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Healthcare Waste Management in A Common Biomedical Waste Treatment Facility in Hyderabad

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ABSTRACT

A Common Biomedical Waste Treatment Facility (CBWTF) is a specialized facility designed for the treatment and disposal of waste generated by healthcare establishments. This study investigates the impact of demographic features of waste handlers on their Knowledge, Attitude, and Practices (KAP) within a Common Biomedical Waste Treatment Facility (CBWTF) in Hyderabad. ANOVA test was used to explore whether demographic characteristics play a significant role in shaping KAP among staff in the waste treatment facility. To delve deeper into the relationships between Knowledge, Attitude, and Practices, the Chi-square test was employed to study the association among these variables. The results demonstrated a strong and statistically significant association between these three variables, indicating that variations in one of these aspects likely to be reflected in the others. This suggests a holistic and interconnected approach is needed when designing interventions or strategies to enhance KAP among the CBWTF staff.

Keywords: CBWTF, Healthcare Waste, Biomedical Waste, KAP Study

INTRODUCTION

In India, the management of healthcare waste is a critical aspect of public health and environmental sustainability. The Common Biomedical Waste Treatment Facilities (CBWTF) play an important role in addressing the challenges associated with the disposal of medical waste. These facilities serve as centralized hubs equipped with advanced technologies to efficiently treat and manage biomedical waste generated by healthcare establishments. By providing centralized infrastructure for the treatment of healthcare waste, these facilities contribute significantly to the reduction of potential health hazards, promoting a cleaner and healthier environment for communities across the nation.

The waste handlers working in these outsourced agencies require special attention, as they are more prone to injuries and infections due to lack of knowledge. Though this is an important aspect, academic work on this aspect is not adequate. This study aims to provide a thorough examination of the CBWTF and its waste handlers.

REVIEW OF LITERATURE

Kamalakanta Muduli and **Akhilesh Barve (2012)** explored the healthcare waste management practices in the healthcare sector and identified key challenges faced by healthcare units. **Vishal Bathma et al.** in **2012** examined the awareness of hospital staff regarding biomedical waste management in a specialty care hospital in Bhopal. The research identified that doctors possessed strong theoretical knowledge regarding legislation and public health, while nurses exhibited good practical knowledge. Nosocomial infections, many of which are transmitted from patient to patient by poorly sanitized hands of healthcare staff and improper biomedical waste management pose a risk to the patients and the community (**Jyotsna S Deshmukh et al, 2013**).

In a study conducted by **Sudeep et al. in 2017**, the biomedical waste management practices in a dental college in Kerala were assessed. The study participants consisted of nurses and dental interns, and a pre-designed questionnaire was administered to gather data. The findings revealed that both groups, on average scored similarly across all aspects of knowledge, attitude, and practices related to hospital waste. However, it was observed that the interns generally had better scores compared to the nurses. The study also highlighted that the lower awareness among the staff directly influenced their waste disposal practices.

Management of hazardous waste poses a significant challenge to a common biomedical waste treatment facility (CBWTF). **Thakur and Anbanandam (2017)** conducted a study to examine the existing practices of hospital waste disposal. Data

was collected over two years. The waste generated during the two-year timeframe exhibited consistent trends, reflecting fluctuations corresponding to seasons and patterns related to illness.

SIGNIFICANCE OF THE STUDY

Common Biomedical Waste Treatment Facility (CBWTF) in India holds paramount significance in the systematic management of biomedical waste generated by healthcare establishments. Serving as a centralized hub, it plays a pivotal role in preventing environmental contamination and safeguarding public health. These facilities employ advanced technologies for treatment, promoting a more sustainable approach to waste management. By streamlining the process, it makes waste management efficient and cost-effective. Investigating the processes and practices within CBWTF allows for an assessment of compliance with regulations. Furthermore, the research sheds light on the knowledge, attitude, and practices of waste handlers of CBWTF.

OBJECTIVES

The study was conducted with the following objectives

1. To assess the influence of the demographic profile of waste handlers on their knowledge, attitude, and practice levels.
2. To study the relationship between knowledge-attitude, attitude-practice, and knowledge-practice of biomedical waste management.
3. To identify specific areas where waste handlers may lack sufficient knowledge or exhibit sub-optimal practices.

HYPOTHESES

- The demographic profile of CBWTF waste handlers has no significant impact on their knowledge, attitude, and practice scores.
- There is a lack of substantial relation between the knowledge-attitude, attitude-practice, and knowledge-practice of biomedical waste management among the staff at the Common Biomedical Waste Treatment Facility (CBWTF).

RESEARCH METHODOLOGY

Type of Research

It is a cross-sectional study. Both primary and secondary data were used for the study. Primary data was directly collected from the waste handlers of the CBWTF, whereas secondary data was collected from journals and books.

Data Collection Tools

An interview schedule was used to collect data from the waste handlers of CBWTF. All the 72 waste handlers working in the CBWTF were included in the study. A pilot study was conducted on 22 CBWTF staff. The Crohnbach's alpha value was found to be 0.781 indicating a high degree of internal consistency. The remaining 50 waste handlers were administered with the interview schedule. The interview schedule had four sections, demographic profile, knowledge variable, attitude variable, and practice variable. The knowledge section contained 8 questions, the attitude section contained 7 questions and the practice section contained 6 questions. The responses for these sections were given on a 5-point Likert Scale.

Data Analysis Tools

The collected data was carefully tabulated, analyzed, logically examined, and inferred. A statistical tool like ANOVA was used to examine the influence of demographic factors on the KAP scores of waste handlers. The chi-square test was used to check the association between knowledge, attitude, and practice variables.

Scope and Period of the Study

The CBWTF is one of the four CBWTFs operating in Hyderabad. The study was conducted during June 2022-August 2022.

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DATA ANALYSIS AND INTERPRETATION

The demographic profile of a population can play a crucial role in shaping knowledge, attitudes, and practices across various domains. Understanding demographic characteristics helps in designing interventions to effectively engage and address the needs of specific groups.

Table -1: Impact of demographic profile on KAP scores of CBWTF waste handlers

Particulars	Category	f-value(K)	p-value(K)	f-value(A)	p-value(A)	f-value(P)	p-value(P)
Age	less than 25 years 25-35 years 35-45 years more than 45	1.252	0.302	1.395	0.256	0.235	0.872
Gender	Male Female	0.391	0.555	3.404	0.071	0.006	0.938
Educational Qualification	Below 5^{th} 5^{th} to 10^{th} Above 10^{th}	0.661	0.521	0.611	0.547	0.480	0.622
Experience	less than 2 years 2-5 years 5-10 years more than 10 years	0.292	0.831	1.066	0.373	2.072	0.117
Marital Status	Single Married	0.643	0.427	1.124	0.294	0.395	0.533
Monthly income	less than 5,000 more than 5,000	2.579	0.115	2.591	0.114	0.376	0.543

Source: primary data ** significant at 1%

Table 1 presents the impact of the demographic profile of CBWTF waste handlers on their knowledge, attitude, and practice scores. There is no significant difference in knowledge scores of CBWTF staff based on their demographic profile. The possible reason could be all the CBWTF staff receive the same level of training on biomedical waste management practices regardless of their demographic profile. Hence it is likely that they will have similar levels of knowledge.

There is no significant disparity in the attitude levels of CBWTF staff based on their demographic profiles. The workplace culture at the CBWTF may be such that all staff members, irrespective of their demographic profiles, share similar values and beliefs. This can create a sense of unity and shared purpose among staff members, leading to similar attitudes towards their work and their facility's objective.

There is no notable variation in the practices of CBWTF staff based on their demographic profile. Biomedical waste treatment facilities are subject to strict requirements. These requirements apply to all staff irrespective of their demographic profile. All the staff are supposed to follow the standard operating procedures. This can lead to similar practices.

Table 2: Relationship between Knowledge and Attitude of CBWTF Staff Concerning Bio-medical Waste Management

Knowledge	Attitude			Total
	Low	Medium	High	
Low	6 (85.7)	4 (14.3)	0 (0.0)	10 (20.0)
Medium	1 (14.3)	21 (75.0)	8 (53.3)	30 (60.0)
High	0 (0.0)	3 (10.7)	7 (46.7)	10 (20.0)
Total	7 (14.0)	28 (56.0)	15 (30.0)	**50** **(100.0)**

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	Chi sqr:30.10**, df:4, T- value:13.3

Source: Primary Data **significant at 1% level

Table 2 reveals the relationship between knowledge and attitude of CBWTF staff concerning biomedical waste management. Knowledge and attitude are closely linked. By examining the relationship between these two, we can identify knowledge gaps, develop effective interventions, and improve decision-making. An analysis of the data furnished in the table reveals that as many as 60.0 % of the CBWTF staff have average knowledge, whereas 20.0 % have extensive knowledge and 20 % have limited knowledge. On the other hand, a predominant group of 56 % of the CBWTF staff have moderate attitudes towards Bio-medical Waste Management, but 30 % have favorable and 14 % have unfavorable attitudes in this regard. As per the cross-distribution of knowledge and attitude of CBWTF staff towards Bio-medical Waste Management, the computed chi-square value 30.10 is found significant at the 1% level because the df is 4 and the table value is 13.3. This indicates that there is a substantial association between knowledge and attitudes of CBWTF staff towards Bio-medical Waste Management, where higher knowledge indicates better attitude and vice versa.

Table 3: Relationship between Attitude and practices of CBWTF Staff Regarding Bio-medical Waste Management

Attitude	**Practices**			**Total**
	Low	**Medium**	**High**	
Low	3 (33.3)	4 (12.9)	0 (0.0)	7 (14.0)
Medium	4 (44.4.0)	24 (77.4)	0 (0.0)	28 (56.0)
High	2 (22.2)	3 (9.7)	10 (100.0)	15 (30.0)
Total	9 (18.0)	31 (62.0)	10 (20.0)	**50 (100.0)**
	Chi sqr:32.96 **, df:4, T- value:13.3			

Source: Primary Data **significant at 1% level

Table 3 reveals the relationship between attitude and practice of CBWTF staff concerning biomedical waste management. Attitude and practice are two related but distinct concepts, and there is often a complex relationship between them. Attitude refers to an individual's feelings about a particular action whereas practice refers to the action itself. The data shows that a predominant group of 56.0 % have a moderate attitude towards Bio-medical Waste Management, but 30.0 % have favorable and 14.0 % have unfavorable attitudes in this regard. On the other hand, a predominant group of 62 % of the CBWTF staff exhibited average practices towards Bio-medical Waste Management, whereas 20 % exhibited superior practice and 18 % exhibited a low level of practice in this regard. As per the cross-distribution of attitude and practice of CBWTF staff in Bio-medical Waste Management, the derived chi-square value 32.96 indicates significance at the 1% level because the df is 4 and the table value is 13.3. This infers that there is a noteworthy association between the attitude and practices of CBWTF staff in Bio-medical Waste Management, where the higher the attitude, the better will be the practices and vice-versa.

Table 4: Relationship between Knowledge and Practices of CBWTF Staff Regarding to Bio-medical Waste Management

Knowledge	**Practices**			**Total**
	Low	**Medium**	**High**	
Low	2 (22.2)	8 (25.8)	0 (0.0)	10 (20.0)
Medium	7 (77.8)	19 (61.3)	4 (40.0)	30 (60.0)
High	0 (0.0)	4 (12.9)	6 (60.0)	10 (20.0)
Total	9 (18.0)	31 (62.0)	10 (20.0)	**50 (100.0)**

	Chi sqr:14.27**, df:4, T- value:13.3

Source: Primary Data **significant at 1% level

Table 4 reveals the relationship between knowledge and practice of CBWTF staff concerning biomedical waste management. Knowledge and practice are related. Knowledge can influence practice whereas, practice can reinforce knowledge. Studying the association between knowledge and practice is important for promoting behavior change, and improving outcomes. An analysis of the provided data in the table shows that as many as 60.0 % of the CBWTF staff have average knowledge levels, whereas 20.0 % have superior knowledge levels and 20 % have basic knowledge. On the other hand, a predominant group of 62 % of the CBWTF staff exhibited moderate practice towards Bio-medical Waste Management, 20 % exhibited proficient practice and 18 % exhibited elementary practice in this regard. As per the cross-distribution of knowledge and practices of CBWTF staff towards Bio-medical Waste Management, the calculated chi-square value 14.27 indicates significance at 1% level because the df is 4 and the table value is 13.3. This indicates a statistically significant correlation between knowledge and practice, highlighting the interdependence, where the higher the knowledge, the better will be the practice, and vice-versa.

MAJOR FINDINGS

1. It was found that 20% of CBWTF staff had limited understanding, 60% had average understanding and 20% had advanced understanding regarding various aspects of managing hospital waste. 14% had poor attitude, 56% exhibited moderate attitude and 30% had a very positive attitude. 18% followed poor practices, 62% maintain average standards in practices, and 20% follow best practices.
   Effective management of waste is of utmost importance in CBWTF as it plays a vital role in preventing the transmission of infections and safeguarding the environment. The fact that the majority of the CBWTF staff had only medium levels of knowledge, attitude, and practices of biomedical waste management is concerning as it indicates that there is room for improvement in this area.
2. The staff lack clarity on the appropriate disposal methods and many staff considered biomedical waste management as an additional burden on their existing work load, which is a serious issue and should be immediately addressed by the authority.
3. Many staff are putting their hands below the bags while carrying the bags. This can lead to needle stick injuries.

SUGGESTIONS

1. Regular comprehensive training programs should be provided on waste handling and disposal procedures. This should include information on potential health risks associated with improper waste management and needle stick injuries.
2. Visual aids such as posters, charts, and videos should be used to enhance understanding.
3. A feedback mechanism should be established where waste handlers can provide input on the effectiveness of training programs and suggest improvements.
4. Surprise audits should be conducted to assess compliance with waste management protocols.

CONCLUSION

Knowledge, attitude, and practice (KAP) studies are significant in healthcare because they provide valuable information on people's understanding, beliefs, and behaviors related to health issues. It provides valuable insights into people's knowledge, attitudes, and practices on a particular topic. This information can help healthcare providers design effective interventions, educate the public, and improve health outcomes.

In this study, the demographic features had no impact on the KAP scores of CBWTF staff. This could be because of homogenous workplace culture where; all the staff members share similar values and beliefs irrespective of their demographic profile. Another possible explanation is all the CBWTF staff members might have received equal level of training. Thereby exhibiting similar knowledge, attitude and practices regardless of their background. Areas with

deficiencies in staff knowledge, attitude, and practices were identified. Intervention programs should target these specific areas for improvement.

UTILITY OF THE STUDY

While there are many studies on biomedical waste management, there are relatively very few studies that specifically focus on common biomedical waste treatment facilities (CBWTF) and their waste handlers. This may be due in part to the fact that waste handlers in CBWTF are often overlooked in favor of studying the other aspects of biomedical waste management, such as segregation, storage, and treatment. This study has a significant contribution to the current knowledge base by providing valuable insights into the working conditions, knowledge, attitude and practices, training needs, and safety of waste handlers. This information can be used to improve the design and operations of CBWTF and promote better working conditions for the waste handlers and as a whole ensure safe and effective waste management.

SCOPE FOR FURTHER RESEARCH

While the study offers a thorough examination of healthcare waste management within a Common Biomedical Waste Treatment Facility, it also creates opportunities for additional research. A comparative study between multiple CBWTFs can be conducted to analyze the variations in waste management practices and KAP levels of waste handlers. This can provide a broader understanding of the effectiveness of different facilities and identify best practices. A longitudinal study also can be undertaken to assess the impact of training programs on the waste management practices of waste handlers over time. This can help in evaluating the sustainability and long-term effectiveness of implemented measures.

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