

# Prevalence of HBV and HIV among students and staff at the University of Jos, Nigeria: Results from a medical outreach screening program

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**Abstract-** Human immunodeficiency (HIV) and hepatitis B virus (HBV) are both of great concern in Nigeria. This study was conducted to understand the HIV and HBV prevalence among students and staff at the University of Jos (Jos, Nigeria) through a medical outreach program in which free screening was offered to voluntary participants at the university. Serum samples from 180 individuals were assayed for the presence of HBV surface antigen, HIV-1 p24 antigen, and HIV-1/2 antibodies. HIV prevalence was 3.88% and HBV prevalence was 7.22%. In sum, the prevalence of HBV and HIV among young Nigerian adults reflects the need for establishment of clear health policy for this risk group.

**Index Terms-** HBV, HBsAg, HIV, Nigeria, student

## I. INTRODUCTION

The hepatitis B virus (HBV) and human immunodeficiency virus (HIV) are today hyperendemic to Nigeria, a large and rapidly growing African economy. Both cause life-threatening conditions and are spread in similar ways, through infected blood and blood products – most notably through unprotected sexual activity and needle sharing in injection drug use (IDU). Many studies have shown that co-infection with HIV leads to a more aggressive hepatitis disease course and a higher risk of liver damage. Indeed, end-stage liver disease due to hepatitis is a leading cause of death in HIV-infected patients.<sup>1</sup> Moreover, HBV, HIV, and their co-infection can impair immune system recovery after starting antiretroviral therapy, thereby complicating treatment.

Thus, the prevalence of HIV and HBV is of great concern to health researchers, but has particular relevance to Nigeria. Globally, more than 200 million people alive today have been infected with HBV at some point in their lives.<sup>2,3,4,5,6</sup> Furthermore, every year, over 4 million acute clinical cases of HBV are recorded, and 1 million die from chronic active hepatitis, cirrhosis, or primary liver cancer.<sup>6</sup> While these global numbers are somewhat alarming, Nigeria, in particular, is being ravaged by this scourge: approximately 75% of its population is likely to have been exposed to the HBV at one time or the other in their life and approximately 7% of them die from its complications every year.<sup>7</sup> The prevalence of HIV stands at

approximately 35 million globally, but tens of millions have already died of AIDS-related complications since the beginning of the HIV epidemic.<sup>8</sup> In Nigeria, people living with HIV number approximately 3.2 million, of whom 210,000 die due to HIV and related complications annually.<sup>9</sup> With the adult HIV prevalence at 5.0% of the population,<sup>1</sup> Nigeria is indeed at the threshold of an exponential, explosive HIV epidemic. In sum, HBV and HIV are completely intertwined as major public health problems in the country.

In addition, further analysis of the disease scenario in Nigeria shows some very alarming trends: a high risk for infection with HBV and HIV tends to be among the youth, most commonly Nigerian students. This could be explained by various economic, cultural, and social factors that lead to high-risk behaviors such as alcohol abuse, multiple partners, and IDU. Moreover, current strategies and programs in Nigeria for HIV and HBV awareness and prevention on campuses and in host communities are grossly inadequate or are often neglected. Indeed, a growing body of literature shows both a lack of awareness in this demographic and, more importantly, a scarcity of information on HIV and HBV prevalence among students. Thus, it is imperative for educational institutes and universities to implement comprehensive responses to stem the growing HIV and HBV epidemic.<sup>10,11,12</sup> HIV and HBV are, after all, preventable and so it necessary to establish their importance and track their prevalence among the youth in order to evaluate the need for implementing preventive action.

With this background, the objective of the present study was to collect primary data on HIV and HBV prevalence patterns among Nigerian students and some staff members in order to understand the dynamics of HBV and HIV infection and thereby guide the development of tailor-made intervention programs for such neglected populations in Nigeria.

## II. MATERIALS AND METHODS

### *Study Setting and Participants*

The study recruited subjects from among graduate students, postgraduate students, and staff at the University of Jos, Nigeria. This was a cross-sectional study conducted among students and staff at University of Jos, Nigeria. Data were obtained during a medical outreach program, with free screening offered to

voluntary students and staff of the university. Permission was obtained from the University of Jos, Nigeria. The sample size was 180. Participation in the study was on voluntary basis; study participants were selected by a simple random sampling technique. All students and staff of the university willing to participate in the study were included in the study. Informed consent was obtained from participants with the assurance that all personally identifying information obtained would be treated with utmost confidentiality. The study was done in 2009.

**Screening Procedure**

**Screening tests**

Serum samples from the 180 individuals were assayed for the presence of HBV antigen. Detection of HBV antigen was carried out using a One Step Strip Style HBsAg test kit (Global Diagnostic®, USA). This test is a rapid, direct binding test for the HBV surface antigen (HBsAg) and is based on the principle of sandwich immunoassay in serum. Monoclonal and polyclonal antibodies are employed to identify HBsAg specifically; this one step test is very sensitive. Detection of HIV was done with a Determine HIV-1/2 Ab/Ag Combo (Alere Medical Co Ltd, USA), which requires a simple two-step procedure for serum; it is quick and easy to use, delivering clear, dependable results. The HIV-1/2 Ab/Ag Combo detects HIV-1 p24 antigen and HIV-1 and HIV-2 antibodies. The manufacturer's instructions were strictly followed to identify the serum samples that were seropositive for HBV and HIV antibody.

**Test procedure**

**Screening test procedure for HBV:** For detection of HBsAg, the strip was immersed into the collected sample of serum from participants with the arrow end pointing toward the serum. It was removed after 5 s and the results were interpreted after 25 min. The sample was considered negative for HBV if only one colored band appeared in the control (C) region and no apparent band appeared in the test (T) region; the sample was considered positive if in addition to a pink-colored control (C) band, a distinct pink-colored band appeared in the test (T) region.

**Screening test procedure for HIV:** A sample of whole blood (50 µL) from participants was added to the sample pad of the strip. When all the blood was transferred from the capillary tube to the sample pad, one drop of chase buffer was immediately added to the sample pad. The results were obtained in 20–30 min. If antibody is reactive then, two pink or red lines appear, one in the control area and other in the lower test area of the test unit. If a line appears on the upper test area of the test unit, then it is HIV-1 p-24 reactive.

**2.7. Data Analysis**

Data on participants and the test results were managed using Microsoft Excel 2007. The SPSS 19 software package was used for bivariate analysis to find correlations between characteristics of participants and their state of infection. The following

indicators were assessed: (i) Socio-demographic distribution of participants, (ii) number and ratio of persons infected with HBV and HIV, and (iii) number and ratio of participants infected with HBV and HIV by age and sex. The chi-square test was used to compare means and the difference was considered statistically significant for  $P < 0.05$ . All data were aggregated to ensure confidentiality.

**III. RESULTS**

**Socio-demographic Characteristics of Blood Donors**

Among the volunteers who came forward for screening, 101 (56.11%) were males while 79 (43.88%) were females. The age of the volunteers varied from 18 to 40 years with a median age of 28 years. (Table 1)

**Table1: Socio demographic characteristics of the study participants**

	Categories	Total	Percentage Distribution
<b>Age</b>	18–20	50	32.25%
	21–23	46	29.67%
	24–26	42	27.09%
	27–30	9	5.8%
	31 and older	8	5.16%
	Age was unknown for the rest of the volunteers		
<b>Religion</b>	Christian	175	97.22%
	Muslim	5	2.77%
<b>Sex</b>	Male	101	56.11%
	Female	79	43.88%
<b>Occupation</b>	Student	177	98.33%
	Others (Clergy/gardener/ staff)	3	1.66%

**Prevalence of HBV and HIV**

Of the 180 participants, 7 were positive for HIV and 13 were HBV positive only. The HIV prevalence among study participants was 3.88% and HBV prevalence was 7.22% (Table 2).

**Table 2: Positive cases of HIV, HBV, and HIV/HVB co-infection among study participants**

	Number of positive cases	Percentage of participants (%)
<b>HIV</b>	7	3.88
<b>HBV</b>	13	7.22
<b>Total</b>	20	11.1

The overall prevalence of HBV and HIV among males was 9.99 % and 3.9%, respectively. The prevalence of HBV and HIV among females was 3.79% (Table 3).

	HIV			HBV		
Sex	Positive	Negative	Total	Positive	Negative	Total
Male	4 (3.9%)	97	101 (56.11%)	10 (9.99%)	91	101 (56.11%)
Female	3 (3.79%)	76	79 (43.88%)	3 (3.79%)	76	79 (43.88%)
Total	7	173	180	13	167	180
Chi square	0.0031			2.4645		
P	0.955255			0.116448		

**Table 3: Gender based sero-prevalence of HBV and HIV infections among Study participants**

As age was known for only 155 volunteers, from the available data for these participants, the prevalence of HBV was highest in the 24–26 age group, followed by the 18–20 and 21–23 age groups. However, the prevalence of HIV was highest in the 21–23 age group, followed by the 24–26 and 18–20 groups. Notably, no cases of HBV or HIV were found in participants aged 27 year and above (Table 4).

**Table 4: Sero-prevalence of HBV and HIV in different age groups (for 155 volunteers)**

Age group	Hepatitis B			HIV			Chi-square	P
	Positive	Negative	Total	Positive	Negative	Total		
18–20	4 (8%)	46 (92%)	50	2 (4%)	48	50	0.7092	0.399703
21–23	2 (4.34%)	44 (95.66%)	46	3 (6.5%)	43	46	0.2115	0.645599
24–26	6 (14.28%)	36	42	2 (4.76%)	40	42	2.2105	0.137072
27–30	0	17	17	0	17	17		

#### IV. DISCUSSION

The prevalence of HBV in our study was 7.22%, which is lower than that reported in previous similar studies in Nigeria. In one study at Ahmadu Bello University, Nigeria, 12.5% of students were found positive for HBsAg.<sup>13</sup> In another study of medical, nursing, and microbiology students presenting with pyrexia of unknown origin in Ibadan, Nigeria, HBsAg prevalence was found to be 14% among the microbiology students, 6.7% among the student nurses, and 13.5% among the medical students.<sup>14</sup> However, a lower HBV prevalence rate of 3.2% was reported among medical students at Lagos State University College of Medicine, Nigeria.<sup>15</sup>

The prevalence of HIV in our study was 3.88%. As it is difficult to estimate prevalence in general population, data from blood donors can often be utilized as an alternative. For HIV in Nigeria, the overall sero-prevalence has been previously reported to be 7.66% in blood donors, which is higher than our finding of 3.88% among university students and staff.<sup>16</sup> HIV sero-prevalence among blood donors in Nigeria rose from 4.25% in 2001 to peak at 12.64% in 2003, before a steep drop to 6.35% in 2004 and a gradual decline to 5.70% in 2006.<sup>17</sup> However, the prevalence of HIV was lower at 3.69% in institutions of higher

education in South-east Nigeria.<sup>16</sup> Furthermore, HIV prevalence has been observed to be even lower (3.1%) amongst Malian students<sup>18</sup> and only 1.5% among students in East Africa.<sup>19</sup>

A number of studies in different transmission groups have confirmed that age is a co-factor for disease susceptibility and progression of HBV and HIV.<sup>20</sup> In our study, the highest prevalence of HBV and HIV was amongst students in the age group of 24–26 years and 21–23, respectively. However, a previous study assessing the prevalence of HBsAg in an urban community in Jos, Nigeria, found that prevalence was highest in an even younger group (9.7% among those aged <20 years); an important point to be noted is that carriage rates were highest among students (13.2%) compared with other occupation categories.<sup>21</sup> Another study reported higher prevalence of 13.8% in students below 30 years of age, compared with only 8.3% in those aged more than 30 years.<sup>13</sup> Thus, it becomes important to evaluate the prevalence of HBsAg in students who are less than 30 years of age.

The reason for this prevalence among those aged less than 30 years is somewhat unclear from this study, as no statistically significant association was observed with respect to age. The greater prevalence in this age group could be related to higher

sexual activity, increasing prominence of IDU, etc., which is a high-risk behavior for HIV and HBV infection.

The considerably higher prevalence of HIV and HBV among males compared with females in our study is also notable, although the trend is not statistically significant. However, previous studies of similar demographics in other countries have found the reverse trend: A study of students at medical colleges in Saudi Arabia reported a higher HBV prevalence in females (0.78% in 18–21 age group; 0.90% in 22–30 age group) than in males (0.17% in 18–21 age group; 0.39% in 22–30 age group). Previous study findings had showed a higher prevalence of HIV infection amongst female students (4.32%) than male students (2.92%).<sup>16</sup> The higher prevalence of HIV and HBV reported among the male Nigerians than the females<sup>22,23</sup> may be explained by a higher frequency of exposure to infected blood and blood products as a result of social behavior and occupational hazards.<sup>24</sup>

The main risk factors for HBV and HIV infection among university students and staff in Nigeria include a history of blood transfusion, history of needle injection, IDU, and multiple sex partners.<sup>25,26,27,28</sup> Unfortunately, this has not been given the attention it deserves in the Nigerian healthcare delivery system, mainly due to the lack of information about HBV and HIV infection. Nevertheless, the baseline data and insights from the present study could provide a basis for further studies on this topic. In addition, further studies on the dynamics and epidemiology of HBV, HIV, and co-infection in Nigeria are necessary to explain the sex- and age-related trends.

HBV and HIV are highly infectious sexually transmitted infections and are hyperendemic to Nigeria. Therefore, there is an urgent need to step up HBV and HIV health education. To prevent and control HBV and HIV, greater priority should be assigned to initiatives aiming to raise awareness, promote partnerships, mobilize resources; formulate evidence-based policy and collect data for action; and prevent transmission and promote access to screening, care, and treatment services. Ultimately, however, the best plan may be to focus on prevention and early treatment to lessen the number of patients proceeding to complications and reduce the HBV- and HIV-related morbidity and mortality. Along with creating awareness among the population through electronic and print media, screening and vaccination of students is recommended since HBV vaccine has been shown to be protective. We propose further studies to identify factors associated with the spread of HBV and HIV in Nigeria. In conclusion, it is pertinent to state that one of the major drawbacks of this study was our inability to employ confirmatory assays such as the HBsAg confirmatory test. Regardless, our result may not reflect the true prevalence of HBV and HIV amongst students, since HBsAg marker is not detected during the window period of the infection.

## V. CONCLUSIONS

This survey of young, healthy, educated adults at a renowned university in Nigeria showed a high prevalence of HBV and HIV infection. However, the environment plays an important role as absence of awareness and the low incomes favor transmission. In sum, the prevalence of HBV and HIV among young Nigerian adults reflects the absence of health policy for fighting these

diseases. This is alarming and, when taking into account the high risk of HBV and HIV transmission in the country, immediate and appropriate actions by health authorities as well as the general population itself may be necessary to reduce the burden of disease.

## CONFLICTS OF INTEREST

The authors declare no conflict of interests.

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