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Seroprevalence of Hepatitis B Surface Antigen (HBsAg) and Associated Risk Factors Among Undergraduate Students of The Federal University of Health Sciences, Otukpo

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ABSTRACT

This study determined the seroprevalence of hepatitis B surface antigen (HBsAg) and assessed risk factors for hepatitis B virus (HBV) exposure among undergraduate students of the Federal University of Health Sciences, Otukpo (FUHSO), Benue State, Nigeria. A descriptive crosssectional study enrolled 120 students using stratified random sampling. Data were collected with a structured questionnaire, while serum samples were screened for HBsAg using the Swe-Care.

HBsAg Rapid Diagnostic Test Kit; 60 respondents also underwent testing with an HBV 5-in-1 Combo Rapid Diagnostic Test Kit. Data were analysed using IBM SPSS version 26.0, with chisquare tests and a significance level of $p < 0.05$. All 120 participants tested negative for HBsAg, giving a seroprevalence of 0.0% (95% CI: 0.0–3.0%). Among the 60 participants tested with the five-marker panel, 7 (11.7%) were positive for anti-HBs, while 53 (88.3%) were negative for all five markers. Most respondents had good knowledge of HBV (97.5%), but vaccination uptake was low: 17.5% had ever received a vaccine and 6.7% had completed three doses. The most frequently reported exposure-related factors were sharing sharp objects (28.3%), accidental blood contact (24.2%) and dental procedures (18.3%). Sex was significantly associated with vaccination status ($\chi^2 = 24.146$, $p < 0.001$) and tattoo/body piercing ($\chi^2 = 6.584$, $p = 0.010$). Although no HBsAg-positive participant was detected, the low vaccination coverage and limited serological immunity indicate continued vulnerability to future HBV infection.

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INTRODUCTION

Hepatitis B virus (HBV) infection is a major public health problem because chronic infection can progress to cirrhosis and hepatocellular carcinoma. The World Health Organization estimated that 254 million people were living with chronic hepatitis B infection globally in 2022, with approximately 1.2 million new infections and 1.1 million deaths annually, mainly from cirrhosis and hepatocellular carcinoma (World Health Organization [WHO], 2024a, 2025). The burden is disproportionately high in Africa, where approximately 65 million people were living with chronic HBV infection in 2022 (WHO, 2024a).

Nigeria continues to carry a substantial HBV burden. Recent evidence estimates national prevalence at about 5.4%, while earlier studies reported higher pooled estimates. In Benue State, community-based data have reported approximately 5.0% HBsAg prevalence, and studies among specific populations in the state have also documented substantial infection burdens (Ajuwon et al., 2021; Malu et al., 2020; Olakunde et al., 2025).

University students may experience exposure through sharing sharp objects, unsafe sexual practices, tattooing, body piercing, blood exposure and inadequate vaccination. Studies among Nigerian university students have reported substantial variation in HBsAg prevalence, from 0.4% in Abuja to 12.2% in Sokoto (Abusufyan et al., 2024; Ogunkoya et al., 2026). However, institution-specific information for FUHSO has been limited. This is important because FUHSO trains future healthcare professionals who may subsequently encounter occupational blood and body-fluid exposures.

Therefore, this study aimed to determine the seroprevalence of HBsAg and assess HBV-related knowledge, vaccination status and exposure-related risk factors among undergraduate students of FUHSO. The study also characterised selected HBV serological markers in a subset of participants.

MATERIALS AND METHODS

Study design and setting

A descriptive cross-sectional study was conducted among undergraduate students of the Federal
University of Health Sciences, Otukpo (FUHSO), in Otukpo Local Government Area of Benue State, Nigeria. The undergraduate population was approximately 2,200 during the 2025/2026 academic session. The target population comprised registered undergraduate students who were present during data collection and willing to participate.

Sample size and sampling

Sample size was estimated using OpenEpi with an expected prevalence of 5.6%, 95% confidence level, 5% absolute margin of error and finite population correction. The calculated minimum was 78 participants; the sample was increased to 120 to account for possible non-response. Stratified random sampling was used, with students grouped by department and participants selected through simple random sampling from registration lists.

Ethical considerations

Ethical approval was obtained from the FUHSO Research and Ethics Committee (approval reference reported in the final project as FUHSO/REC/2025/017). Written informed consent was obtained from participants. Participation was voluntary, confidentiality was maintained, and data were anonymised using coded identifiers.

Data collection and laboratory analysis

A structured questionnaire collected socio-demographic information, HBV knowledge, vaccination history and selected exposure-related factors. Two millilitres of venous blood were collected aseptically into labelled non-vacuum tubes. Samples were centrifuged at 2,000 rpm for five minutes and the separated serum was used for testing. All 120 sera were screened with the Swe-Care HBsAg Rapid Diagnostic Test Kit. A subset of 60 participants was additionally tested using an HBV 5-in-1 Combo Rapid Diagnostic Test Kit for HBsAg, anti-HBs, HBeAg, anti-HBe and anti-HBc. Tests were performed and interpreted according to the manufacturer's instructions.

Data analysis

Data were entered and analysed using IBM SPSS version 26.0. Frequencies and percentages were used to summarise categorical variables. Chi-square tests assessed associations among selected categorical variables; statistical significance was set at $p < 0.05$. Because no HBsAgpositive cases were observed, associations between HBsAg positivity and risk factors could not be statistically estimated. The 95% confidence interval for zero prevalence was estimated using the Rule of Three.

RESULTS

HBsAg seroprevalence

All 120 participants tested negative for HBsAg. The observed HBsAg seroprevalence was therefore 0.0%, with a reported 95% confidence interval of 0.0–3.0%.

Table 1. HBsAg seroprevalence among study participants (N = 120)

HBsAg result	Frequency (n)	Percentage (%)
Negative	120	100.0
Positive	0	0.0
Total	120	100.0

Serological markers and immunity profile

Among the 60 participants who underwent five-marker testing, 7 (11.7%) were anti-HBs positive, consistent with protective immunity attributable to vaccination in the reported profiles. The remaining 53 (88.3%) were negative for all five markers. HBeAg, anti-HBe and anti-HBc were negative in all 60 samples.

Table 2. Hepatitis B serological markers and immunity profile among the five-marker subset (N = 60)

Marker/profile	Positive n (%)	Negative n (%)	Interpretation
Anti-HBs (HBsAb)	7 (11.7)	53 (88.3)	Protective immunity
HBeAg	0 (0.0)	60 (100.0)	No evidence of viral replication
Anti-HBe (HBeAb)	0 (0.0)	60 (100.0)	No evidence of previous serological response
Anti-HBc (HBcAb)	0 (0.0)	60 (100.0)	No evidence of previous exposure
Immune profile: HBsAg−/anti-HBs+	7 (11.7)	0 (0.0)	Consistent with vaccine-induced immunity
Susceptible profile: all five markers negative	0 (0.0)	53 (88.3)	No serological evidence of immunity

Knowledge, vaccination and exposure-related factors

Most respondents had heard of HBV (95.8%), identified it as a viral infection (93.3%), recognised the liver as the major organ affected (96.7%), knew that HBV is preventable (97.5%), knew a vaccine is available (93.3%) and recognised the risk of chronic infection leading to liver cancer (97.5%). Overall, 97.5% were classified as having good knowledge. Nevertheless, 10.0% believed HBV could be transmitted by sharing food and 5.8% believed it could be transmitted by handshake.

Only 21 participants (17.5%) reported ever receiving hepatitis B vaccination, while 55 (45.8%) reported no vaccination and 41 (34.2%) were unsure. Of those who reported vaccination, 8 (38.1%) reported three doses; only 8 participants (6.7% of the full sample) were classified as having completed the three-dose schedule.

The most frequently reported exposure-related factors were sharing sharp objects (28.3%), accidental contact with another person's blood (24.2%), dental procedures (18.3%), tattoo/body piercing (10.0%), blood transfusion (8.3%), surgery (7.5%), history of sexually transmitted infection (5.0%), traditional scarification (4.2%), injections from unlicensed providers (3.3%) and multiple sexual partners (1.7%).

Table 3. Vaccination status and selected HBV exposure-related factors (N = 120)

Variable	Yes n (%)	No n (%)	Not sure n (%)
Ever received HBV vaccine	21 (17.5)	55 (45.8)	41 (34.2)
Blood transfusion	10 (8.3)	103 (85.8)	7 (5.8)
Surgery	9 (7.5)	111 (92.5)	—
Tattoo/body piercing	12 (10.0)	108 (90.0)	—
Sharing sharp objects	34 (28.3)	86 (71.7)	—
Accidental blood contact	29 (24.2)	91 (75.8)	—
Multiple sexual partners	2 (1.7)	118 (98.3)	—
History of STI	6 (5.0)	114 (95.0)	—

Dental procedures	22 (18.3)	97 (80.8)	—
Injections from	4 (3.3)	116 (96.7)	—
unlicensed providers			
Traditional scarification	5 (4.2)	115 (95.8)	—

Associations among selected variables

Because all 120 participants were HBsAg negative, an association between HBsAg seropositivity and the assessed risk factors could not be established. Most secondary chi-square tests were not statistically significant. Significant associations were observed between sex and tattoo/body piercing ($\chi^2 = 6.584$, df = 1, $p = 0.010$) and between sex and vaccination status ($\chi^2 = 24.146$, df = 3, $p < 0.001$). No significant association was observed between sex and knowledge level, age and knowledge level, level of study and knowledge level, residence and knowledge level, sex and sharing of sharp objects, age and sharing of sharp objects, level of study and vaccination status, or knowledge of vaccine availability and vaccination status.

Table 4. Summary of selected chi-square tests

Comparison	χ^2	df	p-value	Significant
Sex vs knowledge level	0.611	1	0.434	No
Age group vs knowledge level	2.051	2	0.359	No
Level of study vs knowledge level	1.981	3	0.576	No
Residence vs	2.636	1	0.104	No
knowledge level				
Sex vs sharing sharp objects	3.464	1	0.063	No
Sex vs tattoo/body piercing	6.584	1	0.010	Yes
Age group vs sharing sharp objects	0.879	2	0.644	No
Level of study vs vaccination status	11.477	9	0.244	No
Sex vs vaccination status	24.146	3	<0.001	Yes
Knowledge of vaccine vs vaccination status	0.397	3	0.941	No

DISCUSSION

The study detected no HBsAg-positive participant among 120 FUHSO undergraduates. This finding differs from the approximately 5.4% national burden reported in recent evidence and the
5.0% community prevalence reported in Benue State, but it is comparable with the 0.4% prevalence reported among students in Abuja. Other Nigerian university studies have reported 1.2%, 2.2%, 4.0%, 4.3%, 4.8% and 12.2%, illustrating substantial variation between populations and settings (Abusufyan et al., 2024; Ashaka et al., 2024; Babatope et al., 2024; Garbati et al., 2024; Iyaji et al., 2018; Ogunkoya et al., 2026).

Several factors may contribute to the observed zero prevalence, including the relatively young study population, possible benefits from childhood hepatitis B immunisation introduced into Nigeria's routine immunisation programme, the health-sciences setting and the modest sample size. The confidence interval also indicates that zero observed cases should not be interpreted as proof that HBV is absent from the wider FUHSO population. A larger study could detect uncommon infections.

The five-marker testing provides additional context. Only 11.7% of the 60 tested participants showed anti-HBs positivity, while 88.3% were negative across all five markers. The absence of anti-HBc in this subset provides no serological evidence of previous exposure among those tested. The low proportion with detectable protective antibody is important because current absence of HBsAg does not guarantee protection against future infection.

Knowledge was generally high: 97.5% of participants had good knowledge. This is consistent with the health-sciences environment and exceeds the levels reported in some Nigerian student populations. However, misconceptions about casual transmission remained, with some respondents identifying food sharing and handshakes as transmission routes. These misconceptions indicate that high overall knowledge scores may coexist with specific knowledge gaps.

The vaccination findings reveal a marked gap between knowledge and preventive practice. Only 17.5% had ever received HBV vaccination and 6.7% reported completing the three-dose schedule. Similar gaps have been documented among Nigerian university and healthcare trainees, with cost, accessibility and competing academic demands identified as barriers in some settings (Garbati et al., 2024; Inya et al., 2021; Onyenemezu et al., 2023).

Sharing sharp objects was the most frequently reported exposure-related behaviour, followed by accidental blood contact and dental procedures. These findings are relevant to students who may later experience occupational exposure to blood and body fluids. The significant associations between sex and vaccination status and between sex and tattoo/body piercing describe differences in these behaviours or statuses by sex, but they should not be interpreted as evidence that sex caused vaccination uptake or tattoo/body-piercing practices.

An important limitation is that no HBsAg-positive cases were detected, preventing statistical testing of relationships between HBsAg infection and the assessed risk factors. In addition, only 60 participants underwent the five-marker panel, so the immunity profile cannot be generalised directly to all 120 participants. Self-reported vaccination and exposure histories may also be affected by recall or reporting error.

CONCLUSION

Among 120 undergraduate students screened at FUHSO, no HBsAg-positive case was detected, giving an observed seroprevalence of 0.0%. The participants generally demonstrated good knowledge of HBV, but vaccination uptake and completion of the recommended schedule were low. In the five-marker subset, most participants had no serological evidence of immunity. The findings therefore support continued institutional attention to HBV screening, vaccination, prevention education and reduction of avoidable blood-exposure risks among students.

RECOMMENDATIONS

Routine or entry-level HBV screening and vaccination should be considered for students.

The university should consider free or subsidised hepatitis B vaccination and accessible oncampus vaccination services.

Health education should address misconceptions about HBV transmission and emphasise completion of the recommended vaccination schedule.

Students should be discouraged from sharing razors, blades and other sharp personal items, and affordable personal grooming kits should be promoted.

HBV prevention should be integrated into student orientation and relevant health-sciences curricula.

Larger studies involving more students and other universities in Benue State should be conducted to better estimate HBV prevalence and immunity.

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STUDY'S EXCERPT

No HBsAg-positive case was detected among 120 undergraduate students screened at FUHSO.

Only 11.7% of the 60 participants tested with the five-marker panel showed anti-HBs positivity.

Despite 97.5% good HBV knowledge, only 17.5% of respondents reported previous vaccination.

Sharing sharp objects, accidental blood contact and dental procedures were the most frequently reported exposure-related factors.

The findings provide institution-specific baseline data to support HBV screening, vaccination and prevention programmes at FUHSO.

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