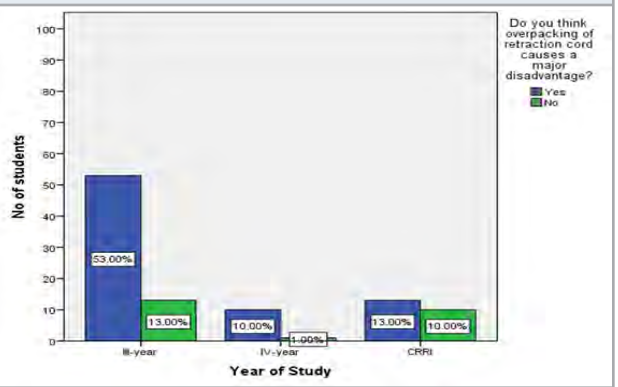
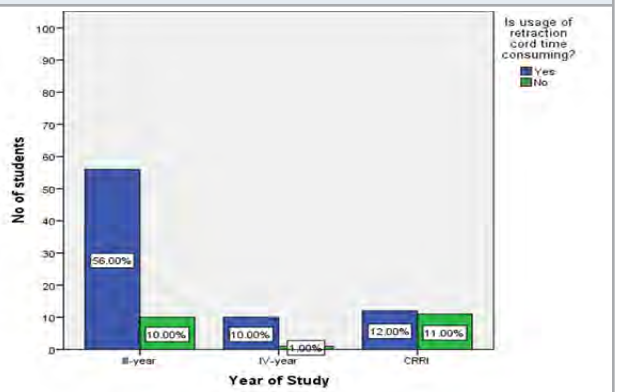


Figure 5: Bar graph shows the association between the year of study and the awareness on time consumption of retraction cord, where X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 78% of the students(blue) were aware that retraction cord is a time consuming procedure of which 56% were third years. Chi-square test was performed(Chi-square value - 11.812a , p=0.003) which showed a significant association of year of study with awareness on time consumption of retraction cord (p<0.05).



70% of the students were aware of Expasyl paste of which 49% were third years with a significant association of year of study with awareness on Expasyl paste(p<0.05)(Figure-7). 66% of the students were aware of Comprecap of which 45% were third years with a significant association of year of study with awareness on Comprecap (p<0.05) (Figure-8). 69% of the students were aware of magic foam of which 49% were third years with

a significant association of year of study with awareness on Magic Foam (p<0.05) (Figure-9). 59% of them use Comprecap in their daily clinical practice of which 34% were third years with a significant association of year of study with the recent materials they use in their daily practice(p<0.05).(Figure-10). 75% of the students were aware of the expense of advanced materials of which 53% were third years with a significant association of year of study with their awareness on the expense of advanced materials(p<0.05)(Figure-11).

Figure 6: Bar graph shows the association between the year of study and the awareness on gingifoam and its working principle where, X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 69% of the students(blue) were aware of gingifoam of which 49% were third years. Chi-square test was performed (Chi-square value - 10.320a , p=0.006) which showed a significant association of year of study with awareness on gingifoam(p<0.05).

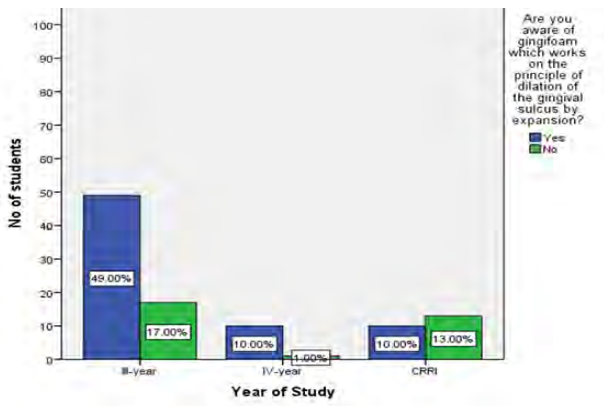


Figure 7: Bar graph shows the association between the year of study and the awareness on Expasyl paste and its convenience where, X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 70% of the students(blue) were aware of expasyl paste of which 49% were third years. Chi-square test was performed(Chi-square value - 8.241a , p=0.016) which showed a significant association of year of study with awareness on Expasyl paste(p<0.05).

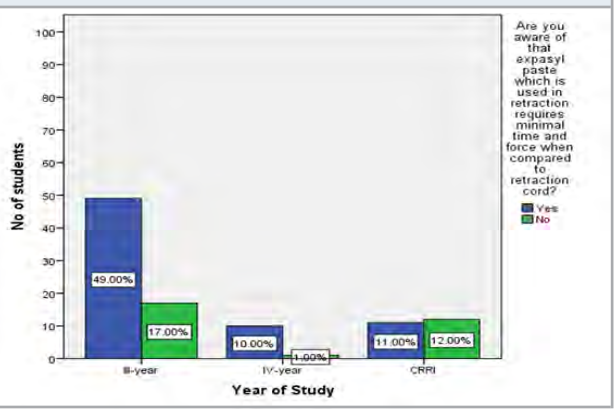


Figure 8: Bar graph shows the association between the year of study and the awareness on Comprecap, where, X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 66% of the students(blue) were aware of comprecap of which 45% were third years. Chi-square test was performed(Chi-square value - 6.567a , p=0.037) which showed a significant association of year of study with awareness on Comprecap (p<0.05).

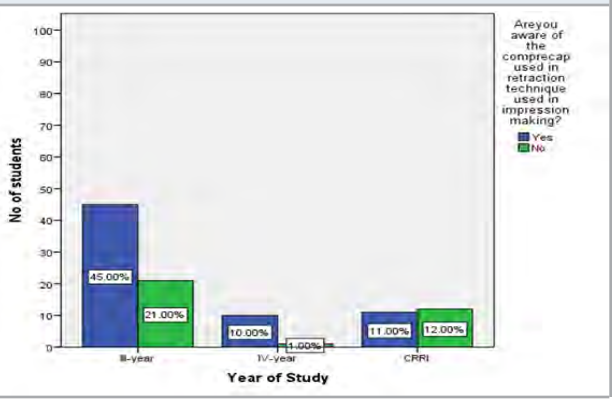
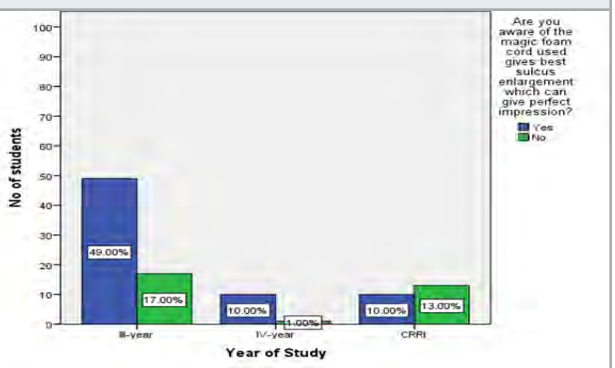


Figure 9: Bar graph shows the association between the year of study and the awareness on Magic Foam and its effectiveness where, X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 69% of the students(blue) were aware of Magic foam of which 49% were third years. Chi-square test was performed(Chi-square value - 10.320a , p=0.006) which showed a significant association of year of study with awareness on Magic Foam (p<0.05).



From the survey we obtained that 66% of the students who attended the survey were third year students, 11% final years and 23% were CRRI. 80% of them were aware of recent advances in gingival retraction materials during impression making. Donovan TE et al(Donovan and Chee, 2004) also found a similar study where dental practitioners were more aware(85%) of recent advances in gingival retraction during impression making. 77% were aware of retraction cord. Shivasakthy et al., (Shivasakthy, 2013) also found in their study that most of the dentists were aware of the retraction cords. Also Xhonga FA and Kannan A(Xhonga, 1971; Kannan and Venugopalan, 2018) found similar results. 76% were

aware of overpacking as a disadvantage of retraction cord.Al-Ani et al.,(Al-Ani et al., 2010) also supported our study stating overpacking as a disadvantage of retraction cord.

Figure 10: Bar graph shows the association between the year of study and the awareness on recent materials they use in their daily practice where, X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 59% of them use Comprecap(Violet) in their daily clinical practice of which 34% were third years. Chi-square test was performed(Chi-square value - 12.265a , p=0.015) which showed a significant association of year of study with the recent materials they use in their daily practice(p<0.05).

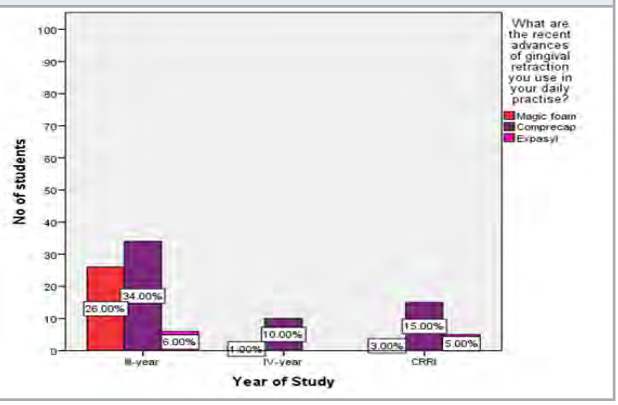
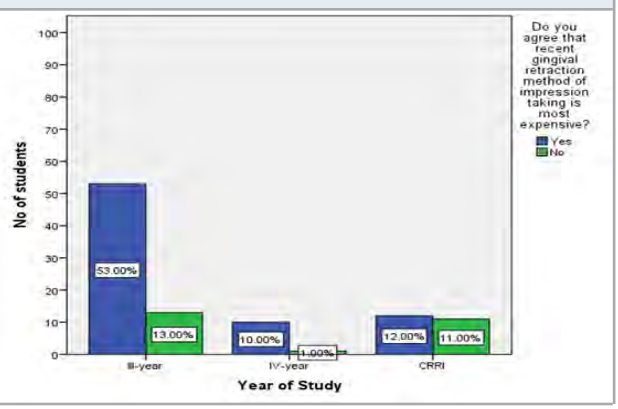


Figure 11: Bar graph shows the association between the year of study and the awareness on the expense of advanced materials where, X-axis represents the year of study of students and Y-axis represents the number of students who filled the survey. 75% of the students(blue) were aware of the expenses of advanced materials of which 53% were third years. Chi-square test was performed(Chi-square value- 8.866a,p=0.012) which showed a significant association of year of study with their awareness on the expense of advanced materials(p<0.05).



78% were aware of the time consumption of retraction cord. Shamsuzzaman et al., (Shamsuzzaman et al., 2014) supported the study stating time consumption as one of the disadvantages using retraction cord. 69% were aware of gingifoam which works on the principle of dilation of the gingival sulcus by expansion. Martignoni et al.,(Martignoni and Feinman, 1985) accepted our study results stating gingifoam usage for exposed margin. 70% were aware of Expasyl paste which is used in retraction requires minimal time and force when compared to retraction cord. Abduljabbar and Al Baker found similar results to our study where he mentioned the impact of expasyl in gingival retraction paste on bond strength of self-etch and total-etch systems (Al Baker et al., 2015; Abduljabbar et al., 2019).66% were aware of Comprecap , Livaditis in his study observed the same results of our study (Livaditis, 1998).

69% were aware of magic foam cord which gives the best sulcus enlargement which can give a perfect impression. Al-Ani et al., (Al-Ani et al., 2010) also supported our study. 59% of them use Comprecap which was higher compared to other retraction materials in impression making.Rosenstiel SF et al.,(Rosenstiel, Land and Fujimoto, 2006) also supported our study. 75% of them were aware of the expense of advanced materials.Shaw et al (Shaw and Krejci, 1986) ,Reddy et al., (Reddy et al., 2016) supported our study stating the high expense in usage of recent advanced retraction materials. There was a significant association between the awareness of recent advances in the gingival retraction materials and year of study(p<0.05).

CONCLUSION

The study concludes that Undergraduate students (3rd year,final year and CRRI) were aware of the recent advances in gingival retraction materials used in impression making. There was a significant association between the awareness of recent advances in the gingival retraction materials and year of study (p<0.05). Since, gingival retraction is an important clinical procedure for soft tissue management and impression-making, reasonable advanced retraction materials should be used in every clinician's daily practice for obtaining best results.

ACKNOWLEDGEMENTS

I sincerely thank my Guide, Mentor, Department of Research & IT Saveetha Dental College and Hospitals,Saveetha Institute Medical and Technical Sciences, Saveetha University for making me complete the research work.

Conflicts of Interest: Nil

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