Determination of Seroprevalence of Hepatitis B Virus Infection and Associated Risk Factors Among Adult Patients at A Tertiary Hospital in Ebonyi State

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ABSTRACT

Background

Hepatitis B virus (HBV) infection is a major global health problem with an estimated burden of 290 million infection. It is associated with high mortality and morbidity especially the chronic liver disease. The study aimed at determining the seroprevalence of hepatitis B viral infections in adult patients and associated risk factors in Alex-Ekwueme Federal University Teaching Hospital in Ebonyi State.

Method

It was a cross-sectional study done in Alex-Ekwueme Federal University Teaching Hospital Abakaliki. The study was conducted among patients that presented in general out-patient clinics between January, 2024 to December, 2024.

Result

Three hundred and twenty were enrolled into the study. There were 54% males and 46% females that participated in the study. The seroprevalence of hepatitis B infection was reported as 10.3% and more males 12.7% (22/172) were seropositive. Participants with previous history of multiple sexual partners and local circumcision were more likely to have positive hepatitis B surface antigen with P-value less than 0.001.

Conclusion

The study revealed high seroprevalence among adult patients attending out-patient clinic in AEFUTHA. It also highlighted multiple sexual partner and genital mutilation as associated risk factors therefore appropriate behavioral change is needed.

Key Words: Hepatitis B, Infection, Multiple Sexual Partner, Seroprevalence

INTRODUCTION

Hepatitis B virus (HBV) infection poses a significant global health challenge, affecting an estimated 290 million people worldwide [1]. A large proportion of these cases remain undiagnosed and untreated [2]. HBV is linked to substantial rates of illness and death. Chronic HBV infection can lead to severe complications such as fulminant hepatitis, cirrhosis, and hepatocellular carcinoma, which together cause between 500,000 and 1.2 million deaths each year [3]. The infection can manifest in various forms, ranging from asymptomatic cases and acute self-limiting hepatitis to fulminant hepatitis that may necessitate liver transplantation. Some individuals progress to chronic HBV infection, increasing their risk of developing cirrhosis or liver cancer. The likelihood of chronic

infection depends largely on the age at which a person is infected [4]. Over 90% of infants, 25–50% of children aged 1 to 5 years, and 6–10% of older children and adults who contract HBV develop chronic infection. Additionally, individuals with weakened immune systems face a heightened risk of chronic HBV infection [3,4].

The World Health Organization has set a goal to eliminate viral hepatitis by 2030, aiming to reduce new infections by 90% and hepatitis-related deaths by 65% [5,6] This highlights the urgent need for timely diagnosis and treatment of individuals with hepatitis B, as failure to do so will likely lead to a continued rise in mortality. In 2016, it was estimated that only 27 million people worldwide were aware of their HBV status, and just 4.5 million of them (16.7%) were receiving treatment [5,6]. Alarmingly, only 9% of those infected with HBV know their status, underscoring the critical importance of routine screening and testing [6].

In Africa, the prevalence of hepatitis B virus (HBV) infection ranges between 8% and 20%, making it the region with the second-highest number of chronic HBV cases globally, following Asia. Sub-Saharan Africa carries the greatest share of this burden [7]. Nigeria continues to experience high endemic levels of HBV infection, despite the introduction of a safe and effective vaccine in 2004 through the National Program on Immunization (NPI) [8]. The first national hepatitis B survey revealed a seroprevalence rate of 12.2% among asymptomatic Nigerians [9]. Among seemingly healthy adults, the prevalence was recorded at 5.5% in Ilorin and 5.3% in Lagos [5,10]. In blood donors, HBV prevalence was reported at 9.8% in Ekiti State [11] and 6.9% among relatively healthy individuals in Ebonyi State [12].

Hepatitis B virus (HBV) is primarily spread through exposure to infected bodily fluids, particularly blood. Common transmission routes include needle stick injuries, blood transfusions, and contact with contaminated blood products [4.5]. Sexual transmission is also possible, especially among individuals with multiple sexual partners and men who have sex with men. In adults, risk factors for HBV transmission include shared needles during tattooing, injection drug use, and unprotected sex with multiple partners [8,13]. HBV is a vaccine-preventable disease, and the key approach to eliminating it involves widespread testing and effective treatment [5]. However, most HBV related studies in Nigeria have focused on small groups, often limited to pregnant women or children.

This study sought to assess the prevalence of hepatitis B virus (HBV) infection and identify related risk factors among adult patients at Alex-Ekwueme Federal University Teaching Hospital, Ebonyi State.

Study Area

The study was carried out in Alex-Ekwueme Federal University Teaching Hospital Abakaliki (AEFUTHA), one the biggest tertiary hospitals in Ebonyi State. A state located in the South eastern zone of Nigeria. The state has boundary with Abia and Imo in the South, and Enugu as well as Benue in the North.

Study Design

It was a cross-sectional hospital based study in Alex-Ekwueme Federal University Teaching Hospital Abakaliki conducted between Ist January, 2024 to December 31st 2024. All consent adult patients who presented in the hospital general out-patient clinic were recruited for the study. A semi-structured pretested questionnaire was administered to each of the participants. Subsequently, 5 mls of whole blood will also be collected from all the participants for the laboratory detection of HBsAg. Those whose serum tested positive will be confirmed with ELISA serological assay. The data will be entered on Excel Microsoft sheet and analysed using SSPS version 25.

Inclusion criteria:

All consenting patients that were up to 18 years and above were recruited into the study.

Exclusion criteria:

Patients that were critically ill and unable to answer the questionnaire during data collection were excluded from study.

Sample Size

The sample size for the cross sectional study was calculated based on the formula:

N = $Z^2\frac{pq}{d^2}$

N = the desired sample size

Z = the standard normal deviation, usually set at 1.96 corresponding to 95% Confidence interval

P = the prevalence.

q = 1-p

d = the standard error (margin of error) set at 0.05.

Where seroprevalence rate of HBV 12.2% was by Olayinka et al[9]

The sample size was calculated using the formula above where: z = 1.96; p=0.122; q=1-p=0.878.; d=0.05.

N = $(1.96)^2$x 0.122 x 0.878/ $(0.05)^2$

$$= \frac{3.8416 \times 0.122 \times 0.878}{.0025}$$

=> 165

Three hundred participants were recruited into the study to improve the validity of the study

Sampling Technique

All the participants were recruited using systematic random sampling technique.

Sample collection and analysis

Five milliliter of whole blood was collected from each participants under the aseptic condition and was kept at room temperature for 30 minutes to facilitate clotting. The clotted blood will then be centrifuged at 3000 rpm for five minutes to separate the serum. The serum samples were transferred through cold chain to the pathology laboratory for serologic screening. Serologic screening for initial qualitative detection of HBsAg immunochromatographic diagnostic kit (ICT) strips (Acon USA) were used. The sensitivity and specificity of both the strips are above 99% and 98%, respectively. All the positive samples on ICT were further confirmed by 3rd Generation Enzyme- Linked Immunosorbent Assay (ELISA) (EASE BN-96 TMB, Taiwan) as previously described [10, 14].

Data collection and analysis:

The data were entered into Excel Microsoft and statistical analysis was done using Social Sciences (SPSS) software, version 25. Chi square test was used for association between HBV seropositivity and the risk factors. The p-values less than 0.05 was interpreted as statistically significant.

Ethical clearance

The ethical endorsement for study conduction was obtained from Alex-Ekwueme Federal University Teaching Hospital Research Ethical Committee (IREC). The study was conducted according to declaration of Helsinki. Both verbal and written informed consents were obtained from all the participants after the detail of the study was explained to them. They were made to understand that the have right to either opt in or out.

Result

In this study, three hundred and twenty participants were recruited from different out patient clinics in Alex-Ekwueme Federal University Teaching Hospital. There were more males 172 (54%) than females 148 (46%) that participated in the study. The mean age of the patients was 42.3 ± 4 years and the highest age group (31.3%) was between 40 to 49 years. The study participants were recruited from Medical Outpatient Clinic (104, 32.5%), followed by Surgical Outpatient Clinic (92, 28.8%) and others. Most participants (47.8%) were married, some were single and others were either divorced or widow. Farmers (36.9%) contributed highest number of patients enrolled into the study, followed by Traders (31.9%), Civil Servants (28.1%) and others (3.1%) (Table 1).

The seroprevalence of hepatitis B infection was revealed as 10.3%. The prevalence in males was 12.7% (22/172) and 7.4% (11/148) in females (Figure 1). The analysis of the risk factors associated with hepatitis B infection revealed strong and significant association between history of multiple sexual partners as well as history of local circumcision and genital mutilation with odd ratio greater than 1 and P-value < 0.001. Other factors (tattoos, IV drug use, and sharing sharp used objects) showed weak association to HBV infection with odd ratio of 1 and P-value > 0.05. There was no association between history of previous surgery and blood transfusion in this study (Table 2).

Tables

Table 1: Sociodemographic characteristics of participants

Characteristics	**Frequency (n=320)**	**Percentage (%)**
Sex		
Male	172	54.0
Female	148	46.0
Age (Years)		
<20	50	15.6
20-29	58	18.1
30-39	81	25.3
40-49	100	31.3
50-56	20	6.3
≥ 60	11	3.4
Mean (42.3± 4)		
Department		
Medicine	104	32.5
Surgery	92	28.8
OBGY	40	12.5
Family Medicine	76	23.7
Others	8	2.5
Marital Status		
Married	153	47.8
Single	102	31.9
Widow	40	12.9
Divorced	25	7.8
HBV Surface Antigen Serology	33	10.3
Positive	287	89.7

Negative	90	28.1
Occupation	102	31.9
Civil Servant	118	36.9
Trader	10	3.1
Farmer		
Others		

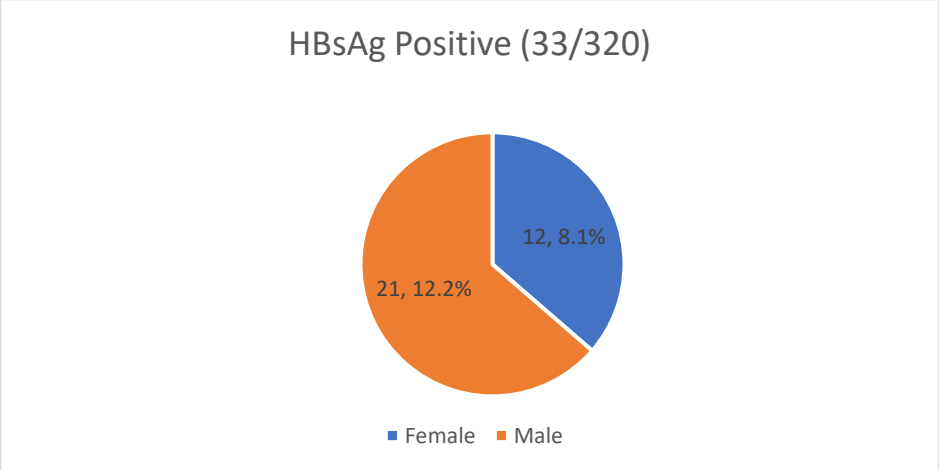
Key: OBGY= Obstetrics and Gynecology

Table 2: Risk Factors Associated with Hepatitis B infection

Serial No	Variables	HBsAg Positive	HBsAg Negative	Odd Ratio	C I (95%)	P-Value
1	Multiple sex partner: Yes	21	72	5.23	2.52- 10.85	< 0.001
	Multiple sex partner: No	12	215			
2	Hx Tattoos : Yes	14	100	1.38	0.68- 2.81	0.36
	Hx Tattoos: No	19	187			
3	IV drug users : Yes	12	80	1.77	0.82- 3.81	0.18
	IV drug users: No	21	207			
4	Sharing Sharps: Yes	13	102	1.17	0.56- 2.44	0.69
	Sharing Sharps: No	20	185			
5	Blood transfusion: Yes	10	120	0.61	0.28- 1.33	0.13
	Blood transfusion: No	23	167			
6	Previous surgery: Yes	11	121	0.60	0.20- 1.30	0.14
	Previous surgery: No	22	166			
7	Local tooth extraction: Yes	11	92	1.06	0.49- 2.29	0.87
	Local tooth extraction: No	22	195			
8	Circumcision/genital mutilation: Yes	19	73	4.00	1.91- 8.38	< 0.001
	Circumcision/genital mutilation : No	14	214			

Key: CI = Confidence interval, Hx= History

Figure 1: Pie Chart of sex distribution of HBsAg seropositive participants



DISCUSSION

This study found a high hepatitis B surface antigen (HBsAg) seroprevalence of 10.3%, indicating HBV infection. This result aligns with findings from similar studies across Nigeria, such as a 7.3% prevalence reported in Ibadan [15] and 8.1% among individuals living with HIV [16]. However, the observed rate is higher than the 5.3% recorded by Oshun and colleagues among asymptomatic individuals in Lagos [5], and the 6.3% reported by Agboeze et al. in Abakaliki [17]. On the other hand, it is slightly lower than the 12.3% prevalence reported in the national survey. Comparatively, lower rates have been documented in other African countries, including 7.3% in Ethiopia and 3.67% in Egypt [18, 19].

These disparities in seroprevalence rates can be attributed to the variation in study population, geographical location, vaccine coverage and time of study. It also be explained by the difference in cultural systems, standard of blood transfusion services, level of health awareness and infection control measures.

One of the major risk factors associated with hepatitis B infection is history of multiple sexual partners. Individuals that have multiple sexual partners have five times more likelihood of contracting hepatitis B infection compared to those without. They engage in risky sexual behaviours such as having unprotected sex, having sex with commercial sex workers or men having sex with another men, thereby increasing the chance of contracting hepatitis B infection [20].

Local practices such as circumcision and female genital mutilation have been identified as significant risk factors for hepatitis B infection, showing a strong association with seropositivity. This observation is consistent with findings from previous studies conducted in Nigeria [5,9]. The increased risk may be attributed to traditional methods of group circumcision based on age cohorts and the continued practice of female genital mutilation in rural communities.

Surprisingly, blood transfusion and previous surgical procedures were not found to be significant risk factors to HBV infection in this study. This is a sharp contrast to the finding in previous study done in Southeast Nigeria by Ezielo and collegues [21]. This may be as a result of improved blood transfusion screening especially in the area of blood transmissible infections.

In 2023, the World Health Organization (WHO) evaluated its performance and found that the African Region did not achieve the 2020 hepatitis B elimination targets, which aimed elimination of HBV infection but only 30% of infected individuals were diagnosed and treated [22, 23]. The findings from this study will provide valuable insights for policymakers by establishing a current baseline that can guide effective interventions, particularly in Ebonyi State, where the prevalence of hepatitis B infection remains high. It is essential to tailor infection prevention and control strategies toward high risk populations by increasing public awareness of the dangers of having multiple sexual partners. In addition, traditional practices such as the use of unsterilized blades for circumcision in rural communities should be eradicated. Furthermore, to achieve the global goal of hepatitis B elimination by 2030, active surveillance and linkage to care for individuals who test seropositive must be prioritized [24].

CONCLUSION

The study identified a high prevalence of hepatitis B virus (HBV) infection among adult patients attending the outpatient clinic of a tertiary hospital. It found that having multiple sexual partners and undergoing traditional genital circumcision were significant risk factors strongly linked to HBV seropositivity. These findings underscore the critical need for ongoing surveillance and the implementation of enhanced infection prevention and control strategies.

Limitations

The strengths of this study include its relatively large sample size and its ability to determine the current prevalence rate of hepatitis B virus (HBV) infection, as well as the associated risk factors contributing to its transmission. However, the study has some limitations. Recall bias among participants may have influenced the

accuracy of self-reported data, which is a common limitation in studies of this design. In addition, the study was conducted in a single hospital, introducing a potential selection bias that may limit the generalizability of the findings to the wider population. Nonetheless, the results provide valuable baseline information and highlight the need for further research in this area.

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