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SERO PREVALENCE OF HEPATITIS B AND C VIRUSES AMONG HIV INFECTED PATIENTS IN A HIV CARE PROGRAM IN KENYA: A CROSS SECTIONAL STUDY
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ABSTRACT

Objectives: **This study was aimed at determining the sero-prevalence of hepatitis B and C among HIV infected patients at a HIV care program in Western Kenya Design: Cross sectional descriptive study.**
Setting: **HIV care program in Western Kenya.**
Subjects: **HIV infected individuals on follow up at the AMPATH (Academic Model Providing Access to Health care) clinic.**
Results: **A total of 247 HIV infected individuals were tested for HBsAg and anti HCV antibodies. The study population had a male to female ratio of 1:2 with the mean age of 39.3±10 years. Sixty seven per cent (67%) of the study participants were on antiretroviral therapy and the median CD4 cell count for all the patients was 224cells/ µl. The sero-prevalence of Hepatitis B was 9.7% and that of Hepatitis C was 1.6% with no dual infection observed.**
Conclusions: **The sero-prevalence of Hepatitis B observed represents high endemicity while that of Hepatitis C is low when compared with local and international.**

INTRODUCTION

Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immunodeficiency Virus (HIV) are among the top 10 leading causes of infectious disease worldwide. The number of people with chronic HBV infections is estimated at 370 million; HCV at 170 million and HIV at 40 million [1]. Amongst the HIV infected population, 2–4 million also have chronic HBV coinfection, while 4–5 million have concomitant HCV infection [2].

The national HIV prevalence estimate in Kenya for 2007 was 7.4% among adults aged 15 – 49 years. [3]. Due to increased access to Antiretroviral therapy (ART) there is increased survival of HIV patients. Hepatitis B and C have also gained recognition as causes of chronic liver disease among HIV infected patients and have been implicated among the major etiologies for drug related hepatotoxicity, accelerated fibrosis and flare-ups during therapy and the immune reconstitution phase [4-6]. The situation is compounded by the fact that HBV, HCV and HIV all share common routes of

transmission but differ in their prevalence due to geographic and socio-cultural variations and their efficiency of transmission [2]. HIV negatively influences the natural history of HBV and HCV infections by worsening the clinical picture. HBV co-infection translates into an eight fold increase in mortality; while HCV co-infection translates into a two-fold increased risk for cirrhosis [4, 6]. HIV positive patients with dual infection are increasingly being recognized. Due to the rise in liver related pathology it is important to ascertain the prevalence of these co-infecting etiologies [7]. There are few local and regional studies highlighting HBV and HCV co-infection in HIV with variations in the outcomes of previous studies, hence the need for this study. This study was aimed at determining the sero-prevalence of hepatitis B and C among HIV infected patients at HIV are program in Western Kenya and their socio demographic characteristics.

MATERIALS AND METHODS

This was a cross sectional descriptive study carried out between July to November, 2009 at the, AMPATH – Moi Teaching and Referral Hospital (MTRH) clinic following approval by both IREC (Institutional Research and Ethics Committee) – Moi University and the AMPATH research committee. AMPATH is a comprehensive care centre within the second largest referral hospital in Kenya, MRTH. AMPATH has enrolled over 160,000 HIV-positive patients in over 500 clinical sites in both urban and rural Kenya. Convenient sampling was used and 247 individuals meeting the study criteria were enrolled. Socio demographic data was collected using questionnaires and 2mls of blood was drawn for HBV and HCV serology. Hepatitis B and Hepatitis C markers were tested using ERBA™ ELISA kits to detect HBsAg and HCV antibodies.

Data collected was entered into SPSS version 6 for analysis. Confidence intervals and measures of central tendency were generated for continuous variables and frequency tables for discrete variables. The Chi squared test and Fisher's exact test were used for associations between categorical variables and a p-value of less than 0.05 was considered significant.

RESULTS

Blood samples were collected from 247 HIV infected patients. Of these, 82 (33.2%) were males and 165 (66.8%) females, the mean age was 39.3±10 years. Majority 129(52.2%) of these patients were married and 15 (9.1%) of the females were pregnant. The sociodemographic characteristics of the study population are shown in Table 1.

The study subjects were reviewed based on their WHO clinical staging and 33.3% were found to be in WHO stage 1 (n=82). The median CD4 count was 224cells/µl (IQR 112.5–376.3) with 58.7% having CD4 counts of greater than 200cell/µl and 94% had Karnofsky functional scores of greater than 80%. In terms of clinical staging 33% (n=8), 16.7% (n=4), 33% (n=8), 16.7% (n=4) of the hepatitis B virus (HBV) positive subjects were in WHO stage I, II, III and IV respectively; while 25% (n=1), 50% (n=2) and 25% (n=1) of the hepatitis C virus (HCV) positive subjects were in WHO clinical stage I, III and IV respectively. The clinical and therapeutic parameters are summarized below (Table 2)

Four percent (4%) of the general study subjects were jaundiced with a median total bilirubin of 42.9 IU/L (IQR of 16.9 - 42.9 IU/L).

Of the participants, 66.8% of the subjects were on ARVs (n=165), 16 these were HBV positive while 3 were HCV positive. Among the HBV positive subjects 14 were on Lamivudine, Stavudine and Efavirenz, while all the hepatitis C positive subjects were on

the same ART combination (Lamivudine, Stavudine and Efavirenz). Among the Hepatitis B and Hepatitis C positive subjects 15 (62.5%) and 4 (100%) respectively were on other drugs notably cotrimoxazole, fluconazole, dapsone, isoniazid, multivitamins and anti-tuberculosis medication. The prevalence of HBsAg was 9.7% while that of Hepatitis C was 1.6%; no HBV/HCV co-infection was observed.

The risk factors evaluated for association with HBV and HCV infection included: alcohol consumption; intravenous drug use; history of imprisonment; sexual activity; condom use; both male and female circumcision; use of unsafe injections; scarification; tattooing and history of blood transfusion. No statistical significance was observed for these parameters. (Table 3)

Table 1
Socio-demographic characteristics of the study population

Socio-demographic characteristic		Study Population N=247 (%)	Hepatitis B positive n= 24(9.7%)	Hepatitis C positive n=4 (1.6%)
Gender	Male	82(33.2%)	9(37.5%)	2(50%)
	Female	165(66.8%)	15(62.5%)	2(50%)
Marital status	Single	66(26.7%)	4(16.7%)	2(50%)
	Married	129(52.2%)	14(58.3%)	2(50%)
	Polygamous	19(7.7%)	1(4.2%)	0
	Widowed	33(13.4%)	5(20.8%)	0
Pregnant women (n=165)	Yes	15(9.1%)	1(7.1)	0
	No	150(90.9%)	14(93.3%)	2 (100%)

Table 2
Clinical and therapeutic parameters

Clinical/therapeutic Parameter		Study population N (%)	HBV Positive n (%)	HCV Positive n (%)
ARV drug use	Yes	165 (66.8)	16(66.7)	3(75)
	No	82 (33.2)	8(33.3)	1(25)
Other drugs	Yes	151(61.1)	15(62.5)	4(100)
	No	96(38.9)	9(37.5)	0(0)
WHO staging	I	81(32.8)	8(33.3)	1(25)
	II	35(14.2)	4(16.7)	0 (0)
	III	78(31.6)	8(33.3)	2(50)
	IV	53(21.4)	4(16.7)	1(25)
CD4 Median (IQR)/µl		224 (113 – 373)	215 (66 - 284)	11 (8 - 172)
CD4 % (Median) (IQR)		15 (9 - 21)	13.5 (6 - 18)	1 (1 - 14)
ALT (Median) (IQR)		26.7 (17 – 42.3)	23.2 (13.6 -56.6)	17.7 (8.9 - 278)

Table 3
Associations between patient characteristics, HBV and HCV infection

Factor	Hepatitis B Yes	No	P value	Hepatitis C Yes	No	P value
Sex						
Male	9	73	0.638	2	80	0.472
Female	15	150		2	163	
Marital status			0.434			1
Single	4	62		2	64	
Monogamous	14	115		2	127	
Polygamous	1	18		0	19	
Widowed	5	28		0	33	
Alcohol consumption						
Yes	4	69	0.166	0	73	0.322
No	20	154		4	170	
Use of intravenous drugs						
Yes	0	1	1	0	1	1
No	24	222		4	242	
Prior history of imprisonment			1			0.47
Yes	3	33		1	35	
No	21	190		3	208	
Sexual activity over the past 6months						
Yes	14	150	0.373	2	162	0.604
No	10	73		2	81	
Condom use						
Yes	12	97	0.666	2	107	1
No	12	126		2	136	
Circumcised						
Yes	11	78	0.371	2	87	0.621
No	13	145		2	156	
Unsafe or unwarranted injections						
Yes	0	9	0.606	0	9	1
No	24	214		4	234	
Tattoos and scarification			1			1
Yes	0	5		0	5	
No	24	218		4	238	
Blood transfusion						
Yes	2	24	1	1	25	0.361
No	22	199		3	228	

DISCUSSION

The sero-prevalence of HBV and HCV in this study was 9.7% and 1.6% respectively. Based on the American Association for the Study of Liver Diseases (AASLD) guidelines the prevalence of hepatitis B in this study is representative of high endemicity [8]. Similarly, based on an estimated global prevalence of 3% for HCV, the hepatitis C prevalence in this study was low [9]. Comparable studies have yielded variable outcomes with a number of European, American and regional studies reporting inverse trends characterized by high HCV prevalence and low HBV prevalence [1013]. None of the study subjects had dual HBV and HCV co-infection however some local and regional studies have documented this phenomenon [14-16]. Triple infection with HBV, HCV and HIV is a rare phenomenon with very low prevalence ranging between 0.2-1%. [12, 17-20].

The high prevalence of Hepatitis B in this study may be attributed to the similar mode of heterosexual transmission as is HIV 42.1% of the participants had multiple sexual partners and more than half of this entire population reported not using condoms. Male circumcision is known to have a role in reducing the sexual transmission of HIV while female circumcision has been implicated among the factors increasing HIV transmission. In this study 79.3% of the male subjects and 14.5% of the female subjects were circumcised, this is less than the observations made during the 2003 Kenya demographic and health survey whereby 86.7% of the men and 44.8% of women in the Rift valley were circumcised [21]. Patients recruited into this study were predominantly from Rift Valley. The lower circumcision rates among males may be attributed to the diverse cultural mix due to rural to urban migration in the study area and may have a bearing on the heterosexual spread of Hepatitis B, especially when it is considered that HBV is transmitted more efficiently than HIV. The increased risk from non-circumcision may have contributed to the high prevalence observed. Other known risk factors for Hepatitis B considered in this study include low level of education, unsafe injections and scarification, blood transfusion and low vaccination rates against hepatitis B. There were however no significant associations for such associations.

Lamivudine and Tenofovir are both effective in suppressing HBV replication. Both drugs are used in HIV/HBV co-infection and sudden withdrawal may lead to flare ups [22]. This study was however not powered to investigate the correlations between Lamivudine/ Tenofovir and Hepatitis B infection. The low prevalence of HCV may be attributed to the rapid progression to death of HCV co-infected HIV positive individuals and hence only few may have been diagnosed in the study [9]. CD4+ cell counts of less than 200cells/µl were observed in 41.3% of the study population among whom four participants had Hepatitis C; low CD4+ counts have been attributed to result in false negative results for HCV and this may also have contributed to the low prevalence observed though this effect may be negligible owing to the high sensitivity of the assay method used [23, 24].

There were few reported cases of potential parenteral modes for hepatitis C transmission with only 0.4% of the study population reporting intravenous drug use, 5% confirming the presence of tattoos and 9% reporting a history of unsafe injections. The low frequency of these modes of potential spread may account for the low overall prevalence of hepatitis C. Scarification featured prominently among the hepatitis C positive subjects; probably accounting for their infection, the small sample size could however not accommodate for inferential statistics. It is known that traditional rituals involving scarification are not done under conditions

of strict hygiene and cases of sharing instruments amongst the ritualists have been reported, this is a clear path of transmission for both hepatitis B and C.

Only one person from among those with hepatitis C infection had ever been transfused with blood however due to small sample sizes no significant associations were established for this risk factor. The fact that blood in Kenya is screened before transfusion also lends credence towards the unlikelihood of blood transfusion being a significant portal of Hepatitis C transmission. These are however potential areas of future scientific enquiry in this setup.

The age distribution in this study was characterized by a modal class of less than 40 years and was similar to that observed at the Kenyatta National Hospital [25], Aga Khan Hospital (Nairobi) [15] and in Nigeria [26]. This age similarity confirms that irrespective of the greater than two decade gap with the Kenyatta hospital study the age related risks for hepatitis B may still be similar.

HBV and HCV infection especially when chronic are not characterized by a marked rise in serum ALT; in this study the ALT range was between 17–42.3 U/l for the whole study population. Thus ALT is not a useful surrogate marker for chronic hepatitis [4]. In a Kenyan study of 2241 women attending antenatal clinic observed that9.3% of the women were positive for HBV[27], in this study only one hepatitis B positive pregnant woman was found translating to a prevalence of 7%, the study population was however too small to allow for any statistical inference.

HBV vaccination is protective for hepatitis B infection, and it was noted by Harania et al that no patient with prior hepatitis B vaccination developed HBV infection [15]. In this study 4 (1.6%) of the study subjects had been vaccinated for HBV and one among them had hepatitis B infection. This is a low vaccination uptake that may not allow for meaningful inferences; however it lends support for vaccination of HIV positive patients against HBV. [28].

STUDY LIMITATIONS

Data components that relied on clinical chart review were limited by availability in the AMPATH medical records system. They included the initial CD4+ cell counts, ALT values, ARV regimes and the WHO clinical stage of the participants. Low CD4+ counts of less than 200cells/µl among 41.3% of the study population may have resulted in false negatives for HCV and hence understated the prevalence. A convenience sample was used in this study that may introduce selection bias.

The lack of association between the described patients' characteristics and the described outcomes could have been due to a small sample size

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COMPETING INTERESTS

The authors declare that they have no competing interests

AUTHOR CONTRIBUTIONS

All authors participated in the conception and design of the study, data collection and analysis, interpretation of data, drafting and approval of the final manuscript.

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