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# Prevalence of Hepatitis b and c viral infections among human immunodeficiency virus (HIV) infected patients on highly active anti-retroviral therapy (haart) in the university of port harcourt teaching hospital

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## Abstract

**Introduction:** This study determined the prevalence of hepatitis B and C viral infections among human immunodeficiency virus (HIV) infected patients on highly active anti-retroviral therapy (HAART) in the University of Port Harcourt Teaching Hospital.

**Methodology:** It was a purposive, cross-sectional study that was conducted in the Anti-retroviral clinic of the facility and a sample size of 38.33 (increased to 100, due to perceived small size), using a prevalence of 2.56% from a previous study by Nnakenyi et al. (2019).

**Results:** There was more female participation, 77.0%, majority had secondary school education, 59.0%, mostly Civil servants, 43.0%, Christians, 87.0% and mainly of Ijaw ethnicity, 39.0%. Majority had heard of HBV and HCV, 84.0%, mainly in the hospital, 36.9%, with the least from friends/family members, 6.0%, 98.0% had not been infected by any of the hepatic viruses, all of them affirmed that the viruses can be treated, 100.0%, while 72.0% confirmed the efficacy of medical treatment for the viruses and 46.0% had been vaccinated against the viruses. Also, majority opined that sexual intercourse is the main route for transmission of the hepatic viruses, 51.0%, followed by blood transfusion, 37.0% and lifestyle is the most common risk factor to contract the viruses, 71.0%. The prevalence of HBV, HCV and VDRL among HIV-infected patients on HAART was 96.0%, 98.0% and 99.0% respectively. Similarly, we observed statistical significance of HBV (0.042) and HCV (0.021), as well as, venereal diseases (0.028).

**Conclusion:** There is low prevalence of the hepatic viruses among HIV infected persons in the study population, while the existence of a venereal disease is a risk factor to contracting the hepatic viruses, owing to similar pathways of transmission, thus, rigorous efforts at educating the populace about the risk factors and common routes of transmission of these viruses is required.

**Keywords:** Hepatitis, venereal disease, HIV, HAART, infection.

## Introduction

Human immunodeficiency virus (HIV) is a retrovirus that infects humans and other mammals. Infection by the virus is a huge public health problem, with African being one of the most affected by the pandemic globally resulting in an estimated 25.7 million human infections worldwide (World Health Organization [WHO], 2019).

Viral hepatitis is also a global health challenge of public concern worldwide (Ndifontaiyong, Ali, Sokoudjou, Ndimumeh & Tume, 2021). Some of the features associated with the micro-organisms are high prevalence, high mortality and morbidity, poor diagnostic tools, leading to sub-optimal diagnosis and poor management approaches, especially, in developing countries (Naghavi, Wang, Lozano, Davis, Liang, Zhou, Vollset, Ozgoren, Abdalla & Abd-Allah, 2015; Mokdad, Lopez, Shahrzaz, Lozano, Mokdad, Stanaway, Murray & Naghavi, 2014).

Hepatitis B virus (HBV) alters the liver architecture and may progress to chronic, life-threatening conditions, such as liver cirrhosis and hepatocellular carcinoma or otherwise mild case, known as hepatitis (Nnakenyi, Uchehukwu & Ntoezimah, 2020). The global prevalence of HBV is estimated as 0.1%-20% (McMahon, 2005; Custer, Sullivan, Hazlet, Loeje, Veenstra & Kowdley, 2004) and its diagnosis is made by detection from blood and body fluids, such as semen, saliva and nasopharyngeal secretion, while the main routes of transmission are sexual intercourse, mother to child transmission in pregnancy, delivery and breastfeeding, blood contact and sharing of infected materials (WHO, 2011).

In 2017, the World Health Organization (WHO) reported that the global prevalence of hepatitis B surface antigen (HBsAg) in the African region was 60 million, with an estimated prevalence of 6.1% (4.6% - 8.5%) and accounting for an estimated 87,890 annual deaths in sub-Saharan African region alone. Both HIV and HBV infections pose a reciprocal effect on the progression of both diseases in regards to the impact on the morbidity and mortality of the diseases, with co-infection being a serious challenge in resource-constrained settings (Xie, Han, Qiu, Li, Li, Song, Wang, Thio & Li, 2016; Milazzo & Antinori, 2014). In the western countries, complications arising from HBV and HCV and the infections itself are rare, but common in Asia and Africa, where the chronic infection is common and usually acquired through the parenteral route or in adulthood (Lavanchy, 2004).

Hepatitis C virus (HCV) is also a major cause of hepatitis, like HBV, with a chronic potential (Nnakenyi et al., 2020). The transmission of HCV is similar to HBV. There are scanty prevalence data for HCV, especially, in sub-Saharan African

region, but approximately 30 million people are reported to be infected by the virus (Matthews, Geretti, Goulder & Klenerman, 2014). HCV also leads to chronic liver diseases like hepatocellular carcinoma, (Ndifontaiyong et al., 2021). Both HBV and HCV are very prevalent in patients infected by HIV and those with the disease condition of HIV, AIDS, leading to an increased morbidity and mortality (Spearman, Afihene, Ally, Apica, Awuku & Cunha, 2017). The co-infection of HIV with either HBV, HCV is associated with poor survival, rapid progression to liver diseases and high potential for hepatotoxicity, arising from the anti-retroviral therapy administered (WHO, 2013; Highleyman, 2010).

Globally, an estimated 550 million people are infected by either HBV or HCV, about 9% of the world population, with the former estimated as 350-400 million, while the latter is estimated as 170-180 million (WHO, 2013; Lavanchy, 2011). Also, the three viruses; HIV, HBV and HCV dominant infections in sub-Saharan African, with 2.6 million HBV infections in HIV-infected people and approximately 2.3 million HCV in HIV-infected people (Kourtis, Bulterys, Hu & Jamieson, 2012).

Highly active anti-retroviral therapy, HAART, is a current, commonly implemented regimen for managing HIV infection. It is an innovation in HIV management and effectively reduces the viral load, as well as, increases the CD4 cell count.

Human Immunodeficiency Virus (HIV) infection, in itself, poses enormous burden on the health care system of many countries. However, the condition of infected individuals is worsened in the existence of co-infection, such as the hepatitis virus, causing poor prognosis and potentially shortens life span (Nnakenyi et al., 2020). It rapidly depletes the immune function of the host, as well as, other vital systems of the affected individual. Evidence suggests that HIV infection progresses faster, even to AIDS-defining illnesses, when there is a co-infection with hepatitis viruses (Greub, Ledergerber, Battegay, Grob, Perrin & Furrer, 2000).

Owing to this co-infection, it is advised that when treating HIV patients, their status of HBV and HCV is ascertained, if the patient is actually co-infected by any of the hepatitis viruses. This is important because a report by the WHO global hepatitis strategy for the elimination of viral hepatitis stipulates that by the year 2030, hepatitis disease will assume a huge public health propensity, thus, 80% of individuals eligible for HBV or HCV treatment should be availed the treatment (WHO, 2016). Despite this, in most developing countries, such as Nigeria, the screening for the hepatitis viruses is still a challenge, due to the cost of investigation or vaccination, unlike in HIV (Diwe, Okwara, Enwere, Azike & Nwaimo, 2013).

Prevalence studies abound in Nigeria regarding co-infection of HIV with either hepatitis B or C viruses, employing different settings and population sizes (Hamza et al., 2013; Idoko, Meloni, Muazu, Nimzing, Badung & Hawkins, 2009; Otegbayo, Taiwo, Akingbola, Odaibo, Adedapo & Penugonda, 2008; Ejele, Nwauche & Erhabor, 2004), with diverse but similar results.

In Nigeria, the national guideline for the prevention, treatment and care for HIV-infected patients does not recommend the screening for HBV, but hepatitis B surface antigen, HBsAg, and HCV commonly done as baseline test for the pre-treatment of HIV-infected patients (National Guidelines for HIV Prevention, Treatment and Care, 2016).

In a study conducted in Enugu state, Nigeria, among 1328 HIV-infected patients on HAART, Nnakenyi et al. (2020) reported that the prevalence of hepatitis B virus infection was 7.8%. Another study conducted among 1779 HIV-infected patients in a different geo-political region in Nigeria, reported HBV prevalence of 11.9% (Otegbayo et al., 2008), while other independent, but similar studies employing smaller sample sizes compared to the those earlier described, ranged from 9.7% to 25.0% (Idoko et al., 2009; Uneke, Ogbu, Inyama, Anyanwu, Njoku & Idoko, 2005; Ejele, Nwauche & Erhabor, 2004).

Regarding the co-infection of HIV and HCV, several studies documented distinct findings, majority of which suggest population size and diagnostic equipment and technique plays crucial roles in the prevalence. In some studies conducted in Nigeria, by Nnekanyi et al. (2020), Diwe et al. (2013) and Adewole, Anteyi, Ajuwon, Wada, Elegba and Ahmed (2013), prevalence values of 4.7%, 0.7% and 2.3% respectively were reported respectively.

Similarly, Nnekanyi et al. (2020) and Adewole et al. (2013) reported that HBV is more prevalent and the situation may be similar for other studies both within and outside Nigeria. Observations show that the varying sample sizes of the populations in the respective studies accounted for the differences reported in their prevalence, while positing that although, the three viruses are transmitted through similar routes, their rates of transmission could be dissimilar. For instance, HIV transmission, historically, is most common through the parenteral route, such as multiple blood transfusions and intravenous drug use, in addition to sexual transmission, but the sexual transmission route is less common for HCV (Tedaldi, Hullsiek, Malvestutto, Arduino, Fisher & Gaglio, 2003).

Yet another finding on the co-infection between HIV and either HBV or HCV also reported gender bias against the transmission, especially, HBV. The study reported that HIV/HBV co-infection is more common among men that have

sex with men, as against men that have sex with women or women that have sex with women, the transmission being almost inefficient in the latter category, while it is also commoner in heterosexual individuals with multiple sexual partners and contacts with commercial sex workers (Alter, 2006).

Triple infection of the three viruses; HIV, HBV and HCV have been observed in certain circumstances. In three individual groups of study conducted in the southeast, north-central and a sub-urban part of Nigeria by Nnakenyi et al. (2020), Adewole et al. (2009) and Diwe et al. (2013), they reported the prevalence of triple infection as 0.58%, 1.5% and 0% respectively. In response to the varying findings in the respective studies, Nnakenyi and colleagues posited that at this point, it will be difficult to discern if residing in the city poses more risk to contracting triple infection and whether social lifestyle in the urban regions is implicated in the observed prevalence, which is absent in the sub-urban region.

Opaleye, Oluremi, Ogbolu, Babalola, Shittu and Adesiyan (2014) also investigate the prevalence of HBV among HIV-infected patients HAART regimen and reported more male co-infection, while the age group of 30-49 years were more predominantly co-infected.

In a study in Burkina Faso among 11,592 blood donors, with sero-positive HIV blood, 1.13% prevalence of HBV co-morbidity with HIV was reported, while the prevalence of HCV among the HIV sero-positive patients was 0.14% (Tounkara, Sarro, Kristensen, Dao, Diallo & Diarra, 2009). This is a clear contrast from the studies documented from the different geo-political regions in Nigeria and may differ from what is tenable in other climes. A review of comparative studies on the prevalence of HBV among HIV-infected patients in four continents; Asia, Africa, America and Europe, reported higher prevalence of co-infection among patients in the developed continents of America and Europe, as against those in the developing continents of Africa and Asia (Askari, Hakimi, Nasiri, Hassanshahi & Kazemi, 2014). The higher prevalence in the patients of developed continents was attributed to better diagnostic equipment and lower sensitivities available in these continents, as against the developing continents.

The treatment of co-infection with HIV and any of HBV or HCV is another area of interest that have elicited several research discourses. At the moment, HAART is the mainstay for individuals with HIV infection and the combination of HAART regimen for the different co-infection varies. This regimen, HAART, comprises of five main drugs that include; tenofovir, Ribavirin, sofosbuvir and emtricitabine. Studies have reported that in cases of HIV/HBV co-infection, tenofovir and emtricitabine should be employed, since

these drugs are effective for the two viruses and reduces the likelihood of HBV developing resistance for any of the drugs, while in co-infection of HIV/HCV, ribavirin and sofosbuvir should be used, just as HBV vaccine can be administered in situations of HIV/HBV co-infection (National Guidelines for Human Immunodeficiency Virus Prevention, Treatment and Care, 2016).

While several studies have been conducted both within and outside Nigeria to ascertain the prevalence of HBV or HCV co-infection among HIV patients on HAART, there is scanty data regarding this in the study area, thus necessitating this study, hoping that it will not only serve as reference, but also avail clinicians and scientists the required information for prompt decisions when attending to these category of patients.

## Methodology

This purposive, cross-sectional study was conducted at the Anti-retroviral clinic and Pathology laboratory of the University of Port Harcourt Teaching Hospital (UPTH), Nigeria, a tertiary healthcare facility located in the southern region of the country and caters for the training of medical students and other allied medical professions, medical and epidemiologic research, as well as, treatment and counseling of medical conditions. A minimum sample size of 38.33 was obtained for the study, using a prevalence of 2.56% (being the average for 4.7%, 0.7% and 2.3% reported for HIV, HBV and HCV respectively) as reported by Nnekanyi et al. (2020), Diwe et al. (2013) and Adewole et al. (2013). However, owing to the small nature of the calculated minimum sample size, it was increased to 100, to make it significant.

5ml venous blood sample was obtained from each participant in the study using an ethylene diamine tetra acetic acid (EDTA) bottle, after they consented to participate and this analyzed by the aid of an auto-analyzer and the result entered into statistical package for social sciences (SPSS) version 22, where both descriptive and inferential analysis were performed. The socio-demographic parameters of the respondents were obtained using a structured questionnaire and also analyzed. Ethical approval for this study was obtained from the Research Ethics Committee of the University of Port Harcourt Teaching Hospital.

## Results

This study had more females, 77.0%, they mostly had secondary school education, 59.0%, with the least having primary school education, 18.0%, and were mostly civil servants, 43.0%, while 27.0% were traders and 17.0% were schooling. Also, majority, 87.0% were Christians, but 6.0% were Muslims and they were mostly Ijaws by ethnicity, 39.0%, followed by Igbos, 35.0%, while the least were Hausas, 4.0%.

**Table 1:** Socio-demographic characteristics

Variables	Frequency (n)	Percent (%)
<b>Gender</b>		
Males	23	23.0
Females	77	77.0
<b>Education obtained</b>		
Primary	18	18.0
Secondary	59	59.0
Tertiary	23	23.0
<b>Occupation</b>		
None	4	4.0
Trading	27	27.0
Civil servant	43	43.0
Artisan	9	9.0
Schooling	17	17.0
<b>Religion</b>		
Christian	87	87.0
Muslim	6	6.0
Others	7	7.0
<b>Tribe</b>		
Ijaw	39	39.0
Igbo	35	35.0
Hausa	4	4.0
Yoruba	5	5.0
Others	21	21.0

**Table 2:** Knowledge of hepatitis viruses B and C

Variables	Frequency (n)	Percent (%)
<b>Heard about hepatitis B or C</b>		
Yes	84	84.0
No	16	16.0
<b>If yes, how did you know</b>		
Hospital	31	36.9
Media	9	10.7
School	27	32.1
Friends/family	5	6.0
Religious body	8	9.5
<b>Have you been infected</b>		
Yes	2	2.0
No	98	98.0
<b>Can the infection be treated</b>		
Yes	100	100.0
No		
<b>Who does it infect more</b>		
Males	16	16.0
Females	3	3.0
Children	1	1.0
Adults	12	12.0
Anybody	68	68.0
<b>How is the infection treated</b>		
Medical	72	72.0
Traditional	21	21.0
Fasting/prayer	1	1.0
Goes on its own	6	6.0
<b>Have you been vaccinated</b>		
Yes	46	46.0
No	54	54.0
<b>If no, what is your reason</b>		
Cost	48	88.9
Distance to health facility	2	3.7
It is not important	3	5.6
Attitude of health personnel	1	1.9



**Table 3:** Factors influencing the infection of hepatitis viruses B and C

Variables	Frequency (n)	Percent (%)
<b>Hepatitis is contracted by</b>		
Blood	37	37.0%
Sex	51	51.0%
Faeces	2	2.0%
Urine	1	1.0%
Cough	1	1.0%
Saliva	1	1.0%
Others	7	7.0%
<b>What are the risk factor hepatitis</b>		
Alcohol	8	8.0%
Smoking	13	13.0%
Smoked fish	4	4.0%
Canned food	1	1.0%
Lifestyle	71	71.0%
Others	3	3.0%

**Table 4:** Prevalence of HBV, HCV and VDRL

Variables	Frequency (n)	Percent (%)
<b>Hepatitis B virus</b>		
Positive	4	4.0
Negative	96	96.0
<b>Hepatitis C virus</b>		
Positive	2	2.0
Negative	98	98.0
<b>Venereal disease research laboratory</b>		
Positive	1	1.0
Negative	99	99.0

**Table 5:** Association between venereal disease and the hepatic infections

Variable	Chi-square	Degree of freedom	p-value	Fisher's exact
Hepatitis B virus	0.042 <sup>a</sup>	1	0.837	0.96
Hepatitis C virus	0.021	1	0.886	0.98

Table 2. Knowledge of hepatitis viruses B and C

In table 2 above, it was observed that most of the respondents have heard about the HBV and HCV, 84.0%, with most of them hearing about it in the hospital, 36.9%, followed by school, 32.1%, while the least heard from friends/family members, 6.0%. However, 98.0% had not been infected by any of the hepatic viruses, with all of them affirming that the viruses can be treated, 100.0%, while 68.0% responded that it can affect anybody, while only 1.0% mentioned it can affect children. Similarly, 72.0% of the respondents agreed that the viruses can be treated medically, but 1.0% person mentioned its treatment by fasting/prayer, with less than half, 46.0% taken vaccination against the viruses and those that have not been vaccinated was mostly due to the cost, 88.9%, while the least was due to attitude of health personnel, 1.9%.

The factors that influence the transmission of hepatitis

B and C viruses, according to the respondents in this study, is presented in table 3 above. It shows majority of them responding to sex, 51.0%, followed by blood transfusion or blood products, 37.0%, while lifestyle is the most reported risk factor for contracting the viruses, 71.0%, followed by smoking, 13.0%, and the least being canned foods, 1.0%.

Table 4 above presents the prevalence of HBV, HCV and VDRL among HIV-infected patients on HAART. Almost all the respondents were negative for the viruses; HBV (96.0%), HCV (98.0%) and VDRL (99.0%).

Table 5 above is the association between the hepatic viruses to venereal disease. It shows that HBV (0.042) and HCV (0.021) were statistically significant with the acquisition of venereal disease, which in this case, is the HIV.

## Discussion

This study recorded more female participation, 77.0%, majority had secondary school education, 59.0%, mostly Civil servants, 43.0%, mostly Christians, 87.0% and mostly Ijaw by ethnic inclination, 39.0%. The finding about more female participation in this study is not surprising, due to the known fact that the female reproductive tract is more receptive and bound to be more impact in infections contracted through sexual intercourse, such as HIV, HBV and HCV. Apart from this, females tend to be more pursuant to seek healthcare than their male counterparts, except the health condition has truly impacted the males, before they reluctantly seek health care. This is in confirmation by the WHO (2019) that women tend to seek help more for their health needs, as well as, being more infected with venereal diseases that are usually, long-standing, owing to the long duration associated with it before clinical symptoms begin to manifest, sometimes, years.

This study also observed that majority of the respondents have heard of HBV and HCV, 84.0%, with many hearing of it in the hospital, 36.9% and the least heard from friends/family members, 6.0%. HIV, like HBV (usually commonly known as hepatitis), are widespread disease conditions, especially, the former, and majority of the populace are aware of it, due to the fact the fact that information about them are ubiquitous. The findings of HIV and HBV in this study are in tandem with those of Ndifontiyong et al. (2021) and Naghavi et al. (2015) respectively. It was also observed in this study that 98.0% of the respondents had not been infected by any of the hepatic viruses, with all of them affirming that the viruses can be treated, 100.0%, with only 1.0% indicating infection in children, while 72.0% confirmed the efficacy of medical treatment for the viruses and 46.0% had been vaccinated against the viruses. This agrees with the report by Highleyman (2010) that although HBV and HCV are in existence and widespread, their prevalence

is considerably low in the general population (McMahon, 2005).

We also observed that shows majority of our study participants responded to sexual intercourse being the main route for transmission of the hepatic viruses, 51.0%, followed by blood transfusion or blood products, 37.0% and lifestyle is the most common risk factor for contracting the viruses, 71.0%. The findings of this study disagrees with that of Liaw et al. (2010), which reported that the parenteral route is the most dominant route of transmission of HBV, HCV and HIV globally, especially, through mother to child transmission during delivery and breastfeeding, while other routes, like sexual intercourse, are also common. The prevalence of HBV, HCV and VDRL among HIV-infected patients on HAART in this study was 96.0%, 98.0% and 99.0%. This is an attestation of the finding by McMahon (2005) that the global prevalence of the hepatic viruses was low in the general population. Similarly, we observed statistical significance of HBV (0.042) and HCV (0.021) venereal diseases, such as HIV. This, we believe to be a common trend, since they mostly share common routes of transmission. However, it confirms the reports by Xie et al. (2016), Milazzo and Antinori (2014), and Lavanchy (2004).

### Summary/Conclusion

There seems to be low prevalence of the hepatic viruses, even among HIV infected persons in the general population, while the existence of a venereal disease may encourage or serve as risk factor for contracting the hepatic viruses, since they share similar routes of transmission. This, calls for more concerted efforts at educating the populace about the risk factors and common routes of transmission of these viruses.

**Conflict of Interest:** None.

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