



## RESEARCH ARTICLE

## SEROEPIDEMIOLOGY AND RISK FACTORS OF HEPATITIS B VIRUS IN JIBLAH TOWN, YEMEN

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### Abstract

**Aims and objective:** Viral Hepatitis is a major global health problem affecting millions of people worldwide. The endemicity of hepatitis B virus infection believed high in Yemen. Data for prevalence of hepatitis B virus in Jiblah town in Yemen are rare and inadequate. Therefore, this study aimed to assess the seroprevalence of Hepatitis B virus and associated risk factors among the general population of Jiblah town, Yemen.

**Methods:** A total of 100 participated included in this study. Serum samples were collected and assayed for HBsAg using the ELISA quantitative technique. A structured questionnaire was used to collect behavioral and sociodemographic data.

**Results:** the results revealed that, the seroprevalence of hepatitis B virus was 3.33%. There was a statistically significant difference between hepatitis B virus infection and monthly income.

**Conclusion:** The finding of this study indicated that the magnitude of hepatitis B virus infection among the general population was intermediate level. Modifiable risk factor, monthly income was identified.

**Keywords:** Hepatitis B virus, Jiblah, Seroepidemiology, Yemen.

## INTRODUCTION

An inflammation of the liver is called hepatitis that is caused by infectious viruses and non-infectious agents leading to a range of health problems and burden for the healthcare system. Hepatitis represents the seventh leading cause of worldwide mortality<sup>1</sup>. Five viruses, Hepatitis A virus (HAV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Hepatitis D virus (HDV), and Hepatitis E virus (HEV) cause viral hepatitis<sup>2</sup>. During 2019, the World Health Organization (WHO) estimates that 296 million people worldwide are living with HBV and 1.5 million people were newly infected with HBV. WHO estimates that 1.1 million deaths occurred in 2019 due to HBV infection<sup>3</sup>. In 2016, the WHO Global Health Sector Strategy called for Hepatitis elimination by 2030 through scaled-up prevention, testing, and treatment<sup>4</sup>.

Elimination of hepatitis as a public health threat was defined as a 90% reduction in incidence and a 65% reduction in mortality, compared with the 2015 baseline<sup>5</sup>. According to time and availability of health facilities, HBV infection varies significantly from one part of the world to another<sup>6</sup>. The WHO estimates that 3.3% of the general population living in the Eastern Mediterranean region (EMR) are infected with HBV<sup>7</sup>. The rate of HBV infection varies from high (>8%

infection rate) to intermediate (2–8%) and low-endemicity (<2%) areas<sup>6</sup>. Iran, Bahrain and Kuwait are areas of low endemicity. Iraq, Cyprus and the United Arab Emirates have intermediate endemicity; and Palestine, Yemen, Egypt, Oman, Jordan, and Saudi Arabia have high endemicity<sup>8</sup>. Previous data showed that HBV is hyper endemic in Yemen<sup>9</sup>. Yemen consequently falls into the intermediate to high endemicity category<sup>10</sup>. Previous epidemiological studies were done in different regions in Yemen, showed that the prevalence rates of HBsAg are (4.75%) in Aden, (10.5%) in Sana'a, (26.3%) in Socotra, (5.6%) and in Haja<sup>11</sup>.

Jiblah is a town located in south-western Yemen, approximately eight kilometers south-west of governorate of Ibb. Due to purported universal culture value of Jiblah and its surroundings, Jiblah is added to the UNESCO World Heritage Tentative List<sup>12</sup>. There have been no previous studies to describe risk factors for HBV in Jiblah, therefore, the aim of the present study is to determine the current seroprevalence of HBV and risk factors involved in the presence of the HBV infection in the general population of Jiblah Town, Yemen.

## MATERIALS AND METHODS

This study was a community-based cross-sectional study conducted in Jibla Town, Yemen. A total of 120 subjects who lived in study area were selected by random sampling with a 100% response rate. Five ml of venous blood was drawn under aseptic conditions, then sera were screened for Hepatitis B surface antigen (HBsAg) using commercial kits (One step HBsAg Test, Intec, China). Positive samples were confirmed by enzyme immunoassay (EIA) for Hepatitis B surface antigen with commercially kits (Fortress Diagnostic Ltd. UK). To obtain relevant information, pre-tested standard questionnaire was prepared to collect participants' socio-demographic variables, HBV vaccination status, and knowledge of infectious agents and risk factors of HBV infection.

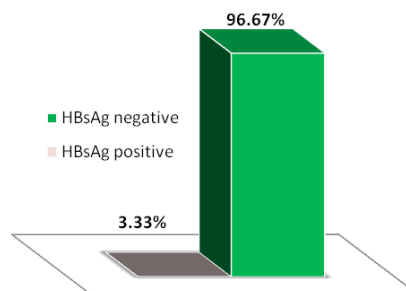
### Statistical analysis

Analysis of collected data was done by using SPSS Version 20. The percentage of variables was quantified. Statistical comparison between categorical variables was performed using Chi-squared pair test and  $p < 0.05$  was considered to indicate significance.

## RESULTS

In this study, overall seroprevalence of HBV infection among study population was 3.33% as shown in Figure 1. The age of the participants ranged from 6 to 70 years with a mean of 39.1 years. HBV prevalence was higher with elder age groups, but this was statistically insignificant ( $p$  value 0.999). Of the total, 87 (72.5%) were males and 33 (27.5%) females. Although there was no association between HBV infection and gender,

the percentage of HBV infection among males were 4 (4.6%) which is higher than in females. Married participants were 92 (76.67%), while unmarried were 28 (23.33%) and HBV infection was higher among married people 4 (4.35%), but this was statistically insignificant ( $p$  value 0.999).



**Figure 1: Percentage of HBV infection in Jiblah town, Yemen.**

Regarding the educational status of the respondents, about 94 (78.33%) were educated and the rest 26 (21.67%) of them had no education. The present study showed the highest seroprevalence of HBV infection among non-educated subjects 2 (7.69%) and the lowest educated subjects 2 (2.3%). The difference found was statistically insignificant ( $p$  value 0.634). Most participants 55 (45.83%) had monthly income less than YR 30,000 (approximately US\$ 54.5) and only 4 (3.33%) of participants had more than YR 80,000 (approximately US\$ 145.5). The difference found was statistically significant ( $p$  value 0.000) (Table 1).

**Table 1: Sociodemographic characteristics of studied population (n = 120).**

Variable	No. (%)	HBsAg No. (%)	$p$ value
<b>Age (years)</b>			0.999
≤ 15	3 (2.5)	0 (0)	
16-25	19 (15.83)	0 (0)	
26-35	35 (29.17)	1 (2.86)	
36-45	23 (19.17)	1 (2.86)	
46-55	22 (18.33)	1 (2.86)	
56-65	11 (9.17)	1 (2.86)	
≥ 75	7 (5.83)	0 (0)	
<b>Gender</b>			0.666
Male	87 (72.5)	4 (4.6)	
Female	33 (27.5)	0 (0)	
<b>Marital status</b>			0.999
Married	92 (76.67)	4 (4.35)	
Non-married	28 (23.33)	0 (0)	
<b>Education status</b>			0.624
Unable to read and write	26 (21.67)	2 (7.69)	
Primary education	27 (22.5)	0 (0)	
Secondary education	44 (36.67)	2 (4.55)	
Graduate education	23 (19.17)	0 (0)	
<b>Monthly income</b>			0.000
Less than RY. 30000	55 (45.83)	2 (3.64)	
RY. 30000-50000	50 (41.67)	1 (2)	
More than 50000-80000	11 (9.17)	1 (9.1)	
More than RY. 80000	4 (3.33)	0 (0)	

## DISCUSSION

Globally, the prevalence of HBV infection in the general population is 3.5% and 3.3% in Eastern Mediterranean countries<sup>13</sup>. As result of introducing the universal immunization program in Yemen against HBV for infants and high risk groups in early 2000<sup>14</sup>; recent studies conducted in Yemen reported the lowest prevalence of HBV infection in which ranges from 0.7-2% among general population<sup>15</sup>. This study presented that, the prevalence rate of HBsAg was 3.33%. Since 2014, war in Yemen as a result of political conflict which led to worst humanitarian crisis in the world. This war led to destruction of health system in Yemen<sup>16</sup>. The result of the present study was lower than results of the studies conducted in Sana'a 4%<sup>17</sup> and 7.1%<sup>18</sup>. The extent to which the health system to cover different regions of the country with HBV vaccine, differences in the geographical distribution of the infection and level of awareness of population could be the reasons of the different results of studies that have been conducted in Yemen. The present results indicate that, there is no association between HBV infection and the age of target population ( $p$  value 0.999). This is similar to a previous studies in Yemen and Iran<sup>8,15</sup>. In this study, seroprevalence was high in males 4 (4.6%), but there is no significant difference ( $p$  value 0.666). Some studies conducted in Yemen, Ethiopia and Egypt revealed similar results<sup>15,19,20</sup>, whereas other studies carried out in Mongolia and Yemen showed that males revealed a significant higher level of HBV than females<sup>22,23</sup>. In the present study, it was found that marital status was insignificantly associated with HBV infection ( $p$  value 0.999) which is similar to studies conducted in Yemen<sup>5,17,24</sup>, and study conducted in Ethiopia<sup>25</sup>. Other studies showed that marital status was a significant predictor for HBV infection. Married participants compared to participants who are unmarried were more likely to have HBV infection<sup>23</sup>. The present study also showed insignificant association between educational level and HBsAg seroprevalence ( $p$  value 0.624) despite the reports demonstrated that there is a relationship between higher education levels and good health. The result of this study is similar to studies conducted in Ethiopia<sup>25</sup> and Yemen<sup>15,26,27</sup>; in addition to the recent study that conducted in 2022, among general population in Egypt<sup>21</sup>. This study likewise revealed high prevalence of HBV infection among people who had low monthly income ( $p$  value 0.000). Yemen is one of the least developed countries in the world in which about 27% of people live under the food poverty line, and 42% are under the national income poverty line<sup>28</sup>. Monthly income of the individual plays an important role in determining the level of health status. As well known, poverty is a key factor in the spread of common diseases.

### Limitation of the study

This study had some limitations; including sample size may be small in related to population size. This may be due to political crises and war in Yemen which led to unavailability recent data about population size in the study area. Because of high financial cost of the tests,

only positive results were confirmed by HBsAg ELISA technique.

## CONCLUSIONS

The findings of this study indicated that the magnitude of HBV infection among the general population was intermediate level. The prevalence of hepatitis B in Yemen is still high compared to many other countries. There are some geographic areas in the country that may be at high risk. Control strategies should take these differences into account. Modifiable risk factor, monthly income was identified. A current war in Yemen led to instability of country and made obtaining the most reliable epidemiological data on HBV infection among the general population in Yemen very challenging.

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## AUTHOR'S CONTRIBUTION

**Al-Mohani SK:** Writing original draft, review, methodology, data curation, literature survey, editing.

## DATA AVAILABILITY

The data supporting the findings of this study are not currently available in a public repository but can be made available upon request to the corresponding author.

## CONFLICT OF INTEREST

None to declare.

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