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## Coinfection of HCV among HIV-infected patients: Cross-sectional study in rivers State, Nigeria

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### Abstract

**Background:** Hepatitis C virus (HCV) has emerged as the cause of the second major epidemic of viral infection after human immunodeficiency virus (HIV) within the past two decades. HCV is the cause of more than three-quarters of liver-related deaths in HIV-seropositive individuals and it is remarkable that today approximately one-quarter of HIV-infected individuals

**Aim:** this study aimed at determining the prevalence of coinfection patterns of HCV among HIV infected individual in Rivers State, Nigeria.

**Materials and methods:** A retrospective survey conducted on 350 HIV infected individual attending ART clinic at Rivers State University Teaching Hospital, Port Harcourt, Nigeria. Sociodemographic data were collected based on interviewer-based questionnaire, and clinical history was obtained from participants' medical records. Antibody analyses for HCV were done using ELISA method.

**Results:** The prevalence of hepatitis C virus coinfection among HIV positive individual was 6(4.0%), The prevalence of HCV and HIV positive individual with regards to age was high within the age of 21 -40 5(2.4%). Prevalence based on gender was females 4(1.1%) and males 2(1.4%), prevalence of HIV/HCV co-infection with respect to marital status was high among the single 6(4.9%), prevalence of HIV/HCV co-infection with respect educational status was high with tertiary 3(3.5%) than the secondary 3(1.6%). The prevalence among the different occupational groups, business had the highest co-infection rate (1.1%) followed closely by Working class (0.8%). Higher HIV/HCV co-infection was observed among those with CD4 cell count 350-499 cells/ $\mu$ l (4.6%).

**Conclusion:** However, the low burden of this hepatotropic virus coinfection calls for continued need to screen for HCV among individual infected with HIV before the start of ART.

**Keywords:** Antibodies; Coinfection; HCV; HIV; Rivers State; Nigeria

### 1. Introduction

Coinfection of hepatitis C virus (HCV) and HIV is an important public health concern, of the 33.4 million HIV positive people globally about 20.0% are coinfecting with HCV (UNAIDS, 2009; Soriano et al., 2010). In sub-Saharan Africa, about 2.6 million people living with HIV are coinfecting with HBV and 2.3 million people with HCV (Kourtis et al., 2012). Hepatitis C is recognized as one of the leading causes of chronic liver disease, and as a result mortality attributable to hepatitis C is expected to more than triple over the next two decades and to exceed the number of HIV related deaths (Rotman & Liang, 2009).

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Some studies have shown that HCV co-infection with HIV varies significantly across geographical regions, risk groups and type of exposure involved. Prevalence of HIV/HCV co-infection have been reported in South Africa, Nigeria and India, the top three countries with the greatest prevalence of people living with HIV (Saravan, 2007; Parboosing et al., 2008; Hamza et al., 2013; USAIDS, 2019). Other studies have shown that in HIV/HCV coinfecting groups, liver inflammation is more intense than in patients HCV monoinfected, and the results of this event are the rapid progression of liver fibrosis and progression to liver disease, as cirrhosis and hepatocellular carcinoma in the most serious cases (Chung et al., 2004; Danta et al., 2008).

Several studies have demonstrated that HCV-HIV coinfection is a relevant association in the clinical treatment of both HIV and HCV because this is a common coinfection due to the similarity in their transmission routes (Menezes et al., 2015; Silva et al., 2019). The existing literature has observed that HCV-HIV coinfection leads to a dynamic and rapid interaction between these two viruses because HCV/HIV coinfection can exacerbate the decrease in CD4+ T cell counts and over load the host's immune system, thus increasing morbidity or producing a higher risk of severe hepatic cirrhosis, severe liver fibrosis, and hepatocellular carcinoma (Rotman et al., 2019).

In a study carried out in southwest Nigeria in 2013, the prevalence rate of HCV among HIV patients in was found to be 23.3% (Mabayoje et al., 2013). In Nigeria, other studies carried out revealed a prevalence rate of co-infection of 3.3% and it was also noted that co-infection was associated with lower CD4 counts and by implication lower immunity (Sajadi et al., 2012). It was noted that in parts of Africa such as Botswana co-infection with hepatitis C was surprisingly rare compared to co-infection with hepatitis B (Patel et al., 2011). The prevalence of HIV in Gambia was 6.7% and HCV was 2.1% while the HIV and HCV co-infection rate was found to be 0.6% (Mabayoje et al., 2007).

HIV-infected patients stand the greater risk of being affected with many diseases (opportunistic infection) including hepatitis C in endemic regions like Nigeria, the aim of this study is to determine the prevalence of HCV antibodies among HIV-infected patients in Rivers State, Nigeria.

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## **2. Material and methods**

### **2.1. Study Area**

The study was carried out in Rivers state in Nigeria, in an urban setting with a population of 7,034,973.

### **2.2. Study population**

The study population included male and female individuals living with HIV that attend ART clinic at the Rivers State University Teaching Hospital, Military Hospital and Modern Primary Health Care Center, Rumuji. Three hundred and fifty (350) HIV-infected individuals were selected and participated in the study. Individuals included in the study were males and females confirmed and documented as being positive for HIV infection that are on ART. While individuals who decline and HIV negatives were not included in the study. A random sampling irrespective of age, gender and ethnicity was done to ensure that sampling was representative of Rivers State, Nigeria. Socio-demographic data such as age, sex, marital status, education and occupation and clinical data for every participant were obtained using a questionnaire.

### **2.3. Sample Collection and Preparation**

Blood samples (about 5 ml) were aseptically collected from the participants during routine investigations, after obtaining written informed consents from the participants. The samples were collected into sterile EDTA bottles and plasma samples were obtained after centrifugation. Samples were appropriately labelled and stored in two aliquots at -20 °C and -80 °C until analysis.

### **2.4. Detection of Hepatitis C Antibody (HCV-Ab)**

Serum samples were analyzed for HCV antibody using the ELISA kit (DIA.PRO Diagnostic Bioprobes, Italy). The tests were performed according to the manufacturer's instructions.

### **2.5. Data analysis**

Data were systematically analyzed as appropriate. Chi-Square test was done using SPSS (Statistical Package for Social Sciences) software.

### 3. Results

Three hundred and fifty patients who had sufficient retrievable data and already diagnosed as HIV positive were included in the analysis. Of the 350 patients, 6(4.0%) were positive for HCV antibody (Table 1). The majority of HCV positive patients were in age groups 21-40 (2.4%), females (2.0%), singles (4.9%), tertiary education holders (3.5%), and business owners (1.1%) as shown in Table 1. Furthermore, immunological markers analysis revealed that HCV seropositivity is more common with patients having CD4 count of 350-499 (4.6%), however, this difference was not significant ( $P = 0.07$ ) as shown in Table 1. Among all the variables tested, none was statistically associated with HIV/HCV coinfection except for marital status ( $P = 0.0008$ ) as shown in Table 1.

**Table 1** HIV/HCV Coinfection relating to their demographic characteristics and immunological markers

Variables	Number tested	HCV +ve	%HCV +ve	Chi-square test
<b>Age groups (years)</b>				
≤20	35	0	0.0	$P = 0.45$
21 -40	206	5	2.4	
≥41	109	1	0.9	
<b>Sex</b>				
Males	147	2	1.4	$P = 0.66$
Females	203	4	2.0	
<b>Marital Status</b>				
Married	227	0	0.0	$P = 0.0008$
singles	123	6	4.9	
<b>Educational Status</b>				
Primary	54	0	0.0	$P = 0.40$
Secondary	190	3	1.6	
Tertiary	86	3	3.5	
None	20	0	0.0	
<b>Occupations</b>				
Student	48	1	0.3	$P = 0.56$
Business	191	4	1.1	
Working class	145	1	0.8	
<b>CD4 (Cells/<math>\mu</math>l)</b>				
<200-349	162	3	1.9	$P = 0.07$
350-499	65	3	4.6	
>500 above	123	0	0.0	
TOTAL	350	6	1.7	

### 4. Discussion

HCV infection is one of the major diseases of mankind and a serious public health problem all over the world. The objective of the current study was to determine the prevalence of HCV among HIV-infected individuals who attend antiretroviral therapy clinics in selected hospitals in Rivers State, Nigeria. On the other hand, many studies reported globally suggest that the presence of HIV infection increases the chances of HCV-liver-related diseases in HIV-HCV

coinfected patients (Chung, 2014; Gatti et al 2007). In the USA and Europe, the prevalence of HIV-HCV coinfection rate in some countries in sub-Saharan Africa ranges from 3.7-8.2% (Ayele et al., 2002; Karuru et al., 2005). The figure obtained in our study (1.7%) is lower than the range obtained in some countries in sub-Saharan Africa.

Among these patients it was discovered that the prevalence HIV/HCV co-infection was higher among ages 21-40 years. This observation agrees with the reports of Opaleye et al. (2016) and Anyanwu et al. (2020), who also found a higher prevalence in the age group 21-30.

Among these participants, it was discovered that the prevalence of HIV/HCV co-infection was higher among the females than the males, which contradicted the work by Amin et al. (2004) where the co-infection was higher in males.

Participants that were single had the highest co-infection in this study. This finding does not correspond with the reports of Mabayoje et al. (2013), who reported the highest prevalence in the married participants and investigation by Oshun and Odeghe (2019).

Educational profile of the patients revealed the highest co-infection rate to be among tertiary education holders.

Also, business owners constituted a higher HIV/HCV coinfection rate (1.1%) compared to other occupational groups. This value is lower compared to the work by Krishna et al. (2014).

Furthermore, the higher co-infection rates reported in patients with CD4 count of 350-499 cells/ $\mu$ l comparable to previous observations in Nigeria.

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## 5. Conclusion

A coinfection rate of 1.7% was obtained in this study. The study has further confirmed the presence of HIV/HCV co-infection in Rivers State, Nigeria. Despite the fact that the HIV/HCV co-infection rate of 1.7% obtained in this study is lower than the range obtained in other studies, it therefore, recommended that the HCV status of the patients be determined at point of entry and treatment instituted as appropriate. Further studies need to be carried out including determination of the actual hepatic damage caused by HIV/HCV co-infection.

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## Compliance with ethical standards

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### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of ethical approval*

All authors hereby declare that all experiments have been examined and approved by the University of Port Harcourt Research Ethic committee and have, therefore, been performed following the ethical standards laid down in the 1964 Declaration of Helsinki.

### *Statement of informed consent*

All authors declare that informed consent was obtained from all individual participants included in the study.

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