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KNOWLEDGE, ATTITUDE, AND PRACTICES REGARDING BIO MEDICAL WASTE MANAGEMENT AMONG DENTAL COLLEGE STUDENTS IN PATNA, EAST INDIA

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ABSTRACT

In spite of the remarkable innovations over the years in the health care delivery system, it is strange that the health care settings which reinstates and maintain the health of the community are also threatening their well-being. A huge risk to the health of the public, patients, professionals and environment arise due to production of a huge amount of '**Biomedical Waste**' which poses a great threat to living beings and environment as a whole. These biomedical wastes if not disposed correctly then these areas can become source of deadly infections. **Aim:** The aim of the study was to assess the knowledge, attitude and practice regarding biomedical waste management among dental students in Buddha Institute of Dental Sciences and Hospital in Patna, Bihar. **Method:** A cross-sectional study was conducted among 200 dental students of the 3rd year, 4th year, interns and postgraduates from a dental college in Patna city. A close-ended structured questionnaire was used to assess the knowledge and attitude and practice regarding biomedical waste management. The chi-square test were used to do the statistical analysis for the given data and the statistical significance was set at $p<0.05$. **Results:** Out of 200 participants, 24% were males and the rest 76% were females. Majority (91%) of dental students were aware of the term biomedical waste and almost 76% subjects agreed to that segregation of waste should be done at the point of generation. 87% of female subjects knew the non-segregation of waste at source increases the risk of injury to waste handlers. 47% disposes the outdated and expired medicines in a secure landfill. **Conclusion**: It can be concluded that with increase in exposure to knowledge, the students can better appreciate the significance of merits and how preventive measures can be employed in routine dental practices, thus making the primary prevention the best option to serve humanity.

KEYWORDS: Bio- medical waste management, Knowledge & Attitude, Dental Students.

INTRODUCTION

The concept of wellbeing or unwell rides on the interplay of epidemiological triad but in the recent times the environmental factor is running too much of an effort to show how it is exponentially exploited to bring an imbalance for a healthy society. The environment has been kind for over centuries and has absorbed all the ill treatments the man has put forth. But the situation has taken a back step and the humanity has started to feel the pinch of healthy and safe environment. This only justifies, in spite of the remarkable innovations over the years in the health care delivery system, it is strange that the health care settings which reinstates and maintain the health of the community are also threatening their well-being. A huge risk to the health of the public, patients, professionals and environment arise due to production of a huge amount of '**Biomedical Waste**' which poses a great threat to living beings and environment as a whole. These biomedical wastes if not disposed correctly then these areas can become source of deadly infections.[1]

In the course of curing, expansion of health care facilities as well as the recent trend of using disposables has led to an unprecedented burden of health care related waste.[2] It is estimated that in a country like India, health care industry is growing at a rate of 12% per annum. The medical waste generated here is around 3 million tons per annum, out of which about 10 to 35 % of medical waste generated is potentially hazardous, but owing to indiscriminate mixing of this with non-hazardous waste converts entirely waste hazardous.[3]

Dental waste is a subset of biomedical waste. Dental setup is a multidisciplinary system which consumes lot

of items for delivery of dental care. This includes sharps, used disposable items, infectious waste (blood-soaked cotton, gauze). All these waste contains a great variety of pathogenic microorganisms which can be detrimental to the health of the individual. Hazardous waste contains metals which are toxic and not degradable. It consists of mercury containing waste (mercury, amalgam scrap), lead containing waste (lead foil packets, lead aprons) and chemical waste (such as spent film developers, fixers, and disinfectants). Amalgam is the most toxic non-radioactive element and heavy volatile metal with a potential to be neurotoxin. Mercury can pose a threat due to release of mercury into the environment from dental practices and industries due to poor disposal. Other materials may contain potential hazards such as polystyrenes, barium, strontium, which may cause harm if correct use and disposal is not instilled. With the increase in demand for dental care, there has been a rapid growth of dental clinics in the recent years and this has led to the increase in the amount of biomedical waste generated by them. Across all specialities, dentists need to have exemplary professional practice in this regard.[2]

Literature search revealed there is scarcity of information related to dental waste management among dental students at various teaching institutions in India. Hence the attempt is made to assess the knowledge, attitude and practices towards dental waste management among dental students in Patna city, Eastern India Region.

METHODOLOGY

A descriptive cross-sectional study was conducted among dental students from in Patna City. Ethical approval for the study was obtained from the Institutional Review Board, Buddha Institute of Dental Sciences & Hospital, Patna and Informed Consent was obtained from each subjects participating in the study.

Students of 3rd year, 4th year, interns and postgraduate students belonging to Buddha Institute of Dental Sciences & Hospital, were included in the study. All the students who were available on the day survey were included in the study. A total of 200 subjects participated in the study.

The data was collected using close-ended self-administered 29-item questionnaire constructed from previous studies. The questionnaire had two major parts; the first part consisted of socio-demographic variables such as age, gender, educational qualification. The second part consisted of questions about knowledge, attitude and practice regarding bio-medical waste management.

The feasibility and validity was tested by a pilot study. Questionnaires were circulated after the usual lecture of the undergraduate students for 3rd and 4th year with prior permission from the Head of the institution and the aim of the study was explained. The interns and postgraduates were given the questionnaires in their respective departments. The time allocated for completion of the questionnaire was 10-12 min.

Statistical analysis: The data obtained were compiled and entered in MS Excel sheet and analyzed using Graph Pad (version 5). The recorded values were represented as number (n) and percentage (%). Chi – Square test was applied to analyze the association between two parameters and level of significance i.e., 'p' value of less than 0.05 was considered as significant.

RESULTS

In the present study, a total of 200 students participated, of which 24% were males and the rest 76% were females. The age of the study subjects ranged from 19-28 years. 29% of the study subjects belonged to 3rd year BDS, 30% belonged to 4th BDS, 26% belonged to Interns and the remaining 15% belonged to Post Graduates.

The knowledge regarding biomedical waste among the study subjects is shown in table 1. An overall 91 % of study subjects were aware of the term biomedical waste. When this was compared with the different educational level it was found that postgraduate students were having better knowledge than interns, final year and third year with significant p value. An overall 78.5% of the study subjects were aware about the biomedical waste management rules that are applicable to the dentists. When this was compared, interns and postgraduates were having approximately same knowledge about the same and it was found to be statistically significant with p value. Regarding the risk of biomedical waste transmiting infectious diseases like HIV/Hepatitis , an overall 88.5% of the study subjects were aware of the risk. When this knowledge was compared with the different educational level it was found to be statistically significant with p value <0.02.An overall 61.5% of the study subjects were aware about that their institute have a certified biomedical waste carrier services to recycle or dispose the waste. When this knowledge was compared with the different educational level it was found to be statistically significant with p value <0.02. Regarding maintaining BMW records are mandatory in hospitals/ clinic, an overall 59% of the subjects agreed that it is mandatory. When this knowledge was compared with the different educational level it was found to be statistically significant with p value <0.02. Similarly, an overall 59% of subjects were aware of the color coding used to dispose the waste. When this knowledge was compared with the different educational level it was found to be statistically significant with p value <0.03. When asked about the storage of waste, an overall 54.5% answered that waste should not be stored more than 48 hours and when this knowledge was compared with the different educational level it was found to be statistically significant with p value< 0.02. An overall 61% of the study subjects think that labelling the container before filling it with waste is of clinical significance. When this knowledge was compared with the different educational level it was found to be statistically significant with p

value< 0.04. Majority (77.5%) of the study subjects were concerned about needle stick injury. When this knowledge was compared with the different educational level it was found to be statistically significant with p value <0.03. An overall 50.5% of the study subjects had the knowledge of Pollution control board of India regulating safe transport of health care waste. When this knowledge was compared with the different educational level it was found to be statistically significant with p value <0.03.

Table 2, shows the attitude of dental students towards biomedical waste management. An overall majority of 76% of the subjects agreed that segregation of waste should be done at the point of generation. When this was compared with the different educational level it was found to be statistically significant with p value <0.04. An overall 87% of the study subjects knew that the non-segregation of waste at source increases the risk of injury to waste handlers. When this was compared with the different educational level it was found to be statistically significant with p value< 0.05 .Of all majority (77%) had positive attitude that decontamination or disinfectant reduces the chances of infection and the results were statistically significant with p value <0.03 when compared to different educational level. An overall 58.5% of the study subjects agreed that prophylactic measures are important in controlling hospital acquired infection and the results were statistically significant with p value < 0.05 when compared to different educational level, An overall 9% of the study subjects believe that reporting of needle stick injury is an extra burden on work. When this was compared with the different educational level it was found to be statistically significant with p value< 0.02

Table 3 shows, the practices of the study subjects regarding biomedical waste management. An overall 59% of the study subjects identified that infectious bio degradable waste are discarded in yellow bag correctly and when this practice was compared with the different educational level it was found to be statistically insignificant with p value 0.07. Of all 41.5% of the study subjects disposed infectious non-biodegradable waste in red coloured bag. When this practice was compared with the different educational level it was found to be statistically significant with p value <0.04. An overall 34.5% of the study subjects disposes the developer solution after diluting it. When it was compared with the different educational level it was found that interns were following better practice in this regard than any other educational level in dentistry with significant p value. An overall 38.5% of the study subjects practices storage of excess silver amalgam in airtight container and with water. When this practice is compared with the different educational level it was found to be statistically significant with p value <0.04. Regarding the disposal of sharp wastes like needle, only 38.5% use puncture proof plastic containers to dispose the needles and sharp and when this practice is compared with the different educational level it was found to be statistically significant with p value <0.02.An overall 47% of the subjects knew that outdated and contaminated medicine are disposed in secured land fills. When this practice is compared with the different educational level it was found to be statistically significant with p value <0.02.An overall 72.5 % of the study subjects would practice the final disposal of dental waste through certified collectors. When this practice was compared with the different educational level it was found to be statistically not significant with p value 0.08.

Table 1: Shows the knowledge regarding biomedical waste among the study subjects.

Sr. No	Knowledge Questions	QUALIFICATION						P value
			3rd year (%)	Final year (%)	Interns (%)	Pg(%)	Overall (%)	
1	Are you aware of the term ‘biomedical waste’?	Yes No Don’t know	84.5 12.0 3.5	86.7 5 8.3	98.1 1.9 0	100 0 0	91	0.01
2	Are you aware that biomedical waste management rules are applicable to dentists?	Yes No Don’t know	72.4 8.6 19	63.3 16.6 20.1	94.2 1.9 3.9	93.3 3.3 3.4	78.5	0.01
3	Is Bio-medical waste (BMW) transmits infectious diseases like HIV/Hepatitis?	Yes No Don’t know	81 12.0 7	88.3 6.6 5.1	92.3 3.8 3.9	96.7 0 3.3	88.5	0.02
4	Does your institute have a certified biomedical waste carrier services to recycle or dispose the waste?	Yes No Don’t know	32.7 18.9 48.4	61.7 18.3 20	75 13.4 11.6	93.3 3.3 3.4	61.5	0.02
5	Is maintaining BMW records mandatory in hospitals/ clinic?	Yes No Don’t know	29.3 20.7 50	68 8.3 23.7	73 9.6 17.4	96.7 0 3.3	59	0.02
6	Are you aware of colour coding of waste containers?	Yes No Don’t know	53.4 25.9 20.7	51.7 21.7 26.6	61.5 3.8 34.7	80 6.6 13.4	59	0.03
7	Do you know that waste should not be stored > 48hrs?	Yes No	22.4 12.0	56.7 11.6	71.2 9.6	83.3 6.6	54.5	0.02

		Don't know	65.6	31.7	19.2	10.1		
8	Do you think that labelling the container before filling it with waste is of any clinical significance?	Yes No Don't know	29.3 17.2 53.5	63.3 11.7 25	75 5.8 19.2	93.3 3.3 3.4	61	0.04
9	Do you consider needle stick injury to be a concern?	Yes No Don't know	55.2 29.3 15.5	76.7 13.3 10	90.4 1.9 7.7	100 0 0	77.5	0.03
10	Are you aware that pollution control board of India regulates for safe transport of health care waste?	Yes No Don't know	29.3 17.2 53.5	38.3 46.7 15	75 21.2 3.8	73.3 16.7 10	50.5	0.03

Table 2: shows the attitude regarding biomedical waste management among the study subject.

S/no.	Attitude Questions	Qualification						p value
			3rd year (%)	Final year (%)	Interns (%)	Pg(%)	Overall (%)	
1	Segregation of waste must be done at the point of generation?	Yes No Don't know	60.3 20.7 19	75 20 5	86.5 11.5 2	90 10 0	76	0.04
2	Non-Segregation of waste at sources increases the risk of injury to waste handlers	Yes No Don't know	72.4 10.3 17.3	88.3 8.3 3.4	96.2 1.92 1.9	96.7 0 3.3	87	0.05
3	Decontamination/disinfection reduce chances of infection	Yes No Don't know	55.2 29.3 15.5	76.7 13.3 10	90.4 1.9 7.7	96.7 3.3 0	77	0.03
4	Prophylactic measures are very important preventive care in controlling hospital acquired infections?	Yes No Don't know	29.3 17.2 53.5	60 11.6 28.4	69.2 5.76 25.1	93.3 3.3 3.4	58.5	0.05
5	Reporting of needle stick injury is an extra burden on work	Yes No Don't know	5.1 27.5 67.4	15 58.3 26.7	5.8 71.1 87.1	3.3 90 6.7	9	0.02

Table 3: Shows the Practices regarding biomedical waste management among study subjects.

Q /no.	Practices towards biomedical waste management (correct answers are underlined in the following questions)	Educational levels					p value
		3rd year (%)	Final year (%)	Interns (%)	Pg (%)	Overall (%)	
1	Infectious biodegradable waste disposed in? (a***Yellow*** (bRed (cBlue (dBlack	63.8	46.7	59.6	73.3	59	0.07
2	Infectious non- biodegradable are disposed of in (aYellow (b***Red*** (cBlue (dBlack	43.1	30	26.9	36.7	41.5	0.04
3	Disposal of hazardous solution(developer solution) a)directly to drain b)diluted and then led to drain c)return it back to supplier d)don't know	31	33.3	38.5	36.7	34.5	0.02
4	Storage of excess silver amalgam a)dispose to common bin b)store in an air tight container c)***store in air tight container with water*** d)store in fixer	37.9	35	44.2	63.3	38.5	0.04
5	Disposal of infectious sharp waste like needle or files a)dispose to common bin b)break the needle and then dispose c)destroy the needle with needle burner	17.2	15	67.3	76.7	38.5	0.02

	d)***dispose in a puncture proof plastic container***						
6	Disposal of outdated and contaminated medicines a. common bin b.deform and disposed c.buried in soil d.***disposed in secured landfill***	24.1	50	55.7	70	47	0.02
7	Final disposal of dental care waste a.corporation bin b.***certified collectors***	62	65	76.9	100	72.5	0.08

DISCUSSION

In the persuasion of the aim of reducing health problems, eliminating potential risks and treating sick people, healthcare services inevitably create waste which itself may be hazardous to Health. The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences on humans and a significant impact on the environment as well. Hospitals and other healthcare establishments have a "duty of care" for the environment and for public health and have particular responsibilities in relation to the waste management. It is ironical that the very hospital that brings relief to the sick, can create health hazard for hospital staff, patients and as well as the community at large. Safe management of healthcare waste becomes very important when it comes to environment conservation and health of the community.

Hospital waste management is a significant environmental and social obligation and hence requires a proper plan or protocol. The hospital waste management plans are devised to incorporate a standard protocol for effective management of waste disposal. Infectious, chemical, and hazardous contents in dental health care waste make its management very complex. Poor dental waste management exposes the workers of health care facility, waste handlers and community as a whole to infection, toxic effect and injury. Lack of information continues to lead dental professionals to contribute to environmental degradation. The present study analyzed knowledge, attitude and practice regarding the existing health care waste management status of the Buddha Institute of Dental Sciences and Hospital, Patna, Bihar.

In the present study a total of 200 students participated, of which 24% were males and the rest 76% were females which is consistent with the fact that, in India, the profession of dentistry is largely occupied by females students.

Regarding the awareness of the term 'Bio-Medical Waste' among the dental students, it was found that 91% of the study subjects were aware of it. These results are in congruence with previous studies of N Anshika Riswana et al (94.5%)[4], Usha GV et al (98%)[2]; Chudasama et al (95.4%)[5] and Madhavi et al (94.8%)[6]. It can be justified that the academic curriculum introduces the topic of Bio medical waste and its management which reflects the increased awareness among the study subjects.

In the present study, 78.5% of the respondents were aware of the fact that biomedical waste management and handling rules were applicable to dentists who perform clinical duties. The results of which are in accordance with Sanjeev R et al (72%)[3], Sood et al (80%)[7] and Narang et al (75%)[8]. This may be attributed to the fact that dental institutions in this country are governed by strict rules (From Pollution Control Board) in handling bio medical waste. And this institution enforces the students to be aware of the fact and follow the guide lines laid by the service provider who handles bio medical wastes. Thus justifies the increase awareness among the study subjects. Among third years students, the awareness is less as they are not much exposed to the clinical work.

It is an important observation that about 88.5% of the respondents considered that biomedical waste transmits infectious disease like HIV or hepatitis. The result conducted among dental health care personnel in three private dental colleges in Delhi by Sood et al was (60%)[7] and Sanjeev R et al (75%)[3]. It can be justified that the higher prevalence of infectious disease like HIV, hepatitis could have influenced their understanding that all biomedical waste can pose a higher risk of developing these common diseases.

It was alarming that in the present study only 56.5% dental students were aware of maintaining a record of biomedical waste disposal as mandatory. In Contrast, the study done by Kaushal Chaudhari et al[13] showed higher percentage with 80.4%. This may be due to ineffective implementation of rules in various hospitals/ clinics by the monitoring authorities.

In the present study, 77.5% subjects agreed on that the needle stick injury is a concern, which is in accordance with the study done by Manchanda et al in Himachal Pradesh (62.8%)[1]. Needle stick injuries are quite frequent in clinical scenario and it is more of a concern with waste handlers, dentists and health care workers, So proper disposal of sharps are very important. Many diseases like hepatitis, AIDS have rich potential of being transmitted so knowledge on the type of needle injuries, patient's history, handling procedures, reporting and maintaining of records are very important. The frequent nature of the occurrence and the damage it can cause in-

terms of deadly diseases which can be contracted has made the subjects to realize the importance of needle stick injuries which justifies the higher knowledge among the study subjects. In a study done by Usha G V et al[2], 94.3% were concerned about needle stick injury.

In the present study, 50.5% of them had the knowledge of Pollution control board of India regulates for safe transport of health care waste which is in accordance with the study done by Usha G V et al (54.3%)[2]. Waste handling is very important measure which has to be regulated seriously because understanding the after effects it can have on humans and the environment at large can be devastating in terms of developing new diseases and contamination. The responsibility which rests on concerned body enforces strict rules on all the bodies or institutions which generate the bio medical waste. So knowledge on who regulates the waste can put the clinician to be aware of how to handle, dispose and decrease environmental burden.

Attitude of the subjects is of paramount importance in the process to change. Simple actions thought towards it can influence a lot on the outcome. Segregation is a very important step in the process of waste management. Steps taken at the point of generation make the process of handling waste a lot easier thereby ensures effective disposal methods faster. In the present study, 76% agreed to the fact that segregation should be done at the point of generation. Studies done by N Anshika Rizwana et al[4] showed lesser percentage with 59% and BS Mannapur (22.95%)[14]. Whereas the studies done by Madhukumar S and Ramesh G [15] at Bangalore showed higher percentage with 87.5% for the same.
87% subjects knew the non-segregation of waste at source would increases the risk of injury to waste handlers which only reflect the knowledge acquired through academic interest. This knowledge helps the person to move towards the change in behavior when they deliver oral health care. In contrast study done by Manchanda et al[1] showed poor awareness (32.7%).

77% of the subjects agreed that decontamination /disinfection reduces the chances of infection which is in accordance with the study done by Manchanda et al[1] (89%). The process of decontamination or disinfection is a well known entity were bacterial load of an infected object can be reduced drastically. This phenomenon decreases the risk of developing a disease thereby it improves the environment we live in.

In the present study, majority of the subjects (56%) agreed that prophylactic measures are important in controlling hospital acquired infection. A similar study done by Usha GV et al[2] also strongly agreed on that as in the course of curing health problems the health care sector produce huge amount of biomedical waste which may be hazardous to all those who come in contact with this waste so to overcome this situation, prophylactic measures are the imminent step to be taken in this diverse range of health care facilities.

In the present study, 9% of study subjects reported needle stick injury is an extra burden on work, which is in accordance with Manchanda et al[1] only 5.7% subjects used to follow the system of recording and reporting needle stick injuries/accidents. Low reporting of injuries may be attributed to the fact that most of the dental students are unaware about a formal system of injury reporting which should be established within all the health facilities. Studies done by Malini et al[9] and Ismail et al[10] showed higher percentage with 88.9% and 72.7% respectively.

Practice means contemplation of rules and knowledge that lead to action thus, a right knowledge, a positive attitude and a good practice are imperative to guide and serve the patients.

59% of the subjects identified that bio degradable waste are discarded in yellow bag correctly. This could be explained by the fact that there is good of knowledge about the categories of the waste and color coding system of the waste disposal among the students of this institution. Studies of N Anshika Rizwana et al (45%)[4], Ismail et al (46.6%)[10] showed poorer awareness in relation to the correct color coding of bag for disposal. 41.5% of the respondents disposed non biodegradable waste in red coloured bag which was right way to dispose the waste.

Used developer solutions are typically considered non-hazardous waste because their silver content is usually below the regulatory level of 5 mg/L. In most jurisdictions, the solution may be disposed of in the municipal sewer system if the pH is within 6 to 10. The ideal method of disposal after diluting the developer solution was followed by only 34.5% of the participants in this study. Which is lesser in percentage compared with the study Usha GV et al (46%)[2] and Keshav R et al (50.8%)[12].

As a bio-hazardous material, injuries from sharps waste can pose a large public health concern. Sharps waste is of great concern in developing and transitional regions of the world. Factors such as high disease prevalence and lack of health care professionals amplify the dangers involved with sharps waste, and the cost of newer disposal technology makes them unlikely to be used. 38.5% of the study participants dispose the needle in a puncture proof plastic container which is an ideal method. Whereas lesser percentage is found when compared with the study done by Usha G V et al (35.5%)[2] and higher in Malini A et al (63%)[8]. It is of note that in India there is need of monitoring in terms of practice to ensure the proper disposal of sharp waste happens.

Only 47% disposes the outdated and expired medicines in a secure landfill which is the ideal and safe method for disposal, which in conformity with the study done by Usha G V et al (31%)[2]. This clearly shows that the participants have inadequate knowledge regarding disposal of outdated and contaminated medicine which warrant further continued education programs in these population.

However, a very positive attitude towards healthcare waste management is highlighted by the observation that over 99% of the respondents felt that the topic should compulsorily be made part of the dental undergraduate curriculum, over 52% of the respondents felt that their knowledge regarding the same was inadequate and over 82% were interested in receiving further training on the same. These results were in conformity with the study done by Malini A et al (100%)[8] and Ismail IM et al (76.6%).[10]

The results of the study revealed that the students were well aware that the dental hospitals/clinics generate BMW and that improper waste management can cause various health hazards. The findings of the study suggest that there is an urgent need to train and educate the students in the dental colleges of Patna through extensive training and re-training programmes. Furthermore, it is also suggested that a proper waste management and infection control educational programme should be included in the curriculum for dental education so as to give due importance to this vital issue. Because the study was confined to one major region of North India, further regional studies are required on a larger population to generalize the results, in the formulation and implementation of BMW guidelines. The topic is very relevant to all countries and it is suggested that all public and private healthcare providers should audit the BMW knowledge and practices of their staff at regular intervals. The results of this study will help the hospital authorities to develop a strategy for improving BMW management. BMW management programmes cannot be successfully implemented without the effective knowledge, willingness, motivation, and co-operation from all sections of employees of any health care setting. A "cradle to grave" approach should be followed in regard to the collection, transportation, treatment and disposal of BMW. There needs to be a sensitization of students to this issue coupled with effective implementation of rules (such as surprise visits from monitoring authorities and performance based incentives that will facilitate successful implementation of the programme), which is vital for better outcome in future.

CONCLUSION

The results of this study have demonstrated a variation in the knowledge, attitude and practices in most aspects of biomedical waste management and infection control among dental students in this dental institution in Patna city. The importance of training regarding biomedical waste management cannot be overemphasized; lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal. It is imperative that waste should be segregated and disposed off in a safe manner to protect the environment as well as human health. It was observed that knowledge, attitude and practices of the study subjects was proportional to their different levels of education.

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