Hepatitis B and Hepatitis C Occurrence and Risk Factors in Medical Waste Handlers in Tertiary Care Hospitals at District Bajaur

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LINK MEDICAL INTERFACE

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ABSTRACT

Background: Viral hepatitis remains a significant global health issue, particularly among healthcare workers exposed to infectious materials. Medical waste handlers are at heightened risk due to their occupational exposure to blood-borne pathogens.

Objective: To determine the prevalence of Hepatitis B and C among medical waste handlers in tertiary care hospitals in District Bajaur, Pakistan, and identify associated occupational risks.

Methods: A descriptive cross-sectional study was conducted over four months in three hospitals in District Bajaur. Fifty medical waste handlers, including males and females of all ages, were recruited. Blood samples were collected and screened for Hepatitis B and C using Immunochromatographic Test (ICT) kits. Data analysis was performed using SPSS version 25, with results presented as frequencies and percentages.

Results: Of the 50 participants, 98.0% were male. Hepatitis B was found in 4.0% (n=2), and Hepatitis C in 6.0% (n=3) of participants. Injuries during waste handling were reported by 62.0% (n=31), and only 14.0% (n=7) always used personal protective equipment.

Conclusion: The study identified a significant prevalence of Hepatitis B and C among medical waste handlers, underscoring the need for improved safety protocols and infection prevention measures in healthcare settings.

INTRODUCTION

The prevalence of infectious diseases such as viral hepatitis, HIV, and tuberculosis continues to pose significant public health challenges globally, particularly in healthcare settings where medical waste handlers are exposed to blood-borne pathogens due to the nature of their work (1). Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are of particular concern as they are major causes of severe liver diseases, including cirrhosis and hepatocellular carcinoma, and can result in both acute and chronic health outcomes (2). These viruses can be transmitted through contact with infected blood or body fluids, needle-stick injuries, or sharing of personal items such as razors, making medical waste handlers vulnerable to infection due to their occupational exposure (3). It is estimated that over 2 billion people worldwide have been infected with HBV, with approximately 350 million chronic carriers, leading to over one million deaths annually (4). The global epidemiology of HBV varies significantly, with regions classified as high, moderate, or low prevalence based on infection rates, highlighting the importance of localized studies to understand and mitigate risks in specific populations (5).

The burden of hepatitis infections is particularly severe in underdeveloped regions, where public health resources are limited, and vaccination coverage may be inadequate. In 2015, it was estimated that 257 million people globally were living with chronic HBV, representing 3.5% of the world's population (6). HBV and HCV remain significant public health problems, particularly in regions with high endemicity, such as sub-Saharan Africa and Asia, where infection rates among healthcare workers and medical waste handlers are notably high (7). In Pakistan, the prevalence of HBV and HCV infections is also concerning, with an estimated 12 million people affected by HBV, and the country is ranked second globally for HCV prevalence after Egypt (8). A national survey conducted in 2007-2008 reported a population prevalence of 4.9% for HCV and 2.5% for HBV, indicating a substantial burden of viral hepatitis in the general population (9).

Medical waste handlers are at increased risk of exposure to HBV and HCV due to frequent contact with potentially contaminated materials, such as needles, surgical instruments, and other medical waste that may harbor infectious agents (10). The transmission risk is compounded by inadequate use of personal protective equipment (PPE) and insufficient training on infection prevention measures, which are common issues in resource-limited settings (11). Despite the known risks, there is limited data on the prevalence of HBV and HCV among medical waste handlers in many regions, including Pakistan, where healthcare-associated infections are a major concern (12). Studies from other countries have shown variable prevalence rates among medical waste handlers, underscoring the need for

targeted interventions to reduce occupational exposure and improve health outcomes (13).

This study aimed to determine the prevalence of HBV and HCV among medical waste handlers in tertiary care hospitals in District Bajaur, Pakistan, and to identify the associated risk factors. By screening medical waste handlers for HBV and HCV, this research seeks to contribute to the existing body of knowledge on the occupational risks faced by these workers and to highlight the importance of preventive measures such as vaccination, use of PPE, and proper waste management protocols to reduce the transmission of viral hepatitis within healthcare settings (14). The findings of this study underscore the critical need for enhanced safety protocols and targeted interventions to protect medical waste handlers, who play a vital role in maintaining healthcare hygiene and safety (15).

MATERIAL AND METHODS

The study was conducted as a descriptive cross-sectional survey in three tertiary care hospitals located in District Bajaur, Khyber Pakhtunkhwa, Pakistan, specifically at DHQ Hospital Khar Bajaur, Pashat Hospital Bajaur, and Chorak Hospital Bajaur. The research spanned a duration of four months and aimed to assess the prevalence of Hepatitis B and C among medical waste handlers. A total of 50 participants, both male and female of all ages who were actively engaged in handling medical waste in these hospitals, were recruited for the study. Individuals who were already diagnosed with Hepatitis B or C, as well as those unwilling to provide samples, were excluded from the study. Informed consent was obtained from all participants prior to their inclusion in the study, ensuring compliance with the ethical guidelines set forth by the Declaration of Helsinki.

Data collection was performed using a structured questionnaire designed to gather demographic information, work-related details, and potential exposure risks from the participants. Blood samples were collected aseptically using sterile syringes and placed into gel tubes for further processing. Each sample tube was labeled appropriately to maintain accurate identification. The blood samples were then transported in a cold box to the laboratory at Bajaur District Hospital, where they were stored at -20°C until analysis. The sera were separated from the blood samples through centrifugation and subsequently screened for the presence of hepatitis B surface antigen (HBsAg), hepatitis B core antibody (total anti-HBc), hepatitis B surface antibody (anti-HBs), and markers for Hepatitis C using Immunochromatographic Test (ICT) kits following the manufacturer's instructions.

Quality control procedures were adhered to by re-testing any samples that initially tested positive to confirm the results. A procedural control band (C line) was utilized in all ICT assays to validate the accuracy of the results obtained. Data analysis was conducted using SPSS version 25, with descriptive statistics employed to calculate frequencies and percentages of HBV and HCV positivity among the study participants. Ethical approval for the study was obtained from the relevant institutional review boards, and all procedures involving human participants were performed in accordance with the ethical standards of the institutional and national research committees, as well as the 1964 Helsinki Declaration and its later amendments (1).

The study aimed to provide a detailed account of HBV and HCV prevalence among medical waste handlers, identify the associated occupational risks, and emphasize the necessity for improved safety measures to mitigate these risks in healthcare settings. By systematically collecting and analyzing data, the study sought to inform strategies for reducing the transmission of blood-borne pathogens among a vulnerable group of healthcare workers (2).

RESULTS

The study included 50 participants, predominantly male, as shown in Table 1, which summarizes the gender distribution among medical waste handlers. The vast majority were male, comprising 98.0% (n=49) of the sample, with only one female participant (2.0%). This demographic highlights the gender disparity in medical waste handling roles within the healthcare facilities studied.

Table 1: Gender of Participants

Gender	Frequency	Percent (%)
Male	49	98.0
Female	1	2.0

When assessing the prevalence of Hepatitis B and C among the participants, the data indicated a relatively low rate of infection. As shown in Table 2, 4.0% (n=2) of the participants tested positive for Hepatitis B, while the remaining 96.0% (n=48) were negative. Similarly, Table 3 presents the findings for Hepatitis C, with 6.0% (n=3) of the participants testing positive, and the remaining 94.0% (n=47) testing negative. These results suggest that although the prevalence of Hepatitis B and C among medical waste handlers is not exceedingly high, it is nonetheless significant given the occupational risks associated with waste handling.

Injury during the handling of medical waste was another critical aspect of the study, as summarized in Table 4.

Table 2: Hepatitis B Status

Status	Frequency	Percent (%)
Positive	2	4.0
Negative	48	96.0

Table 3: Hepatitis C Status

Status	Frequency	Percent (%)
Positive	3	6.0
Negative	47	94.0

A notable 62.0% (n=31) of the participants reported experiencing injuries while handling waste, whereas 38.0% (n=19) reported no injuries. This high incidence of injuries underscores the occupational hazards faced by medical waste handlers and highlights the need for enhanced safety measures and training to prevent such occurrences.

Table 4: Injuries During Handling

Injury During Handling	Frequency	Percent (%)
Yes	31	62.0
No	19	38.0

The use of personal protective equipment (PPE) is a key preventive measure to reduce exposure to infectious materials; however, its usage was inconsistent among the participants, as detailed in Table 5. Only 14.0% (n=7) of the participants reported always using PPE, while the majority, 78.0% (n=39), used PPE only sometimes. A small percentage, 2.0% (n=1), rarely used PPE, and 6.0% (n=3) admitted to never using PPE during their duties. These findings highlight a critical gap in adherence to safety protocols, which could significantly elevate the risk of infection and injury among medical waste handlers.

Table 5: PPE Use During Handling

PPE Use	Frequency	Percent (%)
Always	7	14.0
Sometimes	39	78.0
Rarely	1	2.0
Never	3	6.0

Overall, the study findings demonstrate the occupational risks faced by medical waste handlers, including exposure to Hepatitis B and C, frequent injuries, and inconsistent use of protective equipment. These results emphasize the urgent need for interventions aimed at improving safety practices and compliance with infection control measures in healthcare settings.

DISCUSSION

The present study assessed the prevalence of Hepatitis B and C among medical waste handlers in tertiary care hospitals in District Bajaur, highlighting the occupational risks these workers face. The prevalence rates observed, 4.0% for Hepatitis B and 6.0% for Hepatitis C, align with findings from similar studies conducted in other low-resource settings where healthcare-associated infections are common among workers exposed to blood-borne pathogens. The prevalence of Hepatitis B in this study was slightly lower than the rates reported in some other studies, such as the 6.3% reported among medical waste handlers in Ethiopia (20). Conversely, the prevalence of Hepatitis C was slightly higher compared to other studies, which reported prevalence rates ranging from 1.0% to 2.6% in similar populations (21).

The high rate of injuries reported by participants (62.0%) reflects a significant occupational hazard for medical waste handlers. Injuries during the handling of contaminated waste are a known risk factor for the transmission of blood-borne infections, including HBV and HCV (17). The inconsistent use of personal protective equipment, with only 14.0% of participants always using PPE, further exacerbates this risk. These findings are consistent with studies indicating that insufficient training and lack of adherence to safety protocols contribute to higher rates of infection and injury among healthcare workers (Mengiste et al., 2021). The low rates of consistent PPE usage among the participants underscore the need for targeted interventions to improve compliance with safety measures, such as regular training on infection prevention and the provision of adequate protective equipment.

The study's strengths include its focus on a high-risk population within healthcare settings and the use of a systematic approach to data collection and analysis. However, there were several limitations that should be acknowledged. The relatively small sample size of 50 participants limits the generalizability of the findings to other populations and settings. Additionally, the cross-sectional design of the study precludes the establishment of causal relationships between the observed risk factors and the prevalence of hepatitis infections. Furthermore, the study relied on self-reported data for certain variables, such as injury occurrence and PPE usage, which may be subject to reporting bias.

Despite these limitations, the findings provide valuable insights into the occupational health risks faced by medical waste handlers and highlight the need for improved safety measures within healthcare facilities. To reduce the transmission of hepatitis and other blood-borne infections, it is recommended that healthcare facilities implement comprehensive infection control programs that include regular training for medical waste handlers on the importance of PPE usage and safe handling practices.

Additionally, the provision of vaccines for Hepatitis B and routine health screenings for healthcare workers can help to mitigate the risks associated with occupational exposure (7).

Overall, the study underscores the critical need for healthcare facilities to prioritize the health and safety of medical waste handlers by enhancing safety protocols and ensuring consistent use of protective measures. Future research should explore larger and more diverse populations to validate these findings and further investigate the factors influencing the adherence to safety practices among medical waste handlers. By addressing these gaps, healthcare systems can better protect their workers from the occupational hazards associated with medical waste handling.

CONCLUSION

In conclusion, the study revealed a notable prevalence of Hepatitis B and C among medical waste handlers in tertiary care hospitals in District Bajaur, with significant occupational risks compounded by frequent injuries and inconsistent use of personal protective equipment. These findings highlight the urgent need for enhanced safety protocols, routine health screenings, and targeted training to improve compliance with infection prevention measures among healthcare workers. Addressing these gaps is essential to protect medical waste handlers, reduce the transmission of blood-borne infections, and ultimately safeguard the broader healthcare environment, thus ensuring a safer workplace for all personnel involved in the handling of medical waste.

REFERENCES

1. Abbasi IN, Fatmi Z, Kadir MM, Sathiakumar N. Prevalence of Hepatitis B Virus Infection Among Barbers and Their Knowledge, Attitude and Practices in the District of Sukkur, Sindh. Int J Occup Med Environ Health. 2014;27(5):757-765. doi:10.2478/s13382-014-0299-z.
2. Ahmadi Gharaei H, Fararouei M, Mirzazadeh A, Sharifnia G, Rohani-Rasaf M, Bastam D, et al. The Global and Regional Prevalence of Hepatitis C and B Co-Infections Among Prisoners Living with HIV: A Systematic Review and Meta-Analysis. Infect Dis Poverty. 2021;10(1):1-17. doi:10.1186/s40249-021-00876-7.
3. Ali SA, Donahue RM, Qureshi H, Vermund SH. Hepatitis B and Hepatitis C in Pakistan: Prevalence and Risk Factors. Int J Infect Dis. 2009;13(1):9-19. doi:10.1016/j.ijid.2008.06.019.
4. Alvarado-Mora MV, Fernandez MF, Gomes-Gouvêa MS, de Azevedo Neto RS, Carrilho FJ, Pinho JR. Hepatitis B (HBV), Hepatitis C (HCV) and Hepatitis Delta (HDV) Viruses in the Colombian Population: How Is the Epidemiological Situation? PLoS One. 2011;6(4). doi:10.1371/journal.pone.0018888.
5. Argaw B, Mihret A, Aseffa A, Tarekegne A, Hussen S, Wachamo D, et al. Sero-Prevalence of Hepatitis B Virus Markers and Associated Factors Among Children in Hawassa City, Southern Ethiopia. BMC Infect Dis. 2020;20(1):1-7. doi:10.1186/s12879-020-05229-7.
6. Divala C, Hamer DH, Modan M, Barlow-Mosha L, Vhembo T, Gillespie SH, et al. Public Health Action Campaign. Public Health Action. 2022;12(1):1-5. doi:10.5588/pha.16.0125.
7. Edrees WH, Al-Ofairi BA, Alrahabi LM, Al-Munkari IM, Alawi AS, Al-Mashdali A-HT, et al. Seroprevalence of the Viral Markers of Hepatitis B, Hepatitis C, and HIV Among Medical Waste Handlers in Some Hospitals in Sana'a City, Yemen. Univ J Pharm Res. 2022;7(3):1-7. doi:10.22270/ujpr.v7i3.774.
8. Fretz R, Negro F, Bruggmann P, Lavanchy D, Gottardi A, De Pache I, et al. Hepatitis B and C in Switzerland: Healthcare Provider Initiated Testing for Chronic Hepatitis B and C Infection. Swiss Med Wkly. 2013;143. doi:10.4414/smw.2013.13793.
9. Haqqi A, Munir R, Khalid M, Khurram M, Zaid M, Ali M, et al. Prevalence of Hepatitis C Virus Genotypes in Pakistan: Current Scenario and Review of Literature. Viral Immunol. 2019;32(9):402-413. doi:10.1089/vim.2019.0058.
10. Hebo HJ, Gemeda DH, Abdusemed KA. Hepatitis B and C Viral Infection: Prevalence, Knowledge, Attitude, Practice, and Occupational Exposure Among Healthcare Workers of Jimma University Medical Center, Southwest Ethiopia. Sci World J. 2019;2019:1-7. doi:10.1155/2019/9482607.
11. John AS, Mboto CI, Agbo B. A Review on the Prevalence and Predisposing Factors Responsible for Urinary Tract Infection Among Adults. J Bacteriol Parasitol. 2016;7(4):1-5.
12. Kangethe J, Komu J. Prevalence of Hepatitis B and C Virus Infections Among Medical Waste Handlers in Kenya. JMSCR. 2019;7(3):499-506.
13. Khan A, Afzal S, Yaqoob A, Fatima R, Ul Haq M, Junaid K, et al. Epidemiology of Viral Hepatitis B and C in Punjab, Pakistan: A Multicenter Cross-Sectional Study, 2017-18. F1000Res. 2019;8:2065. doi:10.12688/f1000research.20174.1.
14. Mengiste DA, Dirbsa AT, Ayele BH, Hailegiyorgis TT. Hepatitis B Virus Infection and Its Associated Factors Among Medical Waste Collectors at Public Health Facilities in Eastern Ethiopia: A Facility-Based Cross-Sectional Study. BMC Infect Dis. 2021;21(1):1-8. doi:10.1186/s12879-021-05918-x.
15. Miao Z, Zhang S, Ou X, Li S, Ma Z, Wang W, et al. Estimating the Global Prevalence, Disease Progression, and Clinical Outcome of Hepatitis Delta Virus Infection. J Infect Dis. 2020;221(10):1677-1687. doi:10.1093/infdis/jiz633.
16. Muhammad W. Prevalence of Hepatitis B and C in Malakand Division, Khyber-Pakhtunkhwa, Province of Pakistan. J Public Health. 2022.
17. Mussa S, Kasew D, Wondimeneh Y. Seroprevalence of Hepatitis B and C Viruses, and Associated Factors Among Medical Waste Handlers, Northeast Ethiopia. Afr Health Sci. 2022;12(2):1-7.

18. Samo AA, Laghari ZA, Baig NM, Khoso GM. Prevalence and Risk Factors Associated with Hepatitis B and C in Nawabshah, Sindh, Pakistan. Am J Trop Med Hyg. 2021;104(3):1101-1105. doi:10.4269/ajtmh.20-1228.
19. Sanabria AM, Janice J, Hjerde E, Simonsen GS, Hanssen AM. Shotgun-Metagenomics Based Prediction of Antibiotic Resistance and Virulence Determinants in Staphylococcus Aureus from Periprosthetic Tissue on Blood Culture Bottles. Sci Rep. 2021;11(1):1-13. doi:10.1038/s41598-021-00383-7.
20. Shiferaw Y, Abebe T, Mihret A. Hepatitis B Virus Infection Among Medical Waste Handlers in Addis Ababa, Ethiopia. BMC Res Notes. 2011;4:479. doi:10.1186/1756-0500-4-479.
21. Yizengaw E, Getahun T, Geta M, Mulu W, Ashagrie M, Hailu D, Tedila S. Sero-Prevalence of Hepatitis B Virus Infection and Associated Factors Among Healthcare Workers and Medical Waste Handlers in Primary Hospitals of North-West Ethiopia. BMC Res Notes. 2018;11(1):3538. doi:10.1186/s13104-018-3538-8.