

SEROPREVALENCE OF HEPATITIS B SURFACE ANTIGENEMIA AMONG HIV-INFECTED INDIVIDUALS IN ABA, SOUTH EASTERN, NIGERIA

¹Ngwogu K.O, ²Onyemachi P.E.N, ³Ngwogu A.C, ¹Onwubiko D

Departments of ¹Chemical Pathology, ²Community Medicine, ³Medical Microbiology, College of Medicine and Health Sciences, Abia State University, Uturu, Nigeria.

Corresponding Author: ngwogukenneth@yahoo.com

ABSTRACT

Nigeria has remained a hyper-endemic area for hepatitis B virus (HBV) infection, despite the existence of a safe and effective vaccine, with an estimated 12% of the total population being chronic carriers. Highly active anti-retroviral therapy (HAART) has improved survival of human immunodeficiency virus (HIV) patients by reducing liver-associated morbidities and mortalities in such patients. There is no data on the sero-prevalence of hepatitis B virus infection in our centre. Three hundred and six consecutively recruited HIV-infected individuals comprising 105 males and 201 females were screened for hepatitis B surface antigen (HBsAg) seroprevalence using ELISA test kits. Bio-data collated were analyzed using statistical package for social sciences (SPSS, version 20). Level significance was taken as $P < 0.05$. Thirty of the patients tested positive for HBsAg giving an overall prevalence rate of 9.80%. Co-infection rate among the males was higher (12.40%) than in females (9.50%) but the difference is not statistically significant (P -value > 0.05). The prevalence of HBsAg among the patients with a CD4 count greater than 350 was 40% representing the percentage of HIV patients with HBV who may not be treated with HAART. In conclusion, HBV infection is relatively common in HIV infected individuals in our environment, necessitating routine screening of all such individuals.

Key Words: HIV, HBV, co-infection, seroprevalence, Aba.

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INTRODUCTION

Hepatitis B Virus (HBV) and human immunodeficiency virus co-infection constitute an increasing global health burden (Okocha *et al*, 2012). They share similar transmission routes including sexual, blood-blood contact and injecting drug usage (Saravanan *et al*, 2007, Koziel and Peters, 2007). The prevalence of both infections is greater in the developing world, especially Africa and Asia, where it is estimated that 25 million people are infected with the HIV virus, and another 50 million people are HBV positive (Ocama *et al*, 2005).

The rates of HIV-HBV co-infection are reported as high as 10-20% in countries where HBV infection is either endemic or intermediate to high HBV cases

(Thio, 2009). It has been observed that HBV/HIV co-infection leads to increased morbidity and mortality as compared to HIV and HBV mono-infections (Thio, 2009). The ever-increasing burden of these infections has become a growing concern (Nikolopoulos *et al*, 2009).

With increased access to anti retroviral drugs for HIV patients, migrating populations and social networking by intravenous drug users, cases of HBV co-infection have been on the increase (Lacombe *et al*, 2010), coupled with the dramatic rise in survival rates of these individuals (Sulkowski *et al*, 2000). The increase in mortalities and morbidities from liver diseases among HIV patients is partly due to co-infection with HBV as these viruses promote liver fibrosis by increasing intra-hepatic apoptosis (Iser *et al*, 2011; Diwe *et al*, 2013).



Studies show that HIV co-infection adversely impact on the natural history, diagnosis, progression, morbidity and mortality of HBV infection (La combe *et al*, 2010, McGovern and Sherman, 2009). It is known that liver toxicity from highly active antiretroviral therapy (HAART) exist but does not override the overall usefulness of HAART. With the present availability of HAART and consequent longevity of individuals infected with HIV, co-infected patients have a higher chance of death from liver-related causes (Okocha *et al.*, 2012; Diwe *et al.*, 2013). Current emphasis now is on reducing deaths primarily from liver diseases among HIV patients. One of such strategy is screening of all HIV patients for HBV. The study by Crum-Cianflone *et al.* (2010) showed that 49% of HIV patients with abnormal liver function tests had well identified liver disease.

The diagnosis of chronic HBV infection in HIV infected patient is same as in HIV non-infected (seronegative) patient. Hepatitis B surface antigen (HBsAg) is the serological hallmark of HBV infection and appears in serum 1-10 weeks after acute exposure to HBV (Okocha *et al*, 2012; Mc Govern and Sherman, 2009). Globally, chronic HBV infection affects about 10% of HIV-infected patients (Puoti *et al*, 2002), although regional differences exists in the prevalence of this co-infection. The highest rates occur in sub-Saharan Africa and Asia (Mc Govern and Sherman, 2009) while higher prevalence of this co-infection has been observed in homosexuals and injection drugs users. (Kelterman *et al*, 2003; Rodriguez – Mendex *et al*, 2002).

Studies suggest that HBV -DNA levels and reactivation rates are higher in HIV-infected patients than those with HBV alone and end stage liver disease is an important cause of death among patients with co-infection (Colin *et al*, 1999). Hepatitis B surface antigen and HBV viremia have been documented to reappear in HIV/HBV co –infected patients, whose markers had previously disappeared. Also, HIV infected patients have been documented to have lower rates of spontaneous clearance of HBsAg with increasing mortality (Mills *et al*, 1990; Eskild *et al*, 1992).

The World Health Organization (WHO) recommends that HAART should be commenced in HIV patients co-infected with HBV irrespective of value of CD4 count (WHO, 2009). This reduces the liver – associated morbidities and mortalities in such patients (Diwe *et al*, 2013). In Nigeria, free testing of HBV is not provided alongside free HIV testing and treatment in many centers such as ours. Consequently, many

HIV patients whose CD4 counts are above 350 cells/ml and who may be positive to HBV are unrecognized and do not have early commencement of HAART with damaging consequences on the liver.

This study was carried out among HIV positive patients to determine the prevalence of HBV co-infection and to emphasize the need for inclusion of HAART in the treatment of all HIV patients co-infected with HBV in Aba, a commercial metropolitan town in South-eastern Nigeria. This was done with the knowledge that such patients are at a high risk of a rapid progression coupled with development of liver cirrhosis and hepatocellular carcinoma (Beatrice *et al*, 2009; Zhou *et al*, 2011).

MATERIALS AND METHODS

Study Location: This study was carried out at the chemical pathology laboratory of the Abia State university Teaching Hospital Aba.

Study Duration: The study was conducted between March and June 2016.

Ethical Consideration: Ethical approval was obtained from the ethical committee of the Abia State University Teaching Hospital (ABSUTH) Aba.

Study Population: A total of 306 confirmed HIV positive adult patients who presented newly at the HIV treatment unit of the hospital was used for this study. Only those who gave informed written consent to participate in the study were recruited. Basic demographic data and information on previous history and risks associated with transmission of HIV and HBV infections were obtained.

Sample Collection: About 3mls of venous blood was collected from each participant in a sterile plain tube. The samples were allowed to clot and retract after which serum was isolated by centrifugation at 250 revolutions per minute for about 5 minutes. The serum samples were then screened for HBV using rapid test ELIZA kits (Acon Laboratory USA) to detect hepatitis B surface antigen (HBsAg). Each test kit is a lateral flow qualitative immune chromatographic assay and followed the manufacturer's instructions. Specimens which could not be tested immediately were stored at 8^oC in the refrigerator until laboratory analysis the following day.

Statistical Analysis: Data analysis was done using statistical package for social sciences (SPSS, version 20). Comparison of means was done using the student



-t test. The level of statistical significance was taken as $p < 0.05$.

RESULTS:

A total of 306 confirmed HIV patients were screened for hepatitis B virus infection. The age of the patients ranged from 6-70 years with a mean of 36 ± 10.2 years. The highest prevalence of HIV infection was

seen between the age ranges of 30-39 years (38.20) (Figure 1).

There was progressive increase in the number of HIV patients with each increasing age group up to the 30-39 years age group and a gradual decline thereafter (Figure 1).

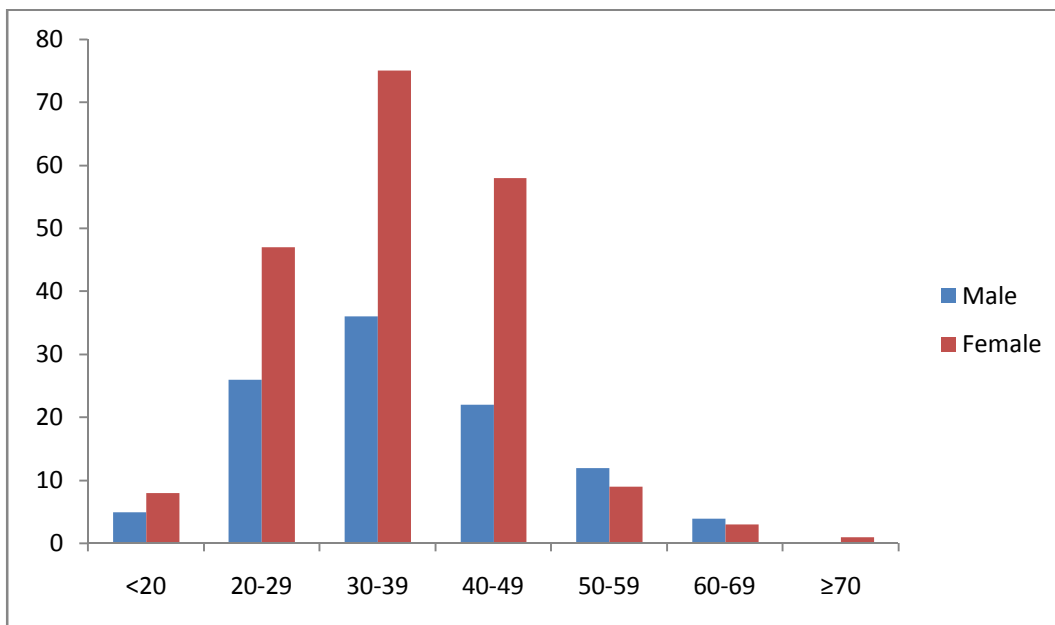


Figure 1: Gender distribution of male and female HIV patients

Table 1: Age and Sex of HBsAg seropositivity among HIV patients.

Age groups (years)	Males	Females	Total No. Tested	Total number positive (%)
< 20	5	8	13	0 (0)
20-29	26	47	73	4 (13.33)
30-39	36	75	111	11 (36.67)
40-49	22	58	80	9 (30.00)
50-59	12	9	21	5 (16.67)
60-69	4	3	7	1 (3.33)
≥70	0	1	1	0 (0)
Total	105	201	306	30 (100)

A total number of 105 HIV patients (34.30%) were males, while 201 (65.70%) were females, giving a male to female ratio of 1:2 (Table 1); implying that male prevalence of HIV respondents is 34.30% while

female prevalence of HIV respondent is 65.70%. HIV/HBV co-infection was higher among males (12.40%) than females (8.50%). The prevalence of HBsAg among the subjects with a CD4 count greater than 350 ($CD4 > 350$) was 40%.



This represents the percentage of HIV patients with HBV who may not be treated with HARRT drugs

since HBV screening is not routinely carried out on all patients (Table 2).

Table 2: Gender distribution of Hepatitis infection among the respondents

Gender	Overall No screened	No positive for HBsAg	No positive for HBsAg with CD4 >350
Male	105	13	5
Female	201	17	7
Total	306	30	12

DISCUSSION

In 2008, the UNADIS report on the global epidemic estimated the total number of people living with HIV to be 33.4 million world-wide with about two third of them living in sub-Saharan Africa (UNADIS, 2008). Although HIV prevalence appears to be stable, much remains uncertain about the direction of the epidemic. In the developed countries, the increased cancer risk among immune-compromised persons with HIV/AIDS (PHA) is well observed (Sule, 2010). With the increased access to antiretroviral therapy in resource limited settings, people living with HIV/AIDS may continue to live longer (Beatrice *et al*, 2009). However, morbidity and mortality due to co-infection with other viruses will increasingly

become important. Although co-infections with HBV among HIV positive patients is well documented in developing countries, the demographics and impact of these infections are not well defined in low resource countries like Nigeria. The need for up to date data on hepatitis co-infections to guide health policy on management of HIV co-infected patients is paramount (Kapembwa, 2011).

The highest prevalence of HIV infection in the study was seen between the age ranges of 30-39 years. There was progressive increase in the number of HIV

patients with each increasing age group up to 30-39 years and a steady decline thereafter. This is similar to the results of other studies (Onwuakor *et al*, 2014).

It correlates with peak age of highest sexual activity in the society and supports the role of sexual intercourse in transmission of HIV.

The age distribution of HBV infection showed that individuals aged 30-39 years had the highest prevalence of HBV with an infection rate of 10.54%. Previous studies have also shown the highest prevalence of HBV infection among these age groups (Ado *et al*, 2010; Adekeye, 2013; Ngwogu and Ngwogu 2016). These age groups contain active youths in the society, and therefore, the highest prevalence of HBV among them may be attributed to some social vices associated with them such as unprotected sexual activities with multiple partners tattooing and intravenous drug use (Shittu *et al*, 2014).

The overall prevalence of HBV among our study population was 9.80%. Abiodun *et al.*, (1985), found a prevalence of 10.4% among blood donors in Benue City, South – West Nigeria while Imoru *et al*, (2003), reported a HBsAg prevalence rate of 10.70% among healthy blood donors in Kano. Mustapha and Jibrin (2004) reported a prevalence rate of 26.5% among patients with HIV infection in Gombe, Northern Nigeria while Baba *et al.*, (1998) obtained a HIV – HBV co-infection rate of 15% in Maiduguri, Northern Nigeria. However, Okocha *et al* (2012), recorded a much lower prevalence rate of 5.90% in Nnewi, South Eastern, Nigeria while Adewole *et al*, (2009) reported a HBV prevalence rate of 11.50% among 260 HIV positive individuals in Abuja, central Nigeria. These reports show that co-infection with



HBV is prevalent among HIV- infected individuals and the burden of co-infection is expected to be greater in areas of the world with high HBV endemicity (Chloe, 2004). However most HBV infection are acquired in childhood through horizontal and vertical transmission and therefore its prevalence in HIV – infected population mirrors what is observed in the general population (Alter, 2006).

The HBsAg seroprevalence rate among the males was higher (12.40%) than in females (9.5%). This difference is not statistically significant (p-value > 0.05). This finding was comparable to reports from elsewhere (Harania *et al*, 2008; Baba *et al*, 1998). This observation may be accounted for by the fact that men are more likely to have multiple sex partners and also practice unprotected sex due to the polygamous nature of their relationships. Also, it is known that males are less likely to clear HBsAg and have a higher risk of progression to cirrhosis. This finding was however different from that of Mustapha and Jibrin (2004) who reported a higher sero prevalence of HBV among females than males.

Studies on HBV and HIV co-infection has attracted considerable interest regarding the direct or co-factorial role of HBV in HIV infection. (Seto, *et al* 1989). Evidence has shown that HBV can infect lymphocytes and produce a protein capable of activating HIV – 1 replication (Seto *et al*, 1989). In addition, it has been found that HIV positive patients with HBV infection are at increased risk of liver related mortality (Thio *et al*, 2002). We advocate that routine screening of subjects for HIV infection should include that of HBV in order to ensure early detection of infection. It is therefore very important to consider anti HBV therapy in addition to antiretroviral therapy in those with dual infection (Mustapha and Jibrin, 2004).

Screening for HBsAg alone does not fully reflect the epidemiology of the disease as it could indicate a carrier state, viral replication or chronic hepatitis (Olokoba *et al*, 2009). Our study did not differentiate carriers of HBsAg from those with active infection.

Among the respondents that tested positive for HBsAg, twelve had their CD4 count greater than 350. The prevalence of HBsAg among the respondents with a CD4 count greater than 350 (CD4 > 350) was 40% (Table 4). This represents the percentage of HIV patients with HBV who may not be treated with Highly Active Anti-Retroviral Therapy (HAART) drugs since HBV screening is not routinely carried out on all HIV patients in our facility. This underscores the need for all HIV patients co-infected with HBV to be treated with HAART irrespective of the value of CD4 count as prescribed by WHO (WHO,2009).

CONCLUSION:

This study shows that HBV infection is relatively common in HIV-infected individuals. Routine screening for HBV should be done for all HIV positive individuals even in resource limited settings in order to reduce morbidities from liver diseases amongst HIV positive patients.

LIMITATIONS: HBV DNA by polymerase chain reaction (PCR) were not done due to unavailability of required technology. This may have increased the prevalence of HBV in our study as it would allow early diagnosis of these infections before surface antigen of HBV become detectable in serum.

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AUTHORS' CONTRIBUTIONS

All the authors participated fully in this work. Their carrier background played important roles.

