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# Hepatitis B and C Co-Infections among HIV-1 Infected Patients Attending the Academic Model Providing Access to Healthcare Clinic, Kenya, 2014

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## Abstract

Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are blood borne viruses that can cause chronic liver disease leading to liver cirrhosis and hepatocellular carcinoma (HCC). More than 2 billion people have been infected with HBV with over 350 million being chronic carriers. About 3% of the world's population is infected with HCV with about 170 million being chronic carriers. Co-infections of both HBV and HCV with HIV occur regularly due to shared transmission routes. Co-infections with HIV impact on the natural history, progression and diagnosis of hepatitis as well as morbidity and mortality of those infected. Distribution patterns continue to vary across different geographic regions

The objective of this study was to determine the prevalence of HIV, HBV and HCV co-infections among HIV patients attending The Academic Model Providing Access to Healthcare (AMPATH), Eldoret, Kenya.

Ethical approval was obtained from the Moi Teaching and Referral hospital Ethical committee. 5ml of blood was obtained by venipuncture from consenting volunteers and screened with the ELISA tests for detecting HBV surface antigen (HBsAg) and anti-HCV antibodies. Statistical analysis was done using SPSS version 20.0.

From a total of 124 subjects, fifty three (42.28%) were male and 71 (57.72%) were female. Seven (5.7%) had HIV/HBV co-infections while two (1.6%) had HIV/HCV co-infections. Five (7.0%) females and two (3.8%) males had HIV/HBV co infections. One male (1.9%) and one female (1.4%) had HIV/HCV co infections. There were no triple viral co-infections.

Although the HBV and HCV co-infections with HIV were reported to be low among the baseline population, the prevalence rates may be higher among the patients who have been infected with HIV.

## Introduction

Human immunodeficiency virus (HIV), Hepatitis B virus (HBV), and Hepatitis C virus (HCV), are the most common chronic viral infections. They share similar transmission routes including sexual, blood-blood contact, and injecting drug usage [1,2].

Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are blood borne viruses and are major causes of chronic liver diseases, in particular liver cirrhosis and hepatocellular carcinoma [3]. Infections with HBV and HCV are very common among HIV patients due to the shared transmission routes [4]. Co-infections with HIV impacts the natural history, progression, diagnosis, morbidity as well as mortality [4,3]. Approximately one third of deaths occurring in HIV are as a result of liver diseases that may be a result of HBV and HCV co-infections, alcoholism, hepatic tuberculosis or due to other effects of antiretroviral therapies [5].

Co-infections of HIV and HBV result in chronic HBV as well as a rapid progression to the advanced liver disease due to drug related hepatotoxicity and hepatitis reactivation [6-8]. Similarly, co-infections of HIV with HCV result in a higher viral load and a rapid progression to advanced liver disease [4]. It is less certain that HCV or HBV is capable of altering the natural progression of HIV disease. According to WHO (2013), infections with HBV may occur during childhood and over 90% of those with chronic HBV develop severe liver complications. More than 2 billion people have been infected with HBV at some point in their lives. Of these, about 350 million have developed chronic disease and/or have become carriers [9]. There are about 4 million new cases of acute HBV infections every year of which, 1 million die from chronic disease, cirrhosis or primary liver cancer [9,10]. The global prevalence of HCV is less known because of the asymptomatic acute infections. It is estimated that there is about 3% of the world population infected with HCV and that about 170 million of those infected are chronic carriers with higher chances of developing hepatocellular carcinoma or cirrhosis [9].

In Africa, HBV, HCV and HIV infections are endemic. Their rates are variable among different African countries. HCV and HBV prevalence rates vary from 1-26% and 3-20%, respectively [11-13]. HIV infection in Kenya has been well documented, however, there is limited data on HBV and HCV co-infections with HIV [14]. In the general population [14], reported a HCV prevalence of 22% among

drug users in Kenya while Karoney and Siika (2013) report the prevalence of HCV in Kenya to be at 0.1%. This study was done to determine the prevalence of Hepatitis B and C co-infections with HIV among baseline HIV positive patients accessing AMPATH HIV clinics. Such patients are at a high risk of a rapid disease progression coupled with development of liver cirrhosis and hepatocellular carcinoma if co-infected with hepatitis B or C [15].

## Materials and Methods

The study was conducted at AMPATH, Eldoret along Nandi road where HIV patients come for critical care. Between March and June 2014, a cross sectional study was carried out involving one hundred and twenty four (124) consenting HIV-1 infected patients. The study focused on baseline HIV patients who were reporting to the clinic for the very first time and who had not been treated elsewhere, these are subjects who had been recently diagnosed with HIV. The volunteers were recruited after providing written consent. Volunteers were given facts about the objectives of the study and informed consent was affirmed by signing a consent form. The range in years was between 18-60 years. They were recruited through systematic random sampling from among the baseline patients visiting AMPATH clinics. 5 ml of blood was drawn aseptically by venipuncture into 10 ml vacutainer tubes (Becton Dickson, San Jose, Carlifornia) for hepatitis serology tests. Centrifugation was done and serum for the serological assays for hepatitis B and C disease markers was stored at -20°C until the time of the assays. Determination of Hepatitis B antigen (HBsAg) and anti-Hepatitis C virus IgG antibody was done using Enzyme linked immunosorbent assay (ELISA) kits (Hepanostika, Murex Biotech Ltd, Dartford, UK) and Murex anti-HCV kit for Hepatitis C virus as per the manufacturer's instructions.

### Ethical considerations

This study was ethically approved by the Moi University School of Medicine (MU-SOM)/Moi Teaching and Referral Hospital (MTRH) Institutional Research and Ethics Committee (IREC) ref no. IREC/2013/179 before it was implemented.

### Data management and analysis

Data obtained was entered into the computer. Data analysis was done using the statistical package for social sciences (SPSS) version 20.0. The prevalence of HBV and HCV co infections with HIV was expressed in percentages. Pearson's chi square was used to test the association between age and HBV or HCV co-infection.

## Results

From among the 124 participants who consented to the study, fifty three (42.28%) were male and 71 (57.72%) were female. The range in years was 18-60 with a median of 43 yrs. There were nine HIV/Hepatitis B or C co-infections. One hundred and fifteen were HIV monoinfected. Seven (5.7%) of 124 subjects had HIV/HBV, two (1.6%) of the 124 subjects had HIV/HCV. Females had the highest prevalence rates of HIV/HBV co-infections with five (7.0%) of the female population with a mean age of 39.3 ± 14.4 having HIV/HBV co-infections compared to two (3.8%) of the male population with a mean age of 44.6 ± 7.7. One (1.9%) male and one (1.4%) female HIV/HCV co- infections. There was no dual presence of HBsAg and anti HCV.

| Categories (n=124) | Male | Female | HIV-1/HBV | HIV-1/HCV | p-value |
|---|---|---|---|---|---|
| Mean Age (yrs) | 42.3 | 39.7 | 41.9 | 53.1 | P>0.05 |
| HBV (%) | 2/7 (28.6) | 5/7 (71.4) | - | - | - |
| HCV (%) | 1/2 (50) | 1/2 (50) | - | - | - |
| Patients n (%) | 52 (42.7) | 71 (57.3) | 7 | 2 | - |

**Table 1:** Characteristics of HIV positive, HIV/HBV and HIV/HCV co-infected subjects.

## Discussion

Studies of HIV, HBV and HCV are essential in devising preventive and treatment strategies as well as in planning health programmes. Studies have shown that the African continent has been worst hit by the HIV pandemic while it has the second highest prevalence of HBV and HCV after Asia [16]. The infection rates of HIV and both Hepatitis B and C differ according to various factors such as socioeconomic status, disease burden in the society and other risk factors that vary between continents, countries and even within different regions in the same country [11]. Access to anti-retroviral drugs has greatly improved the life expectancy of people living with HIV/AIDS. Due to its limited resources, Kenya is vulnerable to threats of HIV/AIDS and other viral infections including HBV and HCV. Co-infections of HIV with HBV and HCV will have a significant contribution to morbidity and mortality within the HIV positive population over the coming years [16].

This study examined the presence of HBsAg and anti-HCV IgG antibodies among HIV positive subjects seeking treatment at the Academic Model Providing Access to Healthcare (Ampath). The study shows a HBsAg and anti-HCV positivity of 7(5.7%) and 2(1.6%) respectively. From the results, co-infection levels of HIV with HBV were reported to be at 5.7%. This is due to the fact that both viruses share common transmission routes, early and unprotected sexual relations and multiple sexual partners. Regarding the criteria taken for the selection of those who were included in the study, the prevalence rates of co-infection with HBV may be much higher in the general population of those with HIV as the study focused on only baseline patients seeking healthcare to improve their CD4 counts. These HIV/HBV co infection rates were found to be in agreement with other results done within Kenya [17-19], Zambia [20], and Nigeria [3]. Compared to studies done on other patients such as the prevalence of HBV in HIV subjects with liver failure, the observed prevalence in this study was low as opposed to the 55.8% observed by Okoth et al., (2006) [21]. The results were also low comparable to those obtained in Botswana and Nigeria [22], and higher than those found in countries such as Rwanda and Uganda [23] as well as in South Africa [24,25]. These diverse prevalence rates in multiple countries are associated with a variety of factors such varying sample sizes for the study, the diverse population groups from among whom the study subjects were selected or from the different test kits with varying sensitivity or specificity.

HIV/HCV co-infections were reported at 1.6% which compares to other results found in other Kenyan studies such as 1.1% [18], Zambia 2.2% [20] and Rwanda 4.9% [23] are reported. However, the results in this study contrasts with those found on HIV/HCV co infections done by Muriuki et al., 2013, in Kenya where a prevalence of 10% was

reported among the HIV subjects and by Kerubo et al., 2015 who got 0.46% from informal settlements in Kenya. Studies done in Tanzania [26,27] and Argentina [28] also had higher prevalences of HIV/HCV. Most anti-HCV studies use blood donors and other high risk groups thus may underestimate the real prevalence of the disease in the population. The differences in prevalence rates across different countries may have been due to the affinity of some studies to high risk groups such as injecting drug users.

The prevalence of HIV/HBV co-infection as per gender was found to be higher in women at 7.0% than in the male population at 3.8%. This higher rate of HIV/HBV among females may have been due to the fact that women of all ages are much more likely to have unprotected vaginal sex thus becoming infected with HBV and both HBV and HIV-1 infection share common epidemiological modes of transmission. Therefore, a higher prevalence of co-infection among women with known HIV-1 status compared to men is not surprising. HIV/HCV was found to be higher in male at 1.9% compared to women at 1.4%. This may have been observed because men are more likely to have multiple sex partners. These observations are in agreement with other studies done in Kenya [19], and Nigeria [29]. The limitation here was of the fact that detection of HCV was based on antibodies rather than its RNA. There were no double viral hepatitis co-infections with HIV observed in the current study. These finding is similar to those done in Kenya and Ethiopia which indicated a low rate of these trio infections [18,30]. Age had no significant association with the risk of one being infected with hepatitis B ($p > 0.05$), this agrees to the study published by Muriuki et al., 2013.

## Conclusion

HIV co-infections with HBV and HCV pose a major health risk if mitigation strategies are not put in place. There should be up to date disease surveillance of these infections that pose a problem to drug and vaccine development.

### Study limitations

This study had some potential limitations. First, it can be questioned if calculating a single prevalence rate for such a large and diverse region is useful. For treatment decisions it is important to take local epidemiological data into perspective. However, pooling data from different centers is relevant because it gives insights on the magnitude of the Hepatitis/HIV co-infection problems in the North Rift Region.

Second, in this study, positive HBsAg is used as a marker for HBV infection. Due to this, occult hepatitis B infections are overlooked. This means the true prevalence of HBV in the population may be underestimated.

In contrast to HBV, serology for HCV cannot be used to distinguish between active and spontaneously resolved infections. The actual HCV prevalence may therefore be lower if serology is used as the test to deduce HCV infection.

The limitations notwithstanding, this study presents a good basis for further larger studies that aim at improving patient care for those HIV patients who are co-infected with hepatitis B and C as well as aid in formulating health policies aimed towards mitigating the effects of co-infections.

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