Research Article

Knowledge, attitude, and practices of biomedical waste management among clinical dental students

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ABSTRACT

Objectives: The health-care sector generates enormous amount of biomedical waste (BMW) and dental waste forms a subset of this hazardous waste. It is, therefore, imperative for the upcoming dental health professionals to be aware of the hazards related to improper waste management and the existing rules and regulations for the same. To gauge the gaps in knowledge and find ways to rectify the same, the aim of this study was to assess the knowledge, attitude, and practice of biomedical waste management among dental students.

Materials and Methods: A cross-sectional study was carried out in a dental teaching hospital, wherein a pre-validated and tested, structured closed-ended questionnaire was adopted and given to the clinical students of dentistry. The responses were self-recorded by the participants after which statistical analysis was carried out using Chi-square test to compare the levels of knowledge, attitude, and practice among the study groups.

Results: Out of 168 participants, 97% agreed that waste needs to be segregated but 70% were unaware of the legislations regarding BMW management. About half of the participants across all groups gave incorrect responses regarding correct disposal of various types of wastes. Only 10.1% of students correctly disposed mercury. Among the study groups, postgraduate students fared better than house surgeons and students. More than 90% of students believed that they required additional training in BMW management.

Conclusion: An overall positive attitude was seen among all students toward safe management of BMW. However, their knowledge and practice toward the same calls for attention on the part of educational institutions in providing continuous educational programs and monitoring the correct disposal of wastes. This was validated by the fact that increase in educational qualification showed better performance toward this subject.

Keywords: Biomedical waste, Health-care waste, Dentistry

INTRODUCTION

An increase in demand for dental care has led to a rise in the generation of biomedical waste (BMW). These wastes pose a threat to human health and environment if not disposed scientifically. Dental care facilities generate a high amount of BMW and improper management of these wastes poses a threat not only to the patients and the dental health professionals but also to the general population who then become at a high risk for health hazards.

According to the Biomedical Waste Rules 1998 of India, biomedical waste is defined as "any solid, fluid, or liquid waste, including its container and any intermediate product, which is generated during the diagnosis, treatment, or immunization of human beings or animals, in

research pertaining thereto, or in the production or testing of biological and the animal waste from slaughter houses or any other like establishments."[1]

Approximately 10–25% of health-care waste is hazardous, capable of creating a variety of health problems. It is because BMW such as infectious wastes, pathological waste, chemical waste, sharps, pharmaceutical waste, genotoxic waste, heavy metal waste, and radiologic waste can cause infectious diseases [such as human immunodeficiency virus (HIV) hepatitis C and B infections] and also disrupts the ecological balance.[2] According to the World Health Organization (WHO), the 11 Southeast Asian countries together produce approximately 350,000 tons of health-care waste per year. About 85% of the total health-care waste generated is general, non-hazardous waste and the remaining 15% is considered hazardous material that may be infectious, toxic, or radioactive.[3] Even though the amount of hazardous waste produced is less than the total amount of health-care waste, the lapse is in poor waste handling practices that cause mixing of both types and hence contamination.

People who are exposed and handle BMW are at higher risk of health hazards. They include health-care employees, dentists, patients, waste handling, and treatment workers. The Biomedical Waste (Management and Handling) Rules state that it is the duty of every occupier of an institution generating biomedical waste to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.[3] The central government made certain rules to amend the BMW Management Rules, 2016, published in the gazette of India which was called as BMW Management (amendment) Rules, 2018.[4] Guidelines and protocols for BMW management should sternly be followed at each level of generation, collection, transportation, storage, treatment, and disposal.[5]

For this, it is essential to be aware of the steps in waste management which includes mainly survey of wastes, waste segregation, waste accumulation, storage and transport, waste pre-treatment, and waste disposal by appropriate methods.[6]

Patient care activities are undertaken by dental health professions students as a part of their training. Such activities generate BMW and hence awareness about guidelines and practice of BMW management protocol is necessary to prevent any potential for health hazard.[7]

Segregating dental waste effectively is of utmost importance as dentists are more prone to infections due to the fact that most of the pathogens are isolated from oral secretions. As most of the materials and equipment used by dental professionals are directly or indirectly exposed to human saliva and blood, these prove to be potential sources of infection. For example, plastic, latex, glass, metallic instruments, dental materials, cotton, gauze, sharps, extracted teeth, soft tissues, etc., are all contaminated with body fluids. Moreover, a high concentration of metals such as silver, tin, and mercury gets accumulated in the wastewater released from dental use due to the scrap from amalgam fillings and the spent X-ray fixer solution.[8] Mercury, especially, is the dangerous of all and is said to be neurotoxic, nephrotoxic, and a bioaccumulant which gets easily released into the environment if not disposed properly. Dental practice substantially contributes to mercury disposal.[9]

Despite the rules and regulations, there is a general laxity seen among dental professionals in following the protocols of BMW management. As seen in various studies,[1,8-15] this laxity is attributed to inadequate awareness of the existing regulations and also lack of understanding and enforcement to practice the same in day-to-day dentistry. Moreover, very few studies in existing literature have noted these aspects among dental students with most focusing on existing staff in teaching institutions or private dental practitioners. In an attempt to address the issue and evaluate the current scenario, this study aims to assess the knowledge, attitude, and practice of biomedical waste management among students of dentistry.

MATERIALS AND METHODS

A cross-sectional questionnaire-based study was planned and carried out among students in a dental teaching hospital in India. The study participants included all clinical students (third and final year undergraduate, house surgeons, and postgraduate residents).

A structured closed-ended questionnaire adapted from a cross-sectional study done by Sanjeev *et al.*[16] and Sharma *et al.*[1] was used for data collection. It was validated and pre-tested by previous authors. It consisted of four parts. The first part consisted of questions for demographic profile (age, gender, and year of study) of the participants, while the second, third, and fourth part assessed the knowledge, awareness, and practice on biomedical waste management, respectively, with 15 questions each. The responses were self-reported by the participants and recorded on a dichotomous and a 3-point Likert scale as applicable.

The study was reviewed by an Institutional Review Board and ethical approval was obtained. A participant information sheet was given, and informed consent was obtained from the willing participants. The total duration of the study was 6 months.

Obtained data were tabulated in Microsoft Excel spreadsheet. Data were transferred to SPSS 20 for statistical analysis and Chi-square test was applied to find out associations between knowledge, attitude, and practice scores with study groups (undergraduate students, house surgeons, and postgraduate residents). "*P*" ≤ 0.05 was considered statistically significant.

RESULTS

A total of 168 students (146 women and 22 men) participated in the survey, with a mean age of 23 ± 2.5 years. Among them, 43% constituted undergraduate clinical students, 28% comprised house surgeons, and 29% were postgraduate residents.

Responses to questions on the knowledge domain are presented in [Table 1]. Half of the respondents believed that all health-care wastes were hazardous. About 81% of the respondents reported that they received no additional training on biomedical waste management and 70% were not aware of any legislations governing biomedical waste handling

(UG: 73.6%, HS: 61.7%, and PG: 76.6%). Only a quarter of the respondents were aware of Indian Medical Association Goes Ecofriendly (IMAGE), a premier waste management agency in the state. Around 68% of the undergraduate students could not identify the biohazard symbol correctly. There was a statistically significant difference between the three groups only with expansion of the acronym IMAGE ($P = 0.019$), identification of biohazard symbol (<0.001), and authorities responsible for safe transport of biomedical waste ($P < 0.001$).

Attitude of respondents toward proper biomedical waste management is given in [Table 2]. While almost all respondents (97%) believed that biomedical waste should

Table 1: Comparison of knowledge domain among the study groups.

Knowledge questions	Response	Designation			P value
		Undergraduate students (%)	Interns (%)	Postgraduate students (%)	
Are all health-care wastes hazardous?	Yes	32 (44.4)	21 (44.7)	31 (63.3)	0.087
	No	40 (55.6)	26 (55.3)	18 (36.7)	
Biomedical Waste Management Rules are applicable to dentists?	Yes	70 (97.2)	47 (100)	46 (93.9)	0.209
	No	2 (2.8)	0 (0.0)	3 (6.1)	
Can any plastic bag be used for biomedical waste disposal?	Yes	18 (25.0)	15 (31.9)	17 (34.7)	0.483
	No	54 (75.0)	32 (68.1)	32 (65.3)	
Have you had any training in biomedical waste management?	Yes	14 (19.4)	8 (17.0)	10 (20.4)	0.909
	No	58 (80.6)	39 (83.0)	39 (79.6)	
Are you aware of IMAGE?	Yes	17 (23.6)	9 (19.1)	16 (32.7)	0.292
	No	55 (76.4)	38 (80.9)	33 (67.3)	
If yes, what does IMAGE stand for	Correct	10 (13.9)	5 (10.6)	15 (30.6)	0.019*
	Incorrect /Do not know	62 (86.1)	42 (89.4)	34 (69.4)	
According to national guidelines, what is the maximum time limit for which biomedical waste can be stored?	Correct	21 (29.2)	5 (10.6)	11 (22.4)	0.058
	Incorrect /Do not know	51 (70.8)	42 (89.4)	38 (77.6)	
Are you aware of amalgam separators?	Yes	65 (90.3)	44 (93.6)	47 (95.9)	0.483
	No	7 (9.7)	3 (6.4)	2 (4.1)	
Which of the following is the universally accepted symbol for biohazard?	Correct	42 (58.3)	41 (87.2)	41 (83.7)	< 0.001*
	Incorrect /Do not know	30 (41.7)	6 (12.8)	8 (16.3)	
Do you know about BM waste generation and disposal legislation?	Yes	19 (26.4)	18 (38.3)	11 (22.4)	0.197
	No	53 (73.6)	29 (61.7)	38 (77.6)	
What agency(ies) regulate(s) wastes generated at health-care facilities?	Correct	29 (40.3)	28 (59.6)	29 (59.2)	0.050
	Incorrect /Do not know	43 (59.7)	19 (40.4)	20 (40.8)	
A separate permit is needed to transport BM waste?	Yes	65 (90.3)	36 (76.6)	46 (93.9)	0.029*
	No	7 (9.7)	11 (23.4)	3 (6.1)	
Who regulates the safe transport of BM waste?	Correct	42 (58.3)	17 (36.2)	37 (75.5)	< 0.001*
	Incorrect /Do not know	30 (41.7)	30 (63.8)	12 (24.5)	
Are you aware of the agencies authorized by government to collect waste from hospital/clinical set up	Yes	34 (47.2)	19 (40.4)	27 (55.1)	0.354
	No	38 (52.8)	28 (59.6)	22 (44.9)	
The approximate proportion of infectious waste among total waste generated from a health-care facility is (%)	Correct	12 (16.7)	2 (4.3)	4 (8.2)	0.080
	Incorrect/Do not know	60 (83.3)	45 (95.7)	45 (91.8)	

*Significant at $P < 0.05$

Table 2: Comparison of attitude domain among the study groups.

Attitude questions	Response	Designation			P value
		Undergraduate students (%)	Interns (%)	Postgraduate students (%)	
Do you agree that biomedical wastes should be segregated into different categories?	Yes	72 (100)	42 (89.4)	49 (100)	0.001*
	No	0 (0.0)	5 (10.6)	0 (0.0)	
Do you feel that biomedical waste management should compulsorily be made part of dental undergraduate curriculum?	Yes	65 (90.3)	44 (93.6)	39 (79.6)	0.079
	No	7 (9.7)	3 (6.4)	10 (20.4)	
Do you think your knowledge regarding biomedical waste management is adequate?	Yes	21 (29.2)	17 (36.2)	15 (30.6)	0.714
	No	51 (70.8)	30 (63.8)	34 (69.4)	
Do you think you require any further training on biomedical waste management?	Yes	67 (93.1)	46 (97.9)	46 (93.9)	0.501
	No	5 (6.9)	1 (2.1)	3 (6.1)	
Do you think it is important to know about BM waste generation, hazards, and legislation?	Yes	65 (90.3)	41 (87.2)	47 (95.9)	0.313
	No	7 (9.7)	6 (12.8)	2 (4.1)	
Safe management of health-care waste is not an issue at all	Agree	8 (11.1)	10 (21.3)	7 (14.3)	0.245
	Disagree	58 (80.6)	31 (66.0)	33 (67.3)	
	No comments	6 (8.3)	6 (12.8)	9 (18.4)	
Waste management is team work, no single class of people is responsible for safe management	Agree	64 (88.9)	40 (85.1)	45 (91.8)	0.784
	Disagree	6 (8.3)	5 (10.6)	2 (4.1)	
	No comments	2 (2.8)	2 (4.3)	2 (4.1)	
Biomedical waste management efforts by the hospital increase the financial burden	Agree	12 (16.7)	13 (27.7)	17 (34.7)	0.005*
	Disagree	39 (54.2)	16 (34.0)	10 (20.4)	
	No comments	21 (29.2)	18 (38.3)	22 (44.9)	
Safe management of health-care waste is an extra work	Agree	20 (27.8)	9 (19.1)	12 (24.5)	0.007*
	Disagree	47 (65.3)	23 (48.9)	31 (63.3)	
	No comments	5 (6.9)	15 (31.9)	6 (12.2)	
Do you think that the college should organize separate classes or a continuing dental education program about BM waste management?	Yes	56 (77.8)	38 (80.9)	46 (93.9)	0.119
	No	7 (9.7)	6 (12.8)	2 (4.1)	
	No comments	9 (12.5)	3 (6.4)	1 (2.0)	
Will you like to attend voluntarily, programs that enhance and upgrade your knowledge about waste management?	Yes	55 (76.4)	34 (72.3)	44 (89.8)	0.282
	No	7 (9.7)	5 (10.6)	2 (4.1)	
	No comments	10 (13.9)	8 (17.0)	3 (6.1)	
Do you think that infectious waste should be sterilized before shredding and disposal?	Yes	60 (83.3)	33 (70.2)	38 (77.6)	0.311
	No	3 (4.2)	2 (4.3)	4 (8.2)	
	No comments	9 (12.5)	12 (25.5)	7 (14.3)	
Do you think that a treatment plant for disinfection of infected water should be set up in dental colleges?	Yes	65 (90.3)	40 (85.1)	44 (89.8)	0.870
	No	4 (5.6)	3 (6.4)	2 (4.1)	
	No comments	3 (4.2)	4 (8.5)	3 (6.1)	
Do you think it is important to report to the pollution control board of India about a particular institution if it is not complying with the guidelines for BM waste management?	Yes	64 (89.8)	39 (83.0)	44 (89.8)	0.650
	No	4 (5.6)	2 (4.3)	2 (4.1)	
	No comments	4 (5.6)	6 (12.8)	3 (6.1)	
Do you think that labeling the container before filling it with waste is of clinical significance?	Yes	68 (94.4)	39 (83.0)	47 (95.9)	0.046
	No	3 (4.2)	2 (4.3)	0 (0.0)	
	No comments	1 (1.4)	6 (12.8)	2 (4.1)	

*Significant at *P* < 0.05

be segregated into different categories, 70% opined that they have inadequate knowledge regarding biomedical waste management. More than 90% of respondents across all groups felt that they require additional training in this waste management. Almost 90% felt that a biomedical waste treatment facility should be set-up in every dental college and close to 92% felt that labeling of BMW is of utmost importance.

Among the practice questions [Table 3], about 10% admitted that they do not segregate BMW according to categories. Incorrect responses were obtained regarding disposal of blood contaminated wastes (55%), pharmaceutical waste (79%), and used developer or fixer solution (89%). A quarter

of the respondents did not/sometimes follow color coding. There was a statistically significant difference between the three groups with regard to correct disposal of different categories of BMW. Postgraduate students fared better followed by house surgeons and students.

DISCUSSION

This study discusses the knowledge, attitude, and practice of BMW management among clinical students of dentistry in a teaching hospital in India. It is agreed that recognition and separation of waste are the best solution for successful management of BMW.[17] Dental schools are unique as they

Table 3: Comparison of practice domain among the study groups.

Practice questions	Response	Designation			P value
		Undergraduate students (%)	Interns (%)	Postgraduate students (%)	
Does your institute have a tie up with waste management companies?	Yes	25 (34.7)	7 (14.9)	20 (40.8)	0.015*
	No/Do not know	47 (65.3)	40 (85.1)	29 (59.2)	
Do you dispose all kinds of waste into general garbage?	Yes	16 (22.2)	19 (40.4)	4 (8.2)	0.001*
	No/Do not know	56 (77.8)	28 (59.6)	45 (91.8)	
Do you segregate the biomedical waste according to different categories	Yes	60 (83.3)	46 (97.9)	46 (93.9)	0.019*
	No/Do not know	12 (16.7)	1 (2.1)	3 (6.1)	
Where do you dispose cotton, gauze, and other items contaminated by blood?	Correct	35 (48.6)	20 (42.6)	20 (40.8)	0.660
	Incorrect/Do not know	37 (51.4)	27 (57.4)	29 (59.2)	
Where do you dispose pharmaceutical waste?	Correct	18 (25.0)	3 (6.4)	14 (28.6)	0.014*
	Incorrect/Do not know	54 (75.0)	44 (93.6)	35 (71.4)	
Where do you dispose waste sharps?	Correct	32 (44.4)	28 (59.6)	34 (69.4)	0.021*
	Incorrect/Do not know	40 (55.6)	19 (40.4)	15 (30.6)	
Where do you dispose excess mercury and mercury contaminated cotton?	Correct	15 (20.8)	10 (21.3)	20 (40.8)	0.031*
	Incorrect/Do not know	57 (79.2)	37 (78.7)	29 (59.2)	
How do you discard the used developer or fixer solution?	Correct	7 (9.7)	2 (4.3)	8 (16.3)	0.145
	Incorrect/Do not know	65 (90.3)	45 (95.7)	41 (83.7)	
How do you dispose the hazardous liquid waste?	Correct	67 (93.1)	37 (78.7)	45 (91.8)	0.039*
	Incorrect/Do not know	5 (6.9)	10 (21.3)	4 (8.2)	
Do you follow color coding for BM waste?	Yes	51 (70.8)	32 (68.1)	42 (85.7)	0.206
	No/Do not know	3 (4.2)	4 (8.5)	2 (4.1)	
	Sometimes	18 (25.0)	11 (23.4)	5 (10.2)	
Documents with confidential patient information are to be disposed of into the paper	True	27 (37.5)	15 (31.9)	22 (44.9)	0.420
	False	45 (62.5)	32 (68.1)	27 (55.1)	
Identify the false statement	Correct	42 (58.3)	30 (63.8)	36 (73.5)	0.233
	Incorrect/Do not know	30 (41.7)	17 (36.2)	13 (26.5)	

*Significant at *P*<0.05; DK: Do not know

contain multiple operatories and clinical departments unlike general dental clinics. These are centers of training which implies students learn the nuances of patient care and other related activities. This is also the time when knowledge and skills are acquired, and it is imperative that they are trained in administrative aspects of dental care like biomedical waste management.

Medical wastes have been classified into eight categories by the WHO as general waste, pathological, radioactive, chemical, infectious to potentially infectious waste, sharps, pharmaceuticals, and pressurized containers.[13] According to Nancy Godwin, dental waste can be classified as general waste (non-regulated), contaminated waste (regulated and infectious waste), and hazardous waste (regulated and toxic waste).[18]

In general, only 10–25% of health-care waste is hazardous but the current study reveals that 50% of students opined that all health-care wastes were hazardous. A study done in North India by Kumar *et al.*[13] also reported close to 60% of respondents considering all health-care wastes as hazardous. However, only 28.6% of the participants in this study were aware of the legislations governing BMW management in India. This observation was very poor compared to many other similar studies,[13,14,19,20] the highest being reported as 94.6% and 98.6% by Amol *et al.*[15] and Khatri *et al.*,[21] respectively. Only a quarter of the participants in this study had knowledge about the local agencies handling BMW in the state, the percentage being lower as compared to 79.5% and 85.7% found by Lakshmikantha *et al.*[19] and Amol *et al.*,[15] respectively. One of the reasons for this observation could be due to the fact that the institution where the study was carried out has their own BMW disposal system. In most dental colleges of the state, BMW is managed by IMAGE (an agency under Indian Medical Association tasked with the collection and management of biomedical wastes in Kerala) who collects wastes on a daily basis, thereby increasing the probability that students are aware of it. In the present study, a statistically significant difference was found among the three groups in being aware of IMAGE as well as in knowing the expansion of the acronym IMAGE. Similar was the observation in another study done by Sanjeev *et al.*[16] where 45.8% were aware of IMAGE, but only 22.3% could give the expansion correctly with interns and teaching staff having greater awareness as compared to students.

Regarding the time limit for storage of BMW, it was observed that only 22% of participants were aware that as per national guidelines, BMW cannot be stored for more than 24 h. This is in contrast to a study done by Kulkarni *et al.*[8] among dental residents where 71.3% of participants were aware of the same. However, 73.8% identified the biohazard symbol correctly which was higher than that reported by Kulkarni *et al.*[8] as 41.3%. There was a statistically significant difference between the study groups with house surgeons and postgraduate students faring better compared to undergraduate students. Comparable was the observation made by Sanjeev *et al.* where a significant difference was found in terms of educational qualification with the teaching staff and interns faring better than the undergraduates.[16] About 19% of the participants reported to have received training on how to handle BMW appropriately which is more than the study by Divya *et al.*[11] where only 8.1% of doctors have been trained.

About 97% of the respondents agreed that biomedical waste should be segregated into different categories. The observations were consistent with most studies discussed earlier.[10,12,14,15] However, Raghuwar *et al.*[9] found in his study that a large number of the respondents (63.7%) were unaware of different categories of biomedical waste. Majority believed that waste management is a team effort and about 24.4% felt that it is extra work on the part of the institution. Similar views were echoed by 27% and 30.4% of the participants (dental practitioners) in studies done by Lakshmikantha *et al.*[19] and Amol *et al.*,[15] respectively. Almost 78% of the participants felt that infectious wastes need to be sterilized before final disposal, which was higher than that reported by Amol *et al.*[15] (52.7%). Just as segregating wastes are important, equally so is the labeling of containers into which they are separated. Similar was the opinion of 91.7% of participants in the current study and also of 86% of participants in the study by Kulkarni *et al.*[8]. Around 95% of students thought that they required further training on biomedical waste management which is higher than many studies[11,15,19,20] showing a positive attitude toward a healthier and safer environment. In addition to a lecture on BMW management which is usually the norm, especially in dental schools, training should be augmented by visits to a BMW treatment facility to enable students appreciate the importance of proper segregation of waste. Overall, attitude questions showed a favorable response.

In practice, 90.5% of the participants routinely segregate waste, which is in accordance with a study by Pawar *et al.*[10] where 93.8% did so. The practice of BMW management showed variation between the studies. Many studies[14,15,22] reported lesser values of practice of waste segregation and in a study by Raghuwar *et al.*[9] About 86.2% disposed all waste in common bins. About 44% of participants correctly disposed cotton, gauze, and other items contaminated by blood into yellow bags which was lesser than as followed by 70.8% of health professionals reported by Pawar *et al.*[10] and more than many other studies.[9,15,22] In the study by Bansal *et al.*,[23] only 16% of the doctors practiced the same. More than three-fourths of the respondents improperly disposal of pharmaceutical waste which was also close to results reported by Raghuwar *et al.*[9] where 77.5% disposed such waste into common bins. In a training institution, students rarely are

associated with disposing discarded medicines; however, lack of knowledge of the proper disposal of pharmaceutical waste is a concern that needs to be addressed. Many other studies[12,14,15,23,24] also showed improper disposal of such waste. About 75% reported that they followed color coding. While these results were comparable with reports from Amol *et al.*[15] and Pawar *et al.*[10] with 79.5% and 85.4%, respectively, in many other studies,[8,9,13,14] this practice was low. The practice of chemical treatment before disposal of liquid waste was known by 88.7% but this was poor in a study by Tsunnero *et al.*[22] where only 9.6% knew about it. The probable reason for this observation could be because the clinical students visit the BMW treatment facility in the institution as a part of their training and have been made aware of final processing of wastes post-segregation.

In dental settings, proper disposal of waste sharps such as infected needles is particularly essential to avoid needlestick injuries and acquiring infections such as hepatitis and HIV. Correct disposal of such waste into puncture proof containers was practiced by 56% of respondents in this study, showing that still about a half of them do not do so. This observation calls for an introspection regarding the disposal of sharps. There was a statistically significant difference between the groups with undergraduate students performing poor compared to house surgeons and postgraduate residents. In a study by Raghuwar *et al.*,[9] even lesser, that is, 20.6% practiced the same. Similar was the finding in many other studies[8,10,14,22] except in the study by Amol *et al.*[15] where comparatively a higher number of 72.3% disposed waste sharps correctly. There is a high possibility of inadvertent needle pricks for waste handlers if disposed in red or yellow waste bags. Hence, students need to be educated regarding the disposal of needles and other sharps in puncture proof containers. Availability of the same should also be ensured in all operatories.

Mercury disposal is a matter of concern in dentistry. Mercury wastes are generated during the use of amalgam, which is a commonly used restorative materials. Although there has been a call for gradual weaning of its use in routine dental practice,[25] it is widely prevalent in dental schools even today. It was observed that only 27% dispose excess mercury and mercury containing cotton in airtight containers which is lesser when compared to the study of Pawar *et al.*[10] and Kulkarni *et al.*[8] where 41.7% and 70%, respectively, practice the same. Facilities for proper disposal of mercury have to be made available in dental schools to ensure proper disposal. Majority of the respondents discarded the used developer and fixer solution inappropriately and it is higher than Sood *et al.*[12] who documented a response of 34%. In the present study, only 10.1% dispose it correctly which is highly alarming as if mixed it turns into hazardous liquid waste. Furthermore, a large amount of valuable silver can be obtained from it and must be recycled.

In the present study, postgraduates fared better in correct disposal of wastes followed by house surgeons and students. Similar was the observation made by Manchanda *et al.*[14] and Sanjeev *et al.*[16] In totality, most studies conducted all over the country show a positive attitude toward BMW management but there were deficiencies in knowledge and practice. Similar observations were made by Tanuja *et al.*[5] who conducted a study in Nepal where 82% are well aware of the segregation of waste and color coding, however, they lack knowledge about the rules laid down by the government and practice regarding the same. One of the limitations of this study was that it was limited to a single institution. There were also limited studies in literature conducted among dental students to obtain an ideal comparison. However, studies like these could be used for evaluating existing BMW management practices in the institutions.

CONCLUSION

Our study showed that although the attitude toward biomedical waste management was highly positive among students and they understood the importance of managing hazardous waste, but the knowledge and practice still has scope for improvement. While focusing on the different groups of students, it was clearly seen that postgraduates and house surgeons fared better in their overall knowledge and practice scores. This highlights that education plays a pivotal role in making the future health professionals aware of safe practices in BMW management. Educational institutions, therefore, must focus on imparting training for BMW management through visits to treatment facilities and also ensure that students follow rules on appropriate waste management strictly beginning from their clinical years itself.

Declaration of patient consent

Institutional Review Board (IRB) permission obtained for the study.

Conflicts of interest

There are no conflicts of interest.

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