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Original Research

Prevalence of Hepatitis B Surface Antigen Among Healthcare Workers at Al-Wahdah Teaching Hospital, Dhamar, Yemen

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Abstract

Background: Healthcare workers (HCWs), are at high risk of blood-borne viral diseases due to exposure to blood and other body fluids. The WHO reported approximately 70,000 HBV infections among HCWs globally. However, the prevalence of hepatitis B among HCWs in Yemen are needed to address this important health problem.

Aim: The study aimed to assess the prevalence of HBV infection among HCWs at Thamar University, Al-Wahdah Teaching Hospital (TUWTH) in Dhamar, Yemen.

Methods: A cross-sectional design conducted at TUWTH among the hospital's employers in various departments, during the period from September to November 2023. Data was collected using a structured questionnaire which included participants' demographic characteristics and the ELISA-based "HBs Ag detection results". Using SPSS version 26.0 software, a statistical analysis was performed, and HBs Ag test results and participant characteristics were examined for significant associations using Chi-square test.

Results: A total of 105 HCWs were included in the study, with the majority being nurses with a diploma degree. The overall prevalence of HBV infection was 2.9%, with positive HBsAg test results found in employees from surgery, ICU, and administration departments.

Conclusion: Screening for HBV infection should be mandatory for all HCWs, and HBV vaccination can provide protection against the virus. Preventive measures are essential to address this important health issue. By implementing preventive measures such as screening and vaccination, healthcare facilities can help protect their employees and reduce the risk of transmission of blood-borne viral diseases. It is crucial for healthcare workers to prioritize their health and safety in order to provide quality care to their patients.

Keywords: Hepatitis B Surface Antigen, Healthcare workers, Dhamar, Yemen.

1. Introduction

Hepatitis B virus (HBV), an enveloped virus belonging to the Hepadnavirus family, infects the liver, leading to hepatocellular necrosis and inflammation [1]. The disease can be acute or chronic and is spread by mucosal or percutaneous contact with infected blood and other bodily fluids [1,2]. In 2019, The World Health Organization (WHO) reported that approximately 296 million individuals were grappling with chronic hepatitis B infection, facing the burden of 1.5 million new infections annually. Tragically, hepatitis B was accountable for an estimated 820,000 deaths in the same year, predominantly stemming from the complications of cirrhosis and hepatocellular carcinoma, which is primary liver cancer [3]. About 650, 000 people die each year from chronic hepatitis B, and the majority of patients who receive current treatments are unable to completely

eradicate the virus, requiring potentially lifelong treatment [4].

HCWs, regularly exposed to blood and other body fluids in their duties, face a heightened risk of blood-borne viral diseases like HBV, hepatitis C virus, and HIV [5-7]. Blood carries, the highest HBV titers, with transmission risks ranging from 1% to 6% in hepatitis B e antigen (HBe Ag) negative cases to 22-31% in HBe Ag positive chronic hepatitis B cases [6,7]. Worldwide, around two million HCWs are exposed annually, leading to approximately 70,000 HBV infections [7]. The global burden outlined by the WHO indicates that 37% of HBV cases among HCWs result from occupational exposure, primarily sharp injuries [2]. Over 90% of these infections occur in developing countries [7]. Factors intensifying the risk of occupational infections in these countries include hospital overcrowding, low HCW-to-patient ratios, inadequate safety equipment, the reuse of contaminated needles and sharp instruments, and limited awareness of the risks associated with exposure to blood and body fluids [5].

The WHO approved the Global Health Sector Strategy on Viral Hepatitis 2016–2020 in May 2016 to address this issue and priorities occupational health measures as a key intervention in the global fight against viral hepatitis [8]. More recently, routine hepatitis B vaccination for HCWs was included as a crucial component of the regional action plan for viral hepatitis 2016–2021 by the WHO Regional Office for South-East Asia in July 2017 [9]. In Yemen, government-backed endeavors to control viral hepatitis have seen increased commitment, however, the prevalence of hepatitis B among HCWs remains unknown, and a preventive measures are needed to address this important health problem [10].

Preventive vaccination, as a component of workplace safety protocols has become standard practice in numerous nations. However, in many resource-limited settings, this approach remains inadequately defined [11, 12]. The WHO reported that, the vaccination coverage for HBV among HCWs in low- and middle-income countries (LMIC) is an inadequate 18–39% while it is between 67–79% in high-income countries. This disparity may be caused by the fact that most LMICs lack clear policies for HBV infection prevention among HCWs [13-15].

Many studies have examined HBV infection among HCWs, focusing on epidemiology and intervention techniques, in the more than 40 years since the first cases of HBV transmission from HCWs to patients were documented [16,17]. These studies were reported in non-endemic countries [10]. Unfortunately, not enough information is available about HBV infection in Yemen, specifically in the Dhamar Governorate. As a result, the mode of transmission and risk factors—particularly for healthcare workers—remain unclear. Few studies point to horizontal transmission as a major mode of infection, and significant risk factors include male sex, age progression, blood transfusion, and healthcare occupation [10, 16, 18, 19].This study uses a participant questionnaire and laboratory testing for HBs Ag to determine the prevalence of HBV infection among HCWs at TUWTH in Ma'bar, Dhamar Governorate, Yemen.

2. Methods

Study Design and Area

A cross-sectional study was used to evaluate the prevalence of HBV infection among HCWs in Dhamar governorate, Yemen. The study was conducted at the TUWTH in Ma'bar City, from September to November 2023. The Al-Wahdah Teaching Hospital is a tertiary care hospital that provides medical care to a wide geographic areas, both in Ma'bar city as well as the surrounding rural villages.

Study Population and Sampling

The study population consisted of all hospital employees who worked in various departments at TUWTH during the study period. These employees included doctors, dentists, nurses, lab technicians, pharmacists, cooks, security personnel and cleaners. The technique of convenience sampling was employed, and those who met the criteria needed were invited to take part. those who refused to participate and those who were unavailable for various reasons, including illness, maternity leave, or absence, during the data collection period were excluded.

Data Collection

The data were collected by using a structured questionnaire including, participant characteristics (age, gender, marital status, occupation, degree of education, and department of employment). A venipuncture was used to obtain 5 milliliters of venous blood from each participant's cubital fossa. After allowing the blood sample to clot at room temperature, it was centrifuged for ten minutes to separate the serum, which was then kept in Eppendorf tubes at -20°C until the test was performed. After that, ELISA testing for HBs Ag was done on all samples. Any sample's HBs Ag levels that were less than 1 s/c (signal per cutoff) were considered as negative, and those that were greater than 1 s/c as positive.

Data Analysis

Using Statistical Package for Social Science (SPSS) software (version, 26), a statistical analysis was performed after the collected data that were entered into a computer database. Descriptive statistics, such as frequencies and percentage, were generated to define the study participants' characteristics and the seroprevalence of hepatitis B viral infection. The HBsAg test results and participant characteristics were tested for significant associations using Chi-square analysis. The significant level was set at P-value of less than 0.05.

Ethical Consideration

The approval on the study was obtained from Thamar University Medical Ethics Committee (TUMEC-22014). A comprehensive overview on the goals and procedures of the study were provided to the recruited participants and a verbal consent was obtained from all of the participants.

Furthermore, the confidentiality of their identity and personal data were expressly guaranteed. Additional to, rights to withdraw from the study at any time.

3. Results

A total of 105 HCWs across different departments of the hospital were successfully enrolled in this study. A majority of the participants were males, married and had diploma education level (61%, 72.4% and 54.3% respectively). The (20 – 29) years old age group was the most represented (n= 53, 50.5%), followed by the age group of 30 – 39 years (n=35, 33.3%). Highest proportions of participants were nurses, cleaners and lab technicians (49.5%, 16.2%, and 14.3% respectively). Most participants were working in obstetrics and surgery departments (25.7 % and 18.1% respectively) (Table 1).

Table 1: Baseline characteristics of the studied participants

Variable	Frequency	Percentage
Age		
20 – 29 years	53	50.5
30 – 39 years	35	33.3
40 – 49 years	15	14.3
> 49 years	2	1.9
Sex		
Male	64	61
Female	41	39
Marital status		
Single	29	27.6
Married	76	72.4
Working Site		
Administration	2	1.9
Emergency and ICU	14	13.3
Internal Medicine Department	8	7.6
Kitchen	6	5.7
Laboratory Department	12	11.4
Obstetrics and Gynecology Department	27	25.7
Pediatric Department	15	14.3
Pharmacy	2	1.9
Surgery Department	19	18.1
Occupation		
Civil Servant	2	1.9
Cleaner	17	16.2
Cook	4	3.8
Lab Technician	15	14.3
Nurse	52	49.5
Pharmacist	2	1.9
Physician	8	7.6
Security Worker	5	4.8
Study Level		
Secondary and below	26	24.8
Diploma	57	54.3
Bachelor	15	14.3
Master	6	5.7
PhD	1	1

The prevalence of HBs Ag positivity among study population was 2.9% (3/105) (figure 1). A significant association between occupation and HBsAg positivity was noted, the majority of positive results of HBsAg test were observed among nurses (P-value 0.04). In other hand, all of participants who had positive HBsAg test results were working at surgery, ICU and administration departments (equally distributed 33.3% (1/3) in each of them), which was statistically significant (P-value 0.04). All of participants who had positive HBs Ag test results were males, and married, and most of them belonged to the 30–39 years age group (n=2, 66.7%), and had a bachelor degree (n=2, 66.7%), however, there were no statistically significant association was found between HBsAg positivity and these variables (Table 2).

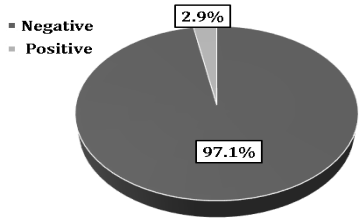

Figure 1: Prevalence of HBs Ag positivity among studied participants

Table 2: Association between HBs Ag test results and the participants' demographic data

Variable	HBs Ag		*P*
	Negative n(%)	Positive n(%)	
Age/ years			
20 – 29	53 (52.0)	0 (0.0)	0.33
30 – 39	33 (32.4)	2 (66.7)	
40 – 49	14 (13.7)	1 (33.3)	
> 49	2 (2.0)	0 (0.0)	
Sex			
Male	61 (59.8)	3 (100)	0.08
Female	41 (40.2)	0 (0.0)	
Marital Status			
Single	29 (28.4)	0 (0.0)	0.27
Married	73 (71.6)	3 (100)	
Working Site			
Administration	1 (1.0)	1 (33.3)	0.013
Emergency and ICU	13 (12.7)	1 (33.3)	
Internal Medicine Department	8 (7.8)	0 (0.0)	
Kitchen	6 (5.9)	0 (0.0)	
Laboratory Department	12 (11.8)	0 (0.0)	
Obs & Gyn Department	27 (26.5)	0 (0.0)	
Pediatric Department	15 (14.7)	0 (0.0)	
Pharmacy	2 (2.0)	0 (0.0)	
Surgery Department	18 (17.6)	1 (33.3)	
Occupation			
Civil Servant	1 (1)	1 (33.3)	0.014
Cleaner	17 (16.7)	0 (0.0)	
Cook	4 (3.9)	0 (0.0)	
Lab Technician	15 (14.7)	0 (0.0)	
Nurse	50 (49.0)	2 (66.7)	
Pharmacist	2 (2.0)	0 (0.0)	
Physician	8 (7.8)	0 (0.0)	
Security Worker	5 (4.9)	0 (0.0)	
Study Level			
Secondary and below	26 (25.5)	0 (0.0)	0.12
Diploma	56 (54.9)	1 (33.3)	
Bachelor	13 (12.7)	2 (66.7)	
Master	6 (5.9)	0 (0.0)	
PhD	1 (1.0)	0 (0.0)	

4. Discussion

This study was conducted in Al-Wahdah Teaching Hospital which is a tertiary care hospital that makes all HCWs at a greater risk of various blood-borne infections including hepatitis B. The importance of this study referred to the fact that HBV is one of the major occupational infectious diseases in the medical staff [20], and the paucity of studies on epidemiology of HBV infection both in general and at risk population in Yemen.

In this study the overall prevalence of HBV infection was 2.9%. This is consistent with that reported in similar previous studies in Yemen and Rwanda (2.8%, and 2.9%, respectively) [10, 21], but higher than that reported in previous Nigerian, and Indian studies (1.1%, and 1%, respectively) [22, 23]. In contrast to our findings, a higher prevalence rate were reported in previous related studies conducted in Tanzania (7%) and in Mozambique (5.1%) [11, 24].

The study found a higher rate of positive HBs Ag among older participants than in younger ones. There are several possible explanations for this, one explanation for the rising incidence of Hepatitis B with age could be that there is a relatively constant lifetime risk of exposure. We cannot completely rule out the possibility that, over time, greater awareness and preventative measures, such as the use of safety needles and glove wear, have altered the risk of transmission. However, the conclusion that extended work exposure in healthcare settings raises the chance of contracting HBV infection is in line with previous studies [25, 26].

All of the positive HBsAg test results were detected among males participants, This finding was consistent with studies done in Ethiopia [27], and Bule Hora Wereda [28]. Variations in different exposure factors may account for this, males are more likely than females to be exposed to outdoor conditions that raise the possibility of contracting hepatitis B.

In our study, among HBsAg positive participants, the majority were nurses, this may be linked to frequent exposure to bodily fluids and other occupational risks during their work, however a larger sample size is needed to adequately study this risk factor. These results were consistent with previous related study conducted in Uganda, which reported a higher prevalence rate of HBV infection among nurses compared to other professionals [25]. Furthermore, it was in line with previous Moroccan study, who documented a higher prevalence rate among nursing auxiliaries, nurses, and physicians [29]. However, a different findings were reported in many previous studies, where the prevalence of HBV infection was highest among laboratory technicians [30, 31].

5. Conclusion

Based on the relatively higher prevalence of HBsAg among HCWs; test for screening HBV infection should be performed in primary evaluation before giving permission to every HCW to be enrolled in hospital and health centers. HBV vaccination showed good coverage protective rate against HBV, therefore, it should be compulsory to all HCWs. Needle stick and/or sharp object injuries are important risk factors for HBV infection, therefore, HCWs should enrolled in periodic training programs to fill the skill gap, and to be enforced to apply universal precaution during health providing procedures.

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Competing interests

The authors declare that they have no competing interests.

References

1. Nguyen MH, Wong G, Gane E, Kao JH, Dusheiko G. Hepatitis B virus: advances in prevention, diagnosis, and therapy. Clinical microbiology reviews. 2020 Mar 18;33(2):10-128
2. Akazong E, Tume C, Njouom R, Ayong L, Fondoh V, Kuiate JR. Knowledge, attitude and prevalence of hepatitis B virus among healthcare workers: a cross-sectional, hospital-based study in Bamenda Health District, NWR, Cameroon. BMJ open. 2020 Mar 1;10(3):e031075.
3. WHO. Hepatitis B. 2023 [cited 2023 December]; Available from: https://www.who.int/news-room/fact-sheets/detail/hepatitis-b.
4. WHO., Guidelines for the prevention care and treatment of persons with chronic hepatitis B infection: Mar-15. 2015: World Health Organization.
5. Tarantola, A., D. Abiteboul, and A. Rachline, Infection risks following accidental exposure to blood or body fluids in health care workers: a review of pathogens transmitted in published cases. *Am J Infect Control*, 2006. 34(6): p. 367-75.
6. Dement JM, Epling C, Østbye T, Pompeii LA, Hunt DL. Blood and body fluid exposure risks among health care workers: results from the Duke Health and Safety Surveillance System. *Am J Ind Med*. 2004 Dec;46(6):637-48.
7. Kermode, M.J.I.J.o.I.D., Healthcare worker safety is a pre-requisite for injection safety in developing countries. 2004. 8(6): p. 325-327.
8. Wijayadi T, Sjahril R, Turyadi, Ie SI, Wahyuni R, Pattelongi I., et al., Seroepidemiology of HBV infection among health-care workers in South Sulawesi, Indonesia. BMC Infect Dis, 2018. 18(1): p. 279.
9. WHO., Regional action plan for viral hepatitis in South-East Asia: 2016-2021. 2017.
10. Waheed AL, Thabit RA, Alkhulaidi M, Ahmed AA..,Vaccination status and Seroprevalence of Hepatitis B surface Antigen among Health Care Workers in Taiz, Yemen Republic. 2020. 1(1): p. 1-9.
11. Mueller A, Stoetter L, Kalluvya S, Stich A, Majinge C, Weissbrich B., et al., Prevalence of hepatitis B virus infection among health care workers in a tertiary hospital in Tanzania. BMC Infect Dis, 2015. 15: p. 386.
12. Lewis, J.D., K.B. Enfield, and C.D. Sifri, Hepatitis B in healthcare workers: Transmission events and guidance for management. World J Hepatol, 2015. 7(3): p. 488-97.
13. Byrd, K.K., P.J. Lu, and T.V. Murphy, Hepatitis B vaccination coverage among health-care personnel in the United States. Public Health Rep, 2013. 128(6): p. 498-509.
14. Prüss-Ustün, A., E. Rapiti, and Y. Hutin, Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. Am J Ind Med, 2005. 48(6): p. 482-90.
15. Tatsilong HO, Noubiap JJ, Nansseu JR, Aminde LN, Bigna JJ, Ndze VN., et al., Hepatitis B infection awareness, vaccine perceptions and uptake, and serological profile of a group of health care

workers in Yaoundé, Cameroon. BMC Public Health, 2016. 15: p. 706.
16. Antono SK, Raya RP, Irda Sari SY, Afriandi I, Anwar AD, Setiabudi D., et al., Occupational risk for human immunodeficiency virus, hepatitis B, and hepatitis C infection in health care workers in a teaching hospital in Indonesia. Am J Infect Control, 2010. 38(9): p. 757-8.
17. Garibaldi RA, Rasmussen CM, Holmes AW, Gregg MB., et al., Hospital-acquired serum hepatitis. Report of an outbreak. Jama, 1972. 219(12): p. 1577-80.
18. Al-Shamahy, H., Prevalence of hepatitis B surface antigen and risk factors of HBV infection in a sample of healthy mothers and their infants in Sana'a, Yemen. Ann Saudi Med, 2000. 20(5-6): p. 464-6.
19. Al-Nassiri, K.A. and Y.A. Raja'a, Hepatitis B infection in Yemenis in Sana'a: pattern and risk factors. East Mediterr Health J, 2001. 7(1-2): p. 147-52.
20. Hutin Y, Hauri A, Chiarello L, Catlin M, Stilwell B, Ghebrehiwet T., et al., Best infection control practices for intradermal, subcutaneous, and intramuscular needle injections. Bull World Health Organ, 2003. 81(7): p. 491-500.
21. Kateera F, Walker TD, Mutesa L, Mutabazi V, Musabeyesu E, Mukabatsinda C., et al., Hepatitis B and C seroprevalence among health care workers in a tertiary hospital in Rwanda. Trans R Soc Trop Med Hyg, 2015. 109(3): p. 203-8.
22. Alese OO, Alese MO, Ohunakin A, Oluyide PO., Seroprevalence of Hepatitis B Surface Antigen and Occupational Risk Factors Among Health Care Workers in Ekiti State, Nigeria. J Clin Diagn Res, 2016. 10(2): p. Lc16-8.
23. Sukriti, Pati NT, Sethi A, Agrawal K, Agrawal K, Kumar GT, Kumar M, et al., Low levels of awareness, vaccine coverage, and the need for boosters among health care workers in tertiary care hospitals in India. J Gastroenterol Hepatol, 2008. 23(11): p. 1710-5.
24. Mabunda N, Vieira L, Chelene I, Maueia C, Zicai AF, Duajá A., et al., Prevalence of hepatitis B virus and immunity status among healthcare workers in Beira City, Mozambique. PLoS One, 2022. 17(10): p. e0276283.
25. Ziraba AK, Bwogi J, Namale A, Wainaina CW, Mayanja-Kizza H., Sero-prevalence and risk factors for hepatitis B virus infection among health care workers in a tertiary hospital in Uganda. BMC Infect Dis, 2010. 10: p. 191.
26. Braka F, Nanyunja M, Makumbi I, Mbabazi W, Kasasa S, Lewis RF., Hepatitis B infection among health workers in Uganda: evidence of the need for health worker protection. Vaccine, 2006. 24(47-48): p. 6930-7.
27. Gebremariam AA, Tsegaye AT, Shiferaw YF, Reta MM, Getaneh A., Seroprevalence of Hepatitis B Virus and Associated Factors among Health Professionals in University of Gondar Hospital, Northwest Ethiopia. Adv Prev Med, 2019. 2019: p. 7136763.
28. Geberemicheal A, Gelaw A, Moges F, Dagnaw M., Seroprevalence of hepatitis B virus infections among health care workers at the Bulle Hora Woreda Governmental Health Institutions, Southern Oromia, Ethiopia. 2013. 2(1): p. 9.
29. Djeriri K, Laurichesse H, Merle JL, Charof R, Abouyoub A, Fontana L, Benchemsi N., et al., Hepatitis B in Moroccan health care workers. Occup Med (Lond), 2008. 58(6): p. 419-24.
30. Lungosi MB, Muzembo BA, Mbendi NC, Nkodila NA, Ngatu NR, Suzuki T., et al., Assessing the prevalence of hepatitis B virus infection among health care workers in a referral hospital in Kisantu, Congo DR: a pilot study. Ind Health, 2019. 57(5): p. 621-626.
31. Efua, S.V., W.D. Adwoa, and D. Armah, Seroprevalence of Hepatitis B virus infection and associated factors among health care workers in Southern Ghana. IJID Reg, 2023. 6: p. 84-89.