



Knowledge, attitude and practice of biomedical waste management among undergraduate dental students of a private dental institution in Chennai

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Article History:

Received on: 25 Jul 2020

Revised on: 18 Aug 2020

Accepted on: 11 Sep 2020

Keywords:

Dental waste,
infection control,
waste collection,
waste disposal,
waste segregation

ABSTRACT

To assess the knowledge, attitude and practice of biomedical waste management among undergraduate dental students of a private teaching hospital in Chennai. Biomedical wastes are all wastes that are being generated during diagnosis, treatment or immunisation of human beings in the testing of biologicals and it's contaminated with human fluids. The waste generated by the healthcare workers during the treatment of patients is the most dangerous of all wastes and has a higher potential for infection and injury. This was an online questionnaire-based study, conducted on an online survey platform in April. The questionnaire was circulated among the Undergraduate dental students (third and fourth years and interns) of Saveetha dental college and hospitals, Chennai. The responses were collected and tabulated using the excel sheet and were exported to the SPSS software by IBM for statistical analysis. Among the interns, 85% had good knowledge and practice of biomedical waste management. 85% had a positive attitude towards the management of BMW. Amongst the final years, 80% had good knowledge, only 65% had a positive attitude and only 18% of the final years practice good BMW management. In the third year, 50% had good knowledge, 58% had a positive attitude and 58% had a good practice of biomedical waste management. The interns had good knowledge, a more positive attitude and good practice of biomedical waste management compared to the third and final years.



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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11iSPL3.3007>

Production and Hosted by

IJRPS | <https://ijrps.com>

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INTRODUCTION

In a developing country like India, which is susceptible to natural disasters, (Kannan *et al.*, 2017) viral and bacterial outbreaks, among its frail and ailing dense population, wherein there are numerous indisposed individuals the amount of biomedical waste generated is immense. In order to maintain community sanitisation and curb the spread of diseases, viral and bacterial pathogens immaculate biomedical waste management must be carried out. In the practice of treatment of the sick and the ailing, the healthcare services inevitably end up creating waste which in itself may be hazardous

to health (Vanesh Mathur *et al.*, 2011). Biomedical waste management is paramount to prevent the spread of contagious diseases like HPV, HIV, TB, COVID-19 et cetera. Hospitals are supposed to be the sights of healing; instead, in the present, hospitals have become the hotspots for various infections (Shaik and Meher, 2017). Biomedical wastes can be defined as any waste that is being generated during diagnosis, treatment or immunisation of human beings are animals are in research activities pertaining to our introduction and testing of biologicals and it's contaminated with human fluids.

The waste generated by the healthcare workers during the treatment of patients is the most dangerous of all wastes and has a higher potential for infection and injury (Khan *et al.*, 2017). The rules pertaining to the biomedical waste management have been declared by the government of India in 1998, which has come into effect in January 2003. The rules contained guidance regarding the collection, segregation and the property is possible of the biomedical waste (Sanwalka, 2020).

In the 21st century, wherein the number of diseases is as abundant as the number of medical and dental professionals. It is important that the patients visiting a dental practice are treated as infective carriers of various viral strains such as the Covid - 19. It is imperative that infection control is maintained at high standards in a dental practice to prevent the spread of these dangerous pathogens from patient to patients and from the patient to the clinician and vice versa (Kazi and Saxena, 2012). Hence, management of dental waste and biomedical waste stands must be held at the highest regard in order to maintain a healthy and ethical dental practice. Initiating the practice of impeccable infection control starts from the 3rd year of the UG level, such that this practice will be carried out in the respective daily dental practices of dentists.

Dental diagnostic and treatment modalities require various chemicals, radiographical materials and materials such as mercury, needles, radiographic films et cetera (Bansal *et al.*, 2013; Manchanda *et al.*, 2015; Kumar and Rahman, 2017). Dental wastes belong to the subset of biomedical wastes. Materials like cotton, shops, extracted teeth, impression materials, suction tubes are usually contaminated with blood and saliva. These wastes can have deleterious effects on the environment as well as on the people handling such wastes. Though there are proper rules and guidelines present for the handling of biomedical wastes, there is still a lack of knowledge and a presence of negative attitude leading to poor practice of biomedical waste manage-

ment (Mathew *et al.*, 2020; Khatri *et al.*, 2019).

According to the previous studies, one of the top ten ethical challenges in dental practice in India is inadequate sterilization and improper management of dental wastes (VanishreeM Kemparaj *et al.*, 2016). This can be prevented by strictly adhering to proper means of biomedical waste management. In one of the previous studies, the knowledge possessed by dental practitioners about biomedical waste management was moderate, but they had failed to practice proper biomedical mismanagement despite possessing a positive attitude towards biomedical waste management.

In a study by Santhosh Kumar *et al.*, among dental undergraduate students yielded better results, the dental students had good knowledge and awareness on biomedical waste management, but the overall practice of biomedical waste management was poor (Bansal *et al.*, 2013; Kumar and Rahman, 2017). Previously numerous randomised clinical trials (Prabakar *et al.*, 2018b; Pratha and Prabakar, 2019; Prabakar *et al.*, 2018a), have been done previously by our team along with cross-sectional studies, (Prabakar *et al.*, 2016; Kumar and Vijayalakshmi, 2017; Kumar and Preethi, 2017) and in vitro studies (Mohapatra *et al.*, 2019; Prabhakar *et al.*, 2011) and systematic reviews (Harini and Leelavathi, 2019; Pavithra and Jayashri, 2019), in the last 4 years.

Though there are already a few previous research studies on biomedical waste management in this region, the studies seem to have been conducted more than 4 years ago, as the dental curriculum has always been updated with time and to overcome previous study limitations such as the small sample sizes; this study was conducted. The aim of the study is to assess the knowledge, attitudes and practice of biomedical waste management among the undergraduate dental students of Saveetha Dental College and Hospitals, Chennai (Neralla *et al.*, 2019; Samuel *et al.*, 2020).

MATERIALS AND METHODS

Study Design

This was a cross-sectional survey study done to correlate the knowledge, attitudes and practice of biomedical waste management among the undergraduate dental students of Saveetha Dental College and Hospitals, Chennai. The online questionnaire was distributed via Google forms. The questionnaire validation was done by circulating the questionnaire to 10% of the study population as a pilot study. The content validity was assessed by congruency per-

centage and the reliability was assessed by Cronbach's alpha.

Sample Size

The sample size was calculated by the G power software. Since the non-response rates were increased in an online setting, 15% of the primary sample size was added and a total of 300 dental students had taken part in the survey. The participation was completely voluntary.

Sampling Method

No sampling method was employed as all the samples of the third year, final year and intern of the institution were included.

Ethical Clearance

The ethical board clearance was obtained from the IERB of Saveetha Dental College and Hospitals, Chennai.

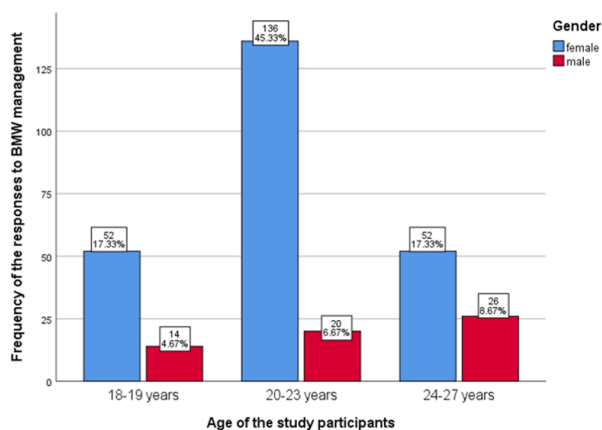
Data Collection

The data from the Google forms were collected and tabulated in the excel sheets. The data tabulated was exported to SPSS software by IBM version 25.00 for window OS for statistical analysis.

Statistical Analysis

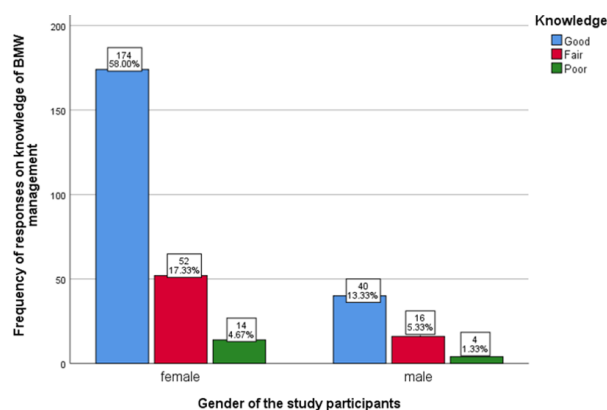
The statistical analysis was done using SPSS software by IBM. The independent variables were the age, gender, year of study, While the dependent variables were the knowledge, attitude, the practice of biomedical waste management. Association was checked using the chi-square test. Any P value less than 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

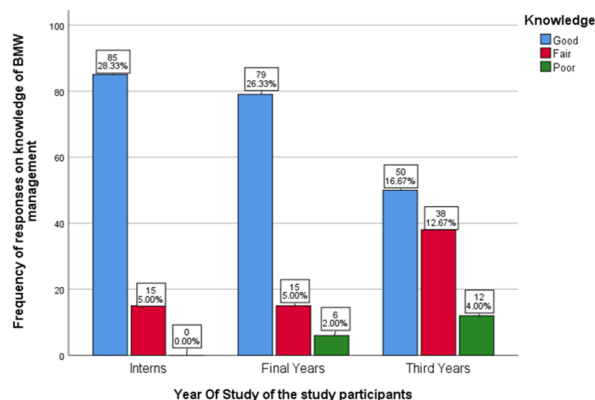


Graph 1: This bar graph represents the distribution of the study population based on age and gender

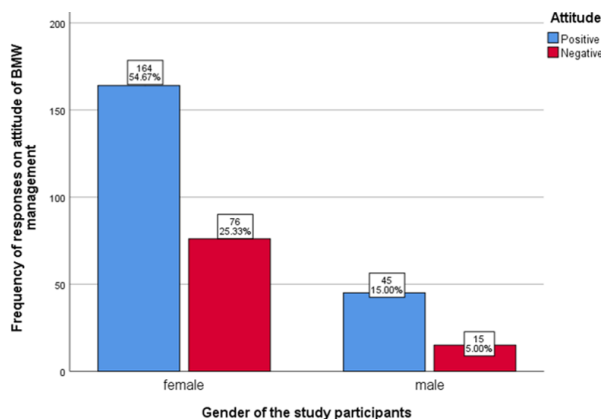
A total of 300 students took part in this cross-sectional survey study, of which 240 (80%) were



Graph 2: This graph represents the association of knowledge of BMW management and gender



Graph 3: This graph represents the association of knowledge of BMW management and year of study



Graph 4: This graph represents the association of attitude of BMW management and gender

female students and 60 (20%) were male students. The range of the ages of the study participants was from 18-27 years of age. On association with gender and knowledge of BMW management, it was found that 174 (58%) of the female students had good knowledge, while 40 (13.30%) of the Male students had good knowledge of BMW management, while 14 (4.67%) of the female students and 4 (1.33%) had poor knowledge of BMW. 85 (28.33%) of the interns had good knowledge, 79 (26.33%) of the final years had good knowledge, and 15 (16.67%) of the third years had good knowledge of BMW management. Among the female students, 164 (54.67%) had a positive attitude towards BMW management, while 76 (25.33%) had a negative attitude. Among the Male students, 45 (15%) had a positive attitude, while 15 (5%) had a negative attitude towards BMW management. 85 (28.33%) of the interns had a positive attitude towards BMW management. 65 (21.67%) had a positive attitude and 59 (19.67%) of the third years had a positive attitude. Among the interns, 85 (28.33%) had a good practice, while 15 (5%) had fair practice. 70 (23.33%) of the final years had a good practice, 18 (6%) had fair practice and 12 (4%) had poor practice. Of the third years, 58 (19.33%) had a good practice of BMW management, while 37(12.33%) had fair practice and 5 (1.67%) had a poor practice of BMW management. On the association between practice of biomedical waste management and gender statistically insignificant results were yielded, 171 (57%) of the female students had good practice, 55 (18.33%) females had fair practice and 14 (4.67%) had poor practice. Among the Male students, 42 (14%) had a good practice, 15 (5%) had fair practice and only 3 (1%) poor practice of biomedical waste management.

Graph 1 Shows that, The X-axis represents the ages of the study participants and the Y-axis represents the frequency of the responses to BMW management. The blue colour indicates the female participants and the red colour indicates male participants. 20-23 years of age formed the majority of the study participants. There was a significant difference between the age and gender among the study participants. [Critical ratio :13.753^a; DF 2; *p*-value = 0.001 < 0.05(statistically significant)].

Graph 2 Shows that, The X-axis represents the gender of the study participants and the Y-axis represents the Frequency of responses on knowledge of BMW management. The blue colour represents good knowledge, the red colour represents fair knowledge and the green colour represents poor knowledge. 174 (58%) of the female students had good knowledge, while 40 (13.30%) of the Male

students had good knowledge of BMW management. 52 (17.33%) of the females and 16(5.33%) of the male students had fair knowledge, while 14 (4.67%) of the female students and 4(1.33%) had poor knowledge of BMW. Overall the female students had better knowledge than the male students on BMW management. There was a significant difference between the knowledge possessed by the students of different genders. [Critical ratio : 4.141^a DF:2; *p*-value = 0.000 < 0.05(statistically significant)].

Graph 3 Shows that, The X-axis represents the year of study of the study participants and the Y-axis represents the Frequency of responses on knowledge of BMW management. The blue colour represents good knowledge, the red colour represents fair knowledge and the green colour represents poor knowledge. Among the interns 85(28.33%) had good knowledge, among the final years, 79(26.33%) had good knowledge, 50(16.67%) third years had good knowledge of BMW management. Overall the interns had better knowledge than the final and third years on BMW management. There was a significant difference between the knowledge possessed by the students of different years of study. [Critical ratio:37.381^a; DF:4; *p*-value = 0.000 < 0.05(statistically significant)].

Graph 4 Shows that, The X-axis represents the genders of the study population and the Y-axis represents the Frequency of responses on the attitude of BMW management. The blue colour represents a positive attitude, while the red colour represents the negative attitude. Among the female students, 164(54.67%) had a positive attitude towards BMW management, while 76(25.33%) had a negative attitude. Among the Male students, 45(15%) had a positive attitude, while 15(5%) had a negative attitude towards BMW management. Overall the female students had a more positive attitude than the Male students on BMW management. There was a significant difference between the attitudes of the students belonging to different genders [Critical ratio 9.394^a; DF:1; *p*-value = 0.002 < 0.05(statistically significant)].

Proper Biomedical waste management practice is essential to stop the spread of infectious diseases from patient to patient and to prevent it. In this age and era where there are innumerable infections and diseases; good knowledge and awareness along with the proper practice of biomedical waste management is important. The survey was conducted to assess the knowledge attitudes and practices of biomedical waste management among undergraduate dental students. The third and final years and

interns participated in the study. A total of 300 students out of us to 240 females and there are 60 males. The knowledge, attitude and practice of BMW management were good in the interns when compared to the final and third years. Female students possessed better knowledge and had a positive attitude and practised good biomedical waste management when compared to male students.

In the study done in Andhra Pradesh among nursing students, it concluded that the overall knowledge of the medical students was good and the overall practice was good (Rao, 2016). Another study in the job done by MC Yadhavanaran et al. showed the good practice was found among the teaching staff (97.4%) than the non-teaching staff (80%). The knowledge, attitude and practice of biomedical waste management of the teaching styles were better than the non-teaching staff (Berad et al., 2010). In the study done by Malina et al., in Puducherry, in the tertiary hospital among the healthcare workers which contained that Interns, both graduates, technicians and the sanitary workers it was found that the interns in the postgraduates had good knowledge awareness and practice of biomedical waste management than the technicians. The sanitary workers were ignorant about the proper practice of biomedical waste management (Malini and Eshwar, 2015).

In a study by Ruma Dutta et al., among 171 dentists, 78.3% had adequate knowledge about the biomedical waste management. In the present study, the overall knowledge was good; the overall attitude of the students was positive, the overall factors of biomedical waste management were adequate (Dutta et al., 2017). In the study by T. Singh et al., in Nepal, 91.2% of the students had a positive attitude towards biomedical waste management, but more than 50% of the students lacked knowledge on the biomedical waste management (Singh et al., 2018). In a study by Amol J et al., among 112 dentists, only 79.5% of the dentists practiced proper biomedical waste disposal methods (Kumar and Padmaja, 2017). In a study conducted by N. Ashika Rizwana et al., on 150 dental students, only 31.1% of the students practice proper biomedical waste disposal (Jamkhande et al., 2019). In the present study, the overall good knowledge was 71.60%, overall positive attitude was 69.70%, though the overall good practice of biomedical waste among all the years was only 53.70%, 85% of the interns had a better practice of biomedical waste management than the final and third years (Riswana, 2016). The differences in the results obtained by the present and previous studies can be due to the different study populations, different regions of study location and the difference in the dental curriculum.

Then the main limitations of this study was the limited sample size, and it was confined to the students of one university and the study was geographically restricted to a single region. In the future, this limitation can be overcome by the inclusion of student populations from other universities within the state and within the country, as a pan India epidemiological survey which can increase the sample size. The future scope of this study is to spread awareness on knowledge, attitude and proper practice of biomedical waste management to promote better infection control and implementation of biomedical waste management into the clinical practice and curriculum. It is paramount that the dental students, especially the third final years and the entrance practice immaculate biomedical waste management so that it can be carried out in the daily clinical practice. Further training and programmes ought to be conducted to promote and educate the dental students on the proper management of biomedical wastes, as proper biomedical waste management is the need of the hour.

CONCLUSION

The aim of the study was to assist the knowledge, attitudes and practices of biomedical waste management among undergraduate dental students. Within the limits of the study, the interns had good knowledge, a more positive attitude and good practice of biomedical waste management compared to the third and final years.

ACKNOWLEDGEMENT

This research was done under the supervision of the Department of Research of Saveetha Dental College and Hospitals.

Author Contributions

Author 1 (P. Deeksheetha), carried out the study by collecting data and drafted the manuscript after performing the necessary statistical analysis. Author 2 (Dr.Sri Sakthi) aided in the conception of the topic, has participated in the study design, statistical analysis and has supervised in preparation of the manuscript. Author 3 (Dr Nashra Kareem) has participated in the study design and has coordinated in developing the manuscript. All the authors have discussed the results among themselves and contributed to the final manuscript.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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