Prevalence of Hepatitis B Virus (HBV) seropositivity in a cohort of people living with HIV and AIDS in Abeokuta, Ogun State, Southwestern Nigeria

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ABSTRACT: This study was carried out to estimate the prevalence of Hepatitis B virus (HBV) seropositivity in a cohort of people living with HIV and AIDS in Abeokuta, Ogun State, Southwestern Nigeria. HBV is a major public health concern as it afflicts an estimated 350 million people worldwide. A clearer picture of HIV, HBV, and HCV prevalence in Africa is important in order to better educate the population, and control these epidemics. Studies are crucial and necessary to give us a better understanding of the epidemiology of the diseases in developing countries like Nigeria. We conducted a retrospective study of HBV seroprevalence among Nigerian population attending the HIV clinic of Federal Medical Centre, Abeokuta and receiving HIV and AIDS treatment. In this cohort study, we collected blood samples from 183 HIV-positive patients between January 2012 and January 2013. Standard enzyme immunoassays were used to determine the serological prevalence of hepatitis B (HBsAg) among HIV-positive individuals. Among the HIV positive individuals, we found that 56 patients were infected with hepatitis B virus (30.6%). The overall HBV-HIV prevalence is 30.6%. The majority of the population infected was under 25 years and above (34.3%) and the higher proportion of males (37.4%) than females (25.0%) was observed. Our findings underscore the importance of screening for hepatitis B virus in the HIV infected population in developing countries, and particularly in sub-Saharan Africa, where the epidemics are still growing and a major public health concern.
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1. INTRODUCTION

Hepatitis B is a potentially life-threatening liver infection caused by hepatitis B virus (Kolawole et al., 2012). It is a major global health problem and the most serious type of viral hepatitis. It can cause chronic liver disease and put people at high risk of death from cirrhosis of the liver and liver cancer (WHO, 2005; Kolawole et al., 2012). The primary method of transmission reflects the prevalence of chronic HBV infection in a given area (Kolawole et al., 2012).

In Nigeria, it is estimated that 3.6% of the population were living with the virus in 2009, and the country had the world's second highest number of HIV and Acquired Immune Deficiency Syndrome (AIDS) related deaths (220,000) after South Africa (CIA, 2009; Tremeau-Bravard et al., 2012). Viral hepatitis is also a major public health concern as hepatitis B virus (HBV) afflicts an estimated 350 million people, and hepatitis C virus (HCV) affects 150 million people worldwide (WHO, 2008, 2011; Tremeau-Bravard et al., 2012). Both viruses are endemic in sub-Saharan Africa where an estimated 75 million people (over 35 million in Nigeria) live with hepatitis B and/or C viruses (Madhava et al., 2002; Modi and Feld, 2007; Tremeau-Bravard et al., 2012).

Hepatitis B virus infection is associated with significant morbidity and mortality in patients with HIV infection (Piliero and Faragon, 2002; Thio *et al*., 2002). Co-infection of HIV with HBV affects change number of patients worldwide (Nelson, 2002). Although, very few co-infection studies have been carried out in Africa but since sub-Saharan Africa is a home of about 29.4 million HIV infected people, high HIV/HBV confection is expected. However results are contradictory. While in Kenya, 32(78%) out of 41 patients with AIDS had serological evidence of exposure to HBV7, a study among pregnant women attending ante-natal clinics in Burkina Faso, showed a low co-infection rate of 0.88% (Dao *et al*., 2001).

Co-infection with HBV increases the risk for hepatotoxicity of HAART and likelihood of onset of an AIDS-defining illness, compared with infection with HIV-1 alone (Greub 2000, Feld et al. 2005; Forbi et al., 2007). Although the HIV co-infection with HBV has been recognized worldwide in individuals exposed to blood-borne diseases, limited data are available on the extent of co-infection and

effect of these viruses on the immune system in developing countries (Forbi et al., 2007). Nigeria belongs to the group of countries highly endemic for viral hepatitis (Odemuyiwa et al. 2001). Few studies have been done on HIV, HBV, separately in Nigeria but the knowledge about the interrelationship between these viruses and their effect on the immune system remains unclear (Forbi et al., 2007).

A clearer picture of HIV and HBV prevalence in Africa is important in order to better educate the population, and control these epidemics. Studies are crucial and necessary to give us a better understanding of the epidemiology of the diseases in developing countries like Nigeria (Tremeau-Bravard et al., 2012). In countries where HBV is highly endemic (hepatitis B surface antigen (HBsAg) prevalence rate of 8% or higher), most infections occur during infancy and early childhood (Kolawole et al., 2012). Infection occurs commonly in all age groups, although the high rate of chronic infection is primarily maintained by transmission during infancy and early childhood (Kolawole et al., 2012). Where endemicity is low (HBsAg prevalence rate of below 2%), infections occur in young adults, especially those belonging to known risk groups (MMWR, 1990; Kolawole et al., 2012).

In areas with high HBV endemicity, perinatal is the main route of transmission (Kolawole et al., 2012). Perinatal transmission is common, especially when HBV infected mothers are also HBeAg positive (Kolawole et al., 2012). HBeAg – positive mothers are more than 70% while from HBsAg – positive, HBeAg negative mothers, it is less than 10% (Nacos et al., 2000; Kolawole et al., 2012). Therefore, this study was conducted to determine the prevalence of HBV among HIV-infected individuals in Abeokuta, Ogun State, Nigeria.

2. MATERIALS AND METHODS

2.1. Study Area

This study was conducted at the Federal Medical Centre, Idi-Aba, in Abeokuta, the capital city of Ogun State, Southwest Nigeria between January 2012 and January 2013.

2.2. Study Population

A total of one hundred and eighty three HIV-infected individuals were enrolled in this study. Of which, 83 were males and 100 were females. Subject were confirmed HIV-infected, ages 15 years and above. The ethical approval was granted by the Ethical Review Committee of the hospital. Informed consent was obtained from each patients and relevant confidentiality was maintained throughout the study.

2.3. Sample Collection

One hundred and eighty-three (183) blood samples were collected for this study. Venous blood was obtained into non-anticoagulated tubes. The samples were centrifuged at 2000 resolution per minutes (rpm) for 5 minutes to obtain sera. The sera were stored at -20^{o}C for serologic assay of HIV and HBV.

2.4. Serologic Assay

SD HIV-1 and HIV-2 screening kit (manufactured by Bioline Standard Diagnostic Inc, Korea) was used in this study. This is an immunochromatography (rapid) method for quantitative detection of antibodies of all isotopes (IgG, IgM, IgA) specific to HIV-1 and HIV-2 simultaneously in serum. Red colour in the control and patient windows indicated a positive result while presence of the red colour in the control and its absence in the patient window indicates a negative result. Each serum sample was screened for antibodies to HBV using the membrane based immunoassay technique (ACON Laboratories, Inc. San Diego, USA). The test line region of the strip had been pre-coated with recombinant HBV antigen. Both are based on chromatographics capillary migration to form colour line. The presence of the colour line indicated a positive result while the absence indicated a negative result.

2.5. Data Analysis

The study was carried out and the proportion of subjects with HIV and HBV status were calculated. The prevalence HBV was cross tabulated with age, sex. Relevant chi-square statistics were computed using SPSS 20.0 window packages to accompany each cross tabulation.

3. Results

One hundred and eighty-three (183) HIV-infected subjects were examined in this study (Table 1 and 2). Of which, 83 (45.4%) were males while 100 (54.6%) were females. Table 1 shows the prevalence of HBsAg amongst HIV-infected subjects in relation to sex. The sex-specific prevalence showed that males had higher prevalence of HBV (37.4%) than females with prevalence for HBV (25.0%). There was a significant difference ($P<0.05$) between sex and HBsAg infections amongst HIV-infected subjects.

Table 1: Prevalence of HBsAg amongst HIV-Infected Subjects in relation to Sex

Sex	No. Tested (%)	No. Positive for HBV (%)
Males	83(45.4)	31 (37.4)
Females	100(54.6)	25 (25.0)
Total	**183 (100.0)**	**56 (30.6)**

The age-specific prevalence of HBsAg amongst HIV-infected subjects is shown in Table 2. It showed that prevalence of HBsAg was higher in age group 25 years and above (41.1%) than the other age groups. However, there was no significant

difference (P<0.05) between age and HBsAg seropositivity amongst HIV-infected subjects.

Table 2: Prevalence of HBsAg amongst HIV-Infected Subjects in relation to Age

Age Groups (year)	No. Tested (%)	No. Positive for HBV (%)
15-24	75(41.0)	19 (25.3)
25 and above	108(59.0)	37 (34.3)
Total	**183 (100.0)**	**56 (30.6)**

4. DISCUSSION

In Nigeria, a country where HBV and HIV prevalence is high, HBV co-infection occurs in 10% to 70% of HIV-infected individuals (Ejele et al., 2004; Iwalokun et al., 2006; Nwokedi et al., 2006; Otegbayo et al., 2008; Idoko et al., 2009). One hundred and eighty-three HIV positive patients aged 15-74 years were screened for HBsAg co-infection. Of these 183 HIV positive patients, 56(30.6%) were positive for HBsAg co-infection. It is noteworthy to state that 34.3% of the subjects; ages 25 years and above tested positive to HIV- HBV co-infections. This suggests that they may have contracted the virus from their mother, family members or peer groups. Also, a history of contact with jaundiced person has been identified as independent risk factor for HBsAg seropositive status (Ugwuja and Ugwu, 2010).

From this study, the prevalence of HIV- HBV co-infections among HIV positive patients in Abeokuta, Ogun State, Southwestern Nigeria is 30.6%. This 30.6% value reported in this study is higher than the 25.0% reported by Uneke et al. (2005) among HIV-infected patients in Jos, Plateau State, Nigeria. Opaleye et al. (2010) reported a prevalence rate of 5.4% among blood donors in Benin City, Nigeria. The differences in prevalence in these studies could be attributed to differences in patient selection.

The co-infection rate of HBV and HIV is high (30.6%) in this study, and is comparable to what is found by other investigators in Nigeria (Lesi et al., 2007; Adesina et al., 2010; Tremeau-Bravard et al., 2012). In a study by Tremeau-Bravard et al. (2012), a 7.9% co-infection rate of HBV and HIV was reported. HBV infection rate in this study is comparable to what is seen in the HIV seronegative population, which indicates an endemic infection by the hepatitis B virus in the Nigerian population (Lesi et al., 2007; Tremeau-Bravard et al., 2012).

Gender-specific prevalence showed that males had higher seropositivity for HIV- HBV co-infections [31(37.4%)] than their female counterparts with 25.0% prevalence. The difference was however, significant (*P<0.05*); the reason for this difference might be due to larger number of females in this study. Uneke et al. (2005) earlier reported that more females than males visit hospitals for medical attention in Nigeria. This suggested that both sexes were not equally susceptible to HIV- HBV co-infections and that gender might necessarily be an important epidemiological determinant of HIV- HBV co-infections among the study patients. This observation however, agrees with the report by Mehmet et al. (2005) in which males had higher prevalence rate than females in both rural and urban areas with observation that male sex was an important risk factor for HBsAg positivity.

The statistically significant difference in HIV-HBV co-infections between males and females in the present study suggests that they were not equally exposed to HBV/HIV in corroboration to earlier findings (Agbede et al., 2007; Ugwuja and Ugwu, 2010) but however in contradiction with the findings of other authors elsewhere (Saves et al., 1999; Odusanya et al., 2005; Inyama et al., 2005; Alikor and Erhabor, 2007). The finding of this study disagrees with the finding of Saves et al. (1999) in a study on the prevalence of HBV in HIV-1 subjects, none tested positive to HIV- HBV co-infections among age group 18-39 years of age. Statistically, this difference observed among these age groups was significant (*P<0.05*). Seropositivity of HIV- HBV coinfections was lower for age group 15-25 years. This difference was also statistically significant (*P<0.05*). This contradicts the report of Motta-castro et al. (2003) who reported that age was not significantly associated with HBsAg seropositivity among Afro-descendant community in Brazil. However, the age of acquiring infection is the major determinant of the incidence and prevalence rates (Ezegbudo et al., 2004). Again serological evidence of previous HBV infections varies depending on age and socioeconomic class (Ugwuja and Ugwu, 2010).

5. CONCLUSION

In Nigeria, studies on the prevalence of HBsAg among HIV-positive patients have been documented. This study showed a high prevalence of HBV (30.6%) among HIV-positive patients. The study also showed a higher prevalence of co-infections of viral hepatitis with HIV in males than their female counterparts. There was also higher infection rates among the age group 25 years and above compared to the other age groups. This is in agreement with previous reports in Northern Nigeria (Nwokoedi *et al*., 2006) and elsewhere (Lincoln *et al*., 2003; Muhammad *et al*., 2009; Michael *et al*., 2012). This may be due to fact that males at age group are most sexually active.

The high prevalence rate of HBV/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/HIV 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 (Hollinger and Liang, 2001).

This study however, confirmed the presence of HBV among HIV positive patients in Ogun State, Southwestern Nigeria. Majority of them might have been infected at earlier stage of their life. Possibility also exists of an ongoing horizontal spread of the infection. In line with the assertion of Ugwuja and Ugwu (2010), asymptomatic HBV infection among HIV positive patients and adolescents without proper identifiable risk factors or mode of acquisition calls for general surveillance, mass immunization, and public health education to curtail the spread of the virus and its sequalae. General surveillance through mass screening to identify those with infection and instituting appropriate treatments, and public health education to enlighten the general public in Abeokuta of the possible risk factors and routes of infection are advocated.

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