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RESEARCH ARTICLE

THE MAGNITUDE AND RISK FACTORS ASSOCIATED WITH HEPATITIS B VIRAL INFECTIONS AMONG INDIVIDUALS SCREENED AT MNAZI-MMOJA HOSPITAL, ZANZIBAR

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Abstract

Background: Hepatitis B virus (HBV) infection is a major public health problem in sub-Saharan Africa and other parts of the world. HBV is a small, double-stranded circular DNA virus that may cause chronic severe liver diseases. The mode of transmission of HBV includes exposure to body fluids of an infected person by perinatal transmission, sexual intercourse, and needle sticks. The diagnosis of HBV infection is based on clinical, biochemical, histological, and serological studies. A vaccine is also available for the prevention of HBV**.**
Methodology: This study aimed to assess the prevalence of HBV infection and associated risk factors among individuals screened at Mnazi Mmoja Hospital in Zanzibar between 2021 and 2023.A Retrospective analysis of secondary data from hospital records. Demographic data such as age, sex, residence, and occupation, along with behavioural, healthcare-related, and awareness-related factors, were analyzed using IBM SPSS 27.
Result: A total of 24,431 individuals were screened for HBV at Mnazi-Mmoja Hospital with an overall prevalence of 7.6% for the three consecutive years. The highest prevalence was found in 2022, which was 8.3%, followed by 7.6% and 6.9% in 2021 and 2023, respectively. This study reveals a moderate prevalence rate of HBV infection within the population, and it further reveals that lack of awareness, socioeconomic, behavioral and health-related factors are the highest drivers for HBV infection transmission in the study population. This study sheds light and alarm to the government and other authorities so that appropriate intervention can be taken based on the current situation.
Keywords: Epidemiology, Hepatitis B, prevalence, risk factors, vaccine, viral infections, Zanzibar.

INTRODUCTION

HBV infection is a serious public health problem in various parts of the world; in SSA, the prevalence is greater than 8%. Zanzibar is one of the archipelagos located along the shores of Tanzania; in 2015, the prevalence in Zanzibar was 5.3%[1]. HBV infection is a broad range of liver diseases ranging from acute and chronic hepatitis to liver cirrhosis and hepatocellular carcinoma (HCC) as complications in chronic infection[2]. HBV is a small virus composed of a partially double-stranded DNA genome; it is a member of a distinct family of DNA viruses known as Hepadnaviridae[3]. The infectious virus particle is a double-shelled sphere 42 nm in diameter; one shell is a lipid membrane containing Hepatitis B surface antigen (HBsAg) and the other is a complex of Hepatitis B core antigen (HBcAg) and viral DNA genome[4]. There are eight genotypes of HBV (A-H) each having a distinct geographical distribution in structure, mode of transmission, target population, and consequences[5].
HBV is transmitted by contact with infected bodily fluids; perinatal transmission and mostly post delivery is more commonly observed than in utero from mothers with positive HBsAg in high and intermediate endemicity regions of HBV infection, including Tanzania. Sexual transmission is possible; however, the risk is high in unvaccinated people with multiple

sexual partners, men who have sex with men, People Who Inject Drugs (PWID), Healthcare Workers (HCWs), and patients undergoing regular blood transfusions and homolysis[6]. About 5-15% of HBV and 80% of HCV infections can progress to chronic severe liver diseases, such as liver cirrhosis and cancer, known as hepatocellular carcinoma, resulting in a high case fatality rate[7]. The two infections have been referred to as a "silent epidemic" because they remain asymptomatic for decades, and the liver disease progresses slowly to severe liver disease and death. The majority of people infected with these two viruses remain unaware of their infection status, and such people unknowingly transmit the viruses, for their lifetime, to an undiagnosed and untreated population[8].

The people infected with these two viruses reside mainly in the WHO Western Pacific Region and the WHO African Region, where 116 million and 81 million people, respectively, are infected with these two viruses. Sixty million people are infected in the WHO Eastern Mediterranean Region, 18 million people in the WHO South-East Asia Region, 14 million people in the WHO European Region, and 5 million people in the WHO Region of the Americas 1.5 million people[9]. Globally, there are 78,000 deaths documented as having resulted from HBV. In Africa, 6.1% of the total population is infected with HBV[10]. The risk of developing chronic HBV infection depends on the age at which they are infected, while the young are at a higher risk of developing chronic HBV infection than the older ones[11]. Tanzania is a high-endemic country. The seroprevalence of HBV infection in the country was found to be 6% in the general population in Dar es Salaam, which has increased from previous studies in which the prevalence was found to be 4.4% in the general population in Dar es Salaam. Relatively lower levels of this infection have been found in children, with a seroprevalence of 4.2% in children who attended different clinics in Kilimanjaro, while 4.3% and 1.8% were found in Iringa and Pemba, respectively, in children who were attended to in health facilities for febrile syndromes[12]. In the case of Zanzibar, some studies were done to determine the prevalence rates of the infections caused by the HBV. However, the majority of the studies done were based on the prevalence rates of the infections caused by the HBV among vulnerable groups such as male sex males, people living with HIV, and those who abuse drugs, which is estimated at 26.9% live with infections caused by the HBV with little information on the possible risk factors which the people who acquired the infection caused by the HBV might encounter[13]. Therefore, the main aim of this particular study is to determine the prevalence rates of the infections caused by the HBV with the possible risk factors which might cause the infections caused by the HBV whereby the results obtained will be useful in determining the ratio of the prevalence rates in Zanzibar with the possible risk factors which might cause the infections caused by the HBV with the aim of controlling the infections caused by the HBV.

MATERIALS AND METHODS

Study location and duration.

The study was conducted at Mnazi Mmoja Referral Hospital located in Zanzibar town, Urban/West, situated at latitude**:** 6°10'04.9"S and Longitude: 39° 11'23.3" E. (more about Zanzibar). The proposed study on assessing the prevalence of hepatitis B viral infections among individuals screened at Mnazi-Mmoja Hospital was conducted from April 2024 to July 2024.

Data collection

Retrospective secondary data were collected from the hospital registry by retrieving patient records from 2021 to 2023. Demographic data (age, sex, residence, occupation), behavioral characteristics, healthcare-related exposures, and awareness-related information were extracted for all individuals who tested positive for HBV infection during the study period.

Data analysis

The collected data was analyzed by utilizing statistical software, IBM SPSS 27 (Statistical Package for the Social Sciences). The collected data was coded, entered, validated, and analyzed by utilizing IBM SPSS 27.

Ethical consideration and approval

This study was approved by the ethical committee of Sokoine University of Agriculture (SUA). Permission to carry out the study in Zanzibar was approved by the research committee of the office of the Second Vice President and the office of the Chief Government Statistician (OCGS), ref No. CA.33/411/01J/30. Permission for data collection of the study was approved by the Zanzibar Health Research Ethics Committee (ZAHREC), ref No. ZAHREC/02/ST/MAR /2021/73 under the Zanzibar Ministry of Health, where the demographics and other customer information will be kept confidential.

RESULTS

The overall prevalence of hepatitis B viral infection among the individuals screened for HBsAg at Mnazi Mmoja Hospital from 2021 to 2023 was 7.6%, whereby females and adults aged between 31-45 years account for 50.5% and 53.0% of the total individuals screened, respectively. The study also reveals that 68.5% of the participants live in urban areas, and among all participants, 42.4% were jobless, while 2.8% were students. The study reveals that behavioral factors associated with HBV patients screened include: multiple sexual partners at 6.6%, history of shaving at barbershops at 8.6%, participation in nose and ear piercing at 18.0%, contact with an HBV case at home at 3.3%, drug injection at 4.1%, and prior traditional medicine procedures at 3.6%. According to the study, an analysis of healthcare service-related factors for HBV patients at Mnazi-Mmoja Hospital found that multiple hospitalizations were the most common (11.9%), followed by attendance at dental procedures (5.6%), undergoing frequent dialysis (5.3%), a history of needle injury (3.3%), and a history of STI treatment (1.8%).

Table 1: Social demographic factors associated with HBV patients.

Variables	Frequency (%)
Gender	
Male	195 (49.5)
Female	199 (50.5)
Age	
15-30	116 (29.4)
31-45	209 (53.0)
46-60	55 (14.0)
Above 60	14 (3.6)
Residence	
Rural	124 (31.5)
Urban	270 (68.5)
Occupation	
Businessman	64 (16.2)
Employee	46 (11.7)
Self-employee	98 (24.9)
Health care	8 (2.0)
Jobless	167 (42.4)
Student	11 (2.8)
Contact with HBV case at home	
Yes	13 (3.3)
No	381 (96.7)

In this study, most participants had an unknown reason for testing during a medical check-up (71.3%), while surgical procedures, blood donation, maternal clinics, and travelling were the main reasons reported, contributing 9.6%, 4.6%, 9.4%, and 5.1% respectively. The study provides the comparison of the prevalence by years from 2021 to 2023 in which the highest prevalence of 8.3% was found in 2022 where the total patients of 24431, followed by 7.6% found in 2021, and 6.9% found in 2023.

Table 2: Behavioural factors associated with HBV patients.

Behavioural factors	Frequency (%)
Having multiple sexual partners	
Yes	26 (6.6)
No	368 (93.4)
History of shaving at Barber shop	
Yes	34 (8.6)
No	360 (91.4)
Participating in nose and ear piercing	
Yes	71 (18.0)
No	323 (82.0)
People who inject drugs (drug abused)	
Yes	16 (4.1)
No	378 (95.9)
Prior traditional medicine procedures	
Yes	14 (3.6)
No	380 (96.4)

DISCUSSION

The current study aims to present a general overview of the general trend of HBV infection among the population of Zanzibar who receive health care in Mnazi Mmoja Hospital. To the best of our knowledge, this is the first study that attempts to investigate the prevalence of HBV among the general population of Zanzibar. The average prevalence of 7.6% of HBV infection revealed in the current study is found to be higher compared to 4.4% for the same study in Romania, and 4.5% in Moldavia, respectively, which was carried out as a nationwide survey on the prevalence and risk factor for hepatitis B viral infection[14].

Table 3: Health care services related factors associated with HBV patients.

Health care services	Frequency (%)
Attending dental procedure ever	
Yes	22 (5.6)
No	372 (94.4)
Attending frequently to dialysis	
Yes	21 (5.3)
No	373 (94.7)
Having a multiple hospitalization	
Yes	47 (11.9)
No	347 (88.1)
History of STI treatment	
Yes	7 (1.8)
No	387 (98.2)
History of needle stick injury	
Yes	13 (3.3)
No	381 (96.7)

According to the WHO, the prevalence of HBV infection can be classified into three levels: high (>8%), intermediate (2-8%), and low (<2%) thus the results from this study places the study population at the upper margin of the intermediate endemicity.Since Subsaharan Africa is considered as high endemic area by WHO[15]. The 7.6% average prevalence of HBV infection for the three consecutive years 2021 to 2023 indicated the same moderate level of the disease although the spread of the illness was high among the study population reaching to 8.3% prevalence in 2022[16]. This study therefore provides an alarm to the authority and to the Zanzibar community at large regarding the general trend of the disease since the patients who attend Mnazi Mmoja Hospital are referred from different health facilities around Zanzibar islands, such as district hospitals, village and private health facilities. This study indicates that individuals aged 31 to 45 years are at a higher risk of HBV infection compared to other age groups. This aligns with a report from Togo, which identified the age group between 20 and 39 years as the highest risk group for HBV infection[17]. This overlap highlights a concerning trend within the demographic examined in our study, many individuals in this age group are in their prime working years, potentially engaging in occupations that heighten their exposure risk to HBV.

Table 4: Awareness-related factors associated with HBV patients.

Awareness-related factors	Frequency (%)
Knowledge about HBV infections	
Yes	79 (20.1)
No	315 (79.9)
Reasons for testing of HBV infection	
Blood donation	18 (4.6)
For operation	38 (9.6)
Medical check up	281 (71.3)
Pregnant clinic	37 (9.4)
Travelling	20 (5.1)

Current findings also show that the chance of getting an HBV infection is higher among jobless individuals. This aligns with global evidence that infectious diseases like HBV are interlinked with lower socioeconomic status, often associated with poor healthcare access and lifestyle factors[18]. The current study also reveals that exposure to and contact with HBV cases within households as an important risk factor for transmission of the infection. Similar studies conducted in North Ethiopia, Turkey, and Iran have reported consistent findings[19]. This risk stems from the close physical interactions between hepatitis patients and their family members, where there is a heightened likelihood of encountering the disease in saliva, blood, sweat, and other bodily fluids during care giving at home.

The study further indicates that urban areas are particularly vulnerable to HBV infection, affecting 68.5% of the total study population. This heightened risk may be attributed to factors such as population density, migration, and mobility. Similar findings were observed in a study conducted in northern Tanzania, which reported prevalence of 57.7% and in neighboring Somalia, where the rate was 85.4%[20]. These results underline the significant incidence of HBV in urban settings, where the combination of larger populations and higher numbers of migrants promotes the transmission of infectious diseases, including HBV[21]. The behavioral factors analyzed in this study revealed that nose and ear piercing (18.0%) was the most commonly reported practice among participants, followed by shaving at barber shops (8.6%) and having multiple sexual partners (6.6%)[22]. These findings align with previous research conducted in Ethiopia, which identified traditional practices such as ear and nose piercing, as well as unsafe shaving, as significant risk factors for HBV transmission[23]. However, further statistical analysis is needed to determine the true strength of association between these factors and HBV infection. Other less common but potential risk factors included injecting drugs (4.1%) and undergoing traditional medicine procedures (3.6%)[24].The study found that multiple hospitalizations (11.9%), dental procedures (5.6%), dialysis attendance (5.3%), needle stick injuries (3.3%), and STI treatment (1.8%) were key healthcare-related exposures linked to HBV transmission[25]. These findings align with prior research showing that hospitalizations and surgeries increase HBV risk due to potential exposure to contaminated instruments or blood products, while dental procedures pose a threat in settings with poor sterilization[26]. Dialysis attendance was less prevalent but remains concerning given documented HBV outbreaks in hemodialysis centers[27]. Awareness of the disease was very low among the study population, with 79.9% of participants being unaware. This may perpetuate the risk of infections since many people with HBV infection do not show symptoms until the disease has progressed significantly, which means the virus can spread unnoticed, contributing to the high percentage of positive individuals[28]. Present study also shows that the majority of the participants were screened not primarily for HBV infection but rather for different purposes, like during blood donation, operational procedures, maternal clinics and for travelling purposes meaning that strategic efforts should be planned in sensitizing the society to perform routine check-up especially for the silent killer diseases like HBV infections.

Limitations of the study

The accuracy and completeness of the data relied on normal clinical documentation; using retrospective secondary data from hospital records may induce information bias. The results may not be as applicable to other parts of Zanzibar or to community-based population because the study was limited to a single referral hospital (Mnazi Mmoja Hospital). The study lacked information on liver function markers, HBV genotypes, and vaccination status, which would have given researchers a better understanding of the dynamics of disease progression and transmission.

CONCLUSION

The prevalence of HBV infection in Zanzibar from 2021 to 2023 is at the upper margin of the intermediate level suggesting proper interventions to rescue the situation. Data gathered from Mnazi Mmoja Hospital provides a general trend of the disease in Zanzibar since patients were referred from different health facilities around the island. The situation has been attributed by several factors ranging from demographic, socioeconomic, behavioral as well as health-related issues. Study concludes that further studies should be conducted to assess the magnitude of the disease for some previous years in order to get a clear trend and therefore advising the government authorities and other stake holders accordingly.

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AUTHOR'S CONTRIBUTIONS

Suleiman SM: formal analysis, conceptualization, writing original draft. **Ussi UH:** formal analysis, critical review. **Hassan HS:** conceptualisation. **Ngalameno MK:** critical review, formal analysis. **Said SS:** data organization. Final manuscript was checked and approved by all authors.

DATA AVAILABILITY

The associated author can provide the empirical data used to support the study's conclusions upon request.

CONFLICT OF INTEREST

There are no conflicts of interest in regard to this project.

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