

HBV Infection among Intending Blood Donors Who Incidentally Tested Positive to HIV Antibody in Two Blood Banks in Ibadan, Nigeria

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Abstract: This study aimed at determining the seroprevalence of HBV infection among prospective HIV positive blood donors at two designated blood banks in Ibadan, Nigeria. A total of 200 samples were collected from consented prospective blood donors at two locations in Ibadan (114 males and 86 females; age ranged 18 ≤ 55 years). The samples were tested for Hepatitis B surface Antigen (HBsAg) using Monolisa Ag HBs plus ELISA. Of the 200 samples tested, 29 (14.5%) were positive to HBsAg. Similarly, of the 120 samples from University College Hospital Blood Bank (UCHBB), 18(15.0%) were positive to HBsAg and 11(13.8%) of the 80 samples from Oyo State Blood Transfusion Centre (OSBTC), were found to be positive for HBsAg. Highest prevalence of HBV infection was observed within the age group 34-42 years in both locations. HBV infection rate was also higher in males than females and among Fashion designers. There was no statistically significant difference with respect to location and sex of the transmission rate ($p>0.05$). Therefore, in order to control the risk of transfusion-associated HIV and viral hepatitis infections in our community, there should be compulsory HBsAg and HIV screening of all blood samples in various blood Banks prior to transfusion.

Key words: ELISA · HIV · HbsAg · Blood transfusion

INTRODUCTION

Nigeria belongs to the group of countries highly endemic for viral hepatitis and Human Immunodeficiency Virus (HIV). Globally, hepatitis B virus (HBV) has been estimated to account for 370 million chronic infections. However, in HIV-infected persons, an estimated 2-4 million have chronic HBV coinfection. Both viruses are said to be commonly transmitted mainly through sex and blood transfusion but HBV damages the liver resulting in liver cirrhosis and hepatocellular carcinoma. HBV has been the major cause of mortality resulting from liver disease worldwide especially in co-infection with HIV.

Hepatitis B Virus (HBV) is a major aetiological agent responsible for viral hepatitis in the tropics especially in

Nigeria causing both acute and chronic liver diseases such as Hepatocellular carcinoma (HCC) and liver cirrhosis [1-2]. However, the cause of acute hepatitis B may be modified in the presence of HIV with lower incidence of icteric illness and higher HBV carriage rate of about 5% in those uninfected with HIV [3]. In chronic infection, markers of HBV replication appear to be influenced by HIV infection. There is a trend towards lower rate of clearance of the hepatitis B envelope antigen (HBeAg) and HBV DNA as well as a significant increase in the serum HBV DNA viral load [4].

Until recently, HBV infection was not considered to be a major clinical problem in HIV infected individuals. However, as a result of the introduction of highly active antiretroviral therapy (HAART), survival has increased in

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HIV infected patients and the contributions of HBV to morbidity and mortality are likely to become significant [5]. Several studies have revealed a synergistic effect on disease progression in HIV/HBV coinfection. Higher frequency of liver toxicity associated with HAART has been reported in patients coinfecting with HBV or HCV [5-8]. Increased drug-associated liver toxicity in HBV/HIV coinfecting patients may be partially explained by the fact that antiretroviral compounds are generally metabolized by the liver and the changes induced by chronic infections hinge on the different pathways involved in drug metabolism [5].

According to Nunez *et al.*, [6], it has also been reported that among intravenous drug users (IDUs), 90% of HIV-infected individuals have evidence of exposure to hepatitis B (hepatitis B core antibody(anti-HBc positivity) and 60% also have evidence of past infection with presence of hepatitis B surface antibody (anti-HBs). The presence of hepatitis B surface antigen (HBsAg) chronic carriage among HIV-infected individuals has equally been reported to be 1.9-9% [9]. Additionally, anti-HBc is more frequently found in HIV-infected men who have sex with men (MSM) compared with those who are HIV seronegative (72% and 31% respectively) [10]. To evaluate the risk of transfusion-associated viral hepatitis infection among Nigerians, we measure HBsAg and HIV antibody in the blood samples collected from prospective HIV positive blood donors. Hence, our study on the association of HBV in prospective HIV positive adult Nigerian blood donors and their correlation with liver disease at University College Hospital Blood Bank and Oyo State Blood Transfusion Centre in Ibadan, Nigeria.

MATERIALS AND METHODS

Study Area: The study area is the municipal area of Ibadan, which is made up of five local government areas. Ibadan is the capital city of Oyo State located in the forest zone of southwestern Nigeria. Ibadan city lies on the longitude 3°5' East of Greenwich meridian and latitude 7°23' North of the Equator. Besides being the largest indigenous city in Africa south of Sahara, the city is an important trade and educational centre. It also houses one of the largest and foremost teaching hospitals in Africa. However, the city is characterized by low level of environmental sanitation, poor housing and lack of potable water and improper management of wastes especially in the indigenous core areas characterized by high density and low income populations.

Study Population: After ethical approval and informed consent was obtained, 200 samples of blood was collected from prospective donors (age ranged 18≤55 years) comprising of 120 and 80 blood samples obtained at University College Hospital Blood Bank (UCHBB) and Oyo State Blood Transfusion Centre (OSBTC) in Ibadan respectively, were used for this study. The study groups were matched with their age, gender and occupation.

Sample Collection and Processing: Five milliliters of blood was collected from each donor into EDTA tubes and centrifuged for 5 min. The plasma was separated and stored at -20°C for further analysis.

Methodology: The samples were tested for the presence of HBV infection using adsorption qualitative technique based on the principle of antigen-antibody reaction (by Monolisa Ag HBs plus ELISA Bio Rad, France) at the Virology unit, Department of Medical Virology, University College Hospital, Ibadan Nigeria. The screening for HIV antibodies was carried out using Chembio HIV-1/2 stat-Pak® [sensitivity 100% (129/129) and specificity 100% (207/207)] containing 20 test devices each and Abbott Determine HIV-1/2® test kit (sensitivity 100% and specificity 100%) containing 100 test strips. The test and interpretation of the results were according to the manufacturer's specifications.

Data Analyses: Data were analyzed by SPSS version 15 (Illinois Chicago, USA) software package. Chi-square and multivariate logistic regression were used to determine the association or significant relationship between each of the age group while percentages and ratios were also used where applicable.

RESULTS

Tables 1-4 show the location, age, gender and occupational distribution of HBsAg among prospective HIV positive blood donors (age ranged 18-55 years) who voluntarily participated in the study after obtaining their consents. The overall seroprevalence of Hepatitis B surface antigenaemia in the tested subjects was 14.5% (Table 1-4).

Table 1: Overall Prevalence of Hbv Infection by Location

Location	No Tested	No Positive (%)
Uchbb	120	18 (15.0)
Osbtsc	80	11 (13.8)
Total	200	29 (14.5)

Table 2: Distribution of Hbv Infection in Relation to Ages of the Subjects

Age (Years)	Overall		Uchbb		Osbtc	
	No. Tested	No. Positive (%)	No. Tested	No. Positive (%)	No. Tested	No. Positive (%)
18-24	45	7 (15.6)	25	4 (16.0)	20	3 (15.0)
>24-30	47	7 (14.9)	30	5(16.7)	17	2 (11.7)
>30-36	40	5 (12.5)	28	3 (10.7)	12	2 (16.7)
>36-42	26	5 (19.2)	15	3 (20.0)	11	2 (18.2)
>42-48	22	3 (13.6)	12	2 (16.7)	10	1 (10.0)
>48-54	19	2 (10.5)	10	1 (10.0)	9	1 (11.1)
Total	200	29 (14.5)	120	18(15.0)	80	11(13.8)

Table 3: Seroprevalence of Hbv in Relation to Gender of the Subjects

Location/gender	Overall		Male		Female	
	No. Tested	No. Positive (%)	No. Tested	No. Positive (%)	No. Tested	No. Positive (%)
Uchbb	120	18(15.0)	69	12(17.4)	51	6(11.8)
Osbtc	80	11(13.8)	45	8(17.8)	35	3(8.6)
Total	200	29 (14.5)	114	20(17.5)	86	9(10.5)

Table 4: Distribution of Hbv Infection in Relation to the Occupation of the Subjects

Occupation	Overall		Uchbb		Osbtc	
	No. Tested	No. Positive (%)	No. Tested	No. Positive (%)	No. Tested	No. Positive (%)
Fashion Designers	31	8 (25.8)	20	5 (25.0)	11	3 (27.3)
Civil Servants	47	3 (6.4)	27	2 (7.5)	20	1 (5.0)
Students	16	3 (18.8)	20	2 (10.0)	6	1 (16.7)
Mechanics	28	5 (17.9)	14	4 (28.6)	14	1 (7.1)
Traders	43	4 (9.3)	13	2 (15.4)	20	2 (10.0)
Hair Dressers	35	6 (17.1)	26	3 (11.5)	9	3 (33.3)
Total	200	29(14.5)	120	18 (15.0)	80	11 (13.8)

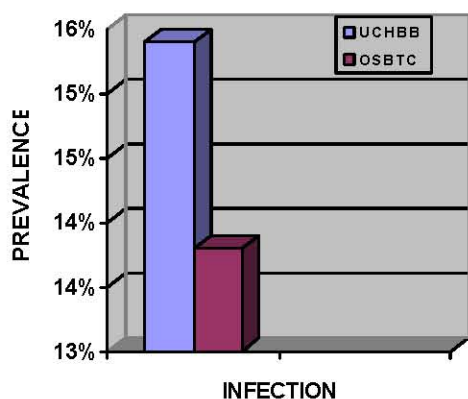


Fig. 1: Overall Hbv Infection among Prospective Hiv Positive Blood Donors

Figure 1 shows the overall HBV infection among prospective HIV positive blood donors. It shows that of the 200 samples tested, 29 (14.5%) were positive to HBsAg. Similarly, of the 120 samples from University

College Hospital Blood Bank (UCHBB), 18(15.0%) were positive to HBsAg and 11(13.8%) of the 80 samples from Oyo State Blood Transfusion Centre (OSBTC), were found to be positive for HBsAg (Figure 1).

Table 1 shows the overall prevalence of HBV infection by location. It shows an HBV infection rate of 15.0% for UCH Blood Bank compared to 13.8% for Oyo State Blood Transfusion Centre (Table 1).

The distribution of HBV infection in relation to the ages of the subjects is shown in Table 2. Among the age groups, subjects within age group >36-42 years [5(19.2%)] with UCHBB having the highest seroprevalences of 20.0% for HBsAg and 18.2% for OSBTC respectively (Table 2).

Table 3 shows the seroprevalence of HBsAg in relation to the gender of the subjects. It shows that HBsAg seroprevalence was higher among the males [20(17.5%)] than their female [9(9.5%)] counterparts ($p>0.05$) (Table 3).

Table 4 shows the seroprevalence of HBV in relation to the occupation of the subjects. It shows that the fashion designers [8 (25.8%)] had the highest seroprevalence of HBsAg infection followed by hair dressers [6(17.1%)], although the infection rate cuts across all the selected occupational groups (Table 4).

DISCUSSION

Acute Hepatitis is common worldwide but HBV infection has accounted for 50-70% of acute viral hepatitis in Africa among the various causative agents [11]. Nevertheless, the cause of acute hepatitis B may be modified in the presence of HIV with lower incidence of icteric illness and higher HBV carriage rate of about 5% in those uninfected with HIV [3]. The infection rates of HBsAg in the present study with 15.0% and 13.8% of University College Hospital Blood Bank (UCHBB) and Oyo State Blood Transfusion Centre (OSBTC) in Ibadan respectively among prospective HIV positive blood donors show that these infections are still high among Nigerians. These observations are similar to the findings in other African countries and the world in general [1-2, 12]. Similar prevalence was also reported by Agbaji [13] from Jos University Teaching Hospital (JUTH) in which they reported a prevalence of 14.8% for HBV amongst HIV positive patients. Coinfection of HBV and HIV is common and a prevalence of 70-90% has been reported [14-15]. The presence of HBsAg chronic carriage among HIV-infected individuals was also reported as 1.9-9% [9, 16].

Both HBV and HIV are parenterally transmitted indicating that the knowledge of their modes transmission is very important. This study has further confirmed that HBV is efficiently transmitted by the parenteral route. In their work, Rodriguez- Mendez *et al.*, [17] it has also been reported that among IDUs, 90% of HIV-infected individuals have evidence of exposure to hepatitis B (hepatitis B core antibody(anti-HBc positivity) and 60% also have evidence of past infection with presence of hepatitis B surface antibody (anti-HBs).

Our present study showed a high prevalence rate of HBV among age group 34-42 years in both study locations. HBV infection rate was also high among male subjects and fashion designers. Relatively high prevalence rates of 25.8% and 17.1% found among fashion designers and hairdressers respectively could be attributed to a number of factors such as sexual promiscuity and contact with blood or blood products. The high prevalence rate of HBV or HIV among relatively

older people in this study indicates that most of these subjects may have acquired the infection through sex and transfusion of unscreened infected blood while others may have acquired any of these infections prior to transfusion. However, the incidence of HBV transmission through sex and transfusion of unscreened infected blood could be reduced with the introduction of HBV vaccines, screening of blood donors and better sterilization procedures for all blood products [8, 18].

HBV infection by gender distribution shows that males had 17.5% prevalence higher than their female counterparts with 10.5% although there is no statistical significance ($p>0.05$). This closely resembles the finding of Saves *et al.*, [5] in a study on the seroprevalence of hepatitis B virus in HIV-1 infected patients in Jamaica where the rates were 50% and 21% for the males and females respectively. Similar finding was also reported by Inyama *et al.*, [19] in their work on HIV infected patients in Jos, Nigeria in which higher hepatitis B virus prevalence (31.8%) in males was reported compared with the females (22.1%). The reason for the high infection rate among the males may be due to habits such as multiple sexual partnership and polygamy which may be higher among the males. A similar study also reported a higher HBsAg seroprevalence in males than females among patients attending Dental Clinic at the University College Hospital (UCH), Ibadan and this was due to shorter HBsAg carrier rate in females than males [1, 20]. However, Lincoln *et al.*, [21] reported a lower prevalence of 6.3% in their study on the prevalence and risk factors for HBV coinfection in the Australia HIV observational data base (AHOD).

Several studies have revealed a synergistic effect on disease progression in HIV and HBV coinfection. Higher frequency of liver toxicity associated with HAART has been reported in HIV patients coinfecting with HBV or HCV [5-8]. Increased drug-associated liver toxicity in HBV-HIV coinfecting patients may be partially explained by the fact that antiretroviral compounds are generally metabolized by the liver and the changes induced by chronic infections hinge on the different pathways involved in drug metabolism [5, 22].

In our study, highest prevalence of HBV infection was observed within the age group 34-42 years in both locations. In conclusion, our study has shown that both HBV and HIV are on the increase and common among Nigerian blood donors some of whom may be in the window phase of these infections. It is therefore pertinent that highly sensitive and modern serological tests more be thoroughly done to detect these pathogens in our blood

banks before transfusion. All laboratory personnel and clinicians should be informed of the importance of proper screening of blood and other blood products against hepatitis and HIV before donation and transfusion. Focused enlightenment campaign of Nigerian masses on the mode and route of transmission of these viruses should be advocated in order to effectively control the spread of the disease.

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