Research Article **ISSN: 2349 – 4492**

Asian Journal of Research in Biological and Pharmaceutical Sciences

Journal home page: www.ajrbps.com

PREVALENCE OF HUMAN IMMUNODEFICIENCY VIRUS AND HEPATITIS B VIRUS CO-INFECTION AMONG PATIENTS ATTENDING UMARU SHEHU ULTRA-MODERNHOSPITAL, MAIDUGURI, NIGERIA

H. K. Mangga[*1], N. Benson[1], M. A. Isa[1], T. Ibrahim[2]

[1*]Department of Microbiology, University of Maiduguri, Maiduguri, Borno State, Nigeria.
[2]Department of Microbiology, Nasarawa State University, Keffi, Nasarawa State, Nigeria.

ABSTRACT

Human immunodeficiency virus (HIV) and Hepatitis B virus (HBV) co-infection are associated with high morbidity and mortality around the globe. Co-infection is a state in which an individual is infected with both HIV and HBV. This study was aimed to determine the prevalence of HBV and HIV co-infection among patients attending Umaru Shehu Ultra-Modern Hospital Maiduguri, Nigeria using an immunochromatographic test. Out of hundred patients tested, only 14 (14.0%) were positive. The distribution of the HBV and HIV co-infection based on gender showed that the male had a high prevalence of 7 (20.5%) as compared to their female counterpart 7 (10.6%). Age group between 51-60years had the highest prevalence of 1 (25.0%) as compared to other age groups. Also, patients with tribal marks had the highest prevalence of 11 (23.0%) as compared to those without tribal marks 3 (5.60%), with a strong correlation between the tribal marks and the prevalence of HBV and HIV co-infection (P-Value= 0.013). Therefore, there is a need to screen and vaccine, HIV patients for HBV prior to the commencement of antiretroviral therapy.

KEYWORDS

Seroprevalence, HIV, Hepatitis B Virus and Co-infection.

Author for Correspondence:

Mangga H K,
Department of Microbiology,
University of Maiduguri,
Maiduguri, Borno State, Nigeria.

Email: mangga4ever@gmail.com

INTRODUCTON

Human immunodeficiency virus (HIV) belongs to the genus *Lentivirinae* of the family *Retroviridae*. It contains ribonucleic acid (RNA) as its nucleic acid and a unique enzyme called reverse transcriptase that transcribes the viral RNA into DNA, a necessary step in the virus's lifecycle (Collier and Oxford, 2006)[1]. This virus causes Acquired Immunodeficiency Syndrome (AIDS), a condition in humans in which the immune system begins to

fail, leading to life-threatening opportunistic infections. Infection with this virus results in the progressive deterioration of the immune system, leading to 'immune deficiency (Aliyu *et al.,* 2013)[2]. World Health Organization (WHO) estimated approximately 36.7 million people living with HIV worldwide, African Region is the most affected area, with 25.6 million people living with HIV in 2016 (WHO, 2017)[3]. The Hepatitis B virus is a partially double-stranded circular DNA virus and is a member of the *Hepadnaviridae family* and genus *Orthohepadna virus* (Isa *et al.,* 2015[4]; Isa *et al.,* 2013)[5]. The virus particle consists of an outer lipid envelope and icosahedra nucleocapsid core that composed of protein (Bello *et al.,* 2013[6]; Isa *et al.,* 2014)[7]. The core of the virus contains circular partially double-stranded DNA; a DNA- dependent polymerase enzyme; and two proteins, the hepatitis B core antigen (HBcAg) and the hepatitis B e antigen (HBeAg). The outer envelope of the virus contains a protein called the hepatitis B surface antigen (HBsAg) (Ganem and Prince, 2004)[8]. This virus causes a potentially life threatening liver infection, which leads to chronic liver disease such as cirrhosis and hepatocellular carcinoma. An estimated 257 million people are chronically infected with HBV (defined as hepatitis B surface antigen positive for at least 6 months), with the majority of cases occurring in regions of Asia and Africa where the virus is endemic (WHO, 2017)[9].

The incidence rate of co-infection is increasing; an estimated 3 to 6 million people living with HIV are co-infected with chronic HBV (Kourtis *et al.,* 2012)[10]. The common methods of transmission of these two viruses are through intimate sexual contact; contact with blood or other body fluid (Stevens, 2010)[11]. HIV attack CD4 positive T cells causes suppression of both cell-mediated and humoral immune responses, therefore HIV- HBV coinfection increases morbidity and mortality. Also HIV-HBV coinfected people have a high risk of developing cirrhosis and hepatocellular carcinoma (Askari *et al.,* 2014)[12]. Therefore the aim of this study was determined the prevalence of human immunodeficiency virus and hepatitis B co-infection among HIV patients.

MATERIAL AND METHODS

Study Area

The study was carried out at Umaru Shehu Ultra-Modern Hospital Maiduguri, Borno State. Borno State is situated in the Northeastern part of Nigeria, which lies between latitude 10^0 N and 13^0 E. It shares boundaries with the Republic of Niger to the North, Chad to the North-East and Cameroon to the East. Within the country, it shares boundaries with Adamawa to the South, Yobe to the West and Gombe to the South-West. Borno state has an area of 69, 435 square kilometers about 7.69% of the total land area of the country. The 2006 census figure has the population of 4,151,193 with a population density of approximately 60 inhabitants per square to meter (NPC, 2006[13]; Isa *et al.,* 2015)[14].

Ethical Approval

Ethical approval to undertake this study was obtained from the ethical committee of the Umaru Shehu Ultra-Modern Hospital Maiduguri.

Study Population

The study was carried out among HIV patients between the aged 10 and 60years attending Umaru Shehu Ultra-Modern Hospital Maiduguri.

Questionnaire Administration

Structured questionnaires were administered to consenting HIV patients to obtain information on the age, gender, history of blood transfusion, tribal mark and educational background prior to sample collection.

Sample Collections

Three milliliters (3ml) of whole blood were collected through veinpuncture and transfer into sterile plain bottles and the blood was allowed to clot. The blood was then centrifuged at 1500 rpm for 5 minutes to obtain the serum. The sera was carefully aspirated with a sterile pipette tips into a labeled plain container and stored at -20^0C until tested.

Statistical analysis

The data obtained from questionnaires and laboratory analysis was analyzed using Statistical Package for Social Sciences version 20. Pearson Chi-square was calculated at 95% confidence interval and p-value < 0.05 was considered significant to determine the association between the presence of the antibodies to the virus and other

parameters such age, educational status, history of blood transfusion and presence of tribal mark.

RESULTS

The results of the prevalence of co-infection between HBV and HIV among patients attending Umaru Shehu Ultra-Modern Hospital Maiduguri, revealed that, out of the 100 patients tested only 14 (14.0%) were positive. Also, the distribution of the HBV among the HIV-infected patients based on gender showed that male had the highest prevalence of 7 (20.5%) as compared to their female counterpart 7 (10.6%), although the difference is not statistically significant (P- Value = 0.762) as shown in Table No.1.

The distribution of HBV among HIV-infected patients attending Umaru Shehu Ultra-Modern Hospital Maiduguri based on age showed that high prevalence of 4 (25.0%) was recorded among the age group of 51-60years, followed by 21-30years 5 (16.7%), 31-40years 3 (15.0%) and 31-40years 5 (12.0%). However, no statistical significant difference observed between the age and the prevalence of the co-infections (P- Value=P=0.844) as shown in Table No.2.

The prevalence of the co-infection between HIV and HBV based on educational status revealed that high prevalence of 3 (16.6%) was recorded among those attained primary school education, followed by non-formal education 8 (14.8%). However, no statistical significant difference observed between the educational status and the prevalence of the co-infections (P- Value=P=0.735) as shown in Table No.3.

The distribution of HBV and HIV co-infection based on history of blood transfusion revealed that high prevalence of 13 (14.4%) was found among those had no history of blood transfusion as compared to a patients with history of blood transfusion 1 (10.0%), although, no statistically significant difference observed (P- Value=P=0.997) as shown in Table No.4.

Also, the prevalence of the co-infection with relation to the presence of tribal marks of the studied patients were observed and presented in Table No.5. High prevalence of 11 (23.0%) were found among those with tribal marks as compared to those without tribal marks 3 (5.60%), with a high statistical significant difference (P-Value= 0.013). Therefore, a tribal mark is considered as risk factors for the co-infection based on the result of this study.

DISCUSSION

The prevalence of HBV among HIV-infected patients among patients attending Umaru Shehu Ultra-Modern Hospital Maiduguri, Nigeria was carried out with the aim of establishing the prevalence rate in the studied area. One hundred HIV positive patients were used in this study after they were advised on the need to know their status. Among the patients 66 (66.0) were female while the remaining 34 (34.0%) were male. This number of gender inequality agreed with most of the studies, where number of female with HIV attending treatment centre outweigh their male counterpart (Aliyu *et al.,* 2015)[15]. However, this does not translate that female were incriminated with high prevalence of the infection, but most women visit heath care centre, after positive HIV test on their sick children, the 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 (Aliyu *et al.,* 2015)[15]. The results of the study showed that the prevalence of HBV among HIV-infected patients was 14.0%. This result is slightly higher than the prevalence rate of 13.6% reported by Aliyu *et al.* (2015)[15] among HIV patients attending HIV clinic in Sokoto specialist Hospital, Sokoto state, Nigeria. The prevalence of 14.0% reported in this study is also higher than 11.9% documented in Southwestern part of Nigeria (Otegbayo *et al.,* 2008)[16], 8.0% among healthy student attending University of Maiduguri Clinic, Borno State, Nigeria (Isa *et al.,* 2015)[17]. However, it is lower than the prevalence of 25.9% among HIV patients in some part of the Northern region of the country (Uneke *et al.,* 2005)[18]. The prevalence rate in relation to gender showed that male had the highest prevalence rate of 7(20.5%) as compared to their female counterpart 7(10.6%). This result disagreed with the finding of Aliyu *et al.* (2015)[15], which reported a high prevalence rate among female, as compared to their male counterpart. However, the findings of this study is not surprising since male involved in many mechanical activities, which is vulnerable to injury

with bleeding that may result in horizontal transmission. In addition male had multiple sexual partner, especially in the studied area which may contribute to the infection, although the difference is not statistically significant (P- Value = 0.762) as shown in Table No.1. Therefore, based on the result of this study gender was not considered as a risk factor for the development of the co-infection. In relation to age high prevalence of 4(25.0%) was recorded among the age group of 51-60years, while those between 31-40years had the least prevalence rate of 5 (12.0%). These findings agreed with the report of Aliyu *et al.* (2015)[15] which showed that high prevalence of HBV among HIV-infected patient in the age group >45years, although, the result of this study disagrees with findings of Olokoba *et al.* (2011)[19] who reported that women between the ages 25-29 years had a greater prevalence rate. However, in most of the prevalence studies of HBV among HIV-infected patient, younger age are always reported to be vulnerable, due to being sexual active group. However, no statistical significant difference was observed between the different age groups and the prevalence of the co-infection (P- Value=P=0.844) as shown in Table No.2. In relation to history of blood transfusion, HIV patients that have no any history of blood transfusion found to have high prevalence rates as compared to those with a history of blood transfusion. This finding agrees with the report of Buseri *et al.* (2010)[20] who found a high number of seropositive women among those that have not been exposed to blood transfusion. But disagrees with the findings of Aliyu *et al.* (2015)[15] and Adewole *et al.* (2009)[21], both identified blood transfusion as a major risk factor for co-infection with these viruses, although, no statistically significant difference observed (P-Value = P=0.997) as shown in Table No.4. In relation to tribal mark, high prevalence rate of 11(23.0%) was recorded among HIV patients with tribal mark. This finding agrees with the report of Aliyu *et al.* (2015)[15], who reported high prevalence of HBV among HIV patients with tribal mark. It also agrees with Adewole *et al.* (2009)[21] who identified the presence of tribal mark and scarification as a major risk factor for co-infection with HBV/HIV. High statistical significant difference (P-Value= 0.013) was observed between tribal mark and the prevalence of the co-infection. Therefore, a tribal mark is considered as risk factors for the co-infection based on the result of this study.

Table No.1: Seroprevalence of HIV and Hepatitis B Co-infection based on Gender

S.No	Gender	No. Tested	No. Positive	Positive %
1	Male	34	7	20.5
2	Female	66	7	10.6
3	Total	100	14	14.0

P- Value =0.762

Table No.2: Seroprevalence of HIV and Hepatitis B Co-infection based on Age

S.No	Age	No. Tested	Positive	Positive %
1	10-20	4	0	0.0
2	21-30	30	5	16.7
3	31-40	42	5	12.0
4	41-50	20	3	15.0
5	51-60	4	1	25.0
6	Total	100	14	14.0

P- Value = P=0.844

Table No.3: Seroprevalence of HIV and Hepatitis B Co-infection based on Educational status

S.No	Educational status	No. Tested	No. Positive	Positive %
1	Primary	18	3	16.6
2	Secondary	21	3	14.2
3	Tertiary	7	0	0.0
4	Non-formal	54	8	14.8
5	Total	100	14	14.0

P- Value = P=0.735

Table No.4: Seroprevalence of HIV and Hepatitis B Co-infection based on Blood Transfusion

S.No	Blood transfusion	No. Tested	No. Positive	Positive %
1	Yes	10	1	10.0
2	No	90	13	14.4
3	Total	100	14	14.0

P- Value = P=0.997

Table No.5: Seroprevalence of HIV and Hepatitis B Co-infection Based On Tribal Mark

S.No	Tribal mark	No. Tested	No. Positive	Positive %
1	Yes	46	11	23.0
2	No	54	3	5.60
3	Total	100	14	14.0

P-Value= 0.013

CONCLUSION

The finding of this study revealed the prevalence of HBV among HIV-infected patients attending Umaru Shehu Ultra-Modern Hospital Maiduguri, Nigeria. A total of hundred blood samples was analyzed, only 14 (14.0%) were positive for HIV and HBV co-infection. The distribution of the co-infection based on gender, age, educational status, history of blood transfusion and tribal marks were also considered to be possible risk factors in this study, although, only tribal marks had a strong association with the prevalence of HBV and HIV co-infection (P-Value= 0.013) and thus considered as a risk factor in this study. Therefore, there is a need to screen HIV patients for HBV prior to the commencement of antiretroviral therapy.

ACKWOLEDGEMENT

The authors wish to express their sincere gratitude to Department of Microbiology, University of Maiduguri, Maiduguri, Borno State, Nigeria for providing necessary facilities to carry out this research work.

CONFLICT OF INTEREST

We declare that we have no conflict of interest.

BIBLIOGRAPHY

1. Collier L and Oxford J. Human Virology, *New York, Oxford University Press,* 3rd Edition, 2006, 179-188.
2. Aliyu B, Manga B and Isa M A. Prevalence of Hepatitis B Virus Among HIV Positive Patients Attending Specialist Hospital Sokoto, Nigeria, *International Journal of Environment*, 2(1), 2013, 37-44.
3. HIV/AIDS, *World Health Organization,* 2017.
4. Isa M A, Bello H S, Mustapha A, Mangga H K, Gulani I A and Aisha M A. Prevalence of hepatitis B Virus among students attending University of Maiduguri clinic, Borno, Nigeria, *Int. J. Adv. Res. Biol.Sci*., 2(1), 2015, 138-142.
5. Isa M A, Bello H S, Shettima A and Allamin I A. Prevalence of serological marker for chronic hepatitis b virus among patients attending Sokoto specialist hospital, Sokoto, Nigeria, *Journal of Microbiology and Biotechnology Research*, 3(3), 2013, 122-125.
6. Bello H S, Isa M A, Shettima A and Allamin I A. Prevalence of serological markers for

acute hepatitis B virus among patients attending Sokoto specialist hospital, Sokoto, Nigeria, *Journal of Microbiology and Biotechnology Research*, 3(3), 2013, 132-135.

7. Isa M A, Bello H S, Aliyu B and Mangga H K. Seroprevalence of Hepatitis B Surface Antigenaemia among PatientsAttending Sokoto Specialist Hospital, Sokoto State, Nigeria, *The Journal of Applied Sciences Research*. 1(3), 2014, 242-249.
8. Ganem D, Prince A M. Hepatitis B virus infection--natural history and clinical consequences, *N Engl J Med,* 350(11), 2004, 1118-29.
9. Hepatiris B. *World Health Organization,* 2017.
10. Kourtis A P, Bulterys M, Hu D J and Jamieson D J. HIV–HBV coinfection-A global challenge, *New England Journal of Medicine*, 366(19), 2012, 1749-1752.
11. Stevens C D. Clinical Immunology and Serology A laboratory Perspectives, *F.A Davis Company Philadelphia,* 3rd Edition, 2010, 383-387.
12. Askari A, Hakimi H, Ahmadabadi B N, Hassanshahi G and Arababadi M K. Prevalence of Hepatitis B Co-Infection among HIV Positive Patients: Narrative Review Article, *Iranian journal of public health*, 43(6), 2014, 705.
13. Abuja. National Population Commission, Nigeria. (2006). Report of the final national census results, *Population and Development Review,* 33(1), 2007, 206-210.
14. Isa M A, Bello H S, Gulani I A, Aliyu B, Aisha M A and Iliya H. Prevalence of hepatitis B virus infection among children attending Mohammed Shuwa Memorial Hospital, Maidaguri, Borno State, Nigeria, *Int J Adv Res Bio Sci*, 2(1), 2015, 128-132.
15. Aliyu H B, Saidu L, Abdu P A and Oladele S B. Retrospective analysis of Newcastle disease diagnosed at the poultry clinic of Ahmadu Bello University, Zaria, Nigeria, *Sokoto Journal of Veterinary Sciences,* 13(3), 2015, 42-48.
16. 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. Prevalence of hepatitis B and C seropositivity in a Nigerian cohort of HIV-infected patients, *Annals of Hepatology*, 7(2), 2008, 152-156.
17. Isa M A, Bello H S, Gulani I A, Mustapha A, Mangga H K, Aisha M A and Igwebuike C. Seroprevalence of Hepatitis B virus among pregnant women attending state specialist hospital Maiduguri, *Int. J. Adv. Res. Biol.Sci*, 2(1), 2015, 133-137.
18. Uneke C J, Ogbu O and Inyama P U. Prevalence of hepatitis B surface antigen among blood donors and human immunodeficiency virus-infected patients in Jos, Nigeria, *Mem. Inst. Oswaldo Cruz*, 100(1), 2005, 13-6.
19. Olokoba A B, Salawu F K, Danburam A, Olokoba L B, Midala J K, Badung L H and Olatinwo A. Hepatitis B virus infection amongst pregnant women in North-Eastern Nigeria- A call for action, *Nigerian Journal of Clinical Practise*, 14(1), 2011, 10-13.
20. Buseri F I, Seiyaboh E and Jeremiah Z A. Surveying infections among pregnant women in the Niger Delta, Nigeria, *Journal of Global Infectious Diseases*, 2(3), 2010, 203-211.
21. 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. Hepatitis B and C virus co-infection in Nigerian patients with HIV infection, *Journal of Infectious Diseases in Developing Countries*, 3(5), 2009, 369-375.

Please cite this article in press as: Mangga H K *et al*. Prevalence of human immunodeficiency virus and hepatitis B virus co-infection among patients attending umaru shehu ultra- modern hospital, Maiduguri, Nigeria, *Asian Journal of Research in Biological and Pharmaceutical Sciences,* 5(4), 2017, 164-169.