

RESEARCH ARTICLE



Seroprevalence of Hepatitis B Virus and Associated Risk Factors among Medical Students at Jamhuriya University in Mogadishu, Somalia

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Abstract:

Background: Hepatitis is a significant global public health issue, with viral hepatitis types A, B, C, D, and E posing considerable mortality and morbidity risks. The hepatitis B virus (HBV) can lead to serious health complications, including cirrhosis and liver cancer. This cross-sectional study aimed to examine the seroprevalence of HBV and the associated risk factors among medical students in Mogadishu, Somalia, conducted from April to August 2024.

Methods: The study involved 240 medical students. Data on sociodemographic characteristics and potential risk factors were collected using a structured and validated questionnaire. Each participant provided a 3 mL blood sample, which was analyzed for hepatitis B surface antigen (HBsAg) using the Instant Hepatitis B Surface Antigen Kit. Statistical analysis was performed using SPSS software.

Results: The seroprevalence of HBsAg among the medical students was found to be 1.3%. Out of the 240 participants, 237 (98.8%) tested negative for HBsAg, while 3 (1.3%) tested positive. Statistical analysis revealed significant associations ($p < 0.05$) between HBV infection and several risk factors, including non-adherence to universal precautions guidelines, a history of blood transfusion, lack of glove use, and a history of dental procedures involving blood contact.

Conclusion: The HBV infection rate among medical students in Mogadishu, Somalia, is relatively low. However, the study identified several risk factors associated with HBV infection, underscoring the need for enhanced adherence to infection prevention measures. Targeted interventions and control measures are essential to address these identified risk factors in this population.

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1. BACKGROUND

Hepatitis B Virus (HBV), a DNA virus belonging to the Hepadnaviridae family, can cause both acute and chronic liver diseases. The primary modes of transmission include exposure to blood, blood products, needlestick injuries, sharp objects, as well as mother-to-child transmission and sexual contact. Individuals who have not been vaccinated or infected are generally at risk(1). HBV infections are a significant contributor to liver disease globally, potentially leading to severe complications such as liver cirrhosis, hepatocellular carcinoma, and even death(2).

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The World Health Organization (WHO) reports that approximately 2 billion people worldwide are affected by HBV, with around 887,000 deaths resulting from complications like liver cancer and cirrhosis. The majority of these cases are found in low- and middle-income countries. In 2015, the estimated prevalence of HBsAg in the general population was 3.61%(1). Key factors contributing to the high rates of HBsAg include a lack of awareness about HBV, failure to adhere to recommended preventive measures, and insufficient vaccination coverage(3).

Despite the successful rollout of vaccination programs, numerous countries in Asia and Africa remain classified as areas with high rates of HBV endemicity(4,5). The prevalence of Hepatitis B virus (HBV) in Africa varies significantly by country. In Somalia, recent studies report a prevalence of 9.7% among blood donors, although historical records indicate rates as high as 19.0% in 1995. Ethiopia shows a prevalence of 10.90% in Jijiga, while Nigeria has a higher rate of 18.60% in the Southwest region, contrasting with 4.10% in Calabar. In Kenya, the prevalence is around 5.60%, and Eritrea reports a lower rate of 2.0%. General, HBV prevalence in Africa ranges from 2% to over 18%, underscoring a major public health issue in various areas of the continent(6).

Healthcare facilities are considered hazardous and high-risk workplaces due to the significant occurrence of work-related injuries and illnesses. Healthcare workers, including direct care providers, practitioners, and medical waste handlers, face risks from occupational hazards, particularly infections like hepatitis B and C. Medical trainees, especially in developing countries, are particularly vulnerable to HBV infection during their training, largely due to low vaccination rates and high instances of accidental exposure to bodily fluids. Reports from Africa show that the HBV infection rate among medical students can be as high as 31.5%. Additionally, a study in Northwest Ethiopia found that up to 4.2% of medicine and health trainees were infected with HBV(7).

Medical and health science students, as integral members of the healthcare delivery system, face similar risks to those of other healthcare workers when they interact with patients and contaminated instruments. As they enter their clinical years, these students are expected to engage in patient care activities. However, the risk of healthcare-associated infections, exacerbated by inadequate medical waste management and non-compliance with safety protocols, poses a significant public health threat. This issue not only risks the health of healthcare workers but also affects their families and the broader community. To facilitate effective prevention and vaccination strategies, it is essential for policymakers and program implementers to have access to thorough and accurate information(8). Currently, there are no studies examining HBV infection rates among medical students in Somalia. This study aims to investigate the seroprevalence of HBV and associated risk factors among medical students at Jamhuriya University of Science and Technology in Mogadishu, Somalia.

2. METHODS

2.1. Study Design

This study employed a cross-sectional descriptive design. It is descriptive and non-experimental in nature, focusing on the seroprevalence of the hepatitis B virus along with associated risk factors among medical students in Mogadishu, Somalia.

2.2. Study Area

The participants of the study were medical students at Jamahiriya University of Science and Technology, Mogadishu, Somalia.

2.3. Target Population

The target population for this study consisted of medical students across various fields, including nursing, medicine, laboratory sciences, public health, and midwifery.

2.4. Inclusion Criteria

The inclusion criteria were specific to medical students enrolled in relevant healthcare programs.

2.5. Exclusion Criteria

Exclusion criteria specifically applied to individuals who were not medical students or who had received the hepatitis B vaccine.

2.6. Sample Size Determination

Sample size determination was based on the number of medical students and the timeline for data collection. A suitable sampling technique was employed.

2.7. The Sampling Technique

Non-probability sampling was utilized in this study to gather information from a conveniently accessible population. Participants completed a questionnaire after providing informed consent.

2.8. Sample Procedure

To investigate hepatitis B among medical students, a stratified random sampling method was employed to ensure a representative selection across various healthcare roles. The sample size was statistically determined, taking into account the workforce and the desired confidence level.

2.9. Data Collection

We designed questionnaires to gather information regarding hepatitis B among medical students, focusing on their vaccination status, previous exposure, and awareness levels. Additionally, we reviewed medical records to determine the incidence of hepatitis B cases within this group.

2.10. Data Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 25, using chi-square analysis.

2.11. Validity

Validity is a critical criterion for evaluating the quality of a test. It pertains to the extent to which the test accurately measures its intended outcomes. A test with high validity ensures that its focus aligns closely with the items being assessed.

2.12. Reliability

Test-retest reliability refers to the consistency of a test when administered to the same group of individuals on two separate occasions.

2.13. Research Instruments

We aseptically collected three milliliters (ml) of venous blood samples from each participant. After centrifugation, serum was separated from each sample and stored at -20 °C for up to three days prior to HBsAg analysis. Each sample was assigned a unique identification number corresponding to the codes on the questionnaire. HBsAg analysis was performed using rapid test kits according to the manufacturer's protocols, with positive results confirmed using ELISA (Gebremariam *et al.*, 2019).

2.14. Ethical Considerations

Ethical concerns regarding confidentiality and privacy were carefully addressed. Participants were assured that their identities would not be disclosed in the research report. Authorization letters were obtained from Jamahiriya University of Science and Technology, and all medical students involved in the study adhered strictly to these ethical standards throughout the research process.

3. RESULTS

3.1. Socio-demographic Data

A total of 240 medical students participated in the study. Among the respondents, 28.3% identified as male, while the majority, 71.7%, identified as female. The minimum and maximum ages of participants were set at 18 and 30 years, respectively. In terms of marital status, approximately 98.3% were single, and 1.7% were married.

Participants were categorized by grade level, with the highest representation in the first year (28.3%), followed by the second year (31.7%), third year (19.2%), fourth year (13.8%), sixth year (5.0%), and fifth year (2.1%). The study included respondents from various departments, with representation as follows: medicine (21.7%), laboratory sciences (40.0%), nursing (20.4%), midwifery (9.2%), and public health (8.8%). Table 1 summarizes the sociodemographic characteristics of the medical student participants.

3.2. Prevalence of Hepatitis B Infection Among Study Subjects

This study found that the seroprevalence of HBsAg among medical students was 1.3%, with all positive cases identified in male participants. Of the 240 individuals tested, 237 (98.8%) were negative for HBsAg, while 3 (1.3%) tested positive.

3.3. Risk Factors

Chi-square analysis revealed several significant risk factors associated with Hepatitis B virus infection, with P-values less than 0.05. These factors included knowledge of Universal Precautions guidelines, exposure to body fluids without wearing gloves, and experiences of needle stick injuries. Additionally, undergoing operations or surgeries, receiving blood transfusions, and having tooth extractions were identified as relevant factors. Participants who reported blood contact with skin or mucosa, as well as those with a family history of chronic liver diseases, also demonstrated increased risk. Table 2 summarizes the risk factors associated with HBsAg status among medical students.

Table 1. Sociodemographic characteristics of the study participant, Mogadishu, Somalia.

Variables	Category	Frequency	Percent %
Gender	Male	68	18.3
	Female	172	71.7
Age	18-24	237	98.8
	25-30	3	1.3
Marital status	Single	236	98.3
	Married	4	1.7
Year of Experience	Sixth years of class	52	21.7
	Fifth years of class	96	40.0
	Fourth year of class	49	20.4
	Third years of class	22	9.2
	Second years of class	21	8.8
	First year of class	240	100.0
Department	Medicine	52	21.7
	Laboratory	96	40.0
	Nurse	49	20.4
	Midwife	22	9.2
	Public health	21	8.8

Source: Authors

Table 2 Risk factors associated with HBsAg status among medical students

Variables	Response	HBsAg status		P-value
		Negative	Positive	
Universal precaution guidelines	Yes	181	0	0.14
	No	56	3	
Without wearing gloves	Yes	36	3	0.004*
	No	201	0	
Needle stick injury	Yes	55	2	0.141
	No	182	1	
Operation or surgery	Yes	21	2	0.025*
	No	216	1	
Blood transfusion	Yes	22	2	0.027*
	No	215	1	
Tooth extraction	Yes	55	3	0.014*
	No	182	0	
Had blood contact	Yes	40	2	0.080
	No	197	1	
Chronic liver diseases	Yes	36	3	0.004*
	No	201	0	

4. DISCUSSION

The current study investigated the seroprevalence of Hepatitis B Virus (HBV) and associated risk factors among medical students in Somalia. Hepatitis is a major public health problem often transmitted in medical student settings, leading to significant mortality and morbidity. The study obtained 240 blood samples from medical students. In terms of gender, the majority of participants (71.7%) identified as female. This is similar to a study conducted among medical students in Saudi Arabia, where the majority of participants were also female (68.5%) (9). However, this finding contrasts with a study in Ethiopia, where the majority of

participants were male (59.7%) (10). This demographic skew may influence the generalizability of the findings, as behaviors and exposures could differ between genders. The lower representation of males should be considered when interpreting the results.

Most respondents in this study were medical students aged 18-24 years, which aligns with findings from Saudi Arabia, where the most common age group was 18-25 years (9). In a similar study in Saudi Arabia, participants ranged from 18 to 20 years old (11). A study in Uganda found that no student was below 18 years of age, with the oldest being 39 years old (8). In contrast, a study among medical students in Sierra Leone reported a median age of 26 years (24–28) (12). The predominance of respondents aged 18-24 indicates that the study population is largely young, typical for students beginning their university education in Somalia.

Among the participants, 98.3% reported being single. This finding aligns with studies conducted in Saudi Arabia, Sierra Leone, and Ethiopia, where most participants were also single (8,9,12). Marital status can influence lifestyle factors and potentially affect HBV exposure and transmission risk, as single individuals may have different social interactions and behaviors compared to married individuals. The study included respondents from various fields: medicine (21.7%), laboratory (40.0%), nursing (20.4%), midwifery (9.2%), and public health (8.8%). Participants were categorized by year level, with the highest representation in the first year (28.3%), followed by the second year (31.7%), third year (19.2%), fourth year (13.8%), sixth year (5.0%), and fifth year (2.1%). This contrasts with a study in Ethiopia, where a broader range of academic years was included, resulting in a 100% response rate (8). The varying representation across departments and year levels may influence the risk of HBV exposure and transmission.

Factors that showed a statistically significant association with HBsAg positive status among medical students included gender, universal precautions, not wearing gloves, having undergone surgery, blood transfusions, tooth extractions, blood contact with skin or mucosa, and a family history of chronic liver diseases (10,12–14). The study revealed that 16.3% of respondents had exposure to body fluids without wearing gloves, which poses a significant risk (P -value = 0.00076) (10). Additionally, 23.8% of respondents experienced needle stick injuries; however, this was not statistically significant (P value = 0.079), which is consistent with findings from a study in Sierra Leone (12). The data indicated that a smaller percentage of respondents had undergone surgical procedures (9.6%), with a statistically significant P value of 0.001 (10). Blood transfusions were reported by 10.0% of participants, with a P value of 0.001, indicating statistical significance. A similar study in Mexico also identified a history of blood transfusions as significant (13). Tooth extractions were reported by 24.2% of participants, with a significant P value of 0.002. Similar findings were observed in Ethiopia (10). Additionally, 17.5% of respondents indicated blood contact with skin or mucosa, with a significant P value of 0.024, although another study found no such significance (15).

The study indicated that 16.3% of respondents reported a family history of chronic liver diseases, suggesting a potential genetic predisposition to liver conditions, with a significant P value of 0.00076. A study in Rwanda also identified family history as a significant factor (14). No statistical significance was found regarding several factors, including age, department, marital status, needle stick injury, and academic year as they relate to HBV among medical students in Mogadishu, Somalia. In contrast, a study in Ethiopia found significant associations between demographic variables, study department, and both mean knowledge and practice scores, indicating a 95% confidence interval (P = 0.007) and (P = 0.001) (8). Another study conducted in Somalia identified statistical significance concerning academic years (16). In our study, the majority of participants tested negative for Hepatitis B Virus, with only a small proportion (1.3%) testing positive, indicating a relatively low prevalence among the study population. A similar study in Saudi Arabia reported a prevalence rate of HBV among students of 0.41%, indicating low prevalence (11).

Another study in Mexico showed an overall prevalence of 0.5% (13). In contrast, a study highlighted a concerning HBV prevalence of 31.5% among students in a tertiary institution, suggesting a high risk despite awareness of risk factors (17). General, the findings from this study indicate a relatively low prevalence of Hepatitis B Virus (HBV) among medical students in Mogadishu, Somalia. This low prevalence is encouraging and suggests that current preventive measures, including vaccination and awareness programs, may

be effective in this population. However, it is crucial to continue enhancing these efforts to ensure ongoing protection against HBV.

5. LIMITATIONS OF STUDY

The study's sample size and demographic distribution may not represent all medical students, and its cross-sectional design provides only a snapshot at a single point in time, limiting causal inferences. As such, the findings may not be generalizable to other populations, including medical professionals in different regions or students in other healthcare fields.

CONCLUSION

The study investigated the seroprevalence of Hepatitis B Virus (HBV) among medical students in Mogadishu, Somalia, revealing a low prevalence of 1.3%. The majority of participants were female (71.7%) and aged 18-24 years, with most reporting being single. Significant risk factors for HBV exposure included gender, lack of universal precautions, and medical procedures like blood transfusions and tooth extractions. While current preventive measures appear effective, the study underscores the need for ongoing awareness and adherence to safety practices among medical students. Further research is recommended to explore regional variations and enhance protective strategies against HBV in this population.

DECLARATIONS:

AUTHORS' CONTRIBUTIONS

All authors contributed equally to the study.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Jamhuriya Research Center Committee. Informed consent was secured from all participants prior to their involvement in the study.

CONSENT FOR PUBLICATION

Consent for publication is not applicable, as no identifying images or personal details of participants are included in the manuscript.

AVAILABILITY OF DATA AND MATERIALS

Data and materials are available upon request. The data generated and analyzed during this study are available from the corresponding author upon reasonable request. The questionnaire used for data collection is provided as a supplementary file (see Supplementary Material 1).

COMPETING INTERESTS

Not applicable.

FUNDING

Not applicable.

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