BBRC
Bioscience Biotechnology
Research Communications

Knowledge, Awareness, Attitude About Bio Medical Waste Management Among General Dentists and Assistants Among the Chennai Population

Rinki Susan George[1], M.P.Brundha[2]* and V.B.Preejitha[3]

[1]Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University,Chennai-77,Tamil Nadu, India

[2]Associate Professor, Department of Pathology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University,Chennai-77,Tamil Nadu, India

[3]Department of Pathology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University,Chennai-77,Tamil Nadu, India

ABSTRACT

The aim of the study was to demonstrate the level of knowledge, awareness, attitude about Bio Medical Waste Management among the various general dentists and assistants of the Chennai population. The study was conducted with the help of a cross sectional questionnaire through Google Forms and the target population were dentists and their assistants of various private clinics in Chennai. The results were analysed statistically(descriptive and chisquare analysis) by using SPSS. Among 100 responses, 98% of the respondents followed the protocol at their healthcare personnel while the remaining 2% failed to practise the protocols,out of which 59% of the males have better understanding of the dental practises than females, thereby throwing light on the existing knowledge, attitude and practice of the dental health care personnel. It indicates that there is a need to train the dental personnel regarding the same all around the country. There is a high need to urge awareness about the management of biomedical waste as inadequate and inappropriate knowledge of handling these wastes can have serious implications on the society as a whole. These bio medical waste can cause serious hazards to health and the environment. Effective bio medical waste management is not only a legal necessity but it must be considered as a social obligation.

KEY WORDS: BIO MEDICAL WASTE MANAGEMENT, AUTOCLAVE, INCINERATION, SECURED LANDFILLS.

INTRODUCTION

The Bio Medical Waste is considered to be a global issue (Cannata et al., 1997). It is as any amount of the solid, liquid waste including their containers and any other intermediate product, which is generated during diagnosis, treatment or immunization of human beings or animals, in various research activities, thereby used in the production or testing of biological and the animal wastes from slaughter houses or any other like establishments (Punchanuwat, Drummond and Treasure, 1998). In the current scenario, there is just partial or no segregation of the waste during the time of generation, which thereby could cause mixing of infectious and non infectious waste. These bio medical waste can cause serious hazards to health and the environment in cases of indiscriminate management, due to these the healthcare

personnel there is a high risk of potentially infectious diseases such as Human Immunodeficiency Virus(HIV) and Hepatitis B(HBV) and C(HCV).To avoid these health hazards ,a rigorous waste management system should be implemented in hospital infrastructure (Acharya and Singh, 2003).

The ideal ways to manage the biomedical waste include efficient segregation of different types of BMW, use of color coded and coloured bags, excellent handling and transfer of these wastes. In order to address these requirements, adequate training and awareness programmes for medical and paramedical personnel are necessary (Singh, Sood and Bhardwaj, 2015). About 40 years ago, it was suggested that in the developed countries approximately about 1-5kg of wastes were generated per bed per day, whereas in developing countries it was 1-2kg per bed per day (William A. Rutala, 2015). According to a study conducted in an Indian Hospital and published in 2005,BMW generated 2.31kg/bed/day, indicating a rise in the waste generated in recent years (Oweis, Al-Widyan and Al-Limoon, 2005).

Dental hospitals normally use instruments and materials that are directly exposed to blood and saliva which are considered to be the potential sources of infections. These include the sharps materials, used disposable items, infectious waste such as blood soaked cotton, gauze etc, lead containing wastes like lead foil packets, lead aprons and chemical wastes such as spent film developers, fixers, disinfectants (DeRoos, 1974). In the past relatively few studies were conducted in the past among dental professionals, among which a poor to good level of awareness of waste disposal were reported (Patil and Pokhrel, 2005).

From the implementation of the biomedical Waste Management Rules1998, every concerned health authority must have significant knowledge, practice and capacity to guide others for the waste collection and management and proper handling techniques (Saraf et al., 2006). The rules were amended twice in the year 2000,which made it mandatory for the health care establishments to segregate ,disinfect and dispose of their waste in an eco friendly manner. The most important prerequisite and keys to the successful waste management program is segregation which is the separation of different types of waste as per the treatment and disposal option. For effective waste management, the waste must be managed at every step, from acquisition to disposal (Sudhakar and Chandrashekar, 2008). The significance of this study is to understand the awareness among the dentists and their assistants regarding the Bio Medical Waste(BMW) Management practices,policies and to assess their attitude towards it among the Chennai population.

MATERIAL AND METHODS

The study was conducted with the help of a cross sectional questionnaire. The target population were the dentists and their assistants of various private clinics in Chennai through Google Forms in the month of November 2019. Google Forms is a survey administration app that collects and collaborates information from users via a personalized survey and automates the responses into an excel spreadsheet. The questionnaire consisted of 20 questions on assessment of knowledge, attitude and practice regarding biomedical management. All questions were close ended.The results were collected and analysed through SPSS software. The descriptive statistical analysis was carried out and chi square test was used and p values were calculated.

RESULTS AND DISCUSSIONS

Our results showed that 61% of the study population were males and 39% were females (Figure 1) and 98% of the respondents reported that they follow the protocol while 2% reported that they don't follow the protocol for the bio medical waste management (Figure 2). As in Figure 3 98% of the respondents had adequate knowledge on biomedical waste management while 2% of the respondents didn't have adequate knowledge on biomedical waste management and Figure 4, 93% of the respondents reported that general wastes are thrown into the green bag while 6% of the respondents reported that these wastes are thrown into blue bags and the remaining 1% reported that these wastes were thrown in white bags.

Figure 1: A Pie chart showing 61% of the respondents reported that they are male professionals (Red) while 39% reported that they are female professionals (Blue).
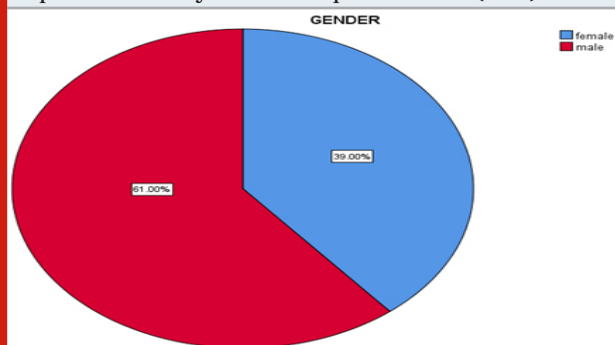

Figure 2: A Pie chart showing 98% of the respondents reported that they follow the protocol (Red) while 2% reported that they don't follow the protocol for the bio medical waste management (Blue).
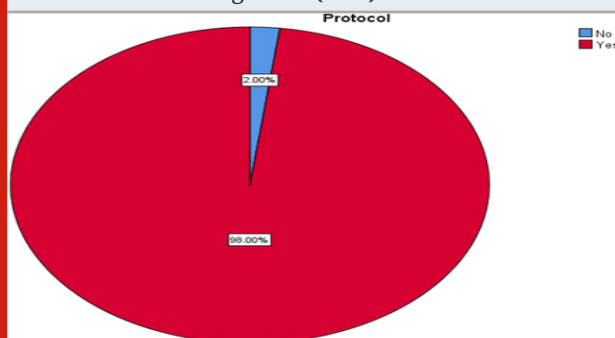
Figure 3: A Pie chart showing 98% of the respondents had adequate knowledge on biomedical waste management (Red) while 2% of the respondents didn't have adequate knowledge on biomedical waste management (Blue).

Figure 4: A Pie chart showing 93% of the respondents reported that general wastes are thrown into the green bag (Red) while 6% of the respondents reported that these wastes are thrown into blue bags (Blue) and the remaining 1% reported that these wastes were thrown in white bags (Green).
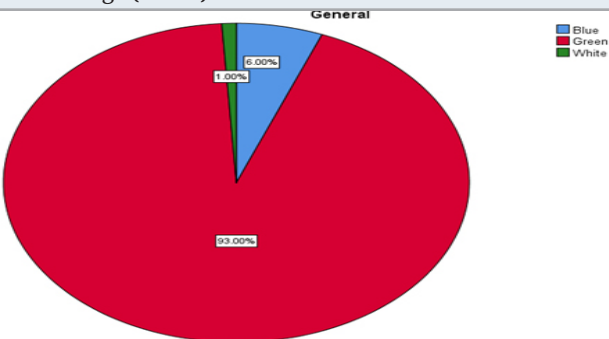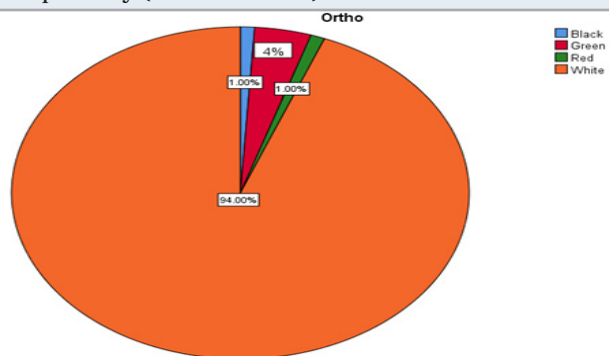

Figure 5: A Pie chart showing 94% of the respondents reported that ortho wires are disposed into white bags (Orange) while 4% reported that they are disposed into green bags (Red) and the remaining 1% reported that these wires are disposed into the black and the red bags respectively (Blue and Green).

We found that 94% of the respondents reported that ortho wires are disposed into white bags while 4% reported that they are disposed into green bags and the remaining 1% reported that these wires are disposed into the black and the red bags respectively (Figure 5). As shown in Figure

6, 93% of the respondents reported that the implants are disposed into blue bags while 5% reported that they are disposed into red bags and the remaining 1% reported that these implants are disposed into the black and the yellow bags respectively. Figure 7 shows that 94% of the respondents reported that the infected wastes are disposed into the yellow bags (Green) while 5% of the respondents reported that these wastes are disposed of into the blue bags and the remaining 1% reported that these wastes are disposed into the black bags. In our study, 91% of the respondents reported that the yellow coloured bags are disposed through incineration while 8% reported that these are disposed through land filling and the remaining 1% reported that they are disposed through recycling process.

Figure 6: A Pie chart showing 93% of the respondents reported that the implants are disposed into blue bags (Red) while 5% reported that they are disposed into red bags (Green) and the remaining 1% reported that these implants are disposed into the black and the yellow bags respectively (Blue and Orange).
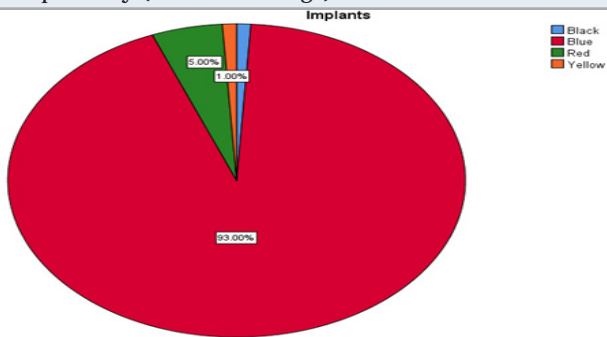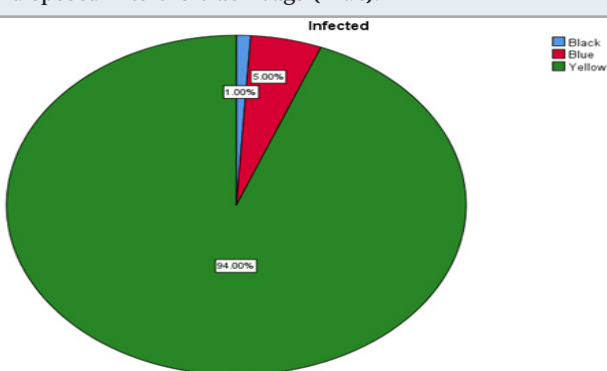

Figure 7: A Pie chart showing 94% of the respondents reported that the infected wastes are disposed into the yellow bags (Green) while 5% of the respondents reported that these wastes are disposed of into the blue bags (Red) and the remaining 1% reported that these wastes are disposed into the black bags (Blue).

As in Figure 9, 93% of the respondents reported that the paper cups are disposed into green bags while 4% reported that they are disposed into white bags and the remaining 3% reported that they are disposed into blue bags and Figure 10 shows that 92% of the respondents reported that the antibiotic vials are disposed into blue

114

bags while 3% reported that they are disposed into purple and green bags respectively and the remaining 2% reported that they are disposed into black bags.

Figure 8 : A Pie chart showing 91% of the respondents reported that the yellow coloured bags are disposed through incineration (Blue) while 8% reported that these are disposed through land filling (Red) and the remaining 1% reported that they are disposed through recycling process (Green).
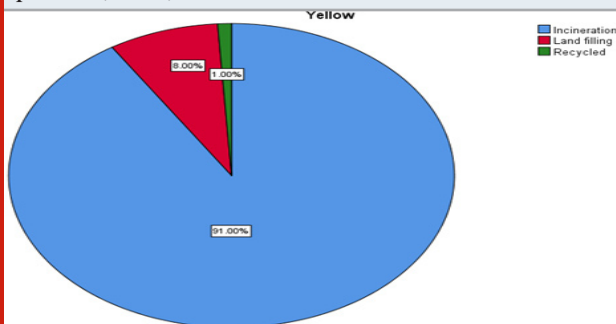

Figure 9 : A Pie chart showing 93% of the respondents reported that the paper cups are disposed into green bags (Red) while 4% reported that they are disposed into white bags (Green) and the remaining 3% reported that they are disposed into blue bags (Blue).
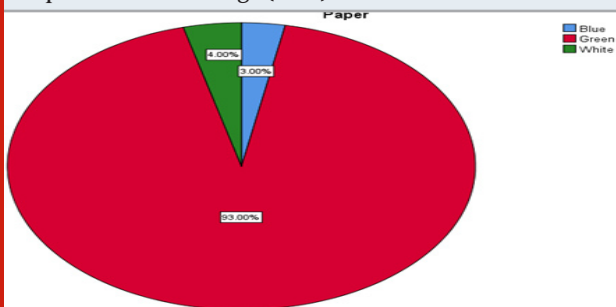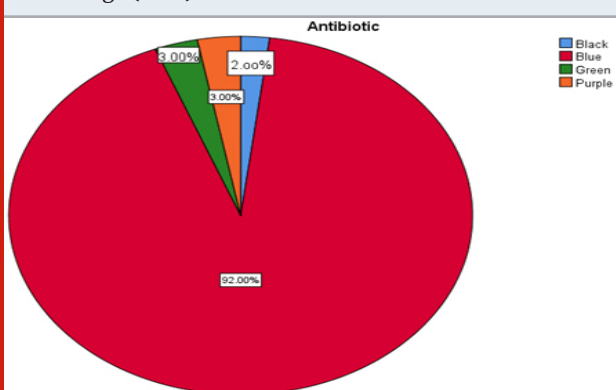

Figure 10: A Pie chart showing 92% of the respondents reported that the antibiotic vials are disposed into blue bags (Red) while 3% reported that they are disposed into purple and green bags respectively (Orange ,Green) and the remaining 2% reported that they are disposed into black bags (Blue).

As shown in Figure 11, 93% of the respondents reported that the syringes are disposed into red bags while 5% reported that they are disposed into yellow and the remaining 1% reported that they are disposed into black and green bags respectively and the figure 13 shows 98% of the respondents reported that red bins are used for the disposal of gloves and plastics while 1% of the respondents reported that red bins are used for the disposal of anatomical, solid waste and needles,wires respectively. Figure 16 shows that 74% of the respondents reported that lab slides are disposed into blue coloured bags while 17% of the respondents reported that lab slides are disposed into yellow coloured bags about 8% of the respondents reported that lab slides are disposed into green coloured bags while 1% of the respondents reported that lab slides are disposed into red coloured bags.

Figure 11: A Pie chart showing 93% of the respondents reported that the syringes are disposed into red bags (Green) while 5% reported that they are disposed into yellow (Orange) and the remaining 1% reported that they are disposed into black and green bags respectively (blue and Red).
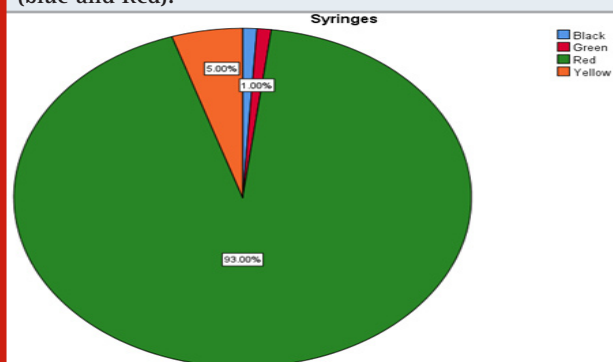

Figure 12 : The bar graph demonstrates the association between the gender of the health professionals and colour of the bio waste bags for undergoing secured landfill technique (%responses). X axis represents the gender of the dentists and their assistants and the Y axis represents the knowledge on disposal of biowastes (%responses). The highest numbers were noticed in case of males as they agreed that the green and red coloured bags were discarded through secured landfill technique. Chi square analysis was done, Pearson Chi Square Value= 1.580, the P value was 0.209 (p>0.05),which was found to be statistically not significant.

Figure 13: A Pie chart showing 98% of the respondents reported that red bins are used for the disposal of gloves and plastics (Red) while 1% of the respondents reported that red bins are used for the disposal of anatomical ,solid waste and needles,wires respectively (Blue and Green).
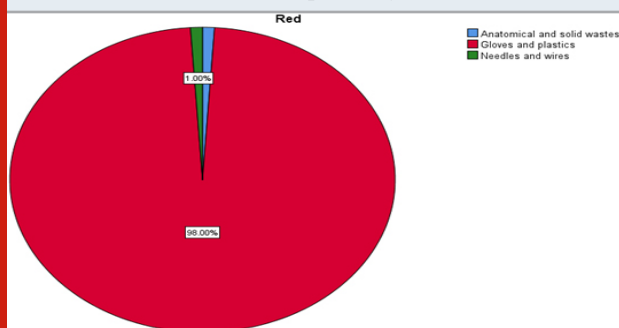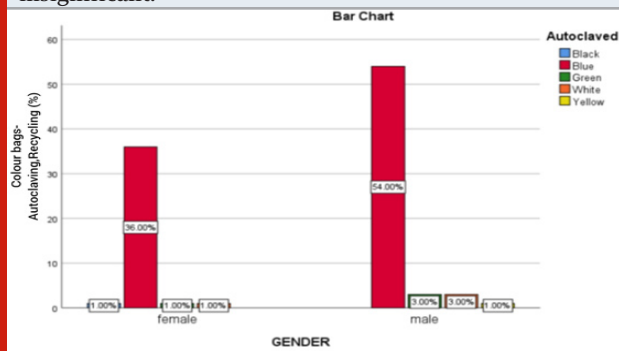

Figure 14: The bar graph demonstrates the association between the gender of the health professionals and the color of the bio waste bags which can be autoclaved and recycled (%responses). X axis represents the gender of the dentists and their assistants and the Y axis represents the knowledge on disposal of biowastes (%responses). The highest numbers were noticed in case of males as they agreed that the blue coloured bags underwent autoclave processes and thereby got recycled. Chi square analysis was done, Pearson Chi Square Value= 2.900, the P value was 0.575 (p>0.05),which was found to be statistically insignificant.

Figure 15: The bar graph demonstrates the association between the gender of the health professionals and the methods for disposal of yellow bags(%responses). X axis represents the gender of the dentists and their assistants and Y axis represents the knowledge on disposal of biowastes (%responses). The highest numbers were noticed in case of males as they agreed that the yellow bags were discarded through the process of incineration. Chi square analysis was done, Pearson Chi Square Value= 1.583 , the P value was 0.453 (p>0.05),which was found to be statistically insignificant.

Figure 16: A Pie chart showing 74% of the respondents reported that lab slides are disposed into blue coloured bags (Blue) while 17% of the respondents reported that lab slides are disposed into yellow coloured bags (Orange),about 8% of the respondents reported that lab slides are disposed into green coloured bags (Red) while 1% of the respondents reported that lab slides are disposed into red coloured bags (Green)

We also got that 52% of the respondents reported that blood stained cotton are disposed into red coloured bags while 45% of the respondents reported that blood stained cotton are disposed into yellow coloured bags ,while 3% of the respondents reported that blood stained cotton are disposed into green coloured bags (Figure 17) and 47% of the respondents reported that cytotoxic drugs are disposed into black coloured bags while 46% of the respondents reported that cytotoxic drugs are disposed into yellow coloured bags, about 4% of the respondents reported that cytotoxic drugs are disposed into blue coloured bags while 3% of the respondents reported that the cytotoxic drugs are disposed into green coloured bags (figure 18).
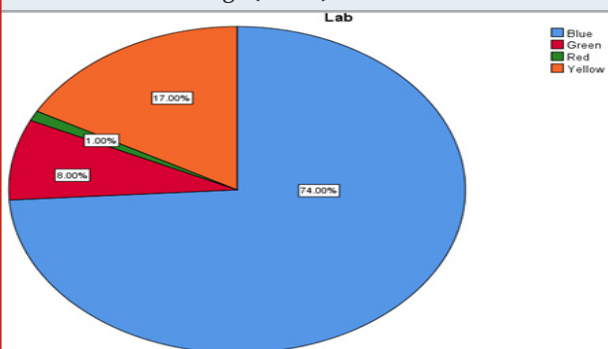
Figure 20 shows that 91% of the respondents reported that catheters are disposed into red coloured bags ,about 6% of the respondents reported that catheters are disposed into blue coloured bags while 3% of the respondents reported that catheters are disposed into green coloured bags. Finally, 97% of the respondents reported that sharp materials are disposed into white coloured bags ,about 2% of the respondents reported that sharp materials are disposed into purple coloured bags, while 1% of the respondents reported that sharp materials are disposed into green coloured bags.

Figure 17: A Pie chart showing 52% of the respondents reported that blood stained cotton are disposed into red coloured bags (Red) while 45% of the respondents reported that blood stained cotton are disposed into yellow coloured bags (Green),while 3% of the respondents reported that blood stained cotton are disposed into green coloured bags (Blue).
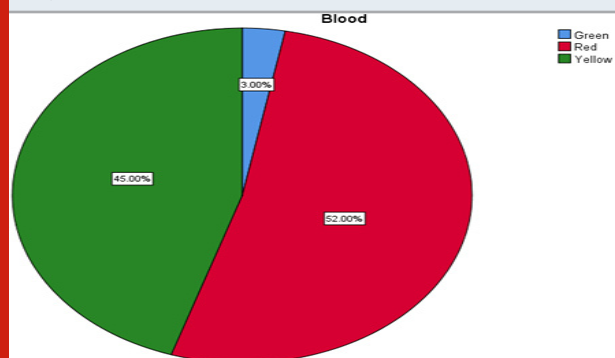

Blood

Figure 18: A Pie chart showing 47% of the respondents reported that cytotoxic drugs are disposed into black coloured bags (Blue) while 46% of the respondents reported that cytotoxic drugs are disposed into yellow coloured bags (Orange), about 4% of the respondents reported that cytotoxic drugs are disposed into blue coloured bags (Red) while 3% of the respondents reported that the cytotoxic drugs are disposed into green coloured bags (Green).

Cytotoxic
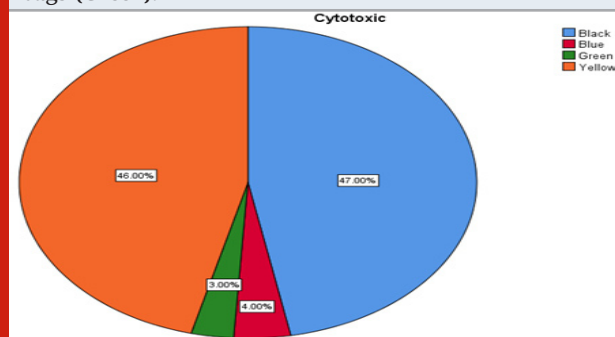
When we studied the association between the gender and the awareness of the biomedical waste disposal and colour coding of the bags related to that we found that the highest numbers were noticed in case of males as they agreed that the green and red coloured bags were discarded through secured landfill technique with a Pearson Chi Square Value of 1.580 and the P value was 0.209 (p>0.05),which was found to be statistically not significant(Figure 12). The highest numbers were noticed in case of males as they agreed that the blue coloured bags underwent autoclave processes and thereby got recycled with a Pearson Chi Square Value of 2.900, the P value was 0.575 (p>0.05),which was found to be statistically insignificant(figure 14).The highest numbers were noticed in case of males as they agreed that the yellow bags were discarded through the process of incineration with a Pearson Chi Square Value of

1.583 , the P value was 0.453 (p>0.05),which was found to be statistically insignificant (Figure 15). The highest numbers were noticed in case of males as they agreed that the blue bags were discarded and underwent the process of autoclave(figure 19).

Figure 19: The bar graph demonstrates the association between the gender of the health professionals and the disposal of the blue coloured bio waste bags (%responses). X axis represents the gender of the dentists and their assistants and Y axis represents the knowledge on disposal of biowastes (%responses). The highest numbers were noticed in case of males as they agreed that the blue bags were discarded and underwent the process of autoclave. Chi square analysis was done, Pearson Chi Square Value= 1.580 , the P value was 0.209 (p>0.05),which was found to be statistically insignificant.
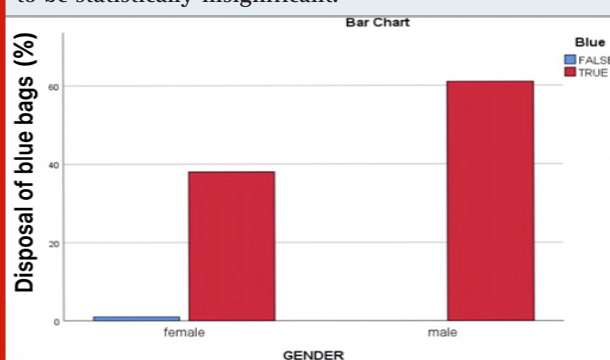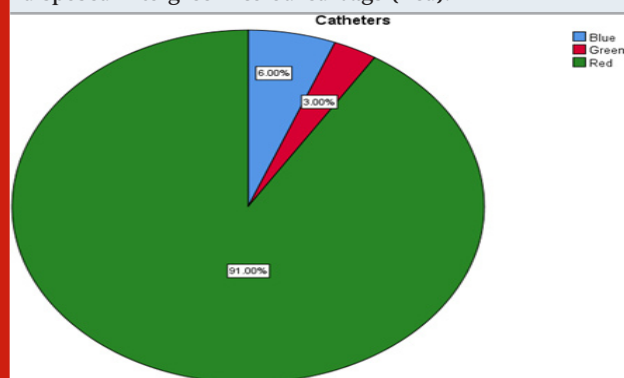

Figure 20: A Pie chart showing 91% of the respondents reported that catheters are disposed into red coloured bags (Green), about 6% of the respondents reported that catheters are disposed into blue coloured bags (Blue) while 3% of the respondents reported that catheters are disposed into green coloured bags (Red).

Catheters

According to a study conducted in Kothamangalam (Sanjeev, Suneesh and Subramaniam, 2013), about 15.2% of the respondents disposed of mercury in general garbage while the corresponding value in Bangalore study was around 15% (Mathur et al., 2011). Poor practice scores were obtained in relation to the majority of the practice related questions in various other cities. One possible reason for this observation is that in the majority of the clinics, it is the chair-side assistants

and other auxiliaries segregate the waste who lack proper awareness of the bio medical waste management (Ingle and Charania, 2011). The study thus throws a light on the existing knowledge, attitude and practice of the dental health care personnel among the Chennai population (Sood and Sood, 2011). It indicates that there is an urgent need to train the dental personnel regarding the same all around the country. Occupational safety must be the primary concern for every health personnel (Yadavannavar, Berad and Jagirdar, 2010).

Figure 21: A Pie chart showing **97%** of the respondents reported that sharp materials are disposed into white coloured bags (Green), about 2% of the respondents reported that sharp materials are disposed into purple coloured bags (Red), while 1% of the respondents reported that sharp materials are disposed into green coloured bags (Blue).
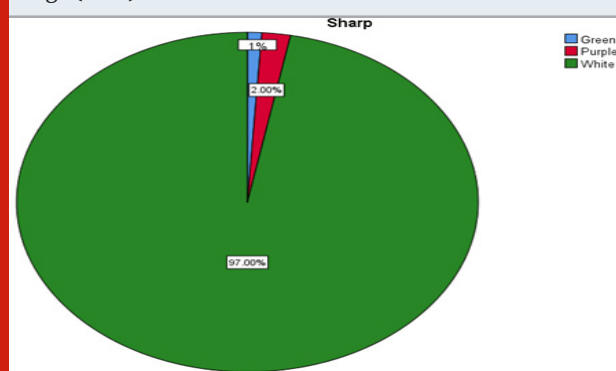
CONCLUSION

The results of this study have demonstrated a significant level of awareness of most aspects of Bio medical waste management among dental auxiliary staff in the dental hospital/clinics in Chennai while there is a lack of awareness among the dentists who work in other hospital/clinics around the country .There is a high need to urge awareness about the management of biomedical waste as inadequate and inappropriate knowledge of handling these wastes can have serious implications on the society as a whole.

ACKNOWLEDGEMENTS

Conflict of Interest: No potential conflict of interest was relevant to this article was reported.

REFERENCES

Acharya, D. B. and Singh, M. (2003) The Book of Hospital Waste Management. Minerva Press. Available at: https://play.google.com/store/books/details?id=AdfPPQAACAAJ.

Cannata, S. et al. (1997) 'Infection control and contaminated waste disposal practices in Southern Sydney Area Health Service Dental Clinics', Australian dental journal, 42(3), pp. 199–202. doi: 10.1111/j.1834-7819.1997.tb00122.x.

DeRoos, R. L. (1974) 'Environmental concerns in hospital waste disposal', Hospitals, 48(4), p. 88 passim. Available at: https://www.ncbi.nlm.nih.gov/pubmed/4813050.

Ingle, N. A. and Charania, Z. K. (2011) 'Awareness and Practices of Dental Care Waste Management Among Dental Practitioners In Chennai City', Journal of Contemporary Dentistry, pp. 15–21. doi: 10.5005/jcd-1-1-15.

Mathur, V. et al. (2011) 'Knowledge, attitude, and practices about biomedical waste management among healthcare personnel: A cross-sectional study', Indian Journal of Community Medicine, p. 143. doi: 10.4103/0970-0218.84135.

Oweis, R., Al-Widyan, M. and Al-Limoon, O. (2005) 'Medical waste management in Jordan: a study at the King Hussein Medical Center', Waste management , 25(6), pp. 622–625. doi: 10.1016/j.wasman.2005.03.011.

Patil, G. V. and Pokhrel, K. (2005) 'Biomedical solid waste management in an Indian hospital: a case study', Waste management , 25(6), pp. 592–599. doi: 10.1016/j.wasman.2004.07.011.

Punchanuwat, K., Drummond, B. K. and Treasure, E. T. (1998) 'An investigation of the disposal of dental clinical waste in Bangkok', International dental journal, 48(4), pp. 369–373. doi: 10.1111/j.1875-595x.1998.tb00698.x.

Sanjeev, R., Suneesh, K. and Subramaniam, R. (2013) 'Knowledge, attitude and practices towards droplet and airborne isolation precautions among dental health care personnel in a dental college in Kothamangalam: A cross sectional study', J Odontol Res, 1, pp. 30–36.

Saraf, Y. et al. (2006) 'Study of awareness status about hospital waste management among personnel and quantification', Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine, 31(2), p. 111. Available at: http://medind.nic.in/iaj/t06/i2/iajt06i2p111.pdf.

Singh, M., Sood, A. and Bhardwaj, A. K. (2015) 'A study to assess the Knowledge about the bio medical waste (management & handling) Rules 2011 Among the Paramedics and laboratory technicians of a tertiary care hospital in north west India', Journal of Evolution of Medical and Dental Sciences, pp. 8661–8667. doi: 10.14260/jemds/2015/1253.

Sood, A. G. and Sood, A. (2011) 'Dental perspective on biomedical waste and mercury management: a knowledge, attitude, and practice survey', Indian journal of dental research: official publication of Indian

Society for Dental Research, 22(3), pp. 371–375. doi: 10.4103/0970-9290.87055.

Sudhakar, V. and Chandrashekar, J. (2008) 'Dental health care waste disposal among private dental practices in Bangalore City, India', International dental journal, 58(1), pp. 51–54. doi: 10.1111/j.1875-595x.2008.tb00176.x.

William A. Rutala, D. J. W. (2015) 'Disinfection, Sterilization, and Control of Hospital Waste', Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. Elsevier, p. 3294. doi: 10.1016/B978-1-4557-4801-3.00301-5.

Yadavannavar, M., Berad, A. S. and Jagirdar, P. (2010) 'Biomedical waste management: a study of knowledge, attitude, and practices in a tertiary health care institution in bijapur', Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine, 35(1), pp. 170–171. doi: 10.4103/0970-0218.62591.