

Sero-prevalence of Hepatitis B Virus Infection among HIV Co-infected Patients in Port Harcourt, NigeriaFrank-Peterside, N², Ayodele, Martins B. O^{1*}¹Department of Medical Microbiology & Parasitology, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port Harcourt, P.M.B. 5323, Port Harcourt, Rivers State, Nigeria.E-mail: ufuomartins@yahoo.com: Tel: +2348037055953(*Corresponding author)²Department of Microbiology, Faculty of Science, University of Port Harcourt, P.M.B. 5323, Port Harcourt, Rivers State, Nigeria.E-mail: nnenna.frank-peterside@uniport.edu.ng: Tel: +2348033106272

Abstract: Hepatitis B Virus (HBV) is one of the major health concerns which accounts approximately for 350 million chronic cases out of 2 billion people infected worldwide. Co-infection with HBV in HIV infected person as been identified as one of the burdens of HIV infections in sub-Saharan Africa owing to common route of transmission and the similar risk factors. HBV is more destructive in HIV-positive than in mono-infected individuals, with associated HBV carrier rates, increased concentrations of HBV viraemia, more frequent occurrences of activation, and faster progression to liver cirrhosis. Blood samples from 535 HIV I/II sero-positive patients were re- screened to confirm their HIV sero-positivity and also screened for HBsAg, Sero-prevalence of HBsAg was 25(4.67%). Among the 535 HIV sero-positive patients studied, 360(67.3%) were females and 175(32.7%) were males; the mean age in years was 33.5±11.7 Age groups 31-40 had the highest frequency of 224(41.8%) while age group above 60 had the lowest frequency of 4(0.7%). Out of the 25(4.67%) HBsAg sero-positive patients, 13(2.43%) were females while 12(2.24%) were males. Age group 31-40 had the highest frequency of 12(2.24%) while age groups 51-60 and above 60 had lowest frequencies of 0(0.0%) each. There was no significant differences between sex and HBsAg infections and also between age and HBsAg infections among HIV infected subjects ($p>0.05$). Transmission routes of HBV and HIV are similar, regular screening, awareness and knowledge of HBV sero status, vaccination and understanding of other risk factors will reduce the spread of HBV/HIV co-infection and progression. Hence, appropriate information, advocacy and awareness campaign strategies are advocated.

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1. Introduction

Hepatitis B virus (HBV) is a member of the hepadnavirus family that has particle called virion, an outer lipid envelope and an icosahedral nucleocapsid core which is composed of protein (Locarnini, 2004). The virus, also often referred to as Dane particles consist of hepatitis B core antigen (HBcAg), hepatitis B surface antigen (HBsAg), and viral DNA and is infective (Cheesbrough, 2000). The embedded proteins located on the outer envelope are responsible for the binding of the virus and its penetration into the potential and susceptible host cells.

The Dane particles which are called virions have the ability to infect liver cells known as hepatocytes (Howard, 1986). Complimentary to Dane particles are certain bodies, naturally filamentous and spherical, lacking a core which can be found in the serum of infected individuals, essentially part of the lipid and protein that forms the surface of the virion, called the hepatitis B surface antigens (HBsAg) and are produced in excess during the life cycle of the virus (Kay and Zoulim, 2007). The earliest serological

indication of HBV infection is the appearance of HBsAg, which may be present before any obvious symptoms of infection, is noticed. Chronic infection is said to have occurred when this antigen persists for more than 6 months in an individual who is referred to as a potential carrier with the ability to spread the infection throughout his life (WHO, 2002).

Human immunodeficiency virus (HIV) causes progressive impairment of the body's cellular immune system, leading to increased susceptibility to infections and tumors and the fatal condition, called acquired immunodeficiency syndrome (AIDS) (Cheesbrough, 2000).

According to the United States Centre for Disease Control, (1998), the list of groups of people who are or could be at risk of contracting HBV includes infants born to infected mothers, sexual/household contacts of infected persons, health care workers, patients and employees in haemodialysis centres.

Co-infection with hepatitis B virus (HBV) has been identified as a leading and significant cause of

morbidity and mortality among HIV-positive patients mainly because of the promoting effect which HIV brings to bear on HBV replication and progression of hepatic damage (Collin *et al.*, 1999). Both viruses have properties which are similar, these include transmission using the enzyme called reverse transcriptase in replication, the propensity to develop chronic infections, and a huge capacity to mutate genomically, which can lead to emergence of mutant strains, which has the potentials to become resistant to the anti-viral agents commonly used (Mphahlele *et al.*, 2006). Studies conducted in South Africa revealed increased HBV prevalence in adults' patients infected with HIV (Lukhwareni *et al.*, 2009, Firnhaber *et al.*, 2008). According to Salvana *et al.*, (2015), greater number of people who are infected with hepatitis B reside in the developing countries and infection usually takes place at birth or in early childhood and most of the studies conducted on HIV and HBV co-infection have been done in developed countries, where the use of intravenous drugs or sexual transmission constitute the main modes of transmission. In HBV highly endemic countries where HBsAg prevalence rate could be 8% or higher, most infections occur during infancy and early childhood (Kolawole *et al.*, 2012). High rate of chronic infection is primarily maintained by transmission during infancy and early childhood. This is usually a reflection of infections seen in all age groups (Kolawole *et al.*, 2012). In low endemicity areas where HBsAg prevalence rate is below 2%, the infections occur in young adults, particularly those belonging to known risk groups (Kolawole *et al.*, 2012).

Nigeria has been categorised as a hyperendemic area of hepatitis B virus infection, with an estimated 12% of the total population being chronic carriers despite the huge resources expended on provision of a safe and effective vaccine (Ugwuaja, 2010). In studies conducted on HIV/HBV co-infection in Nigeria, where HBsAg was used as serological marker, prevalence rates ranged between 10% and 70%, this constituted one of the widest variation of HIV/HBV co-infection prevalence from studies emanating from any African country or the world at large (Owolabi *et al.*, 2014). In a review study Owolabi *et al.*, (2014), it was posited that 15% prevalence of HBsAg was a substantial burden for Nigeria. Ijarotimi *et al.*, (2015), stated in their study that a very high numbers of subjects who are human immunodeficiency virus seropositive and human immunodeficiency negative had evidence of either past or current contact with HBV and concluded that Nigeria is a highly endemic environment of hepatitis B virus than HIV infection despite the common route of transmission.

In Port Harcourt, HBV/HIV co-infection prevalence rates of 6.67% among pregnant women, 6.7% among blood donors and 9.7% among HIV seropositive patients have been documented by Frank-Peterside and Neenwi, (2010), Okonko *et al.*, (2015) and Ejele *et al.*, (2004) respectively. There is assumed increased level of the awareness of risk factors and possible transmission of HBV infection in the general populace and among HIV seropositive individuals in particular, this study therefore was aimed at determination of the sero-prevalence of HBsAg among HIV seropositive patients.

2. Materials and Methods

This study was conducted at the University of Port Harcourt Teaching Hospital and Obio Cottage Hospital, both in Port Harcourt, the capital city of Rivers State, South-South, Nigeria between January 2013 and March 2016.

A total of five hundred and thirty five HIV infected individuals were enrolled in this study. Of which, 175(32.7%) were males and 360(67.3%) were females. The subject were confirmed HIV-infected, mean ages was 33±11.7 year. The ethical approval was granted by the Ethical Review Committee of the hospitals. Informed consent was obtained and relevant confidentiality was maintained throughout the study.

Five hundred and thirty five (535) blood samples were collected for this study. Venous blood was obtained into non-anticoagulated specimen bottle. The samples in non-anticoagulated specimen bottles were centrifuged at 3,000 revolutions per minutes (rpm) for 5 minutes to obtain sera. The sera were stored at -20°C for serologic assay of HIV and HBV.

Determine HIV-1/II screening kit (manufactured by Alere Medical Co. Ltd, Japan) was used in this study. This is a qualitative immunoassay (rapid) method for detection of antibodies specific to HIV I/II simultaneously in serum. 50 µl of the serum sample was applied to the sample pad and after 15 minutes, the results were read. 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 indicated a negative result.

Each serum sample was also screened for antibody to HBV using a one-step rapid immunoassay technique (ABON Biopharm, Co., Ltd, China). The test line region of the strip had been pre coated with recombinant HBV antigen. The reaction is based on chromatographic capillary migration to form colour line. The test strip was immersed vertically in the serum for 15 seconds, removed and waited for 15 minutes before the results were read. The presence of the red colour line in the test and control regions indicated a positive result while the presence of the

red colour line only in the control region indicated a negative result.

The study was carried out and the proportion of subjects with HIV and HBV status, demographic information were determined. The prevalence of HBV was cross tabulated with age, sex. Relevant chi-square statistics were computed using SPSS 20.0 window packages to accompany each cross tabulation. A two tailed $p < 0.05$ value was taken as statistically significant.

3. Results

Five hundred and thirty five (535) HIV infected subjects were examined in this study. Of which, 175(32.7%) were males while 360(67.3%) were females. Table 1 shows the prevalence of HBsAg amongst HIV-infected subjects in relation to sex. The sex-specific prevalence showed that females had higher prevalence of HBV (2.43%) than males with prevalence for HBV (2.24%). There was no significant difference ($P > 0.05$) between sex and HBsAg infections amongst HIV-infected subjects.

Table 1. Sero-prevalence of HBsAg amongst HIV Infected Subjects in relation to Sex

Sex	No Tested (%)	No. Positive for HBsAg (%)
Males	175(32.7)	12(2.24)
Females	360(67.3)	13(2.43)
Total	535(100.0)	25(4.67)

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 31-40 year (2.24%) than the other age groups. However, there was no significant difference ($P > 0.05$) between age and HBsAg sero-positivity amongst HIV-infected subjects.

Table 2. Prevalence of HBsAg amongst HIV Infected Subjects in relation to Age Groups

Age Groups (years)	No Tested (%)	No Positive for HBsAg (%)
20-30	209(39.06)	8(1.50)
31-40	224(41.87)	12(2.24)
41-50	65(12.15)	5(0.93)
51-60	33(6.17)	0(0.0)
Above	4(0.75)	0(0.0)
Total	535(100.0)	25(4.67)

4. Discussion

In this study, the prevalence of HBsAg among HIV sero-positive co-infected patients in Port Harcourt, Rivers State, Nigeria, was determined. The prevalence of HBsAg among HIV co-infected patients

was 4.67%, this was close to prevalence of 3.6% reported by Bello *et al.*, 2011, in a study conducted in Biu, Borno State, Nigeria. Prevalence of 6.67% was reported by Frank-Peterside and Neenwi, 2010 among pregnant women, 9.7% by Ejele *et al.*, 2004 and 6.7% by Okonko *et al.*, 2015 in Port Harcourt, Rivers State, Nigeria. However, prevalences higher than these have been recorded by various authors, these includes 15% by Baba *et al.*, (2011), 25.9% by Uneke *et al.*, (2006), 51.9% by Iwalokun *et al.*, (2006), and 70.5% by Nwokedi *et al.*, (2006). In this study, there was no statistical significance between the ratio of males 12(2.24%) and females 13(2.43%) who were sero-positive to HBsAg, $p > 0.05$. This did not agree with the study of Ojo *et al.*, (2013), where males had higher frequency of 37.4% and females had 25.0%. Irrespective of the differences in the frequencies, there is the fact that both sexes are exposed to the HBV-HIV co-infection. But the slightly higher ratio of females to male could be attributed to the fact that more females visits hospitals than males for medical attention, a reason earlier reported by Uneke *et al.*, (2005). Though, there was no statistical significance in the distribution of co-infection among male and females in this study, it has however been observed by Mehmet *et al.*, (2005) that sex was an important risk factors for HBsAg sero-positivity.

Furthermore, there was no statistical significance in the frequencies of HBV-HIV sero-positivity in the age groups in this study, as results showed that even though, age group 31- 40 years had the highest frequency of 12(2.24%) of the co-infected subjects, the age group 20-30 also had a closely related frequency of 8(1.50%). The highest frequency of age group 31 – 40 years in this study is in consonance with the study of Bello *et al.*, (2011), where highest frequency was also recorded in the same age group and was attributed to the unsafe sexual behavior of the polygamous men coupled with their religion inclination, socio-economic, cultural and occupation of the men in the northern Nigeria where the study was conducted. This cannot be said to be applicable with what is obtained in Port Harcourt, a cosmopolitan city where this study was done. However, it should be noted that the highest frequencies of co-infection which was observed among 31 – 40 and 20 – 30 years in this study, suggests the conformity with the age of high sexual activities among both sexes. The high prevalence of HIV and HBV among this age group is in line with the report in literature that ages 25 to 35 years are mostly affected with HIV/AIDS (WHO, 1996).

5. Conclusion

In Port Harcourt, Rivers State, South-South, Nigeria, sero-prevalence of HBsAg among HIV co-

infected individuals has been documented. This study showed a low prevalence of HBsAg (4.67%) among HIV sero-positive patients. The study additionally revealed that there was no statistically significant difference in co-infection in males than in females. There was a higher co-infection rate among 31-40 years age group compared to the other age groups. In agreement with the view of Ojo *et al.*, (2013), the higher prevalence of co-infection in relatively “sexually active” age in this study suggests that the infection may have been acquired through sex. In conclusion, transmission route of HBV and HIV are similar, aggressive awareness through medical education, encouragement of voluntary counseling and testing, regular screening, understanding of the risk factors, and vaccination will reduce the spread of HBV-HIV co-infection and progression to cirrhosis.

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Correspondence to:

Ayodele, Martins B. O.
Dept of Medical Microbiology & Parasitology,
Faculty of Basic Medical Sciences,
College of Health Sciences,
University of Port Harcourt,
PMB 5323 Choba, East-West Road,
Port Harcourt, Rivers State, Nigeria;
ufuomartins@yahoo.com,
tuntun2503@gmail.com
Tel.: +2348037055953

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