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Awareness and Knowledge of Medical Waste Management Among Dental and Medical Students

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Key Words:
Dentistry, Medical waste, Waste Management.

Abstract:

Background: Due to the current Covid19 pandemic the Biomedical waste generation has increased, following the rise in medical and health care. In this study, we have gathered the basic information and knowledge of waste management of medical and dental students. This article puts a spotlight on whether the students have enough knowledge about the type of waste and their segregation or not. We have focused on the knowledge and assessing awareness of young doctors who are in the learning process.

Methods: The data was collected by conducting cross-sectional questionnaire-based study among dental and medical students of India. The study participants included third and final year dental undergraduate & final year medical undergraduate.

Results: From the results, it was concluded that Medical students (89.63%) are better-introduced to the concept of Biomedical Waste during graduation, compared to dental students (81.29%) and hence, are more aware.

Conclusion: From this research, it was concluded that those students who were introduced to the concept of the subject were more aware of the rules and regulations of the same and hence had better application. The information provided from our research will help authorities to arrange more discussion and practical implication regarding the concept of bio medical waste management.

1. Introduction

In 2007 during the WHO meeting in Geneva, core principles for sustainable management of waste were developed (1). In July 1998, first Bio Medical Waste Management was notified in the country by the Government of India, by the Ministry of Environment and Forest (1). The BMWM rules of 1998 were

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modified various times in 2000, 2003, 2011 and 2016 (2). The rules amended in 2016 have been notified to efficiently manage BMW in the country. Strict rules and words for proper handling were included in the new rules to have more clarity in the application of the rules.

Despite this, we have experienced that the topic of biomedical waste management is somewhat neglected and not given enough importance that it deserves. Especially for some of the dental and medical students, it can be nothing more than an important question for examination sometimes. These students carry the same attitude and become irresponsible practioners. To break this cycle, it is very important to aware the students at academic level itself.

Our research primarily focuses on the knowledge and assessing awareness of young doctors who are in the learning process. This survey will provide us with ground level current situations and interests of medical and dental students to learn regarding the field.

We conducted our survey with the aim of spreading awareness among ongoing batches of medical and dental college years.

2. Methodology

Sample Collection

A cross-sectional questionnaire-based study was planned and carried out among dental and medical students in India during the time period of April 2021 to June 2021. The study participants included all clinical students (third and final year dental undergraduate & final year medical undergraduate). The total sample size was 596 out of which, 326 were dental students and 270 were medical students. This research obtained Institutional Review Board (IRB) approval of Karnavati Research Ethics Committee, Karnavati School of Dentistry (Reference No.: KU/20/KSD347, Date: April 03, 2021), Uvarsad-Adalaj Road At. & PO.: Uvarsad, District: Gandhinagar, Gujarat 382022, India. This study was carried out as per the declaration of Helsinki (Version 2008).

Demographic

The aim of the questionnaire was to judge the awareness, knowledge and practical application of the bio medical waste management rules among the target audience. A self-administered questionnaire as a google form was used. Questionnaire consisted of 11 questions which have been taken from previously conducted different studies. The combined questionnaire was validated again. Out of 11 questions; 6 questions were knowledge based, 1 question awareness based, 2 questions were attitude based and 1 question was practice based (Table 01).

S.NO.	QUESTIONS
01.	Your qualification?
02.	During under graduation, have you been introduced to the concept of Biomedical waste management?
03.	Are biomedical waste management rules applicable to college hospitals and clinics?
04.	How would you rate college education on biomedical waste management?
05.	Which of the following is the symbol of biomedical waste?
06.	Are all healthcare waste hazardous?
07.	What type of plastic is used for biomedical waste disposal?
08.	Do you segregate biomedical waste according to different color coding?
09.	Broken glass, articles or vials should be disposed in which color plastic bag and container?

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10.	Rate your awareness about biomedical waste management.
11.	How likely are you to attend programs that enhance and upgrade your knowledge about biomedical waste management?

Table 01: Questionnaire of the research

The questionnaire was distributed digitally among the third and final year dental students and third year medical students. The participants were informed about the purpose of study and consent were taken for publication of the results.

Obtained data was tabulated in Microsoft Excel spreadsheet. Data was transferred to SPSS version 21.0 (for MS Windows, Chicago, IL, USA) for statistical analysis and Chi-square test was applied to find out associations between knowledge, attitude, awareness and practice scores with study groups (Medical and Dental students). "P" ≤ 0.05 was considered statistically significant.

3. Result

The response rate for the study observed was 20.67%. As per the observed response rate the participants consisted of dental students 54.7% (326), and medical students 45.3% (270).

The following results were obtained from the survey:

01. Qualification

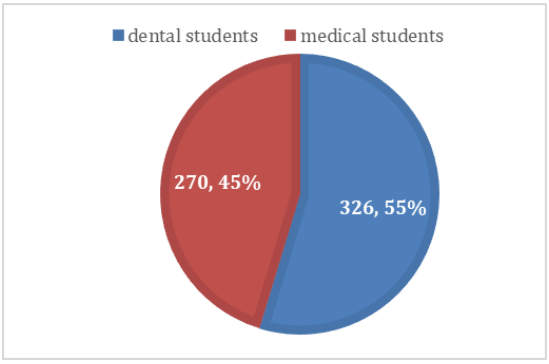

Figure 1: Types of graduates

There was a slight majority of dental students (55%) over medical students (45%) in the study (Fig 01).

02. During under graduation, have you been introduced to the concept of Bio-medical waste management (BMWM)?

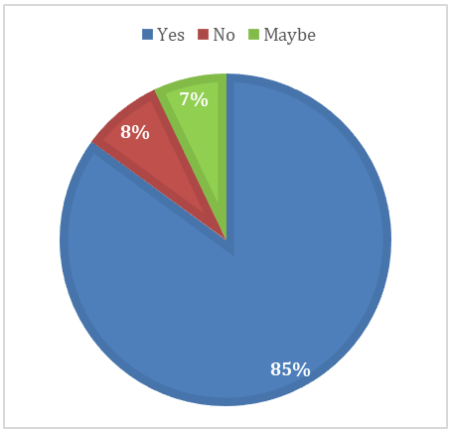

Figure 02: Answer of questionnaire "During under graduation, have you been introduced to the concept of Bio-medical waste management (BMWM)?"

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Most of the participants (85%), irrespective of their fields, were introduced to the concept of biomedical waste management during their under graduation (Fig 02).

03. Are biomedical waste management rules applicable to college hospitals and clinics?

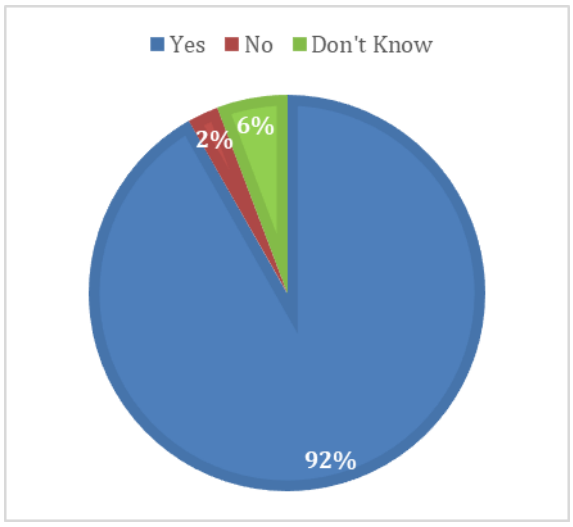

Figure 03: Answer to questionnaire "Are biomedical waste management rules applicable to college hospitals and clinics?"

Majority of the participants (92%) stated that biomedical waste management rules were applicable to their college hospitals and clinics (Fig 03).

04. How would you rate college education on Bio-medical waste management?

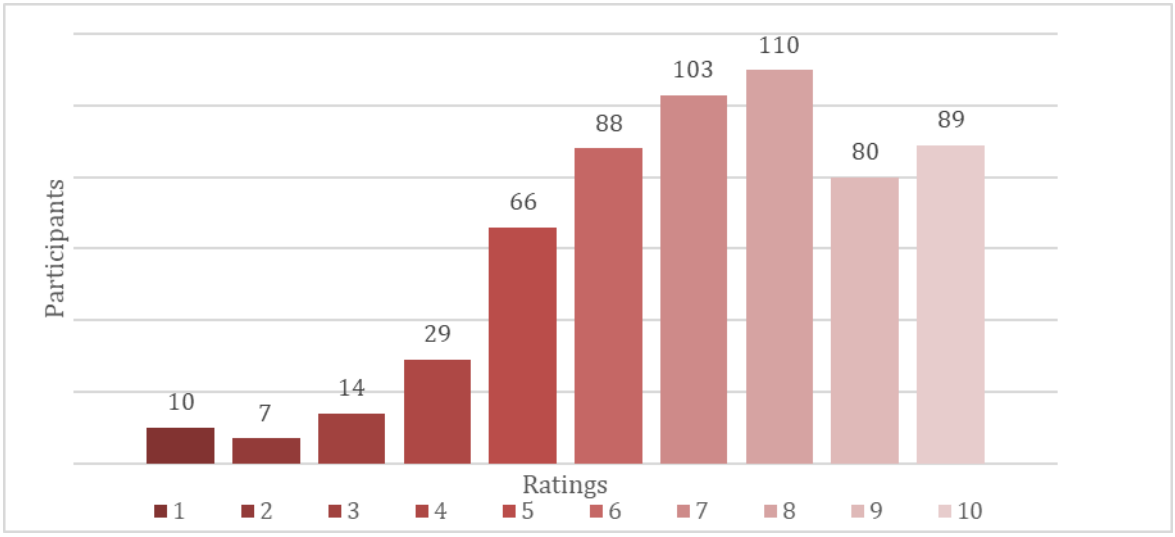

Figure 4: Answer to questionnaire "How would you rate college education on Bio-medical waste management?"

Majority of the participants gave decent ratings to the education provided by their college on biomedical waste management (Fig 04). This result is identical to the results obtained from Fig 02.

05. Which one is the symbol of Bio-medical waste?

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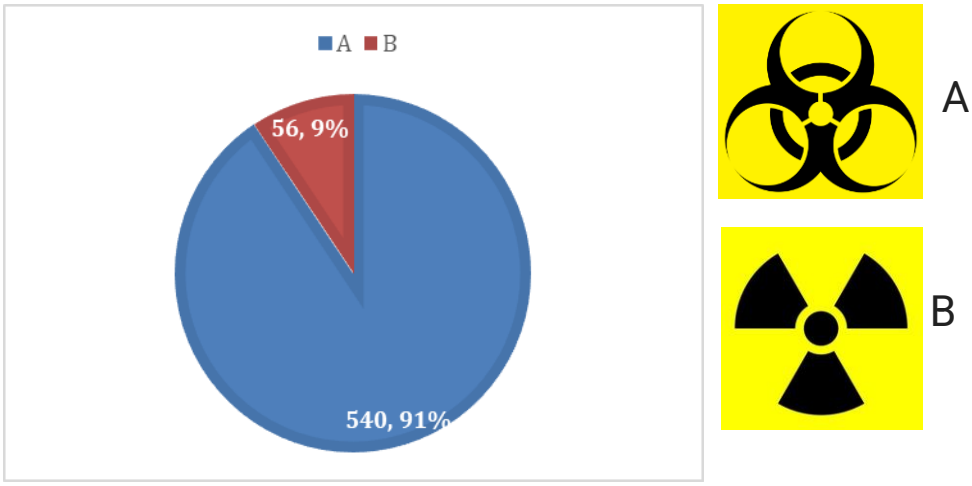

Figure 5: Answer to questionnaire "Which one is the symbol of Bio-medical waste?"

Majority of the participants (91%) were aware about the symbol of biomedical waste (Fig 05).

06. Are all health care waste hazardous?

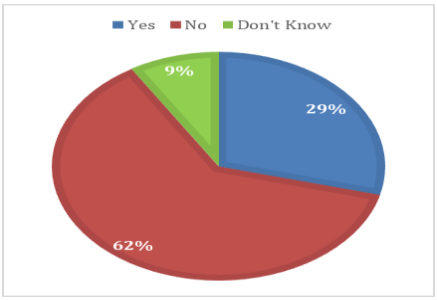

Figure 6: Answer to questionnaire "Are all health care waste hazardous?"

A majority of participants (62%) were equipped with the right knowledge regarding nature of biomedical waste (Fig 06). However, the number is not very satisfying. 29% of participants think that biomedical wastes of all kinds are hazardous and 9% were clueless about the topic.

07. What type of plastic is used for Bio-medical waste disposal?

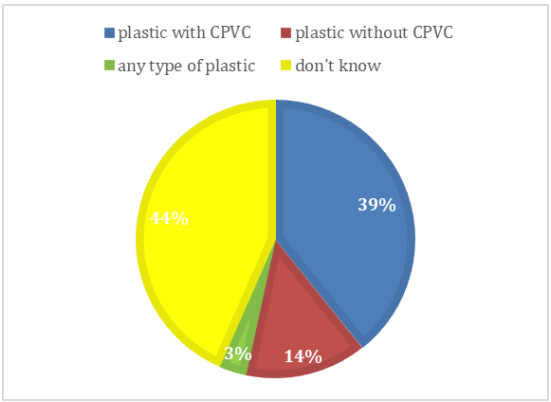

Figure 7: Answer to questionnaire "What type of plastic is used for Bio-medical waste disposal?"

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Though the education is provided in the institutions regarding biomedical waste management, the practical knowledge of the participants seems inadequate. Though a portion (39%) of participants were able to answer correctly, a majority of participants (61%) were not, out of which 44% didn't even know (Fig 07)!

08. Do you segregate the BMW according to different colour coding?

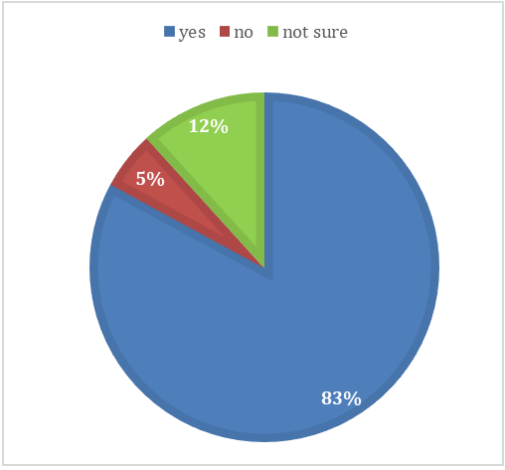

Figure 8: Answer to questionnaire "Do you segregate the BMW according to different colour coding?"

Majority of participants (83%) agree that they segregate biomedical waste according to different colour coding (Fig 08).

09. Broken glass, articles or vials should be disposed in which colour plastic bag or container?

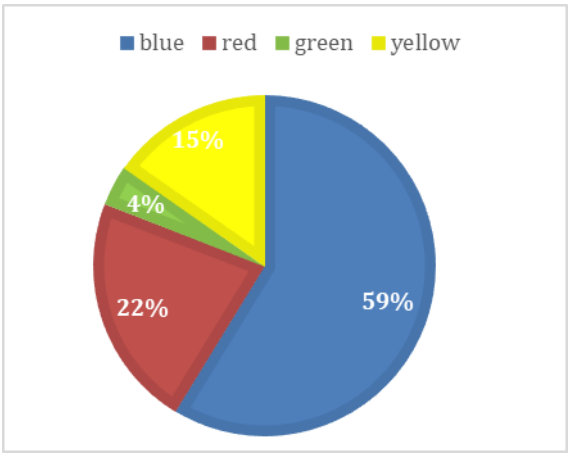

Figure 9: Answer to questionnaire "Broken glass, articles or vials should be disposed in which colour plastic bag or container?"

A slight majority of the participants (59%) is equipped with the correct practical knowledge. However, 41% participants are not correctly following the color system for biomedical waste management (Fig 09). This result contradicts with Fig 08, where a vast majority of participants agreed that they segregate waste according to the guidelines, but this is not the case when assessed.

10. Rate your awareness about BMWM

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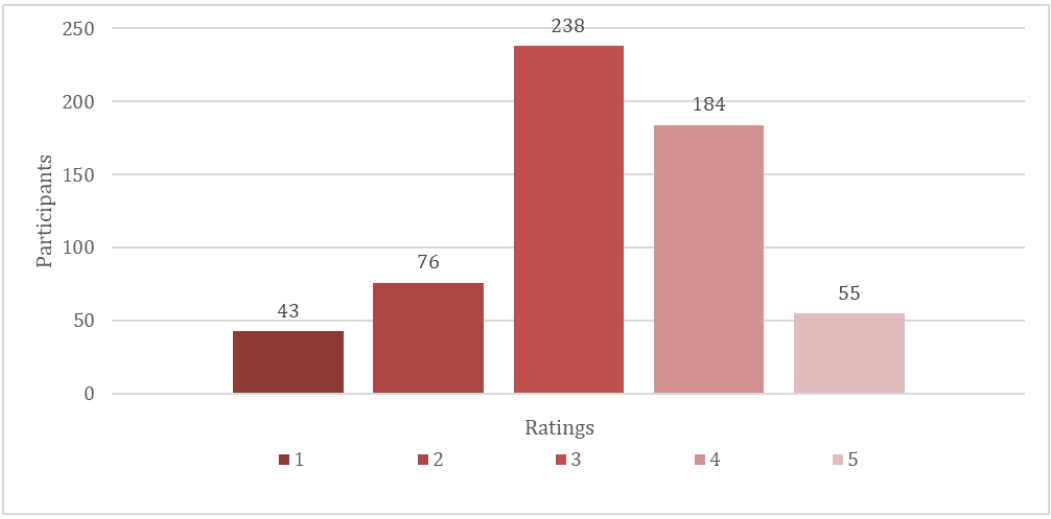

Figure 10: Answer to questionnaire "Rate your awareness about BMWM"

Majority of participants rated their awareness regarding biomedical waste management decent (Fig 10), which contradicts with our previous results (Fig 07, 09).

11. How likely are you to attend programs that enhance and upgrade your knowledge about BMWM?

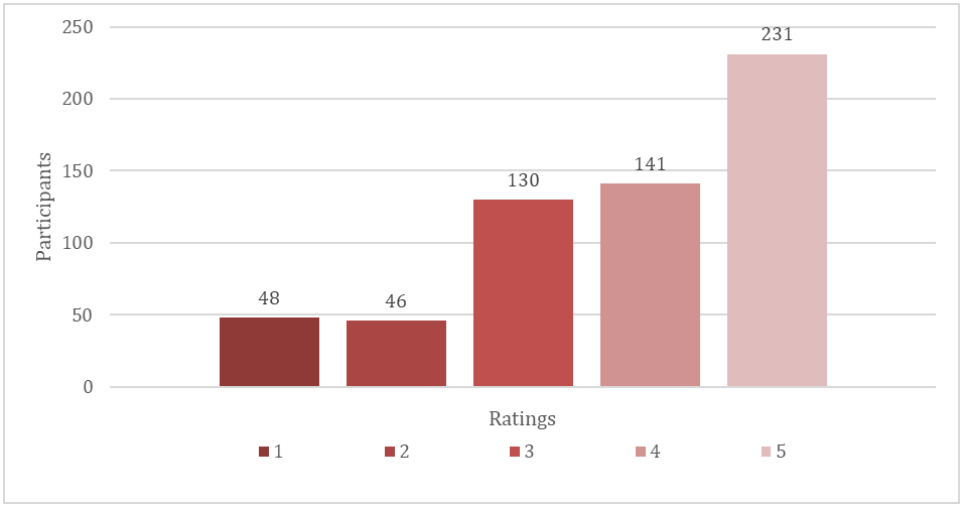

Figure 11: Answer to questionnaire "How likely are you to attend programs that enhance and upgrade your knowledge about BMWM?"

Majority of the participants are willing to attend programs that enhance and upgrade their knowledge about biomedical waste management (Fig 11).

There is a significant association among qualification of the participants and their introduction to the concept of biomedical waste management. However, it is a weak association. (Table 02)

For a great majority of the participants (91.7%), BMWM rules are applicable in their medical/dental colleges. (Table 04)

A significant association is found between qualification of the participants and the clinical application of bio medical waste management rules. However, it is a weak association (Table 03).

Interestingly, the majority of the participants considered the quality of education their colleges

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provide and their awareness on Biomedical waste Management satisfactory (Table 05).

4. Discussion

According to WHO, hazardous waste generated by health care units is 20%. Developing countries have documented in literature about the inadequacy of knowledge and poor outlook of health care workers regarding biomedical waste.

Developing countries documented the shortage of knowledge and health care workers' poor attitude regarding biomedical waste. Studies that have been documented from India (3), Brazil (4), Dhaka (5) and Turkey mainly focus on biomedical waste management.

Very few studies in existing literature have noted awareness, knowledge and attitude towards biomedical waste management among dental and medical undergraduate students.

In an attempt to address this issue, the aim of this study is to assess the knowledge, awareness and attitude of the third and final year dental and medical students towards biomedical waste management.

Majority of the participants (85%), irrespective of the background, were well-introduced to the concept of bio medical waste management. This result is identical to the study done on Biomedical waste management practice in dentistry in Nov 2020 (6).

A great majority of the participants (91.7%) BMWM rules are applicable in their medical/dental colleges. This result is identical to a study amongst the dentists associated with institutions and private practitioners in North India in Mar 2018. Astonishingly, the majority of the private practitioners were not following bio medical waste management rules, despite being well-introduced due to financial problems, service unavailability and poor attitude towards management, while most of the dentists associated with institutions were religiously following the rules (7).

However, when clinical application was judged, only 58.7% students were following the rules which is significantly low, considering the previous result. This result was identical to the study done in Amritsar regarding the awareness of biomedical waste management among dental professionals and auxiliary staff in Dec 2012 (8). The study concluded lack of awareness amongst both - dentists and dental auxiliaries. A similar result was obtained in a study regarding awareness of bio medical waste management among healthcare personnel in Jaipur (9) and a study done in Uttar Pradesh (10).

Interestingly, the majority of the participants considered the quality of education their colleges provide and their awareness on Biomedical waste Management satisfactory. However, the majority of the participants are eager to attend future programs on biomedical waste management. This is quite relatable when compared to the study done regarding Knowledge and awareness regarding biomedical waste management in dental teaching institutions in India in Oct 2014 (11) and Current biomedical waste management practices and cross-infection control procedures of dentists in India in Jun 2012 (12). Both of these studies conclude that continuing education and training programs are required to enhance the knowledge of biomedical waste management amongst dental practitioners.

Limitations and shortcomings of the study

The survey was conducted during the pandemic. During this time, many students were not able to attend practical lectures, which resulted in assessing mostly theoretical knowledge regarding this topic. The practical application was judged by hypothetical situations.

Many colleges were not able to cover this topic properly during online lectures. which is why some students do not possess complete and proper knowledge regarding BMWM.

In this survey, only a few questions were asked regarding the practical application, knowledge and awareness regarding BMWM, which might not be enough to interpret someone's knowledge and judge their expertise in BMWM.

5. Conclusion

Our survey and research were focused on knowledge and awareness among dental and medical students and their exposure to this topic theoretically and practically. We concluded that those students who were introduced to the concept of BMWM were more aware

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of the rules and regulations of BMWM. When discussing practical applications those who were introduced to the concept BMWM had better application. The information provided from our research will help authorities to arrange more discussion and practical implication regarding the concept of BMWM.

TABLES

TABLE 02

				2.) During under graduation, have you been introduced to the concept of Bio-medical waste management (BMWM)?			Total	P value
				Maybe	No	Yes		
1.) Your Qualification		Dental student	Count	30.00	31.00	265.00	326.00	.015
			% within 1.) Your Qualification	9.20	9.51	81.29	100.00	
			Adjusted Residual	2.26	1.62	-2.84		
		Medical student	Count	12.00	16.00	242.00	270.00	
			% within 1.) Your Qualification	4.44	5.93	89.63	100.00	
			Adjusted Residual	-2.26	-1.62	2.84		
Total			Count	42.00	47.00	507.00	596.00	
			% within 1.) Your Qualification	7.05	7.89	85.07	100.00	

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TABLE 03

			9.) Broken glass, articles or vials should be disposed in which colour plastic bag or container?				Total	P value
			Blue	Green	Red	Yellow		
1.) Your Qualification	Dental student	Count	171.00	17.00	87.00	51.00	326.00	.002
		% within 1.) Your Qualification	52.45	5.21	26.69	15.64	100.00	
		Adjusted Residual	-3.42	1.89	2.93	.28		
	Medical student	Count	179.00	6.00	45.00	40.00	270.00	
		% within 1.) Your Qualification	66.30	2.22	16.67	14.81	100.00	
		Adjusted Residual	3.42	-1.89	-2.93	-.28		
Total		Count	350.00	23.00	132.00	91.00	596.00	
		% within 1.) Your Qualification	58.72	3.86	22.15	15.27	100.00	

TABLE 04

Are biomedical waste management rules applicable to college hospitals and clinics?	Those who opted for 'Yes'	Those who opted for 'No'	Those who opted for 'Don't Know'	Total
	547	15	34	596
	91.8%	2.5%	5.7%	100%

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TABLE 05

Rate your awareness about BMWM	Those who gave rating of 1	Those who gave rating of 2	Those who gave rating of 3	Those who gave rating of 4	Those who gave rating of 5	Total
	43	76	238	184	55	596
	7.2%	12.7%	40%	31%	9.2%	100%

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