INTERNATIONAL JOURNAL OF ENVIRONMENT

**Volume-2, Issue-1, Sep-Nov 2013** **ISSN 2091-2854**

***Received:9 September*** ***Revised:16 September*** ***Accepted:25 September***

# PREVALENCE OF HEPATITIS B VIRUS AMONG HIV POSITIVE PATIENTS ATTENDING SPECIALIST HOSPITAL SOKOTO, NIGERIA

B. Aliyu, S[1], B. Manga[2] and M. A. Isa[3*]

[1]Dept of Laboratory, General Hospital Jega, Kebbi State

[2]Department of Microbiology, Usmanu Danfodiyo University, Sokoto, Nigeria

[3]Dept of Microbiology, University of Maiduguri, P. M. B. 1069, Borno State

*Corresponding author: mustafaalhajiisa@gmail.com

**Abstract**

Prevalence of hepatitis B virus infection among HIV patients attending Sokoto specialist Hospital, Sokoto state, Nigeria was carried out between June and July, 2012, using Diaspot HbsAg kit (preliminary test) and Biorex Diagnostic ELISA kit (Confirmatory test). Demographic data, clinical characteristics and laboratory results (Questionnaire, CD4 counts and HBsAg) were analyzed. Out of 140 HIV patients tested for hepatitis B surface Antigen (HBsAg) only 19 individuals were found positive given the prevalence rate of 13.6% (19/140) among HIV patients. The statistical analysis has shown that there was no observable statistical significant difference between demographic data, clinical characteristics and risk factors with respect to HBV infection. Two of the 140 HIV patients were in the chronic stage of the infection giving a prevalence of 1.43% and two of the patients were at the acute stage of the infection with a percentage prevalence of 1.43% while the remaining fifteen patients were in the active stage of the infection. There was no statistically significant relationship between the mean CD4 counts (428cells/µl of blood) in HIV monoinfected patients and the mean CD4 counts (391.1579cells/µl of blood) in HBV/HIV co-infected individuals (t=22.1351,df=1,p-value=0.02874,95 percent confidence interval: 174.435 – 644.5648, mean=409.5). Therefore, HIV patients should be screened for HBV during their clinical visit in order to inform clinical management, also adequate care and support programs should be organized to help people living with both infections.

Key Words: Prevalence, HIV, HBV and Co-infections

## Introduction

HIV (Human Immunodeficiency Virus) is a virus that infects cells of the human immune system (mainly CD4 positive T cells and macrophages key components of the cellular immune system), and destroys or impairs their function. Infection with this virus results in the progressive deterioration of the immune system, leading to 'immune deficiency (UNAIDS, 2008). While hepatitis is the inflammation of the liver; it may be caused by exposure to certain chemicals, autoimmune diseases, or by bacterial infections but is often caused by one of several viruses (Ahmedin *et al.*, 2004; Redmond, 2008).The hepatitis virus

lives in the blood and other body fluids and is transmitted from person to person through unprotected sexual intercourse with an infected person, sharing infected needles, or other sharp agents that break the skin (Redmond, 2008). Viral hepatitis (especially HBV) and HIV have been associated with reduced survival, increase risk of progress to liver disease and hepatotoxicity associated with anti- retroviral therapy. Hepatitis B virus and HIV share the same routes of transmission; as a consequence, infection with HBV is expected in HIV infected patients. Hepatitis B virus (HBV) infection is one of the most common infections in the world, with approximately 2 billion people infected (WHO, 1996). Approximately five per cent suffer from chronic liver disease (WHO, 1996). Also, over two-thirds of all cases of liver cancer worldwide are caused by HBV (Lee, 1997).

While chronic- HBV infection in the setting of HIV/AIDS is not considered an opportunistic infection, it is a common co-existing infection seen in HIV-infected individuals because of the shared modes of transmission (Thio, 2003). Both hepatitis B virus (HBV) and human immunodeficiency virus (HIV) are devastating viruses that share certain epidemiological characteristics such as risk populations and transmission routes. This puts HIV positive individuals at risk of co-infection with hepatitis B virus. For HIV and HBV co-infection (HIV/HBV), the seroprevalence ranges from 6.3% to as high as 39% (Mendes-correa, 2000).

When both HBV and HIV co-infect a patient, the mortality rate from chronic hepatitis B is increased above that of either infection alone with a faster rate of progression to liver cirrhosis and hepatocellular carcinoma (HCC). Co-infected individuals have a reduction of HBV surface antigen (HBsAg) seroconversion, higher levels of HBV DNA and often show reactivation of HBV replication despite previous HBsAg seroconversion (Buseri *et al.,* 2010). Since HIV and hepatitis B virus (HBV) share common routes of transmission, the prevalence of hepatitis B markers (Anti hepatitis B core antibodies (anti-HBcAb) or hepatitis B surface antigen (HBsAg) in HIV-infected patients is remarkably high. Around the world, 90% of HIV-infected persons have biological signs of prior HBV infection (defined by the presence of serum anti HBcAb) and 5%–15% suffer from chronic infection (defined by the presence of serum HBsAg). As a consequence, 2–4 million of the 33 million people living with HIV globally are also co-infected with chronic hepatitis B. Modes of transmission can be characterized by the geographical origin of infected patients. The main consequence is a prevalence of co-infection of between 5% and 10%, 10 times higher than that of the general population (Lacombe *et al.,* 2010).

In contrast, in Africa and Asia, where HBV endemicity is high (8% and often approaching 15% HBsAg-positive), most HBV infections occur within the first 5 years of life through perinatal transmission (Asia) or close contact within households and medical or cultural procedures, such as scarification and tattoos (Africa). In these settings, the prevalence of HBV infection is often close to 15%, regardless of HIV co-infection (Lacombe *et al.,* 2010).

The population prevalence of HIV/HBV co-infection in Nigeria is thought to reflect the population prevalence of hepatitis B surface antigen (HBsAg). Several studies in Nigerian children have recorded prevalence rates of HBsAg ranging from 7.5% to 44.7%, varying from one locale to another. The prevalence of HBsAg among children in Benin City was 10.8%. It is therefore expected that the prevalence of HIV/HBV co-infection will vary from

locale to locale. Therefore, the objective of the present study is to determine the prevalence of HBV among HIV patients attending HIV clinic in Sokoto state specialist hospital, with a view to establish the prevalence rate in the state

**Materials and Methods**

This study was carried out at the pathology department of Sokoto specialist hospital, Sokoto, Nigeria. The hospital is one the largest referral hospital in Sokoto. The study was conducted with the approval of the hospital ethical committee, during June - July 2012. Patients attending the clinic were screened for HIV based on clinical subsection after pretest counseling and achieving the informed consent as a routine checkup. The laboratory follows the world health organization (WHO) diagnostic strategies for HIV testing. Only the positive serum samples were included in this study and were anonymously tested for HBsAg, HBeAg anti-HBc, anti-HBe, and anti-HBs.

**Viral diagnosis**

The serum samples which were found to be HIV positive according to WHO testing strategies were coded and stored at $-4^0$C until analyzed. HBsAg test was carried out by immune-chromatography assay (Diaspot Blumbe, USA). The HbsAg seropositivity was confirmed by ELISA (Biorex, Anstrim, UK). All HbsAg positive samples were further analyzed to detect HBV serological makers (Anti-Hbs, HbeAg, Anti-Hbe, Anti-Hbc) using. CD4 counts of patients was also determine using BDFACS CD4 counting machine.

**Questionnaire**

Questionnaire was used for the retrospective study to obtained data on both Socio-Demographical characteristic and risk factor. Socio-Demographic characteristic include age, marital status and sex while risk factor include unprotected sex, multiple blood transfusion, scarification mark and IV drug abuse.

**Statistical analysis**

Data was analyzed by using statistical software R version 2.13.1. Chi-square test was use to compare the prevalence of Hepatitis B virus and risk factor for the infection and $P<0.05$ was considered as significant.

**Results**

A total of 140 sera were collected from HIV infected individuals attending Sokoto Specialist hospital, Sokoto, Nigeria. Questionnaires were administered to each subject to obtain information used to assess the demographic and risk factors associated with the infection. Hepatitis B surface Antigen (HBsAg) was detected with a prevalence of 13.6% (19/140) among HIV infected patients. Two of the 140 patients were in the chronic stage of the infection giving a prevalence of 1.43% and two of the patients were at the acute stage of the infection (having both HBsAg and IgM-HBc in the serum) with a percentage prevalence of 1.43%, while the remaining fifteen patients were in the active stage of the infection. HIV infected patients in the age group 16-30 years recorded the highest prevalence 17.6% (9/51) while those in age group 31-45 years recorded the lowest prevalence of 7.8% (5/65). HIV infected single individual recorded the highest prevalence of 19.0% (4/21) and there was 0% (0/5) prevalence among divorced HIV patients. The highest prevalence was recorded for female gender (14.8%; 13/88) as against male with prevalence of (11.5%; 6/52). The highest prevalence was recorded for those in clinical stage 3 (20%) (2/10) and the lowest prevalence was seen with those in clinical 4 (7.4%) (2/27). The distribution of HBV markers in the

HBsAg reactive HIV patients was analysed and the result indicates that 10.5% of the patients have developed hepatitis B envelop antigen, while 89.5% do not have the envelop antigen. Also 10.5% of the patients have developed hepatitis B core antibody, while 89.5% do not have the core antibody. This study also shows that no single patient have developed either hepatitis B envelop antibody or hepatitis B surface antibody. Although the difference observed in the prevalence of HBsAg in patients undergone blood transfusion and those who were not, was not statistically significant, patients who had been transfused were 1.1 times likely to be infected with HBsAg than those who were not. The patients with tribal marks recorded the highest prevalence of 16.7% (9/54) while those without tribal marks recorded the lowest prevalence of 11.6% (10/86). In this study only 6 out of 140 patients were exonerated with intravenous drug abuse and none of them were reactive to HbsAg, while 14.2% (19/140) of the remaining 134 patients reacted to the antigen. The mean CD4 counts of HIV infected patients with single infection was found to be 428cells/µl of blood in only HIV patients and CD4 count of 391cells//µl among the HIV and HBsAg coinfected patients.

**Table: The distribution HBV among HIV patients base on socio-demographic characteristics**

| Social characteristic and Risk factors | Total number of HIV patients (n=140) | Number of HbsAg positive (%) | Number of HbsAg negative (%) | *P- Value* |
|---|---|---|---|---|
| **Age** | | | | |
| 1-15 | 6 | 1(16.7) | 5(83.3) | |
| 16-30 | 51 | 9(17.6) | 42(82.4) | 0.280 |
| 31-45 | 65 | 5(7.7) | 60(92.3) | |
| >45 | 18 | 4(22.2) | 14(77.8) | |
| **Sex** | | | | |
| Male | 52 | 6(11.5) | 46(88.5) | 0.776 |
| Female | 88 | 13(14.8) | 75(85.2) | |
| **Marital status** | | | | |
| Single | 21 | 4(19.0) | 17(81.0) | |
| Married | 87 | 12(13.8) | 75(86.2) | 0.476 |
| Divorced | 5 | 0(0.0) | 5(100) | |
| Widowed | 19 | 1(5.3) | 18(94.7) | |
| **Clinical stage** | | | | |
| Stage 1 | 71 | 11(15.5) | 60(84.5) | |
| Stage 2 | 32 | 4(12.5) | 28(87.5) | 0.748 |
| Stage 3 | 10 | 2(20) | 8(80) | |
| Stage 4 | 27 | 2(7.4) | 25(92.6) | |
| **Blood transfusion** | | | | |
| Yes | 20 | 3(15) | 17(85) | 0.880 |
| NO | 120 | 16(13.3) | 104(86.7) | |
| **Tribal Marks** | | | | |

| | | | | |
|---|---|---|---|---|
| Yes | 54 | 9(16.7) | 45(83.3) | 0.553 |
| No | 86 | 10(11.6) | 76(88.4) | |
| **I.V. Drug Abuse** | | | | |
| Yes | 6 | 0(0.0) | 6(100) | 0.702 |
| No | 134 | 19(14.2) | 115(85.8) | |
| **Serological marker for HBV** | | | | |
| Anti-Hbs | 0(0.0) | 19(100) | 19 | |
| HbeAg | 0(0.0) | 19(100) | 19 | 0.341 |
| Anti-Hbe | 2(10.5) | 17(89.5) | 19 | |
| Anti-Hbc | 2(10.5) | 17(89.5) | 19 | |

**Discussion**

Prevalence of hepatitis B virus infection among HIV patients attending HIV clinic in Sokoto specialist Hospital, Sokoto state, Nigeria was carried out between June and July, 2012 in this study. Out of the 140 HIV patients used in this study, the number of female (88) outweighs the number of male (52). This gender inequality in presentation for therapy is consistent with the sex distribution documented in the majority of treatment centres particularly in the first decade of antiretroviral therapy. A potential explanation for more females in the centre used for this study is that women present for care after positive HIV test on their sick children, death of their husband, or perhaps they are more sensitive to changes in their health and may be socially conditioned to seek and receive assistance for their sickness. This, however, does not translate to more women are infected with HIV in the population as study in some part of Nigeria which found more men were afflicted with HIV/AIDS than women (Otegbayo *et al.,* 2008). It is well known that HIV/HBV co-infection is linked most often to sexual intercourse (both heterosexual and men who have sex with men (MSM). The co-infection prevalence of 13.6% for HIV and HBV is a clear indication due to the fact that HBV is a major threat to HIV/AIDS patients in Nigeria, as reported in other parts of the world. The HBV co-infection rate in this study is higher than the prevalence of 11.9% documented in southwestern part of Nigeria (Otegbayo*et al.,* 2008), also higher than the 9.7% reported in healthy urban population Northern region, but lower than the 25.9% reported in HIV positive in Northern region of this country (Uneke *et al.,* 2005). The factors driving these regional differences are unclear. The highest prevalence of HBV was found in female for this study. This finding is in contrast with higher prevalence in male, which observed that a high proportion of HBV infections in sub-Saharan Africa are acquired vertically or horizontally (from family members and other children) before the age of 5 years (Alter, 2003). Since boys have a predilection for aggressive sports and plays that may result in injury with bleeding, they may be more predisposed to horizontal HBV transmission. Further, societal acceptance of multiple sexual partners for men may contribute to the higher HBV prevalence among HIV-infected men (Zoulim *et al.,* 2006). In this study, Pearson chi-square analysis showed no statistically significant difference in the distribution of HIV infection among the various age groups (P=0.280). However, HBsAg seropositivity was highest (22.2%) among the HIV patients aged >45years, and lowest (7.7%) in those aged between 31

and 45 years. This finding is in contrast to the finding of Olokoba *et al.* (2011) who reported that women between the ages 25-29 years having a greater prevalence rate. This may be associated with higher sexual activities within these age groups. In all epidemiological studies, younger age has always proved to be the most important factor, which contrasted with this study, which pinpointed that old age was more prevalent. The age of acquiring the infection is the major determinant of the incidence and prevalence rates. Since HIV prevalence among young pregnant women (15-24 years) is used as a proxy for measuring rates of new infections in a population, (FMOH, 2009) therefore, the findings in this study suggest an increasing new rate of infection. This is in agreement with the Nigeria national HIV prevalence trend among pregnant women, whom the average prevalent rate was 4.4% in 2005 and 4.6% in 2008 (FMOH, 2009). In relation to history of blood transfusion, HIV patients that had been transfused were more HBsAg seropositive (15.0%), as against the 13.3% seropositive HIV patients who have not been transfused. This may be due to transfusion of improperly screened blood, or seroconversion after blood transfusion. This is in contrast to Buseri *et al.* (2010) that found a high number of seropositive women among those that have not been exposed to blood transfusion, but there is not statistical significance difference as shown in Table 4.6. Since HBV is transmitted mainly through body fluids, unprotected heterosexual relationship with an infected partner or vertical transmission was a more culpable risk factor. But this study disagrees with Adewole *et al.* (2009) that identified blood transfusion as a major risk factor for co-infection with these viruses. In relation to tribal marks, HIV patients who had tribal mark and scarification recorded the highest HBsAg positive 16.7% while those without tribal mark and scarification recorded the lowest positive of 11.6%. This was in agreement with Adewole *et al.* (2009) that identified presence of tribal mark and scarification as a major risk factor for co-infection with HBV/HIV. The result of this finding was in contrast with the finding of Buseri *et al* (2010) which postulated that unprotected heterosexual relationship with an infected partner or vertical transmission was a more culpable risk factor of transmission of the infections. In relation to marital status, HBV seropositivity was higher among the HIV patients who are single (19.0%) as compared to the married (13.8%). But, there is no statistical significance difference between the marital statuses. This may imply that marital status is not really a risk factor for HBV infection but an indicator to consider the sexual partner as a risk factor for the infection, since unmarried people may tend to have many sexual partner or unprotected sex. Also positive HBsAg, among the infected married patients (13.8%) indicating that the infection might be through unprotected heterosexual intercourse or close contact with their infected partners as the virus can be spread through body fluids (Willey *et al*., 2011). The distribution of HBV markers in the HBsAg reactive HIV patients indicates that 10.5% of the HIV patients have developed the anti-HBe indicating clearance of the infection as anti-HBe replaces HBeAg as the chronic HBV infection is resolving (Brooks *et al.*, 2009). Anti HBe generally persists for a lifetime in over 80% of patients and indicates immunity (WHO, 2012). Also, Anti HBc IgM is found to be 10.5%, the detection of this antibody in a blood is a clear indication that the body mount an immune response to the virus which accompanied by the development of jaundice and acute hepatitis B. The hepatitis B core antibody of IgM class (anti – HBc IgM) signifies and is diagnostic of acute HBV infection (Highleyman, 2009). It is only marker that distinguishes between acute and chronic infection. However, it cannot persist for life (Highleyman, 2009).

However, 78.9% do not have the antibody indicating active infection. Presence of HBsAg without any antibodies is an indicator of an active hepatitis B infection. This antigen may be present before symptoms of an HBV infection are present. If this antigen level remains high for more than 6 months, the patient probably becomes a carrier of HBV, meaning patient can transmit it to others throughout the life. The mean CD4 count in HIV patient in this study was calculated to be 448.6 cells/ l of blood, and those with both HIV and HBV were (409.7cell/µl). This count is higher than the 179cells/ul obtained in the study by Omonkhelin *et al.* (2010). However, this implies that most of the HIV patients should receive HBV vaccine. This is to maximize the effectiveness of the vaccine which also should be provided early (before the CD4 cell count declines to <350 cells/µL); however, for persons with advanced immunosuppression, vaccination should also not be delayed while awaiting an increase in the CD4 cell count following antiretroviral therapy (Peters and Marston, 2012). The mean CD4 count among the HIV and HBV coinfected was calculated to be 409.7 cells/µl of blood. There was statistical significant relationship between the mean CD4 count in the HIV monoinfected patients and the mean CD4 count in the HIV and HBV coinfected individuals (t = 22.0643, df = 1, p-value = 0.02883, 95 percent confidence interval: 182.0143 676.2857, mean = 429.15). The most prevalent CD4 count in this study was 508 cells/µl of blood which is higher than the 100-150 cells/µl obtained by Omonkhelin *et al* (2010).

**Conclusion**

A prevalence of 13.6% was found among HIV patients attending Sokoto specialist hospital were seropositive for hepatitis B virus. We can concluded that the high prevalence obtained in this research may probably be a pointer to the fact that HBV infection is the major threat to the HIV infected patients as a result increase hepatotoxicity after initiation of antiretroviral therapy. Therefore, HIV infected patients should be screened for as well as vaccinated against HBV infection prior to the initiation of antiretroviral therapy.

**References**


Adewole, O.O., Anteyi, E., Ajuwon, Z., Wada, I., Elegba, F., Ahmed, P., Betiku, Y., Okpe, A., Eze, S., Ogbeche, T. and Erhabor, G.E.(2009). Hepatitis B and C virus co-infection in Nigerian patients with HIV infection.*Journal of Infectious Diseases in Developing Countries*, 3:369-375.

Ahmedin, J.; Taylor, M.; Ram, C.T.; Asma, G.; Alicia, S.; Elizabeth, W.; Eric, J.F.; Michael, J.T. (2004). A New Section in Cancer Offering Timely And Targeted information, A Cancer Journal for Clinicians; 54 (8) Doi: 10.33222/canjclin .54.1.8 © American Cancer Society.

Alter, M. (2003). Epidemiology and prevention of Hepatitis B. *Seminars in Liver Disease.*23: 39-46.

Buseri, F.I., Seiyaboh, E. and Jeremiah, Z.A. (2010).Surveying infections among pregnant women in the Niger Delta, Nigeria.*Journal of Global Infectious Diseases*, 2:203-211.

Brooks, G.F., Carrol, K.C., Butel, J.S., Morse, S.A. and Mietziner, T.A. (2009).*Jawetz, Melnick and Adelbergs, Medical Microbiology*. U.S.A: McGraw Hill Companies Inc. pp 472-487, 609-622.

Federal Ministry of Health, Nigeria (2009). Report on the 2008 National HIV seroprevalence sentinel survey among pregnant women attending antenatal clinics in Nigeria. 2009.

Highleyman, L. (2009). Effect of HIV Immunosuppression on response to Hepatitis B and HBV evolution. Paper presented during the16th conference on Retroviruses and opportunistic infections. CROI 2009.

Lacombe K., Bottero J., Lemoine M., Boyd A. and P. M. Girard (2010). HIV/hepatitis B virus co-infection: current challenges and new strategies. Journal of Antimicrobial Chemotheraphy; 65: 10–17.

Lee W.M. (1997). Hepatitis B virus infections.*N England Journal of Medicine*; 337:1733-45.

Mendes-Correa M.C, Barone A.A, Cavalheiro N.P, Tengan F.M, Guastini C (2000) Prevalence of hepatitis B and C in the sera of patients with HIV infection in São Paulo, Brazil. Rev Inst Med trop S Paulo 42: 81-85.

Olokoba, A.B., Salawu, F.K., Danburam, A., Olokoba, L.B., Midala, J.K., Badung, L.H., and Olatinwo, A. (2011). Hepatitis B virus infection amongst pregnant women in North-Eastern Nigeria- A call for action. *Nigerian Journal of Clinical Practise*,14:10-13.

Omonkhelin, J., and Owolabi, E.A.G. (2010).A review of viral hepatitis in HIV positive patients using UBTH as a case study.*African Journal of Health Sciences*, 17: 3-4.

Otegbayo, J.A., Taiwo, B.O., Akingbola, T.S., Odaibo, G.N., Adedapo, K.S., Penugonda, S., Adewole, I.F., Olaleye, D.O., Murphy, R. and Kanki, P. (2008). Prevalence of hepatitis B and C seropositivity in a Nigerian cohort of HIV-infected patients.*Annals of Hepatology*, 7:152-156.

Peters, P.J. and Marston, B.J. (2012). Preventing Deaths in Persons With HIV/Hepatitis B Virus Coinfection: A Call to Accelerate Prevention and Treatment Efforts- Editorial. *Journal of Infectious Diseases*,15:1.

Redmond, W.A. (2007). *Liver* Microsoft Student [DVD] Microsoft Corporation.

Thio C.L. (2003). Hepatitis B in the human immunodeficiency virusinfected patient: epidemiology, natural history, and treatment. Semin Liver Dis; 23:125-36.

UNAIDS (2008) Report on Global AIDS epidemic.http://www.unaids.org/en/ Knowledge Centre/HIV Data/GlobalReport/2008.Accessed March 20, 2009.

Uneke, C.J. Ogbu, O. and Inyama, P.U. (2005). Prevalence of hepatitis B surface antigen among blood donors and human immunodeficiency virus-infected patients in Jos, Nigeria.*Mem. Inst. Oswaldo Cruz*, 13:6.

Willey, J.M., Sherwood, L.M., and Woolverton, C.J. (2011).*Prescotts Microbiology*.(8th edition). McGraw hills international edition publishings. U.S.A. 919-920.

WHO Report (1996) Fighting disease, fostering development. Geneva: World Health Organization.

World Health Organization (2012). Hepatitis B: Global alert and Response.www.who.int.14-03-2012.

Zoulim, F. (2006).New nucleic acid diagnostic tests in viral hepatitis.*Seminars in Liver Disease*, 26:309-311.