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Knowledge, Awareness and Practice Among Dental Students on Colour Changes and Retention Qualities in Temporary Crowns

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ABSTRACT

Fabrication of provisional restoration is an important part in fixed partial denture.The provisional crowns must satisfy the requirements of pulpal protection, stability, marginal adaptability, wear resistance, occlusal functions, and esthetics.The aim of this study is to evaluate the awareness among dental students on colour changes and retention qualities of temporary crowns. A cross sectional study was conducted among dental students. The questionnaire consisted of 10 questions and were equally distributed among the students.The total sample size was 150 dental students. The data collected was entered in an Excel sheet and subjected to statistical analysis using SPSS version 23. it is observed that 15.33% of the third years felt that there was a change in shade of the temporary crowns after cementation, while only 7.33% of the interns felt a change in shade after cementation. 30% of the interns find their temporary crowns are of right thickness.17.33% of the interns have found their temporary crowns to be dislodged, rare, while 18% of the third years have responded to be often, for all of which the p value was statistically significant. Within the limits of the study, it is observed that most of the undergraduate students had difficulty in temporisation's shade selection and factors leading to change in retention qualities in temporary crowns.

KEY WORDS: PROVISIONAL CROWNS, CEMENTATION, RETENTION, SHADE MATCH.

INTRODUCTION

Provisional crowns in fixed prosthodontics is an important procedure, especially, if the restoration is expected to function for a longer duration or in cases of rehabilitation (Binkley and Irvin, 1987). Fabrication of provisional restoration is an important part in fixed partial denture.

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The provisional crowns must satisfy the requirements of pulpal protection, stability, marginal adaptability, wear resistance, occlusal functions, and esthetics (Dumbrigue, 2003). A provisional crown must also provide a preview of the future prosthesis, while enhancing the abutment and periodontal health (Federick, 1975).

There are various ways by which a temporary crown can be made. It can either be made directly on a prepared tooth/teeth (Miller, 1983),(Fehling and Neitzke, 1994) or can be done indirectly with the impression of the prepared teeth (Boberick and Wyke, 1999), (Small, 1999) or by combination of both; direct-indirect method (Bennani, 2000). Provisional material selection should be based on how their mechanical, physical, and handling properties fulfill specific requirements for any clinical case.

Other factors to be considered are biocompatibility and complications from intraoral use, such as chemical injury from the presence of monomer residue and thermal injury from an exothermic polymerization reaction. The most common materials used for custom interim-fixed restorations are several types of acrylic resins such as poly(methyl methacrylate) resin, poly(ethyl methacrylate) resin and polyvinyl (Regish, Sharma and Prithviraj, 2011).

Provisional crowns are made available in different forms such as; preformed crowns, custom made crowns. Preformed provisional crowns commonly consist of tooth-shaped shells of cellulose acetate, or metal. They are usually relined with acrylic resin to provide a more custom fit before cementation, but the plastic and metal crown shells can also be cemented directly onto the prepared teeth. Polycarbonate resin is the material of choice, that is commonly used for preformed crowns (Shetty, Alva and Prasad, 2012).

Another factor to be considered with provisional crowns is, they must be easy to remove without damaging the existing tooth preparation (Strassler, 1998),(Gratton and Aquilino, 2004) Other key purposes for the temporary restoration include the maintenance of the tooth preparation position both occlusally and proximally. The provisional restoration should be adjusted to duplicate the desired final occlusion and must have proximal contact with adjacent teeth to avoid tooth movement and shifting that can have a negative impact on the placement of the final restoration (GEGAUFF and AG, 2006),(Zinner, Trachtenberg and Miller, 1989).

In esthetically visible areas, the provisional crowns must not only provide a shade match, but also must maintain its esthetic appearance over the period of usage (Doray, Li and Powers, 2001). Discolouration of the restoration can lead to patient dissatisfaction, and is particularly problematic when provisional restorations are subjected to prolonged exposure to colorants during the course of the treatment (Sham et al., 2004). Color stability of provisional restorations is an important quality of the resin used, particularly for extensive reconstruction over a long period of time (Koumjian, Firtell and Nimmo, 1991). Hence, color stability can be a significant criterio in the selection of a particular provisional material for use in an esthetical area of the oral cavity.

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, awareness and practice among dental students on colour changes and retention qualities in temporary crowns.

Thus, the present study focuses on the knowledge, awareness and perception among dental students on retention qualities of a provisional restoration and also its colour change in due course.

MATERIAL AND METHODS

Study design:
Cross sectional study:
Data collection: A cross sectional study was conducted in January 2020 among dental students (Third years, Final years, Interns). It was an online questionnaire based study, conducted to assess the knowledge, attitude and perception colour stability and retention qualities of temporary crowns. 150 dental students (Third years, Final years, Interns) participated in this study from dental colleges in Chennai. The data collection was done via google forms.

Survey instrument: A pretested, self administered, closed ended questionnaire comprising the following sections formed the survey instrument. A structured questionnaire containing 10 questions was adopted from a validated questionnaire. The questionnaire was distributed among Third years, Final years, Interns. The goal of developing this questionnaire was to know about the knowledge the dental undergraduates had on colour stability and retention qualities of temporary crowns.

Data analysis: The data collected was entered in an Excel sheet and subjected to statistical analysis using SPSS version 23. Chi square test was done. The level of significance was set at $p<0.05$.

Questionnaire given is as follows:

- Year of study
- What type of temporary crowns do you use for temporization?
- Have you found any difficulties in shade matching the temporization of the material?
- What type of temporary cement do you use to lute for the temporary crowns?
- After cementation of temporary crowns, have you felt there was a change in shade with what you matched?
- Have you ever felt your temporary crown is of right thickness?
- Do you use the temporary luting cement according to the recommendations?
- How often have you found a temporary crown to be dislodged?
- How was the retention in your temporary crowns post cementation?
- How was the retention of your temporary crowns while retrieving?
- How many times the temporary crowns have been dislodged without you retrieving it?

RESULTS AND DISCUSSION

From the response obtained, it was observed that 33.33% of the third years, 32% of final years and 22% of the Interns use indirect methods for temporization. The direct method is mostly used by the Interns (11.33%) for which the p value was found to be statistically significant (p-0.000) (Figure 1). 28% of the third years have faced difficulties in shade matching. The P value was found to be statistically significant (p-0.001) (Figure 2). On type of temporary luting cements being used, 22% of the third years use IRM and 21.33% of the final years use ZOE-based cements for which the P value was 0.009 which is statistically significant (Figure 3). 15.33% of the third years felt that there was a change in shade of the temporary crowns after cementation, while only 7.33% of the interns felt a change in shade after cementation.

Figure 1: Bar graph showing association between year of study of the students and number of students using what type of temporization method. The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 33.33% of the third years use indirect methods (green) and 11.33% of the interns use direct methods (blue) for which the P value was found to be statistically significant (p-0.000).

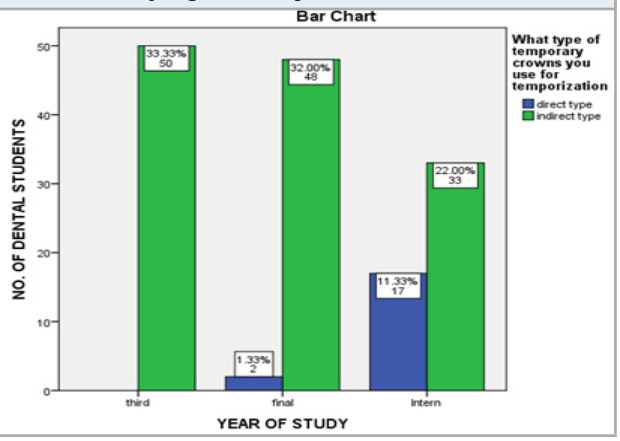


Figure 2: Bar graph showing association between year of study of the students and number of students who had difficulties in shade matching . The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 28% of the third years had difficulty (green) in shade matching and 14.6% of the interns did not have (blue) difficulty in shade matching for which the P value was found to be statistically significant (p-0.001).

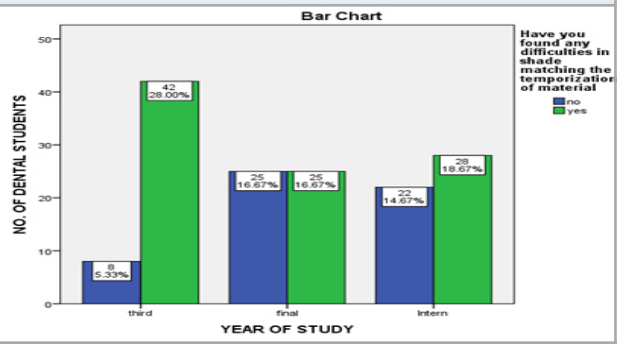


Figure 3: Bar graph showing association between year of study of the students and number of students using what type of temporary cement for luting. The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 22% of the third years use IRM (blue) and 21.33% of the final years use ZOE based cements (green) for luting, for which the P value was found to be statistically significant (p-0.009).

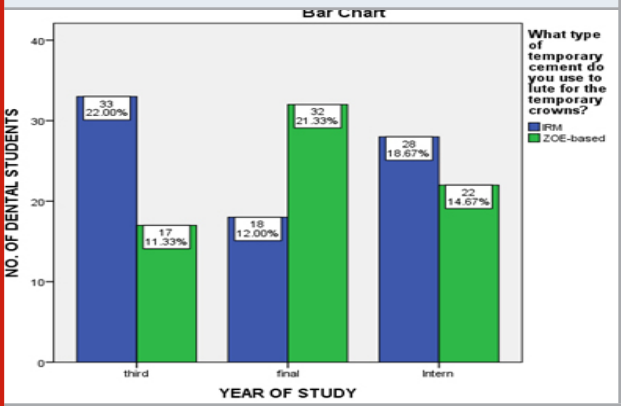
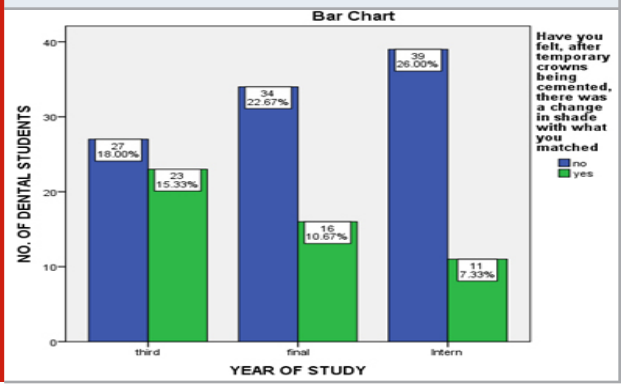


Figure 4: Bar graph showing association between year of study of the students and number of students who had an experience of shade change post cementation. The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 15.33% of the third years had experienced shade change (green) and 7.33% of the interns didn't experience shade change (blue) post cementation, for which the P value was found to be statistically significant (p-0.038).



The P value was 0.038(p<0.05) (Figure 4). 30% of the interns find their temporary crowns are of right thickness for which the p value was 0.001 (p<0.05) (Figure 5). 26.67% of the third years use the recommended P:L ratio for mixing while only 18% of the interns use it according to the recommended ratio. The P value was 0.013(p<0.05) (Figure 6). 17.33% of the interns have found their temporary crowns to be dislodged, rare, while 18% of the third years have responded to be often for which the P value was statistically significant (p-0.017) (Figure 7). 22.67% of the interns have found their temporary crowns to have a good retention, post cementation. The P value is 0.002 (p<0.05) (Figure 8).

15.33% of interns felt the temporary crowns had good retention while retrieving it and 24.67% of the final years felt the retention was fair. The P value was 0.000 (Figure 9). 22.67% of the final years have responded that <50% of the times, the temporary crowns were dislodged, without them retrieving it, for which the P value was found to be significantly not significant (p-0.736) (Figure 10).

Figure 5: Bar graph showing association between year of study of the students and number of students who think their crowns are of right thickness. The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 20% of the third years have responded no (blue) and 30% of the interns have responded yes (green) for which the P value was found to be statistically significant (p-0.001).

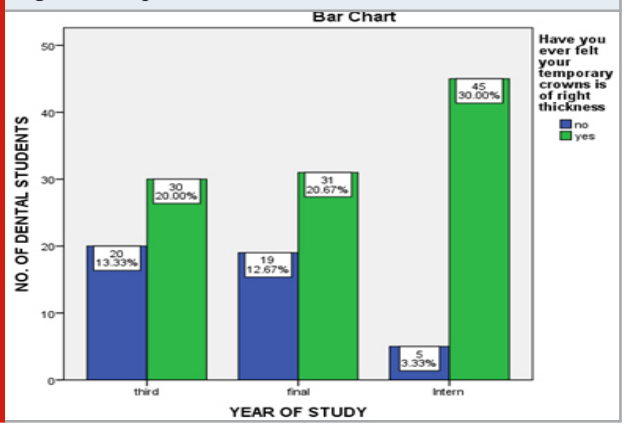
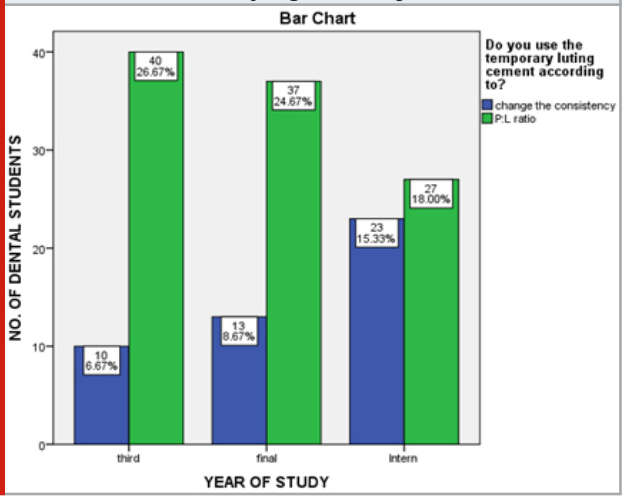


Figure 6: Bar graph showing association between year of study of the students and number of students using what type of P:L ratio. The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 26.67% of the third years use the recommended P:L ratio (green) and 15.33% of the interns use it with a change in the consistency (blue) for which the P value was found to be statistically significant (p-0.013).



From the present study, it is observed that 15.33% of the third years felt that there was a change in shade of the temporary crowns after cementation, while only 7.33% of the interns felt a change in shade after cementation. 30% of the interns find their temporary crowns are of right thickness.17.33% of the interns have found their temporary crowns to be dislodged, rare, while 18% of the third years have responded to be often, for all of which the p value was statistically significant.

Figure 7: Bar graph showing association between year of study of the students and number of students who had experienced crown dislodgement. The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 18% of the third years responded often (blue), 17.33% of the interns responded rare (blue) and 9.33% of final years responded very often (mustard) for which the P value was found to be statistically significant (p-0.017).

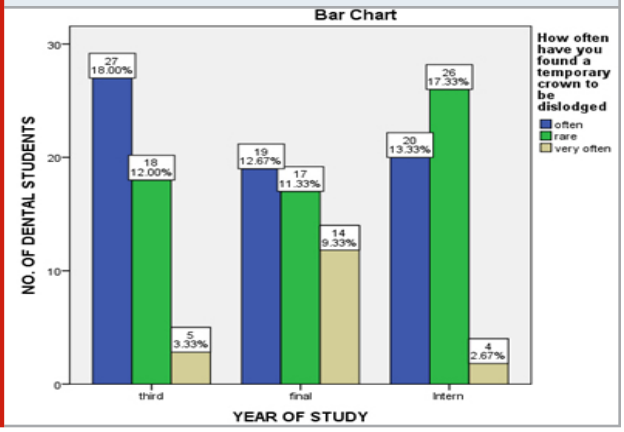
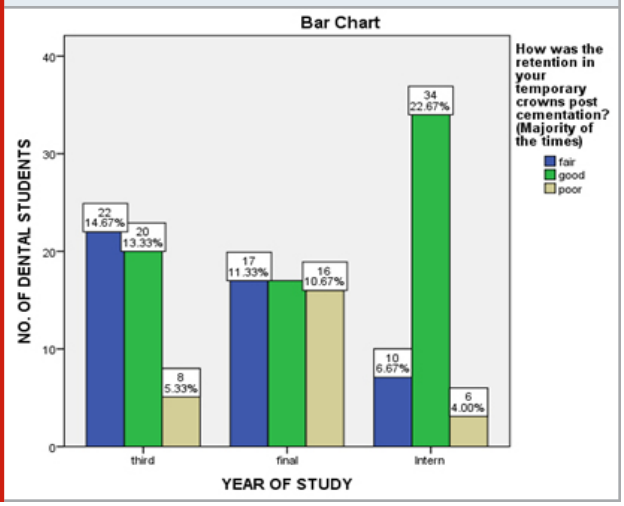


Figure 8: Bar graph showing association between year of study of the students and number of students on their experience of temporary crown retention post cementation. The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 14.67 % of the third years responded fair (blue), 22.67% of the interns responded good (green) and 10.67% of final years responded poor (mustard) for which the P value was found to be statistically significant (p-0.002).



Koumjian et al. in an in vivo-study, found that methyl methacrylate resin was lesser color stable than bis-acryl composite (Protemp II) (Koumjian, Firtell and Nimmo, 1991), whereas study by Gupta et al showed Revotek LC was the most color stable material (Gupta and Gupta, 2011). An awareness study done by Guru et al, showed that about 40% of the participants responded that methyl methacrylate is not directly used in the oral cavity, whereas 35% of the participants responded that methyl methacrylate is directly used in the oral cavity (Guru, Prasanna Guru and Sengottaiyan, 2019).

Figure 9: Bar graph showing association between year of study of the students and number of students on their experience of temporary crown retention while retrieving. The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 10% of the third years responded poor (mustard),15.33% of the interns responded good (green) and 24.67% of final years responded fair (blue) for which the P value was found to be statistically significant (p-0.000).

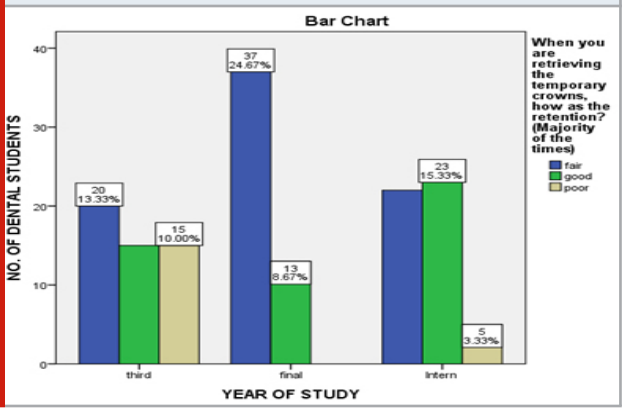
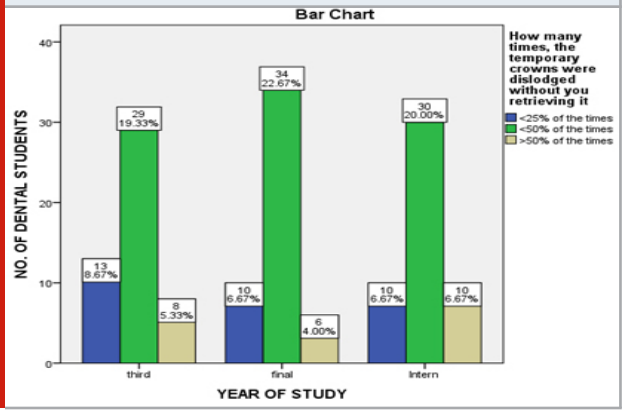


Figure 10: Bar graph showing association between year of study of the students and number of students on their experience of temporary crown dislodgement before retrieving them. The X axis denotes year of study and the Y axis denotes number of dental students. It is observed that 8.67% of the third years responded <25% of the times (blue),6.67% of the interns responded >50% of the times (mustard) and 22.67% of final years responded <50%of the times (blue) for which the P value was found to be statistically not significant (p-0.736).



Few articles have compared the colour stability with various materials. Crispin and Caputo studied the color stability methyl methacrylate materials which exhibited the least darkening, followed by ethyl methacrylate and vinyl-ethyl methacrylate materials (Crispin and Caputo, 1979). Guler et al study showed that the color stability of four provisional restorative materials was evaluated after 48 hours of immersion in a staining solution, according to the different finishing procedure (Guler, Kurt and Kulunk, 2005).

According to the Hamid J et al, the methyl methacrylate-based provisional restorative material was found to be more color stable than the auto polymerized and light- polymerized composite provisional materials (Hoseinkhezri et al., 2012). According to Malek A et al, bulk filing of the temporary crowns with luting cement increased the adaptation discrepancies (Alabdulkader and Habib, 2018).

Though the present study was found to be statistically significant, there are no comparative studies since not much attention is given towards training the students at an undergraduate level to encounter and manage patients. Thus the curriculum should emphasise the need to know about the subjects which also helps in the management of patients and their needs.

CONCLUSION

Within the limits of the study it is observed that indirect technique of temporisation (88%) was more commonly employed in the construction of temporaries. The use of zinc oxide eugenol based temporary cement was more common and not much clinical colour change was noticed by the operators post cementation but found difficulty in colour matching of temporaries to natural teeth (62%). The temporary crowns or bridges were intact and retentive only in 63% of the survey opinion at the time of retrieval.

Conflicts of Interest: Nil

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