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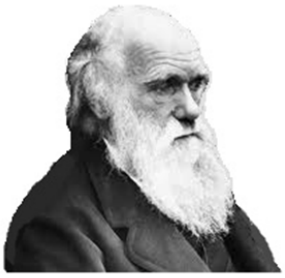

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Profile of HIV and Hepatitis B Virus Co-infected Patients Visiting Federal Teaching Hospital, Abakaliki (FETHA), Ebonyi State, Nigeria

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ABSTRACT

Information is very scarce on the co-infection of human immunodefficiency virus (HIV) with hepatitis-B virus (HBV) infection among patients receiving treatment for infectious diseases in Nigeria. 80 samples were analyzed in this study and were evaluated for the presence and qualitative detection of HIV and HBV surface antigen using a lateral chromatographic immunoassay kit (BC-ABON HIV, ABON HBsAg) among patients aged (11-74 years) attending Federal Teaching Hospital Abakaliki (FETHA), Nigeria. Twelve (15%) of the patients examined were seropositive for HIV, while ten (12.5 %) patients were HBsAg seropositive. A higher HIV seroprevalence was recorded in the females (20 %) than males (10 9%) among the patients. A slight higher HBsAg seroprevalence were observed in males (15 %) than females (10 %) with the highest prevalence of HBsAg occurring in the 11-20 and 51-60 years age group (16.67 %), followed by those of 41-50 years (12.5%). Results of the co-infection of HIV with HBV revealed that 5 (62.5 %) were seropositive for both HIV and HBV surface antigen with a considerably difference observed in male (10 %) than in female (2.5 %). Results confirmed the high endemicity of HBV infection among patients attending FETHA Ebonyi State, Nigeria and the significantly greater prevalence of HIV infection than HBV among infected patients.

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***Keywords*:** human immunodefficiency virus, HIV, hepatitis-B virus, HBV

1. INTRODUCTION

Hepatitis B virus (HBV) belongs to the hepadnaviridae virus with a partially double-stranded DNA. The virus is known as Dane particles and has human beings as the only source of infection. They have a peculiar quality of having excess of its capsular material called the hepatitis B surface antigen (HBsAg), circulates in the human blood (Vernet and Tran 2006).

HBV is the leading cause of liver infection across the globe and account for about 96% mortality together with Hepatitis C virus (WHO, 2017). It is estimated that infection with HBV exceeds two billion people with more than 30 million people living with chronic HBV infection worldwide within the last two decades (Drosten *et al*., 2002, Ajuwon *et al*., 2021). According Uneke *et al*., (2005), the prevalence of the virus is relatively higher in the tropics than other regions, highly contagious and high frequency of transmission from one infected individual to another either through blood to blood contact, during birth from mother to child, unprotected sex and needle sharing among the uneducated people. Nigeria is classified among the countries highly endemic for HBV infection (Ajuwon *et al*., 2021), with increase in road accident, armed robbery incidences, pregnancy-related hemorrhage and other blood-borne pathogens resulting from transmission of infected blood been the most causative factors for its high prevalence in Nigeria and many other part of sub-Saharan Africa. About 75% of Nigerian population is reported to have been exposed to HBV at one time or the other in their life with estimated 20 million people that are chronically infected (Sirisena *et al*., 2002, WHO 2020) with North western region recently reported to be the most affected part of the country (Ajuwon *et al.*, 2021).

It is estimated worldwide that about 2 - 4 million of HIV infected individuals (about 10%) are living with HIV-HBV co-infection (Drahel and Sterling 2014; Cheng *et al*., 2021). Although the prevalence of HIV/HBV, co-infection varies widely, the global rise of HIV/HBV co-infection has a public health issue of serious concern especially in the Sub-Saharan Africa, where the human population is been mostly affected by HIV/AIDS pandemic with almost 9% of its adult population living with HIV (WHO, 2003). Nigeria is hyper endemic for HIV- HBV co-infection. All the states of Nigeria have general epidemics of over 1% with some areas having prevalence higher than 10%. Furthermore, the infection cut across both sexes and all age groups but youths between age 20-29 years are more infected (Sirisena *et al*., 2002).

The HIV/AIDS pandemic in Nigeria is not only prevalent among the adult population that is commonly classified as the high-risk group but has been observed to be increasingly common across different age groups (Oladokun, *et al.*, 2010), with the prevalence rate of 10-15% of the overall population with adult population having about 5.8% prevalence over the last decade (Orji *et al*., 2020; Ajuwon *et al*., 2021) and a recent study has reported a prevalence of 0.58% of both HBsAg and HCV-positive among coinfected individuals attending health institution in the South eastern region of Nigeria (Nnakenyi *et al*., 2020).

HBV and HIV share the common mode of transmission; thus co-infection of these two viruses occurs frequently. Despite the high rate of co-infection, the correlation between HBV and HIV mostly depends on the affected community as well as transmission route (Uneke *et al*., 2005; Ajuwon *et al*., 2021).

2. MATERIALS AND METHODS

2. 1. Study Area

This study of the profile of HIV and HBV co-infected cases among patients was carried out at the Alex Ekwueme Federal University Teaching Hospital located in the mid-town of Abakaliki, Ebonyi State, Nigeria. The hospital is managed by the state government and the University authority and it's a major centre of most febrile illness in the State. The Alex Ekwueme Federal Teaching Hospital, Abakaliki (FETHA) has various department/wards which includes; the single ward, obstetrics, gynecology ward, laboratory department, medical out patients clinic and general out patients clinic. Abakaliki as one of the local government of Ebonyi State is made of three communities, which includes Enyigba, Amagu and Izzi Unuhu communities. It lies in the longtitude 8°05'E and latitude 6°15'N and about 86 km from Enugu East in Enugu State. Ebonyi State Abakaliki is bounded on the west by Enugu while the North and South share common boundaries with Benue and Abia State respectively. Ebonyi State is located in the lower belt of Nigeria with tropical rain forest vegetation and some guinea savannah and surrounded by a major river called Ebonyi River, which is tributary to Cross River.

Figure 1. Map of Ebonyi State with red stars showing the study area

2. 2. Collection of Samples

A total of 80 samples were collected from patients from Federal Teaching Hospital Abakaliki, Ebonyi State; using sterile needle. 40 EDTA containers were used in the collection of blood samples, latex and disposable hand gloves were also used during the process. A well design personal data information sheet was used to gather information regarding age, occupation, ethnic group, trimesters and parity from 40 patients. Tourniquet was tied on the patient's arm in order to expose the veins. After which the surface of the skin was cleaned with cotton soaked with 70% ethanol (methylated spirit). Blood sample was obtained by vein puncture using a sterile needle 21G and 5ml syringe. The tourniquet was loosened before withdrawing the needle from the patient's arm. After which the blood sample was emptied in a labeled potassium EDTA container.

2. 3. Microbiological Analysis of Samples

The serum was separated from the blood as soon as possible to prevent haemolysis and was stored at -20 °C, the samples were evaluated for the presence and qualitative detection of HIV and HBV surface antigen using a lateral chromatographic immunoassay kit (WHO BC-ABON HIV, ABON HBsAg) with a 2 years expiration time. Assays were done at room temperature. The pouch were opened under room temperature because the test strips need to equilibrate with room temperature prior testing (WHO, 2008). The serum was also brought out of the refrigerator for it to also equilibrate with the room temperature before testing. With the arrows pointing downwards, the test strips were then immersed vertically into the serum for 10-15 seconds. The maximum line (MAX) on the strip was observed in order to avoid exceeding the line. The strip was now placed on a non-absorbent surface. The timer was then set for 15 minutes, waiting for the red line to appear or not. The result was read after 15 minutes and results were recorded. To serve as control, a colored line always appears in the control line region indicating that proper volume of specimen has been added.

3. RESULTS

Of all the 80 individuals used for the survey of HIV infection, the age range of study population was 11 to 74years. Individuals with age range of 21 - 30 had the highest prevalence (20 %), followed by individuals with age range of 11 - 20, 31 - 40 and ≥ 70 with the same percentage of infection (16.67 %). Individuals within the age range of 41 - 50 and 61 - 70years also had the same prevalence of 12.5 %. Of the 3 individuals of age range of 51 – 60 years none was infected. There was no significant difference between age and the prevalence of the infection. ($X^2 = 1.98$, df = 6, $P < 0.05$). In gender, of the individuals examined for HIV infection, 40 were males and 40 were females. Out of the 40 males examined, 6 were infected (15 %), while 4 of the females were infected (10 %).

Males were more infected (15 %) than the females (10 %). In all the 80 individuals examined 10(12.5 %) were infected. There was no significant difference between sex and prevalence of HBV. ($X^2 = 0.54$, df = 1, $P < 0.05$). In occupation, of all the 80 individuals examined for HIV infection, 16 were civil servants, 16 were farmers, 20 were into business, 12 were students and 16 were applicants.

Of all the subjects examined in relation to their occupation, student had the highest prevalence 3 (25 %) followed by applicants 3(18.75 %), civil servants and farmers had 2 (12.5 %) prevalence. The least infected population was business 2 (10 %). There was no significant difference between occupation and the prevalence of HIV infection ($X^2 = 2$, df = 4, $P < 0.05$) (Table 1).

Table 1. Assessment of HIV Prevalence among the Subject in Relation to Age, Sex and Occupation of the Patients.

Study Group	Number Tested	Number Infected (%)	Chi-square
AGE			
11-20	12	2(16.65)	
21-30	20	4(20)	
31-40	12	2(16.65)	
41-50	16	2(12.5)	
51-60	6	- (0)	
61-70	8	1(12.5)	
≥ 70	6	1(16.65)	
Total	80	12(15)	1.98
SEX			
Male	40	4(10)	
Female	40	8(20)	
Total	80	12(15)	1.78
OCCUPATION			
Civil Servant	16	2(12.5)	
Farmer	16	2(12.5)	
Business	20	2(10)	
Student	12	3(25)	
Applicant	16	3(18.75)	
Total	80	12(15)	2.00

Individuals with age range of 11 - 20, 51 - 60 and ≥ 70 had the highest prevalence of 16.65 % each, followed by individuals with age range of 41 - 50 and 61 - 70 (12.5 %). Individuals with age range of 31 - 40 had the lowest prevalence (8.75 %). There was no significant difference between age and the prevalence of the HBV infection ($X^2 = 0.81$, df = 6, $P < 0.05$). Out of the 40 males examined for HBV infection, 6 were infected giving a prevalence of 15%, while 4 of the females were infected with percentage prevalence of 10. The overall HBV infection percentage prevalence was 12.5 %. There was no significant difference between sex and HBV ($X^2 = 0.54$, df = 1, $P < 0.05$). Occupationally, 8 were civil servants, 8 were farmers, 10 were into business, 6 were students and 8 were applicants. Of the entire subject examined in occupation, business had the highest HBV prevalence of 20 % followed by civil servants and applicants (12.5 %). Students had prevalence of 8.75 %. Farmers had the least prevalence of 6.25 %. There was no significant difference between occupation and the prevalence of HBV infection ($X^2 = 2.1$, df = 4, $P < 0.05$) (Table 2).

Table 2. Assessment of HBV Prevalence among the Subject with respect to Age, Sex and Occupation of the patients.

Parameters Examined	Number Examined	Number of Subject value (%)	Chi-square
AGE			
11-20	12	2(16.67)	
21-30	20	2(10)	
31-40	12	1(8.35)	
41-50	16	2(12.5)	
51-60	6	1 (16.67)	
61-70	8	1(12.5)	
≥ 70	6	1(16.67)	
Total	80	10(12.5)	0.81
SEX			
Male	40	6 (15)	
Female	40	4 (10)	
Total	80	10 (12.5)	0.54
OCCUPATION			
Civil Servant	16	2 (12.5)	

Farmer	16	1 (6.25)	
Business	20	4 (20)	
Student	12	1(8.35)	
Applicant	16	2 (12.5)	
Total	80	10 (12.5)	2.10

Of the 80 individuals examined for co-infection of HIV and HBV. Individuals with age range of 11 - 20 and ≥ 70 had the highest prevalence, followed by individuals with age range of 61 - 70 (12.5 %). Individuals within the age range of 24 - 30 had prevalence of 5% while individuals of age range of 31 - 40, 41 - 50 and 51 - 60 had zero prevalence of the co-infection. There was no significant difference between age and the prevalence of HIV and HBV co-infection. (X^2 = 6.58, df = 6, P < 0.05). Of the 80 individuals examined, 40 were males and 40 were females. 10 % of the males were co-infected while 2.5 % of the female subject was co-infected. In all 80 individuals examined, 5 (6.25 %) were co-infected. There was no significant difference between sex and the prevalence of HIV and HBV co-infection (X^2 = 3.07, df = 1, P < 0.05). Under occupation of all the 80 individuals examined, 8 were civil servants, 8 were farmers, 10 were into business, 6 were students and 8 were applicants. Of all the occupation examined, applicants had the highest prevalence (12.5 %), followed by students (8.35 %). Civil servants had 6.25 % prevalence and individuals doing business had 5 % prevalence. Farmers had zero prevalence. There was no significant difference occupation and the prevalence of HIV and HBV co-infection (X^2 = 2.43, df = 4, P < 0.05) (Table 3).

Table 3. Assessment of Age, Sex and Occupation in relation to Co-infection of HIV and HBV.

Parameters Examined	**Number Examined**	**Number Infected (%)**	**Chi-square**
AGE			
11-20	12	2(16.65)	
21-30	20	1(5)	
31-40	12	0(0)	
41-50	16	0(0)	
51-60	6	0(0)	
61-70	8	1(12.5)	
≥ 70	6	1(16.65)	

Total	80	5 (12.5)	6.58
SEX			
Male	40	4(10)	
Female	40	1(2.5)	
Total	80	5 (6.25)	3.07
OCCUPATION			
Civil Servant	16	1(6.25)	
Farmer	16	0(0)	
Business	20	1(5)	
Student	12	1(8.35)	
Applicant	16	2(12.5)	
Total	40	5 (6.25)	2.43

4. DISCUSSION

This study was carried out to examine the level of HIV and HBV co-infected cases among patients visiting Federal Teaching Hospital, Abakaliki, Ebonyi State, Nigeria. The findings in this study revealed a high prevalence rate of HIV (15 %) among patients examined at the infectious disease unit of Federal University Teaching Hospital, Abakaliki (FETHA). The age grade mostly affected were those between adolescent age followed by the early adult age, mid-age and age > 70 years. The least affected age was those in the middle age with those between fifty one and sixty years. The prevalence among female patients were higher than in males patients while the prevalence across the various occupations revealed students having the highest prevalence followed by applicants whereas infection among business men were the lowest (Table 1). The findings in this study also revealed a high prevalence in HBV (12.5 %) among patients attending FETHA within period of examination.

The high prevalence of 12.5% among patients that attend FETHA against the low prevalence of < 2%, moderate prevalence as 2–8%, and high prevalence as >8% HBsAg positivity as defined by WHO in 2010 (Omotola, *et al.*, 2020), indicates a serious health concern. This is because of the wide gap between the findings in this study and the severity index as defined by WHO, 2010. The high prevalence of HBV observed in this study corresponds with other reports of 8.5%, 12.1%, 8.2-8.3%, 13.7% in North-Central, North-West, South-East and North-East Nigeria respectively (Omotola *et al*., 2020; Ajuwon et al., 2021; Eke *et al.,* 2011; Olokoba *et al*., 2011; Dan-Nwafor *et al*., 2021). But slightly differs with previous report on HBV prevalence in some part of the country where a moderate prevalence of 2.1% (South-East) (Orji *et al*., 2020), 4.1% in Abakaliki (South-East) (Ugwuja and Ngwu, 2010) and 5.5% in Keffi (North Central) (Oti *et al*., 2021).

The reason for the disparate findings may not be easily identifiable in Nigeria, which is among countries with a high prevalence rate coupled with inconsistent estimates of HBV cases. This calls for additional requirement of clarity in the management of HBV-associated public health challenges (Ajuwon *et al.*, 2021). The age mostly affected was the early age, middle age and late beyond seventy years of age. Male patients were mostly affected than the female patients across the gender whereas, occupational distribution showed that businessmen had the higher prevalence compared to other occupational groups (Table 2). This is in consonance with previous reports (Omotola *et al.*, 2020; Mohammed *et al*., 2015). The higher prevalence among males as observed in this study may be as a result of heightened indiscriminate sexual choices among males than females and also the fact that males are less likely to clear HBsAg compared to females (Lawal *et al.*, 2009; Okonko *et al.*, 2012).

The 6.25% HIV-HBV co-infection observed in this study is moderately prevalent as it is somewhat above the 4.9% occupational prevalence observed by Adoga *et al*., (2010) and the 1.5% prevalence reported by Oti *et al.*, (2021) in other part of Nigeria. Our finding is not in consonance with the 25.9% and 19% prevalence previously reported by Uneke *et al*., (2005) and Kramvis and Kew (2007) in other parts of Nigeria. When compared with the 7.8% co-infection that is recently reported by Nnakenyi *et al*., (2020) in the same South Eastern region where our study was carried out, there seem to be a uniform spread of HIV-HBV co-infection across the southern belt of Nigeria as Frank-Peterside and Ayodele, (2016) and Ikpeme *et al.*, (2013) reported a 4.7% co-infection among patients in Port-Harcourt and 6.02% among children enrolled in an antiretroviral treatment programme in Uyo, South-southern Nigeria respectively.

Despite the high prevalence of HIV-HBV co-infection in the southern part of Nigeria, there is a relatively higher prevalence in the northern part of Nigeria as high as 11.9% that was previously reported by Modi (2007). These differences could be attributed to the epidemiologic conditions of the virus that depends on the overlapping degree of risk factors which is more predominant in the Northern part than the southern of Nigeria and the degree of awareness and participation in the ongoing vaccination programme that began in 2002 in Nigeria.

In our study, HIV-HBV co-infection was higher in males than females with no significant statistical difference ($P < 0.05$). This correlates with previous finding reported Guan (2005) in Malaysia. The prevalence of hepatitis B co infection amongst civil servants farmers and business was very low, with farmers having no co-infection and applicants with the highest prevalence and this was not in accordance with the survey carried out in Kaduna which showed that people into business had the highest prevalence (Telatela *et al*, 2007) and the report of Omotola et al., (2020) on its prevalence in Ankpa City, Kogi State.

The reason for the difference may not be easily ascertained as Okonko *et al.* (2010) opined that prevalence rates of the viruses among different subjects in Nigeria vary significantly at interstate level, depending on frequency of exposure to risk factors. The rate of co-infection between HIV and HBV can be attributed to diverse factors, particularly lack of vaccines for HBV and its route of transmission mostly through injection especially among drug addicts as the rate of drug addiction in Nigeria is on a constant increase (Jatau *et al*., 2021). Though our study shows a low prevalence of Hepatitis B co infection in HIV infected individuals in patients visiting Ebonyi State Teaching Hospital, its reduction to zero prevalence is still strongly a desirable advocacy. This can be achieved by strengthening the uptake of Hepatitis B vaccine as part of the routine childhood immunization programme and constant education of the public on the presence of both HIV and HBV in the population because of their shared routes of transmission and common risk factors.

Despite that AIDS-related complication has been on the decline as a result of effective antiretroviral treatment (ART), liver-related deaths have become the second leading cause of mortality among HIV infected individuals. HIV infection has a serious negative impact on the natural history of HBV and other opportunistic infection. The leads to a decreased level of immunity in HIV infected patients and increases their susceptibility to various opportunistic infections (Mkpuma *et al*., 2018), thus making the coinfection of HIV with HBV to remain a serious increasing risk for malignant hepatoma, hepatic cirrhosis and liver-related mortality (Drahel and Sterling, 2014). This ugly public health narrative that is commonly observed in a country such as Nigeria, should always be a center focus for strengthening the state and national policies on the prevention and control of their various route of transmission which includes cultural practices such as tattooing, ear piercing, tribal scarification, sexual promiscuity and circumcision with unsterilized sharp objects that are widely practiced in underdeveloped countries including Nigeria. In order to circumvent the constant presence of HIV and HBV in a developing society, the availability of effective antiviral chemotherapy against both HIV and HBV together with simplified treatment algorithms must be strongly advocated.

5. CONCLUSION

In conclusion, this study highlights endemicity of HBV and HIV co-infection among patients visiting FETHA, Ebonyi State, Nigeria. Co-infection was highest within the age group of 11-20 followed by 21-30 which corresponds with age of highest sexual involvement. Male also had higher prevalence of the co-infection than in females which is in consonance with the fact that male folks are more sexually promiscuous than the females. Co-infection of HIV with HBV among febrile patients attending FETHA presents the need for routing advocacy and constant screening of asymptomatic patients attending the hospital especially those individuals within the sexually active group to enable early detection and adequate action. We recommend routine mass immunization against HBV and effective implementation of antiretroviral treatment algorithms together with functional public health policy aimed at educating and enlightening the people on the observable risk factors and routes of infection. However, a wider study coverage that involves both rural settlers and urban distribution is needed to determine burden of the disease on the Nigeria society.

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