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SEROPREVALENCE OF HEPATITIS B AND C VIRAL CO-INFECTION AMONG COHORT SEROPOSITIVE HIV PATIENTS ACCESSING HEALTHCARE IN NASARAWA STATE NORTH CENTRAL, NIGERIA.

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Abstract

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Evidence of hepatitis B and C viral co-infection with HIV accelerates disease progression and also has an effect on the management of patients that are HIV seropositive. The prevalence of HIV co-infection with hepatitis viruses varies widely. This study is planned to determine and evaluate the prevalence of hepatitis B and C co-infection among HIV patients accessing healthcare at federal Medical Center Keffi, Nasarawa State, Nigeria. A total of 200 seropositive HIV patients participated in the study at the ART clinic of which blood samples collected from the patients were screened for HBV and HCV on the basis of the presence of HBsAg and anti-HCV markers. Socio-demographic information was collected by the use of a questionnaire. The study population comprises of 54 (27%) males and 146 (73%) females, of these, 11% (22/200) were positive for HBV, 13.5% (27/200) were positive for HCV and 5% (10/200) were co-infected. The prevalence rates of hepatitis B and C co-infection among the HIV patients was insignificantly different ($P > 0.05$) statistically for sex, ART status, Educational status, Marital status, Age, Occupation, CD4 Count, and socio-demographic factors. The prevalence rates of HBV and HCV co-infection are increasing in patients with HIV. Having acquired knowledge on the effect of HBV/HCV co-infection, it is essential that all HIV infected patients be screened for HBV and HCV infection.

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Introduction

Human Immunodeficiency Virus (HIV) infection, a worldwide phenomenon is a serious public health problem. HIV infection has globally claimed over 25 million lives, and recent studies have shown that over 40 million people carry the infection (UNAIDS, 2005). The rate of infection is remarkably high in sub-Saharan Africa, where the majority of HIV and AIDS cases are concentrated (UNAIDS and WHO, 2002). Present, especially in resource-limited setting. Despite wide spread evidence that suggest increasing prevalence of HBV/HIV and HCV/HIV co-infection there has been no published report about the frequency of infections in HIV-positive patients in this region. Epidemiological survey showed that

about 5% of the world populations are asymptomatic carriers (Volfet *al.*, 2008). Chronic HBV or HCV infection is the major cause of mortality among children and adults who might be HIV seronegative. Studies in Nigeria have shown that HBV and HCV is the major etiological factor for liver cirrhosis and hepatocellular carcinoma (Ojoet *al.*, 2008). The prevalence rate of HIV infection in Nigeria has been on the increase because preventive measures have not had adequate impact from a prevalence rate of 1.4% in 1991, it has increased to 5.8% by 2002 (Federal Ministry of Health report on HIV, 2002). In view of the advantage of early detection and therapy, this study is designed to determine the seroprevalence of HBV and HCV and apparently their co-infections among HIV patients.

Material and Methods

Study Area and Population

The study area for this research work was Keffi, it is approximately 68km from Abuja, the Federal Capital Territory and 128km from Lafia, the Capital of Nasarawa state Keffi is located between latitude 8° 5' N of the equator and longitude 7° 8' E and situated on an altitude of 850m above sea level (Akwa *et al.*, 2007). The study participants were adults living with HIV / AIDS and accessing health care in Federal Medical Center, Keffi who agreed to participate in the study. The participants were persons of both sexes and between the ages of 18-65 years.

ETHICAL CONSIDERATIONS

Clearance from the health research ethical committee of Federal Medical Center, Keffi was obtained in accordance with the code of ethics for biomedical research involving human subjects. Signed informed consent was also obtained from each of the subjects.

EXCLUSION AND INCLUSION CRITERIA

The study included women who were HIV seropositive, attended ART clinic, seropositive naive and drug experienced patients and provided signed consents form and self-administered questionnaires. The exclusion criteria were HIV sero-negative individuals and age below 15 or above 60 years for the seropositive drug experienced and drug naive individual failure to sign a consent forms.

Method of Screening for HBsAg: All the blood samples were screened for HBV using the HBsAg rapid test kit (ACON, USA) following the manufacturer's instructions. The HBsAg one step test strip is a qualitative, lateral flow immunoassay for the detection of HBsAg in serum or plasma.

Method of Screening for Anti-HCV: All the blood samples were screened for anti-HCV using rapid test kits (ACON, USA). The HCV one step hepatitis virus C test strip (serum/plasma) is a qualitative, membrane based immunoassay for the detection of antibody to HCV in serum or plasma.

Ethical Approval

The study was conducted with the approval of the ethical review committee on health research, Federal Medical Centre, Keffi, Nasarawa State.

Data and Statistical analysis

The data obtained was analyzed using statistical package for social sciences (SPSS) (version 17.0), descriptive statistics were presented in bar charts and

the Chi-square (χ^2) test was used to determine the level of association of the prevalence of HBV/HCV co-infection among HIV patients with respect to sex, age, marital status, occupation, HAART status and CD4 count. Values obtained were considered statistically significant at $p \leq 0.05$.

Result

A total of 200 HIV patients participated in the study, of which 54(27%) were males and 156 (73%) were females. A total prevalence of hepatitis B and C and co-infection was reported to be 29.5% of which 13.5% were HCV positive, 11% were HBV positive and 5% were co-infected. (Table 2). In relation to sex, this study reported the highest prevalence of co-infection among the male HIV patients with a recorded prevalence of 12.7% while the females had a low prevalence of 2.1%. Co-infection of HBV and HCV however showed no significant difference ($P > 0.05$) statistically with respect to sex. This simply depicts that hepatitis B and C has no host preference as both sexes are susceptible to it. (Table 1). With respect to socio-demographic factor a higher infection rate (5.5%) was documented among the rural dwellers while the urban settlers had the least infection rate (4.4%) and there was no significant difference ($p > 0.05$) statistically among the HIV patients with respect to their socio-demographic factor (table 1). And in respect to the patients socio-economic status the lower class recorded a total prevalence of 34.7% while the upper class and middle class recorded a total prevalence of 25.3% and 20.5% respectively and the difference was not significant, ($p > 0.05$) statistically. This implies that the variation in the socio-economic status of the HIV patients has no influence on the prevalence rate of hepatitis. (Table 1)

Based on the patients educational status this study revealed the highest prevalence (7.5%) of hepatitis B and C co-infection among patients that are uneducated because they are mostly not aware of the risk factors associated with the transmission of these viruses, while the least prevalence was observed among the educated patients. Although there was no significant difference ($P > 0.05$) statistically among HIV infected patients with respect to educational status (Table 1) In relation to age, this study reported the highest prevalence among patients aged >40 years (25%) followed by patients aged <20 (8.3%) and patients of age 21-30 and ≥ 61 both recorded a prevalence of (3.6%) and (0%) respectively. HBV and HCV co-infection in this study showed no significant difference ($p > 0.05$) statistically with respect to age. (Table 2). The prevalence of hepatitis B and C co-infection in respect to occupation as

presented in Table 3 shows highest co-infection rate (11.4%) among students followed by farmers and artisans with a reported prevalence of 7.1% and 5.3% respectively. The least prevalence was recorded among civil servants (0%) and unemployed 3.4%. However, there was no significant ($p>0.05$) statistically in terms of HBV and HCV co-infection among different occupations. (Table 3). In relation to CD⁴ Count, this study depicted the highest prevalence of hepatitis B and C co-infection among HIV patients with CD⁴ Count of ≤ 200 with a recorded prevalence of (13.3%) followed by patients with CD⁴ Count ranging from 201-300 (7.3%) and 5% among patients with CD⁴ Count ranging from

401-500. The decrease in CD⁴ Count could be as a result of the presence the hepatitis viruses which are major contributors of early progression to AIDS and hepatocellular carcinoma in HIV patients thereby leading to death. However the difference was not statistically significant. ($p>0.05$) (Table 5). Based on the ART status of the patients a higher prevalence was reported among patients on HAART with a recorded prevalence of 6.9% and 2.4% prevalence among HAART naïve patients. However, there was no significant difference ($P>0.05$) statistically (Table 6).

Table 1: The seroprevalence of Hepatitis B and C co-infection among HIV patients in relation to sex and socio-demographic factor.

VARIABLES	NO EXAMINED	NO REACTIVE			TOTAL(%)
		HCV(%)	HBV(%)	HBV/HCV(%)	
LOCALITY					
RURAL	110	14(10.7)	12(10.9)	6(5.5)	32(27.1)
URBAN	90	13(14)	10(11)	4(4.4)	27(29.4)
TOTAL	200	27(13.5)	22(11)	10(5)	59(29.5)
GENDER					
MALE	54	12(22.2)	12(22.2)	7(12.7)	29(57.1)
FEMALE	146	15(10.3)	10(6.8)	3(2.1)	28(19.2)
TOTAL	200	27(13.5)	22(11)	10(5)	59(29.5)
SOCIO-ECONOMIC STATUS					
LOWER CLASS	90	15(14.7)	12(13.3)	6(6.7)	33(34.7)
MIDDLE CLASS	70	7(10)	6(8.2)	2(2.1)	15(20.3)
UPPER CLASS	40	5(10.5)	4(10)	2(5)	11(25.5)
TOTAL	200	27(13.5)	22(11)	10(5)	59(29.5)
EDUCATIONAL STATUS					
EDUCATED	80	10(12.5)	8(10)	4(5)	22(27.5)
UNEDUCATED	120	17(14.7)	14(11.7)	6(7.5)	37(30.8)
TOTAL	200	27(13.5)	22(11)	10(5)	59(29.5)

Table 2: The seroprevalence of Hepatitis B and C co-infection among HIV patients in relation to age.

AGE (YRS)	NO EXAMINED	NO REACTIVE (%)			TOTAL(%)
		HCV (%)	HBV (%)	HBV/HCV(%)	
≤ 20	12	2(16.6)	2(16.6)	1(8.3)	5(41.5)
21-30	112	11(9.8)	8(7.1)	4(3.6)	23(20.5)
31-40	55	8(14.5)	8(14.5)	3(5.5)	19(34.5)
41-50	15	2(13.3)	2(13.3)	1(6.7)	5(33.3)
51-60	6	3(50)	2(33.3)	1(25)	6(100)
≥ 61	0	0(0)	0(0)	0(0)	0(0)
TOTAL	200	27(13.5)	22(11)	10(5)	59(29.5)

Table3: The seroprevalence of Hepatitis B and C co-infection among HIV patients in relation to occupation.

OCCUPATION	NO EXAMINED	NO REACTIVE			TOTAL (%)
		HCV (%) HBV/HCV (%)	HBV (%)		
CIVIL SERVANTS	40	8(20)	4(10)	0 (0)	12(30)
STUDENTS	35	6(17)	5(14.3)	4(11.4)	15(42.7)
FARMERS	28	4(14.3)	4(14.3)	2(7.1)	10(35.7)
ARTISANS	38	4(10.5)	4(10.5)	2(5.3)	10(26.3)
UNEMPLOYED	59	5(8.5)	5(8.5)	2(3.4)	12(20.4)
TOTAL	200	27(13.5)	22(11)	10(5)	59(29.5)

Table 4: The seroprevalence of Hepatitis B and C co-infection among HIV patients in relation to marital status.

MARITAL STATUS	NO EXAMINED	NO REACTIVE			TOTAL(%)
		HCV(%)	HBV(%)	HBV/HCV(%)	
SINGLE	64	9(14.1)	6(9.4)	6(9.4)	21(25)
MARRIED	118	16(13.6)	10(8.5)	4(3.4)	30(17.5)
DIVORCED	18	2(11.1)	6(33.3)	0(0)	8(44.4)
TOTAL	200	27(13.5)	22(11)	10(5)	59(29.5)

Table5: The seroprevalence of Hepatitis B and C co-infection among HIV patients in relation to CD⁺4 Count.

CD ⁺ 4 COUNT	NO EXAMINED	NO REACTIVE (%)			TOTAL(%)
		HCV (%)	HBV(%)		
		HBV/HCV(%)			
<200	30	8(26.7)	7(33.3)	4(13.5)	19(63.3)
201-300	55	11(20)	6(10.9)	4(7.3)	21(38.2)
301-400	42	11(26.2)	1(2.4)	0(0)	12(28.6)
401-500	40	4(10)	4(10)	2(5)	10(25)
501-600	14	1(7.1)	2(14.3)	0(0)	3(21.4)
≥600	19	2(10.5)	2(10.5)	0(0)	4(21)
TOTAL	200	27(13.5)	22(11)	10(5)	59(29.5)

Discussion

This study examined the seroprevalence of HBV and HCV co-infection among HIV patients and the observed positivity of HBV, HCV and co-infection obtained was 22 (11%), 27 (13.5%) and 10 (5%) respectively. The prevalence rates of HBV and HCV

among these patients are comparable with reports by *forbiet al* (2007), in north central Nigeria, South African cohort (*parboosing et al.*, 2008), Senegal (*Diop-Ndaiyeet al.*, 2008) and France (*Larsen et al.*, 2008). The prevalence rates of HBV obtained in this study is not comparable with previous reported high prevalence in different part of Nigeria; *Keffi* (20.6%)

(Forbiet *et al.*, 2007), Jos (28.7%) (Irisena *et al.*, 2002), Illorin (30.4%) (Olatunji *et al.*, 2008), Kano (70.5%) (Nwokiedi *et al.*, 2006) and India (33.8%) (Stud *et al.*, 2001). Some other studies reported a prevalence of 6% from South Africa (Iodeny *et al.*, 2000) and Nigeria; Maiduguri 15% (Baba *et al.*, 1998), Lagos 9.2% (Lesie *et al.*, 2007), Niger-Delta (9.7%) (Ejele *et al.*, 2004), and Thailand 8.7% (Sungkanuparp, 2004) which are however comparable with observed figures in this study (11%). In Brazil the results of a study showed that the rates of prevalence of HBV/HCV co-infection among HIV patients is 5% (Tripathi *et al.*, 2007) which is the same with the result obtained in this study. In the US and Europe HBV/HCV coinfection among HIV patients was reported to be within the range of 6-14% (Dodi *et al.*, 2001). In a similar study carried out in Alivaz-South Iran, the co-infection rates of HBV/HCV in HIV patients was found to be 20% (Alavi *et al.*, 2007) which is higher than the rate obtained in this study. In another study conducted in Nigeria HBV/HCV co-infection rates was found to be less than 1% (Otegbayo *et al.*, 2008) which is not comparable with the co-infection rate obtained in this study. Analysis of the sex-related sero-prevalence of HBV/HCV co-infection amongst the HIV infected patients showed that the males (12.7%) were more infected than the females (2.1%), though more of the female patients reported to hospital for medical attention than the males. The reason for higher frequency of HBV/HCV co-infection among the male patients could probably be as a result of higher frequency of exposure to risk factors associated with the viruses such as injection of drug use, unprotected sex and having more than one sex partners as well as occupation and behaviour (Halimet *et al.*, 1992). However statistically significant association was observed among patients in respect to sex ($p \leq 0.05$) which is comparable to results reported by Halimet *et al.* (1992). This observation is not at par with previous study by Lesie *et al.* (2007) who reported a higher prevalence among the female patients (37.5%) than the male patients (18.8%). The present study has reported a higher prevalence of Hepatitis B and C co-infection among patients of age < 20 and >40 years with a reported prevalence of 8.3% and 25% and a higher prevalence of hepatitis B alone among patients of age <20 (16.6%) and >40 (33.3%) years and HCV alone among patients of age 51-60 years. Although there was no statistically significant difference between the prevalence of the hepatitis viruses in respect to age ($p > 0.05$) which is not comparable with the study carried out by Mohsen *et al.* (2009) who reported a prevalence of 77.2% among patients aged <30 infected with HCV alone and 74.2% among patients aged 31-50 and a prevalence of 12.9% among

patients infected with HBV alone of aged <30 and 13.2% in patients aged >40 years and finally HBV/HCV co-infection rates of 5.7% and 8.9% in the age group of HIV positive patients <40 and >60 years. Analysis of marital status-related sero-prevalence of HBV/HCV co-infection amongst the HIV infected patients showed that there was a higher prevalence of the viruses among patients that are single (9.4%) compared to those that are married (3.4%) and divorced (0%) which could probably be due to high tendency of promiscuous behaviour among those who are single than those that are married. However the difference was not statistically significant ($p > 0.05$) which is comparable to study conducted by Mohsen *et al.* (2009). There was no statistically significant association found in this study between CD⁴ Count and serological status of the subjects. As shown in the present study individuals with the highest prevalence of HBV/HCV co-infection are having CD⁴ Count less than 200 which depicts that decrease in CD⁴ Count among HIV patients could be attributed to co-infection with either of viral hepatitis or even both. This finding is comparable with a finding observed in a previous work in Jos, Nigeria (Ladepet *et al.*, 2007). Although the reasons for the CD⁴ Count decline is not clear but it is known that there is an imbalance in peripheral blood T-lymphocytes subsets and turbulence in cellular immunity in the patients with chronic hepatitis infections (Tian *et al.*, 2005). The higher prevalence rate of HCV in HIV patients in comparison to the rate for HBV in HIV patients could be considered as noticeable and it could be attributed to diverse factors particularly lack of vaccines for HCV contrary to the existence of vaccines for HBV. Also, sexual transmission of this virus is lower in comparison to HBV and it is transmitted mostly via infection especially in drug addiction (Alter, 2008). Many studies have been conducted in this realm, all showing high rates for the viruses in HIV patients due to the above mentioned factors. Some patients are currently infected with the three viruses of HIV, HBV and HCV due to their shared risk factors and mode of transmission. Consequently, co-infection with the three viruses will increase the risk of cirrhosis, liver deficiency, and mortalities in comparison to when a person is infected with only one of these viruses. Therefore diagnosing HBV/HCBV in HIV patients is vital order to take care of them and allot resources in health plans so that all HIV patients have to be tested for both HBV and HCV (Salmon *et al.*, 2003 and Bruno *et al.*, 2007).

Conclusion

With the 5% prevalence of HBV/HCV co-infection in this study population, it is an indication that

HBV and HCV infections are on the increase among HIV patients which turns out to be a major contributor to the increased in morbidity and mortality rate among these patients as a result of rapid progression to AIDS and hepatocellular carcinoma. Conclusively, the phenomenon of Hepatitis B and C co-infection among HIV patients is a cause for concern. Therefore the medical community in Nigeria should be alerted to this phenomenon as smart treatment option would need to be instituted among such individuals if treatment is to be effective and meaningful.

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