World Journal of Advanced Research and Reviews, 2020, 06(02), 227–233

World Journal of Advanced Research and Reviews

e-ISSN: 2581-9615, Cross Ref DOI: 10.30574/wjarr

Journal homepage: https://www.wjarr.com

(RESEARCH ARTICLE)

Prevalence and determinants of hepatitis B virus infection among human immunodeficiency virus patients at a tertiary health care facility in Central Nigeria

Alaku Sarah, Haruna Isa Mohammed * and Pennap Grace Rinmecit

Department of Microbiology, Nasarawa State University, P.M.B. 1022, Keffi, Nigeria.

Publication history: Received on 30 April 2020; revised on 22 May 2020; accepted on 24 May 2020

Article DOI: https://doi.org/10.30574/wjarr.2020.6.2.0133

Abstract

Hepatitis B virus (HBV) co-infection with human immunodeficiency virus is a major public health problem especially in developing countries. In this study, the prevalence of HBV infection was evaluated among 400 consenting HIV patients accessing healthcare in Federal Medical Center, Keffi, Nigeria using HBsAg detection as the surrogate. Blood samples were collected and screened for HBsAg using ACON screening kit (ACON Laboratories Inc, USA). The Chi-square statistical test was performed to identify possible determining factors associated with the viral infection. Overall, 30 (7.5%) of the participants were reactive to HBsAg. The possible determining factors for acquiring the virus recorded in this study were marital status and alcoholism ($p<0.05$). Gender, age, educational status, occupation, history of blood transfusion, locality, cigarette smoking, self-manicure and pedicure, tribal marks, tattoos and history of HBV vaccination were not significantly associated with acquiring the viral infection ($p>0.05$). This finding calls for a concern because co-infection of HBV with HIV accelerates disease progression and also has an effect on the management of patients infected with HIV.

Keywords: Hepatitis B surface antigen; HIV; Co-infection; Nigeria

1. Introduction

Although hepatitis is caused by different agents such as heavy alcohol use, nonalcoholic steatohepatitis (NASH), certain medication, toxins, other infections, and autoimmune diseases. But worldwide, it is mostly caused by virus (viral hepatitis) [1].

Co-infection of HBV and HIV is commonly observed because both viruses have the same mode of transmission [2]. During co-infection, HIV significantly regulates the natural course of HBV infection. Compared with individuals that are only infected with HBV, the course of chronic HBV infection in HIV co-infected patients is more aggressive resulting in lower transaminase elevation, increased HBV DNA levels, decreased inflammatory activity and a higher prevalence of cirrhosis and hepatocellular carcinoma [3].

Hepatitis B virus is 50 – 100 times more infectious than HIV and 10 times more infectious than HCV, with many carriers not knowing they are infected with the virus and thus it is referred to as a "silent killer" [4,5].

To date, Nigeria remains one of the endemic nations of the world whose citizen's health is being challenged with HBV and HIV infections and these viral diseases cause significant morbidity and mortality [6]. Although there are several reports of HBV/HIV co-infection in Nigeria [6, 7, 8], Nevertheless, for any control research work to be successful there is need for adequate information on the epidemiology of the disease including the population at risk. Considering this context, the present study was aimed to investigate the prevalence and determinants of hepatitis b virus among human immunodeficiency virus patients at a tertiary health care facility in Central Nigeria.

* Corresponding author: Haruna Isa Mohammed

2. Materials and methods

2.1. Study area and population

The study area for this research was Federal Medical Center, located in Keffi Local Government Area of Nasarawa State, Nigeria. Keffi is approximately 68km from Abuja, the Federal Capital Territory and 128km from Lafia, the capital of Nasarawa State. It is located geographically between latitude 803'N of the equator and longitude 7050'E and situated on an altitude of 850m above sea level [9].

The study was conducted on 400 consenting HIV positive individuals accessing Antiretroviral Therapy (ART) in Federal Medical Centre, Keffi Nigeria. The socio-demographic information of the participants was obtained by the use of a designed questionnaire. The study involved both male and female adult patients accessing ART in Federal Medical Centre. Such patients are mainly from Keffi and other surrounding Local Government areas. Those within Keffi metropolis were categorized as urban while those outside Keffi metropolis and other surrounding local government areas were categorized as rural.

2.2. Sample size determination

The sample size for this study was determined using the formula by Thrusfield [10]:

$$N = \frac{(1.96)^2 \times Pexp\ (1 - pexp)}{D^2}$$

Where: N = Number of samples; Pexp = Expected prevalence of 12.3; D^2= Desired absolute precursor of 5

N = 3.84 x 0.12 x 0.88 / $(0.05)^2$; N = 0.4048 / 0.0025; N = 161.92

This was however rounded up to 400 samples.

2.3. Sample collection, processing and storage

A total of 400 blood samples were collected from patients in the ART clinic of Federal Medical Center, Keffi from May through August, 2018. About 3 ml of blood sample was collected from each consenting participant using a sterile vacuutainer as described by Cheesbrough [11].

The samples were allowed to clot at room temperature and spun for 5 min at 3000 rpm. The resultant sera were harvested into well-labeled cryovials and stored at −20 °C until use.

2.4. Laboratory analysis

2.4.1. Screening for HBsAg

Screening for HBsAg from the HIV infected patients' blood samples was done using the ACON rapid test kit (ACON, USA) in accordance with the manufacturer's instructions.

2.5. Ethical approval

Ethical clearance and approval to conduct this study was sought and obtained from the Health Research Ethics Committee of Federal Medical Centre, Keffi, Nasarawa State on 6th February, 2018.

2.6. Statistical analysis

Chi Square analysis was used to test for significance using Smith Statistical Package (SSP) version 2.8. The statistical significance was determined at 5 % probability (P ≤0.05).

3. Results and discussion

Hepatitis B virus infection among seropositive HIV patients is a growing public health problem [6]. A total of 400 HIV seropositive patients accessing ART in Federal Medical Centre, Keffi participated in the study. There was an overall HBV prevalence of 7.5% (Table1) based on the use of HBsAg as a surrogate for the viral infection. The prevalence of HBV infection in this study is lower than the earlier report of 9.7% [12] and 12.5% [6] among HIV patients in the same facility

and 11.0% among HIV positive children in Nasarawa State [13]. However, it was higher than report of 6.3% [14] among HIV children in Anambra State and 4.6% in Benin City [15]. These differences might include but not limited to different screening methods, different population and different localities with probably different risk factors. Studies from HIV populations in other countries showed varying prevalence as well. For example, it was 5.9% in Ethiopia [16], 7.0% in South Africa [17] and 3.7% in Botswana [18]. Higher prevalence compared to reports of this study has also been reported in different population. For example, it was 9.2%, among students in Zaria [19], 11.3% among Health Care Workers in Bida[20], 10.7% among patients of Niger Delta University Teaching Hospital [21] and 9.7% in a subset of young people in Central Nigeria [22].

Table 1 The prevalence of HBV infection in relation to socio-demographic factors among HIV positive patients accessing healthcare in Federal Medical Centre, Keffi, Nigeria

Socio-demographics	No. Examined	No. Positive (%)	(χ^2)	p-value
Gender				
Male	113	11(9.7)		
Female	287	19(6.6)	1.5294	0.2161
Total	**400**	**30(7.5)**		
Age(Years)				
18-27	35	1(2.9)		
28-37	132	10(7.6)		
38-47	152	15(9.9)	3.9658	0.5543
48-57	66	2(3.0)		
58-67	9	1(11.0)		
68-77	6	1(16.7)		
Total	**400**	**30(7.5)**		
Marital Status				
Single	132	18(13.6)		
Married	250	10(4.0)	6.9652	0.0306
Divorced	18	2(11.0)		
Total	**400**	**30(7.5)**		
Educational Status				
Primary	30	2(6.7)		
Secondary	180	14(7.7)	1.4559	0.4828
Tertiary	190	14(7.5)		
Total	**400**	**30(7.5)**		
Occupation				
Students	91	10(11.0)		
Farmers	150	10(6.7)		
Unemployed	120	8(6.7)	1.4301	0.8389
Artisans	21	1(4.8)		
Civil Servants	18	1(5.6)		
Total	**400**	**30(7.5)**		
Locality				
Urban	130	5(3.8)		
Rural	270	25(9.3)	0.0161	0.8990
Total	**400**	**30(7.5)**		

Table 2 The prevalence of HBV infection in relation to possible risk factors among HIV positive patients accessing healthcare in Federal Medical Centre, Keffi, Nigeria

Risk Factors	No. Examined	No. Positive (%)	(χ^2)	p-value
History of blood transfusion				
Yes	155	10(6.5)		
No	245	20(8.2)	0.1784	0.6727
Total	**400**	**30(7.5)**		
Alcoholism				
Yes	30	5(16.7)		
No	370	25(6.8)	9.4162	0.0020
Total	**400**	**30(7.5)**		
Cigarette smoking				
Yes	182	18(9.9)		
No	218	12(5.5)	0.7621	0.3826
Total	**400**	**30(7.5)**		
Self-manicure				
Yes	385	29(7.5)		
No	15	1(6.7)	3.2000	0.0735
Total	**400**	**30(7.5)**		
Self-pedicure				
Yes	390	30(7.7)		
No	10	0(0.0)	0.0000	1.0000
Total	**400**	**30(7.5)**		
Tribal mark(s)				
Yes	20	1(5.0)		
No	380	29(10.4)	0.8081	0.3686
Total	**400**	**30(7.5)**		
Tattoo				
Yes	30	1(3.3)		
No	370	29(7.8)	1.4815	0.2235
Total	**400**	**30(7.5)**		
History of HBV vaccination				
Yes	150	8(5.3)		
No	250	22(14.7)	0.4375	0.5083
Total	**400**	**30(7.5)**		

The higher rate of HBsAg seropositivity among males (9.7%) than their female counterparts (6.6%) reported in this study is similar to other Nigerian studies among adult HIV patients [23,24]. This finding contradicts that of similar studies in Nigeria where the prevalence of the viral infection was higher in females [6,20]. However, there is no obvious

explanation for the difference in prevalence with regards to gender observed in this study. However, males may be more pruned to risky behaviors that predispose them to the viral infection such as multiple sexual partners without any protection and intravenous drug usage more than females.

The distribution of HBV infection when stratified by age showed no significant association between age and the viral infection. It was highest in the age ≥58 years in this study contrary to a report where highest prevalence was observed among younger HIV patients in Ngeria [6] and in Ethiopia [25]. The highest prevalence among those ≥58 years in this study may imply that the elderly have acquired the virus through other means such as blood transfusion, alcoholism, sharing of sharp objects etc.

The viral infection in this study was higher among those that were single compared to those that were married. This is in agreement with the findings of Mohammed et al. [22] in a subset of young people in Central Nigeria. The higher prevalence rate of HBsAg recorded in this study among the unmarried and divorced participants may be due to the promiscuous lifestyle that is common among singles and divorcees.

With reference to occupation, students recorded the highest prevalence of HBsAg, followed by unemployed, farmers and artisans; the least seroprevalence was recorded among civil servants. Although there was no significant association between the viral infection and occupation of the partipants ($p>0.05$), the higher prevalence among students may be attributed to their life styles [22] which may facilitate the acquisition of both viruses (HIV and HBV).

History of blood transfusion was also not found to be associated with the viral infection in this study ($p>0.05$). Higher prevalence was observed among those with no history of blood transfusion. This outcome is in agreement with the outcome of other researchers [24,26] but contrary to that of Mohammed et al. [22]. The recorded higher prevalence in this study among patients with no history of blood transfusion may be that the patients have acquired the virus through other means such as unprotected sex and other risky behavior.

The prevalence of HBV infection in the present study was higher among those patients from rural areas. This outcome correlates with other reports in Nigeria [6,12] and in Ethiopia [27].This may be due to poor hygiene practices such as, sharing of sharp objects which are common to rural settings.

There was a significant association between alcoholism and the viral infection ($p <0.05$). It was higher among those that take alcohol. These results agree with that of Ajegena et al.[12] and Pennap et al. [6] in Nigeria but contradict that of Bezabeh et al. [25] in Ethiopia among HIV positive patients. Alcohol sometime makes one to indulge in risky behavior which might promote the transmission of HBV infection.

There was no statistically significant association between cigarette smoking and the viral acquisition ($p>0.05$). However, it was higher among those that smoke cigarette. These results agree with that of Ajegena et al. [12] and contradict that of Pennap et al.[6] in Nigeria among HIV patients.

There was no correlation between the prevalence of the infection and manicure or pedicure practices. It was however higher among those who practice self-manicure. Similar studies have also reported higher prevalence among those who practice self-manicure and self-pedicure in Brazil among HIV patients [28].

There was no association between tribal mark(s) and tattoo(s) with HBV infection in this study ($p>0.05$). The infection was higher among those with no tribal mark(s) and tattoo(s)unexpectedly because scarification mark (s) has been established to be a determining factor for HBV infection [6,12,22] which may be as the result of the use of unsterilized objects in making those body piercing. Additionally, History of HBV vaccination was also not found to be associated with seropositivity of HBV infection among HIV patients in this study. It was however higher in those with no history of HBV vaccination which agrees with the report of Pennap et al. [6]. The presence of HBsAg among those with history of vaccination may be that the virus was present before the administration of the vaccine or inconsistency in receiving the vaccine.

4. Conclusion

A 7.5% HBV prevalence among HIV patients accessing healthcare in Federal Medical Centre, Keffi was reported. This is likely to have been driven by alcohol consumption and marital status which were found to be significant determining factors. This is a problem because there is likeness for chronic HBV to advances faster to cirrhosis, end-stage liver disease and liver cancer in people with HBV/HIV co-infection.

Compliance with ethical standards

Acknowledgments

The study team would like to thank the Federal Medical Centre Keffi and the study participants who voluntarily participated in the study. However, this research did not receive any form of grant from governmental or non-governmental organizations.

Disclosure of conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Statement of ethical approval

Ethical clearance and approval to conduct this study was sought and obtained from the Health Research Ethics Committee of Federal Medical Centre, Keffi, Nasarawa State on 6th February, 2018.

Statement of informed consent

All individuals included in this study completed and signed an informed consent form. Individual anonymity was treated with confidentiality and for the purpose of this study.

References

[1] World Health Organization (WHO). (2016). What is Hepatitis?

[2] Akmal M, Zulkifle M and Arisari AH. (2015). Assessment of awareness of hepatitis B virus infection in the patients attending Nium, Bangalore, India. International Research Journal of Pharmacy, 6(3), 210-212.

[3] Sarkar J, Saha D, Bandyopadhyay B, Saha B, Kedia D, GuhaMazumder GDN, RunuChakravarty R and Kamal SG. (2016). Baseline characteristics of HIV & hepatitis B virus (HIV/HBV) co-infected patients from Kolkata, India. Indian Journal of Medical Research, 143, 636-642.

[4] Pennap GR, Yakubu A, Oyige O and Forbi J. (2010). Prevalence of hepatitis B and C virus infection among people of a local community in Keffi, Nigeria. African Journal of Microbiology Research, 4(4), 274-278.

[5] Negussie A and Beyene E. (2016). Seroprevalence of hepatitis B Surface antigen among pregnant women attending antenatal clinic in Jigjiga, East Ethiopia: A Cross-Sectional Study. International Journal of Research and Review, 3(2), 1-7.

[6] Pennap GR, Oti BV, Alaribe AG, Ajegena SA and Galleh PR. (2017). Seroprevalence of hepatitis B and C among human immunodeficiency virus infected patients in Federal Medical Center Keffi. Journal of Advances in Microbiology, 3(4), 1-6.

[7] Akyala AI, Godwin OA and Ishaleku D. (2013). Seroprevalence of hepatitis B and C co-infection among cohort seropositive HIV patients accessing healthcare in Nasarawa State North Central Nigeria. British Journal of Psychological Research, 1(1), 15-24.

[8] Djuidje MM, Cyriaque AA, Marlene TIG and Paul FM. (2017). Human immunodeficiency virus and hepatitis B virus co-infection in people living with HIV/AID identified in Yaoundé central hospital, Cameroon: Seroprevalence and impact on disease progression. Journal of AIDs and HIV Research, 9(6), 123-128.

[9] Akwa VL, Binbol NL, Samaila KL and Marcus ND. (2007). Geographical Perspective of Nasarawa State, Onaive Printing and Publishing Company Ltd, Keffi, 50.

[10] Thrusfield M. (1997). Veterinary epidemiology, Blackwell publishing, Edinburgh, 55.

[11] Cheesbrough M. (2006). District Laboratory practice in tropical countries. 2nd ed. Cambridge University press, USA, 297.

[12] Ajegena SA, Oti BV, Pennap GR and Richard M. (2017). Prevalence of Hepatitis B surface Antigen and hepatitis B virus serotypes using antigen detection and PCR methods among human immunodeficiency virus patients accessing healthcare in a Tertiary Healthcare Facility in Central Nigeria. Journal of Advances in Microbiology, 3(3), 1-10.

[13] Oti BV, Pennap GR and Ngari HR. (2017). HBsAg and anti-HCV prevalence among pregnant women accessing antenatal care in a tertiary healthcare facility in Central Nigeria, Hepatology and Pancreas Science, 2, 110-113.

[14] Okeke NN, Egbuono I, Ugochukwu EF, Ulasi TO, Okono CO, Ejofor OS and Ifezuuke CC. (2017). Seroprevelence of HBV and HIV coinfection in children in Nnewi, South East Nigeria. Pediatrics and Health Research, 2(3), 20-31.

[15] Oladeinde BH, Ejejindu IM, Omoregie R, Odia I, Aguh OB and Okwu UM. (2018). New strains of hepatits B virus genotype E circulating in Nigeria. International Journal of Health Science, 12, 6-12.

[16] Weldemhret LM, Asmelash T, Belodu R. and Gebreegziabiher D. (2016). Seroprevalence of hepatitis B virus and associated risk factor among HIV positive individuals attending ART clinic in Mekelle hospital, Tigray, Northern Ethiopia. AIDS Research and Therapy, 13(6), 1-7.

[17] Matthews PC, Beloukas A, Malik A, Carison JM, Jooste P, Ogwu A, Shapiro R, Riddell L, Chen F, Luzzi G, Jaggernath M, Jesuthasan G, Jeffrey K, Ndung'u T, Goulder PJR and Geretti AM. (2015). Prevalence and Characteristics of hepatitis B virus (HBV) coinfection among HIV positive women in South Africa and Botswana. Public Library of Sciences, 1, 1-11.

[18] Bhaumik P, Bhattacharjee P and Sil SK. (2015). Hepatitis B and hepatitis C virus co-infection among Human Immunodeficiency virus infected patients of Tripora. International Journal of Scientific Study, 3(6), 77-80.

[19] Isa I, Aminu M, Abdullahi SA, Sani MA and Esona MD. (2015). Seroprevalence of hepatitis B virus in a tertiary institution in North-Western Nigeria. African Journal of Microbiology Research, 9(3), 171-179.

[20] Amiwero CE, Nelson EA, Yusuf M, Olaosebikan OF, Adeboye MAN, Adamu UG, Oladele C, Busuyi JS, Erinle SA and Babalola A. (2017). Knowledge, awarenessand prevalence of viral hepatitis among health care workers in Nigeria. Journal of Medical Research, 3(3), 114-120.

[21] Ochei KC, Obeagu EI, Ibegi BT, Ugobo EI and Odu M. (2016). Prevalence of hepatitis B and C from samples received from the various wards in Niger Delta University Teaching Hospital (NDUTH), Okolobiri for Hematological analyses. Merit Research Journals, 4(4), 204-209.

[22] Mohammed HI, Pennap GR, Oti BV and Adoga M.P. (2019). Markers of hepatitis B virus infection in a subset of young people in central Nigeria. Scientific Africa, 5, e00121.

[23] Ojide CK, Kalu EL, Ogbaini-Emevon E and Nwadike VU. (2015). Co-infections of hepatitis B and C with Human Immunodeficiency Virus among adult patients attending Human Immunodeficiency Virus outpatients clinic in Benin City, Nigeria. Nigerian Journal of Clinical Practice, 18 (4), 516-521.

[24] Afolabi AY, Oladipo EK and Fagbami AH. (2015). Hepatitis B Virus among Potential Blood Donors in Ibadan, Nigeria. International Journal of Medicine and Medical Sciences, 3(2), 40-43.

[25] Bezabeh YH, Muluneh MD, Sillasie SG and Kloos H. (2015). Higher prevalence of hepatitis B virus infection among ARV-exposed than naïve HIV-infected individuals in North Shewa Zone, Ethiopia. Journal of AIDS and HIV Research, 7(1), 10-17.

[26] Al-Rubaye A, Tariq Z and Alrubaiy L. (2015). Prevalence of hepatitis B seromakers and hepatitis C antibodies in blood donors in Basra, Iraq. Bio Medical Journal of Open Gastroenterology, 3, e000067.

[27] Birku T, Gelaw B, Moges F and Assefa A. (2015). Prevalence of hepatitis B and C Viruses infection among Military Personnel at Bahir Dar Armed Forces General Hospital, Ethiopia. Bio Medical Central Research Notes, 8, 737-740.

[28] Flores GL, Almeida AJ, Miguel JC, Cruz HM, Portilho MM, Scalioni LP, Marques VA, Lewis-Ximenez LL, Lampe E and Villa LM. (2016). A Cross section study to determine the prevalence of antibodies against HIV infection among hepatitis B and C infected individuals. International Journal of Environmental Research and Public Health, 13(314), 1-10.

How to cite this article

Alaku S, Mohammed HI and Pennap GR. (2020). Prevalence and determinants of hepatitis B virus infection among human immunodeficiency virus patients at a tertiary health care facility in Central Nigeria..World Journal of Advanced Research and Reviews, 6(2), 227-233.