

SEROPREVALENCE OF HEPATITIS B VIRUS AMONG THE SOLID WASTE WORKER IN SANA'A GOVERNORATE- YEMEN

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ABSTRACT

Background: The workers involved in the management of solid waste (SW) are considered at risk for hepatitis virus (HBV) transmission and subsequent infection due to the nature of their work. The dissemination of hepatitis B virus among these workers occurs through their daily contact with waste in areas known to have a considerable number of HBV-infected individuals. Such places include regions where the habit of informal waste picking is undertaken, areas that handle the collection and disposal of medical waste, and quarantine areas. However, the indicators of the potential of HBV among solid waste workers employed in SW institutions in these regions are not well documented. Yemen is ranked as one of the countries with HBV infection as a highly significant public health issue and has a sustained high prevalence. Even studies conducted at various healthcare, educational, and societal levels do not consistently report data on the HBV situation. Objectives: This study aimed to determine the seroprevalence of HBV among solid waste workers in Sana'a Governorate, Yemen. Methods: A cross-sectional study was conducted on 99 solid waste workers who worked in Sana'a between January and May 2021. The volunteers were recruited using convenience sampling. A set of questionnaires was administered through face-to-face interviews. Blood samples from each worker were tested for hepatitis B surface antigens using enzyme-linked immunosorbent assay. Result: A total of 99 participant of solid waste worker in Sana'a government were contacted in the study, there were 5 participants are positive for HBsAg. All participants who tested positive for hepatitis B virus were in the age group of 21-30 years. Conclusion: This study highlights that the prevalence of hepatitis B virus among solid waste workers in Sana'a was higher than the global prevalence reported by the World Health Organization, placing our findings within a broader epidemiological context.

INTRODUCTION

Hepatitis B virus (HBV) infection is one of the most prevalent infectious diseases in the world and remains important clinical and public health problem due to its role in causing acute hepatitis, chronic hepatitis, a carrier state, hepatocellular carcinoma and death (Herrscher, Roingeard, & Blanchard, 2020)

HBV infection is a major public health problem, over 2 billion infections worldwide (Organization, 2017). An estimates 296 million people had chronic hepatitis B infection in 2019, with 1.5 million new infections occurring each year (WHO, 2022). An approximately 90 percent of them reside in developing countries and 50 million of these cases are in Africa. At an estimated one million death each year, it rates as the tenth most prevalent cause of death worldwide. HBV is second only to tobacco among identified human carcinogens that may be responsible for up to 80% of the total cases of hepatocellular carcinoma worldwide (Lavanchy, 2004).

According to systematic reviews and meta-analyses (Belyhun, Maier, Mulu, Diro, & Liebert, 2016) revealed that the prevalence of HBV in the general population ranged from 6% to 7.4%. Whereas 5%–7% of pregnant mothers were a major source of disease for newborns (Yazie & Tebeje, 2019).

It is also estimated that 2–5% of the population in the Middle East and India are chronically infected by HBV (Corrao, Del Cimmuto, Marzuillo, Paparo, & La Torre, 2013). This study aimed to determine the seroprevalence of HBV among solid waste workers in Sana'a Governorate, Yemen.

METHODOLOGY

This ***cross-sectional study*** survey was conducted among 99 solid waste workers.

Data were collected through questionnaires and blood tests to determine the presence of HBV surface antigen (HBsAg). The volunteers were recruited using convenience sampling. A set of questionnaires was administered through face-to-face interviews. Blood samples from each worker were tested for hepatitis B surface antigens using enzyme-linked immunosorbent assay in Al Ain Specialized Laboratories, Sanaa, Yemen.

Data Analysis

Data analysis is conducted by using statistical analysis from Statistical Package for Social Sciences (SPSS, IBM v20) and Microsoft Excel (2016) statistical software packages and variable described using frequency distribution for categorical variable.

Ethical Consideration

Prior to commencement of this study, ethical approval was obtained from , Faculty of laboratory Medicine, University of 21 September for Medical and Applied Sciences, Sana'a, Yemen.

RESULTS AND DISCUSSION

Out of the 99 participants, 5 participants were HBsAg positive. All participants who tested positive for hepatitis B virus were in the age group of 21–30 years and the educational level of them, (20%) had diploma, two (40%) had high school, and the remaining two (40%) had only comprehensive school. All positive participants were married. Most of them (80%) worked for less than 5 years in this job. Table1.

Table 1: Distribution of the participants according to demographic characteristic in the governorate of Sana'a 2021

Variable	Categories	Frequency	HBsAg Positive (n=5)	HBsAg Negative (N=94)	P value
Age group	>20	6 (6.1%)	0 (0.0%)	6 (6.4 %)	0.59
	21-30	54 (54.5%)	5 (100%)	49 (52.1 %)	0.037
	31-40	29 (29.3%)	0 (0.0%)	29 (30.9 %)	0.14
	41-50	7 (7.07%)	0 (0.0%)	7 (7.4 %)	0.5
	>50	3 (3.03%)	0 (0.0%)	3 (3.2%)	0.6
	Total	99 (1 00%)	5 (100%)	94 (100.0%)	
Marital status	Single	21 (21.22%)	0 (0.0%)	21 (22.3%)	0.23
	Married	75 (75.75%)	5 (100%)	70 (74.5%)	0.19
	Window	3 (3.03%)	0 (0.0%)	3 (3.2%)	0.6
	TOTAL	99 (100%)	5 (100%)	94 (100.0 %)	
Educational level	Illiterate	23 (22.8%)	0 (0.0%)	23 (24.5%)	0.2
	basic school	22 (21.8%)	2 (40%)	20 (21.3%)	0.32
	secondary school	30 (29.7%)	2 (40%)	28 (29.8%)	0.6
	Diploma	24 (23.8%)	1(20%)	23 (24.5%)	0.8
	TOTAL	99 (98%)	5 (100%)	94 (00.0%)	
Years of work	from 1-5	54 (53.5%)	4 (80%)	50 (53.2%)	0.2
	from 6-10	25 (24.8%)	1(20%)	24 (25.5%)	0.7
	from 11-15	10 (9.9%)	0 (0.0%)	10 (10.6%)	0.4
	more than 15 years	10 (9.9%)	0 (0.0%)	10 (10.6%)	0.4
Total		99 (98%)	5 (100%)	94 (100.0%)	

The data in Table 1 suggests that the (21–30) year age group has the highest proportion of the population at 54.5%. This is followed by the (31–40) year age group at 29.3%. The remaining age groups, under 20 and (41-50) years, account for a smaller portion of the population at 6.1% and 7.1% respectively, and the group over 50 years old is the smallest at 3.0 %.

The marital status of participants suggests the majorities 52 of the participant in the percent of 65% were married, the 21 of the participants which is 21.2% were single and remaining 3 was 3% window.

This table above shows the educational level; that 23 out of 99 participant which was 23.2% were about basic school, 22 out of 99 participant which was 22.2% were secondary school, 30 out of 99 participant which was 30.3% were Diploma 24 out of 99 participant which was 24.3 % were Bachelor 0 out of 99

The table 1 show high experience from (1-5) years were 54 =54.3%, secondly from (6-10) years were 25=25.3 %, while the remaining of experience year distribution equally both from (11-15) and 10=10.1% and from 10=10.1

Table 2: Distribution of the participation according to risk factors of associated with HBV infection among solid worker in the government of Sana'a 2021

Risk factors	Categories	Frequency	HBsAg positive	HBsAg Negative	P value
Wear protective	Yes	18 (18.1 %)	0(0.0%)	18(19.1%)	0.28
	No	81 (81.8 %)	5(100%)	76(80.9%)	
	TOTAL	99 (100%)	5 (100%)	94(100.0)	
Exposed to sharp prick or hitting needles	Yes	48 (48.5%)	4(80.0%)	44(46.8%)	0.14
	No	51 (51.5 %)	1(20.0%)	50(53.2%)	
	TOTAL	99 (100%)	5 (100%)	94(100.0%)	
Handle Medical waste	Yes	38 (38.4%)	3(60.0%)	35(37.2%)	0.31
	No	61 (61.6 %)	2(40.0%)	62(66.0%)	
	TOTAL	99 (100%)	5 (100%)	94(100.0%)	
Exposed to blood or body fluids of infected patients	Yes	21 (21.2 %)	1(20.0%)	20(21.3%)	0.94
	No	78 (78.8 %)	4(80.0%)	74(78.7%)	
	TOTAL	99 (100%)	5 (100%)	94(100.0%)	
awareness of	Yes	33 (33.33%)	1(20.0%)	32(34.0%)	0.51
	No	66 (66.67%)	4(80.0%)	62(66.0%)	
	TOTAL	99 (100%)	5 (100%)	94(100.0%)	
Blood transfusion	Yes	11 (11.1%)	2(40.0%)	9(9.6%)	0.03
	No	88 (88.9%)	3(60.0%)	85(90.4%)	
	TOTAL	99 (100%)	5 (100%)	94(100.0%)	
Surgery	Yes	29 (29.3%)	2(40.0%)	27(28.7%)	0.5
	No	70 (70.7%)	3(60.0%)	67(71.3%)	
	TOTAL	99 (100%)	5 (100%)	94(100.0%)	
Relative infection with HBV	Yes	19 (19.2 %)	2(40.0%)	17(18.1%)	0.22
	No	80 (80.8%)	3(60.0%)	77(81.9%)	
	TOTAL	99 (100%)	5 (100%)	94(100.0%)	
Injectable medication	Yes	9 (9.1%)	0(0.0%)	9(9.6%)	0.4
	No	90 (90.9%)	5(100%)	89(100.0%)	
	TOTAL	99 (100%)	5 (100%)	94(100.0%)	

The present result showed that the highest rate of positive HBsAg was observed among solid worker in government of Sanaa. The frequency of risk factors it shows the highest rate of positive HBsAg in persons were not wear protective gear 5 (100%), also it shows high rate in persons whom exposed to sharp prick 80%. The present result showed that the highest rate of positive HBsAg was observed among solid worker in government of Sanaa risk factors it shows the highest rate of positive HBsAg person were not wear protective 5 (100%), also it shows high rate in while wear protective zero (00 %), the person had exposed to sharp prick 4 (80%), were none exposed to sharp prick 1 (20%), Medical waste handle 2 (40%), were none medical waste handle 3(60%), receive a blood transfusion (60%), donate blood (60 %),

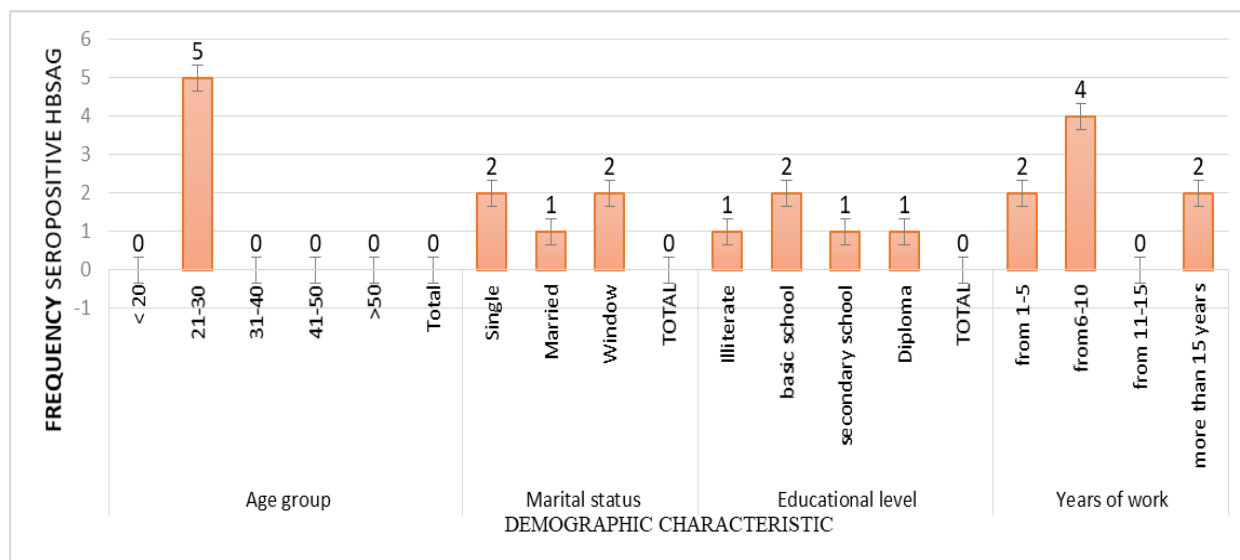


Figure 1: Distribution of seropositive HBsAg according to demographic characteristic and risk factor in the governorate of Sana'a 2021

This chart above shows distribution positive, In the current result, it was reported that the higher rate of HBsAg was 5 (100%) with age group 21-30 years old, compared to other age groups at zero, with a non-statistically significant difference ($P > 0.05$) as listed in, also, Marital status, was 80% with basic school and secondary school, and most of the infected worker 80% had experience less than 5 years. The chart indicates the prevalence of HBsAg (hepatitis B surface antigen) in different age groups among the age group 21-30 years old, the rate of HBsAg was 100%. In comparison to other age groups, the prevalence of HBsAg was zero.

However, this difference was not statistically significant ($P > 0.05$). Additionally, the marital status of infected individuals showed that 80% had basic school and secondary school education. Most of the infected workers (80%) had less than 5 years of experience. Please note that HBsAg is an important marker for hepatitis B infection. The findings highlight the need for further investigation and awareness regarding hepatitis B in different age groups and educational backgrounds.

Discussion

The findings of this study suggest that the prevalence of Hepatitis B virus (HBV) among solid waste workers in Sana'a Governorate is approximately 4.5%, based on the detection of HBsAg in 5 out of 99 participants tested. This rate may place solid waste workers at a higher risk factors to potential contact with infected blood or bodily fluids, underscoring the need for targeted public health interventions.

Key Points:

The observed prevalence of 5.05% is relatively low; however, even a small number of cases holds significant implications for public health strategies.

Further research involving a larger sample size is essential to obtain a more accurate estimate of HBV prevalence among solid waste workers in Sana'a.

Implementation of public health interventions, such as vaccination programs for solid waste workers, could significantly reduce the risk of HBV infection within this group.

Demographic Insights:

The age distribution indicates that younger workers (21-30 years, 54.5%; and 31-40 years, 29.3%) are more affected than older age groups. Notably, 75.8% of the participants were married, and the single participants constituted 21.2%.

Educational levels varied, with 30.3% of workers having attended secondary school, followed by 24.3% with diplomas, 23.2% illiterate, and 22.2% with basic schooling.

Experience levels showed that 50.3% had 1-5 years of experience, 34.4% had 6-10 years, and 8.5% had 11-15 years.

Comparative and Regional Context:

Previous studies in Yemen indicated varying HBV rates 1.81% in Ibb city and 10.5% in Sana'a, 4.72% in Aden 5.6% in Hajjah, 26.3% in Sogatra and 2.7% in Mukala, highlighting regional disparities within the country (Gacche & Kaid, 2012).

Compared to other regions, such as Egypt in 2019 (1.5% positivity rate among 1467 participants), Greece in 2005 (11.3% positivity) and Ethiopia in 2024 (11.3% positivity), the prevalence among solid waste workers in Sana'a is significant (Abd El-Wahab & Eassa, 2019; Dounias, Kypraiou, Rachiotis, Tsovili, & Kostopoulos, 2005; Ejeso, Berego, & Ahmednur, 2024).

This study contradicts findings from Italy where the prevalence was low due to effective immunization strategies, demonstrating the impact of public health policies on HBV control (Squeri, La Fauci, Sindoni, Cannavò, & Ventura Spagnolo, 2006).

CONCLUSION

This study highlights the prevalence of hepatitis B virus among solid waste workers in Sana'a, governorate an approximate was prevalence of 5.05%. This underscores the critical need for comprehensive healthcare strategies, including education, vaccination, and regular health monitoring. According to WHO, the global prevalence rate of HBV was 2.7% in 2006, which situates our findings within a broader epidemiological context.

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