Prevalence of Hepatitis C Virus (HCV) seropositivity in a cohort of people living with HIV and AIDS in Abeokuta, Ogun State, Southwestern Nigeria

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Abstract: Viral hepatitis is also a major public health concern as hepatitis B virus (HBV) afflicts an estimated 350 million people, and hepatitis C virus (HCV) affects 150 million people worldwide. Therefore, this study was carried out to estimate the prevalence of HCV seropositivity in a cohort of people living with HIV and AIDS in Abeokuta, Ogun State, Southwestern Nigeria. In this cohort study, we collected blood samples from 183 HIV-positive patients between January 2012 and January 2013. Standard enzyme immunoassays were used to determine the serological prevalence of hepatitis C virus among HIV-positive individuals. Among the HIV positive individuals, we found that 43 patients were infected with hepatitis C virus. The overall HCV-HIV prevalence is 23.5%. The result showed a significance difference ($P<0.05$) between HIV-infected subjects and subjects positive to HCV. A higher percentage of males (28.9%) were infected with HCV than females (19.0%). The highest HIV prevalence (53.3%) was observed in age groups 55 years and above. The findings of this present study have demonstrated that co-infection of HIV and HCV is on the increase in Nigeria. Thus, the phenomenon of HIV and HCV co-infection is a cause for concern.
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1. INTRODUCTION

In Nigeria, it is estimated that 3.6% of the population were living with the virus in 2009, and the country had the world's second highest number of HIV and Acquired Immune Deficiency Syndrome (AIDS) related deaths (220,000) after South Africa (CIA, 2009; Tremeau-Bravard et al., 2012). Viral hepatitis is also a major public health concern as hepatitis B virus (HBV) afflicts an estimated 350 million people, and hepatitis C virus (HCV) affects 150 million people worldwide (WHO, 2011; Tremeau-Bravard et al., 2012). Both viruses are endemic in sub-Saharan Africa where an estimated 75 million people (over 35 million in Nigeria) live with hepatitis C virus (Madhava et al., 2002; Modi and Feld, 2007; Tremeau-Bravard et al., 2012).

Transmission of HCV predominantly occurs parenterally as a result of blood transfusion and exposure to blood derivatives, and the disease was first recognized in recipients of blood and blood products such as factor VIII and immunoglobulins. Transplanted organs and needles stick injuries have also been implicated in transmission. Mc Lean *et al.* (1997) reported transmission in drug misusers and patients in dialysis and surgical units. Sexual contact has also been incriminated in the transmission of HCV (Alter *et al*., 1982). There is also a growing evidence of vertical transmission (mother to baby).

HCV has been shown to have a worldwide distribution, occurring among persons of all ages, genders, races and regions of the world (WHO, 1996). Recent report by the World health Organization (WHO) estimated that 170 million persons, or about 3% of the world's population, are infected with HCV who are at risk of developing liver cirrhosis, cancer or both (WHO, 1996). Slightly different prevalence was reported from different regions of the world.

Co-infection with HCV increases the risk for hepatotoxicity of HAART and likelihood of onset of an AIDS-defining illness, compared with infection with HIV-1 alone (Greub 2000, Feld et al. 2005; Forbi et al., 2007). Although the HIV co-infection with HCV has been recognized worldwide in individuals exposed to blood-borne diseases, limited data are available on the extent of co-infection and effect of these viruses on the immune system in developing countries (Forbi et al., 2007). Nigeria belongs to the group of countries highly endemic for viral hepatitis (Odemuyiwa et al. 2001). Few studies have been done on HIV and HCV separately in Nigeria but the knowledge about the interrelationship between these viruses and their effect on the immune system remains unclear (Forbi et al., 2007).

A clearer picture of HIV and HCV prevalence in Africa is important in order to better educate the population, and control these epidemics. Studies are crucial and necessary to give us a better understanding of the epidemiology of the diseases in developing countries like Nigeria (Tremeau-Bravard et al., 2012). Although screening for HBV markers in patients was introduced over two decades ago, transfusion-associated hepatitis due to HCV has continued to occur (Egah *et al*., 2004). Therefore, this study was carried out to estimate the prevalence of HCV seropositivity in a cohort of people living with HIV and AIDS in Abeokuta, Ogun State, Southwestern Nigeria.

2. MATERIALS AND METHODS

2.1. Study Area

This study was conducted at the Federal Medical Centre, Idi-Aba, in Abeokuta, the capital city of Ogun State, Southwest Nigeria between January 2012 and January 2013.

2.2. Study Population

A total of one hundred and eighty three HIV-infected individuals were enrolled in this study. Of which, 83 were males and 100 were females. Subject were confirmed HIV-infected, ages 15 years and above. The ethical approval was granted by the Ethical Review Committee of the hospital. Informed consent was obtained from each patients and relevant confidentiality was maintained throughout the study.

2.3. Sample Collection

One hundred and eighty-three (183) blood samples were collected for this study. Venous blood was obtained into non-anticoagulated tubes. The samples were centrifuged at 2000 resolution per minutes (rpm) for 5 minutes to obtain sera. The sera were stored at -20^{o}C for serologic assay of HIV and HCV.

2.4. Serologic Assay

SD HIV-1 and HIV-2 screening kit (manufactured by Bioline Standard Diagnostic Inc, Korea) was used in this study. This is an immunochromatography (rapid) method for quantitative detection of antibodies of all isotopes (IgG, IgM, IgA) specific to HIV-1 and HIV-2 simultaneously in serum. Red colour in the control and patient windows indicated a positive result while presence of the red colour in the control and its absence in the patient window indicates a negative result.

Each serum sample was screened for antibodies to HCV using the membrane based immunoassay technique (ACON Laboratories, Inc. San Diego, USA). The test line region of the strip had been pre-coated with recombinant HCV antigen. Both are based on chromatographics capillary migration to form colour line. The presence of the colour line indicated a positive result while the absence indicated a negative result.

2.5. Data Analysis

The study was carried out and the proportion of subjects with HIV and HCV status were calculated. The prevalence level of HIV and HCV were cross tabulated with age and sex. Relevant chi-square statistics were computed using SPSS 20.0 window packages to accompany each cross tabulation.

3. RESULTS ANALYSIS

One hundred and eighty-three (183) HIV-infected subjects were examined in this study (Table 1 and 2). Of which, 83 (45.4%) were males while 100 (54.6%) were females. Table 1 shows the prevalence of HCV amongst HIV-infected subjects in relation to sex. The sex-specific prevalence showed that males had higher prevalence of HCV (28.9%) than females with 19.0% prevalence for HCV. However, there was significant difference ($P<0.05$) between sex and HCV seropositivity among HIV-infected subjects.

Table 1: Prevalence of HCV amongst HIV-Infected Subjects in relation to Sex

Sex	No. Tested (%)	No. Positive for HCV (%)
Males	83(45.4)	24 (28.9)
Females	100(54.6)	19 (19.0)
Total	**183 (100.0)**	**43 (23.5)**

The age-specific prevalence of HCV amongst HIV-infected subjects is shown in Table 2. It showed that HCV were higher in age group 55 years and above (53.3%) than other age groups. However, there was no significant difference ($P>0.05$) between age and HCV seropositivity amongst HIV-infected subjects.

Table 2: Prevalence of HCV amongst HIV-Infected Subjects in relation to Age

Age Groups (year)	No. Tested (%)	No. Positive for HCV (%)
15-24	33(18.0)	8 (24.2)
25-34	42(23.0)	6 (14.3)
35-44	64(35.0)	17 (26.6)
45-54	29(15.8)	4 (13.8)
55 and above	15(8.2)	8 (53.3)
Total	**183 (100.0)**	**43 (23.5)**

4. DISCUSSION

This study showed a high prevalence of HCV (23.5%) among HIV-positive subjects. The study also showed a higher prevalence of co-infections of HCV with HIV in males than their female counterparts.

There was also higher infection rates among the age group 55 years and above compared to other age groups. This is in agreement with previous reports in Northern Nigeria (Nwokoedi *et al*., 2006) and elsewhere (Lincoln *et al*., 2003; Michael *et al*., 2012). Ruan et al. (2004) reported 71.0% of intravenous drug abusers (IDAs) in China had antibodies to HCV. HCV—HIV co-infection among IDAs was 11.3% in a study by Ruan et al. (2004). Kaur and Marshalla (1998) screened 233 serum samples for HCV and found that 0.8% for HCV. Garg et al. (2001) evaluated blood donors for HCV and the incidence of HCV was 0.29%. Nanu et al. (1997) screened blood donors and reported that HCV rates to be 1.49% among donors, and those with multiple infections were uncommon. Patel (2004) screened blood donors in Mumbai over a 6-year period, from 1994 to 1999, and found that 0.78% had antibodies to HCV. Gupta et al. (2004) screened blood units in Ludhiana, during the period 2001—2003 and reported that 1.09% were HCV positive.

The finding of 23.5% prevalence rate of HCV in this study further confirm the presence of hepatitis C infection in Nigeria (Mutimer *et al*., 1994; Mwangi, 1999; Egah *et al*., 2004). Forbi et al. (2007) found an HCV seroprevalence rate of 11.1% in the group of HIV-1 infected individuals sampled. Previous studies in Nigeria had reported an overall HCV prevalence of 2.9% among blood donors in Rivers state of Nigeria (Kaote et al. 2005). Agwale et al. (2004) had recorded an HCV seroprevalence rate of 8.2% among HIV infected Nigerians. There is a clear indication of increased HCV infection in HIV infected individual in Nigeria. It is known that HIV/HCV co-infected individuals accelerate rapidly to end-stage liver disease, AIDS defining clinical event and death (Greub 2000, Monga et al., 2001). Unfortunately at this time, no effective vaccine has been developed against HCV infection. Forbi et al. (2007) reported a case of a 35 years old female client co-infected with HIV and HCV who virologically failed therapy (CD4+ decline from 199 to 66) after four months on HAART. Forbi et al. (2007) also recorded that, the rate of increase in CD4+ cells post-HAART does not change in HIV and hepatitis coinfection but HCV appears to hinder virological response to therapy. Although there have been case reports of clearance of HCV viraemia after initiation of HAART (Ranieri et al. 2003), majority of available data indicates that HAART results in net increase in HCV viraemia (Chung et al. 2002). Forbi et al. (2007) have recorded that 7.2% of individual do have triple co-infection with HIV/HBV/HCV.

Gender-specific prevalence showed that males (28.9%) had higher seropositivity for HIV-HBV co-infections than their female counterparts with 19.0% prevalence. The difference was however, significant ($P<0.05$); the reason for this difference might be due to lesser number of males in this study. In this study, more females than males were infected with HIV only. This gender disparity is consistent with the sex distribution seen in other studies in Nigeria and reflects the national distribution where a little over 55% of people infected with HIV are women (Otegbayo et al., 2008; Adewole et al., 2009; Ogbuji and Oke, 2010; Aliyu et al., 2010; Tremeau-Bravard et al., 2012). This is comparable to what was reported in a study by Tremeau-Bravard et al. (2012) that more women than men were infected with HIV only. However, in this present study, more males (28.9%) are co-infected with HIV and hepatitis than females (19.0%). This distribution has been also found in other parts of Nigeria (Uneke et al., 2005; Forbi et al., 2007; Tremeau-Bravard et al., 2012), and could be explained by the fact that the male population is more prone to have multiple sexual partners than females (NCCA, 2001; Tremeau-Bravard et al., 2012).

The age distribution in our study does not vary between the HIV and HIV/hepatitis population. Almost half of the studied population is in the 35-44 years age group, which mirrors the overall demographic in Nigeria (CIA, 2009; Tremeau-Bravard et al., 2012). Analysis of the age related prevalence of HCV in this study showed that age group 50 years and above had the highest prevalence of 53.3% compared to other age groups. This agrees favourably with the findings of Okonko et al. (2012) who reported a higher prevalence of HCV among older age group 40 years and above. This pattern indicates that most HCV transmission occurred in the recent past (i.e. 20-40 years ago), primarily among young adults. This slightly agrees with the pattern observed in the United States where highest prevalence was observed among persons 30-49 years old (Alter *et al*., 1999; Okonko et al., 2012). Another pattern that emerges is observed in Egypt, where the prevalence of HCV infection increases steadily with age and high rates of infection are observed among persons in all age groups (Mohammed *et al*., 1996; Okonko et al., 2012). The reason for these observed differences in the prevalence pattern of HCV infection in different parts of the world is not immediately known to this study.

5. CONCLUSION

The present study have demonstrated that co-infection of HIV and HCV is on the increase in Nigeria. Thus, the phenomenon of HIV and HCV co-infection is a cause for concern. The medical community in Nigeria therefore needs to be alert to this phenomenon as smart treatment options would need to be instituted in such individuals if treatment is to be meaningful.

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