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Prevalence of Hepatitis B Virus among VCT and PICT Clients in St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

Haftamu Weldesenbet[a1] Daniel Asrat[b] Yimtubezinash W/Amanuel[c]

Abstract
Background: -Hepatitis B virus is one of the most common sexually transmitted infections. Although HBV and HIV have the similar route of transmission, screening services for HBV are not common in most of the voluntary counseling and testing centers (VCT). Therefore, more information is required on prevalence of HBV in VCT and PICTcenters, and the rate of co-infection of HBV and HIV.**METHODS:** A cross-sectional study was conducted from November 2011 to February 2012 in St. Paul's Hospital Millennium Medical College. 292 consecutive samples were collected using convenient sampling method from PICT and VCT clients. Data on socio-demographic characteristics and sexual behaviors were collected using a questionnaire. Blood specimen was tested for the presence of Hepatitis B surface antigen and the data was analyzed using version16 SPSS software.**Results**: The prevalence of HBV was 14.7%. Hepatitis B Virus prevalence among HIV positive clients was 25% while among HIV negative was 14.3%. Sex which is demographic data is statisticallysignificant (p=0.02).**Conclusion**: The prevalence of HBVis 14.7% and one fourth of the HIV positive attendants seen in the PICT and VCT centers have HBV and HIV Co-infections.
Keywords: Co-infection, HIV, HBV, VCT, PICT, ADDIS ABABA, ETHIOPIA

Full list of author information is available at the end of the article

1. BACKGROUND OF THE PROJECT

1.1. HEPATITIS B VIRUS (HBV)

Hepatitis B virus is one of the most common sexually transmitted infections. It occurs worldwide and constitutes a serious public health problem. Globally, 2 billion people are infected with HBV at some time in their lives (1). Of these, about 350 million people remain infected chronically and become carriers of the virus, and 1.5 million deaths occur due to HBV related liver diseases each year (2, 3).

Africa isthe second highly affected region.There are more than 50 million chronic carriers of hepatitis B Virus with 25% mortality risk. In Sub-Saharan Africa, it is highly endemic with 56% to 98% of the adult population show previous exposure (4).

The main routes of transmission in developing countries is: during neonatal period with HBV carrier mother infecting her infant usually during birth or soon after birth following close contact (1).

In an earlier study done to define the mode of transmission of Hepatitis B infection in Ethiopia, 5% of pregnant women were reported to be positive for HBsAg (5). A similar study done to determine the prevalence and significance of sexually transmitted diseases among Ethiopian women attending antenatal care in Addis Ababa hospitals, the prevalence of HBsAg among pregnant women was similar (5%) to the above study (6).Similarly, a study conducted among pregnant mothers in a rural hospital in Southern Ethiopia, to assess the risk of transmitting to the newborn and the sero-prevalence of HBsAg was 6% (7).

1.2.3. HEPATITIS B VIRUS (HBV) AND HIV CO-INFECTION

Since HIV and hepatitis B virus share similar routes of transmission hence, co-infection is a frequent problem. In areas of low endemicity, HBV and HIV infection are usually acquired in adulthood through sexual or percutaneous transmission. In areas of low endemicity and the prevalence of chronic co - infection is around 5-7% among HIV-infected individuals (8). In countries with intermediate and high HBV endemicity, the main routes of transmission of HBV are perinatal or in early childhood; in these countries HBV co- infection rates are 10-20% (9).

[1] Haftamu Weldesenbet, Department of Medical Microbiology and Infectious diseases, Madawalabu University, Bale, Ethiopia

Accurate assessment of HBV infection in HIV co-infected individuals is necessary for therapeutic decisions (10). WHO advocates HBsAg testing especially in areas of high HBV prevalence (11).

The rate of progression and complications from viral hepatitis are accelerated in patients with HIV co-infection. After acquiring HBV infection, HIV infected individuals are 6 times more likely to develop chronic hepatitis B than HIV negative individuals. This was more likely to occur in HIV infected men with lower CD4 cells (12, 13)

In the setting of HIV co-infection, the mortality rate from chronic Hepatitis B Virus is higher than that of either infection alone. Specially there is high risk of developing hepatotoxicity following the initiation of antiretroviral therapy in subjects with underlying chronic hepatitis than in HIV-mono-infected individuals and is important to consider HBV therapy as a priority in HIV-co infected patients (14).

The importance of the present study is to determine the prevalence of HBV in HIV-infected and HIV-uninfected individuals which is very important during therapeutic management. Furthermore, this study will clarify whether prevalence and associated risk factors of this infection differ between HIV-infected and HIV-uninfected individuals. Consequently, in the present study, we sought to provide some initial estimates regarding the rate of co-infection between HIV and HBV, and to contribute additional information to the scientific community on HBV serology among HIV-positive and HIV-negative individuals in Ethiopia.

MATERIALS AND METHODS

A cross-sectional descriptivestudy was conducted from November 2011 to February 2012 involving the VCT and PICT centers in St. Paul's Hospital Millennium Medical College Addis Ababa, Ethiopia. This institution provides health care service for approximately 100,000 patients per year to the Addis Ababa and the surrounding population and those referred from different parts of the country. The study site also provides voluntary counseling and testing services.

After proposal was ethically cleared by Department of Research and Ethical Review Committee (DREC) and approved by Department of Microbiology, Immunology and Parasitology of Addis Ababa University, Written informed consent was obtained from study participants and letter of permission from St. Paul's Hospital Millennium Medical College**.** Using convenient sampling method, 292 study subjects were selected from PICT and VCT centers. All consecutive volunteers for HBV testing were recruited. The study participants were between the ages of 18 and 75.Sample size was determined by using single population formula considering the following assumptions, Prevalence of HBsAg 5.7% **(15),**Level of significance = 0.04, Degree of accuracy desired (d) =4%, Non-response rate =10%. Note: n= sample size, Z (a/2) = Z-score at 96% confidence interval**.**

After pre-test counseling, 4ml of venous blood was aseptically collected from each of the study participants. These blood samples were used to testHIV and HBsAgusing

HBsAg test kit (ACON Laboratories, Inc., USA) which is a rapid chromatographic immunoassay for the qualitative detection of Hepatitis B surface Antigen in serum or plasma. The test procedure was followed according the manufacturer's protocol.

The data collected were entered in computer to compile, organize and analyze using computer-based statistical analysis software, SPSS version 16.

The prevalence of HBV in HIV positive and negative individuals was determined using bi-, and multi-variate analysis, considering 4% level of significance. The associated risk factors and demographic data collected by a questionnaire were analyzed by logistic regression and by descriptive statistics respectively. The prevalence of HBV among HIV positive and negative individuals was compared. Descriptive statistics for laboratory results and questionnaire variables was calculated.

RESULTS

3.1. Study Subjects

The socio-demographic characteristics of the study subjects (n=292) were described in (Table 3.1).

Table 3.1. Socio-demographic characteristics of study participants (n=292) in St. Paul's Hospital Millennium Medical College (November 2011 to February 2012).

VARIABLES		NUMBER (%)
Sex	Male	92(31.5)
	Female	200(68.5)
Age (in years)	18-25	87(29.8)
	26-35	109(37.4)
	36-45	55(18.8)
	>45	41(14.0)
Living Area	Addis Ababa	162(55.6)
	Outside Addis Ababa	130(44.4)
Educational status	Literate< 4th grade	186(63.7)
	Illiterate≥ 4th grade	106(36.3)
Marital status	**Single**	**60(20.3)**
	Married	**210 (72.0)**
	Widow	**8(2.7)**
	Divorced	**14 (4.7)**

The socio-demographic characteristics of the study subjects showed that 31.5% of the study participants were males and 68.5% of them were females. The mean age of the study participants was 33 years and the highest age category was between 26 to 35 years 37.7% followed by <26 years of age 30.0%. Majority (55.1%) of the study participants was from Addis Ababa and 44.9% of them were from Outside Addis Ababa. Most of study participants were married 72.3%, 20.4% single, and 4.7% were divorced and few of them were widowed 2.7%. In educational background 63.7% of the study participants were literate and 36.4% were illiterate.

3.2. HBV

The prevalence of HBsAg among males and females and in different age groups is listed in (Table 3.2).

Table 3.2. Prevalence of HBs antigen among the study subjects attending PICT and VCT center at St. Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia (November 2011 to February 2012).

Variables		HBsAg status		p-value	Odds ratio	Confidence interval (96%)
		Positive No (%)	**Negative No (%)**			
Sex	Male	20(21.74)	72(78.26)	0.02	2.13	1.07- 4.25
	Female	23(11.5)	177(88.5%)	0.00	1	
	Total	43(14.7)	249(85.3)			
Age (in years)	18-25	12(13.79)	75(86.21)	0.88	0.92	0.30-2.79
	26-35	15(13.76)	94(86.24)	0.86	0.91	0.31-2.66
	36-45	10(18.18)	45(81.82)	0.65	1.30	0.41-2.12
	>45	6(14.63)	35(85.37)	000	1	

Among the 292 PICT and VCT clients, a total of 14.7% were HBsAg positive. The highest prevalence of HBV infection was observed among males 21.7% (p= 0.02, OR=2.13) compared to females which accounts for 11.5%. HBsAg is most prevalent among the 26-35 age groups 13.76% (p=0.57).

3.3. HBV and HIV co-infections

The prevalence of HBV among HIV positive and HIV negative clients is listed in table 3.3.

Table 3.3. Prevalence of HBV among HIV Positive and Negative individuals

		HIV status			
		Positive No (%)	**Negative No (%)**	**P-value**	**OR(96% CI)**
HBV	Positive	2(25)	41(14.44)	0.41	2(0.36-11.08)
	Negative	6(75)	243(85.56)	0.000	1()

Prevalence of HBV among HIV positive was 2/8(25%) and among HIV negative was 14.4%.The prevalence rate of HBV was higher in those having HIV infection as compared to those without the infection.

3.4. Risk factors for HBV infection.

Some risk factors that can influence prevalence of HBV are involved in this study. The risk factors and their relationship with prevalence of HBV are listed in table 3.4.

Table 3.4. Significance of risk factors in HBV prevalence

Variable		HBsAg (HBV)			
		Positive No (%)	Negative No (%)	P-value	OR(96% CI)
Needle stick injury	No	39(14.44)	231(85.56)	0.00	1
	Yes	4(18.18)	18(81.82)	0.62	1.33(0.4-4.2)
multiple sex partner	No	32(12.08)	233(87.92)	0.00	1
	Yes	11(40.74)	16(59.26)	0.56	1.98(.18-21.7)
History of medical Procedure	No	40(14.60)	234(85.40)	0.00	1
	Yes	3(16.67)	15(83.33)	0.8	1.19(0.31-4.56)
Use of Sharp Materials	No	39(14.55)	229(85.45)	0.00	1
	Yes	4(16.7)	20(83.3)	0.76	1.19(0.4-3.9)

P= <0.04 statistically significant

Prevalence HBV among those with needle stick injury was 18.2% compared to 14.4% those with no history of needle stick injury. Prevalence of HBV in those with multiple sex partners was 40.7%.

DISCUSSION

HBV is the most common type of STIs throughout the world. This infectionis endemic and constitute a huge health and economic burden in Sub-Saharan countries including Ethiopia (16).

Previous epidemiologic studies conducted among VCT clients, assessed individual infections of HIV or HBV, or clients from PICT were not included in their study. This study has tried to ascertain association of HIV infection with HBV among VCT and PICT clients. The results of this study showed the risk of acquiring HIV and HBV from PICT and VCT centers in St. Paul's Hospital. In addition this cross-sectional study provides an important opportunity to assess the status of the HIV infection among clients from Addis Ababa and outside Addis Ababa, since this study area is a referral hospital.

HBsAg sero-prevalence obtained in the present study was remarkable 14.7%. In contrast a study from the general population and from pregnant HIV infected women in the USA indicated a much lower prevalence of HBV, 0.4% and 1.5%, respectively, as compared to the present study (17). This could be due to the fact that in most developed parts of the world (Western Europe, USA, Australia), the endemicity of HBV infection is low(18). The sero-prevalence of HBV (14.7%) is higher than the previous reports, 10.4% in Nigeria (19) and similar to 15.0% in Ghana (20).

Although VCT and PICT clients are not usually representative of the general population, these numbers confirm the high endemicity of HBsAg in Ethiopia. According to (21) prevalence of HBV which is greater than or equal to 8% is considered to be endemic.

Astudy in Northwest Ethiopia to determine the sero-prevalence of HBsAg and associated risk factors indicated that the sero-prevalence of HBsAg was (5.3%) which was quite lower than this study (22).

In Shashemene hospital a cross-sectional study done among VCT clients a 5.7% prevalence of HBsAg was determined which was relatively low compared to the current data. Similarly, a study conducted in Addis Ababa revealed a 5.7% HBsAg prevalence among VCT clients. These data indicate that a low prevalence of HBsAg as compared to the present study (15).

Significant association has been found between HBsAg positivity and sex like other studies done in the country from VCT centers and general population, where males were two times at high risk than females OR=2.13 (96% CI, 1.07-4.26, p=0.02). This was in line with previous studies done among VCT clients where men were at high risk than that of women (23, 24). This was also supported by another study done at Gondar University teaching Hospital showed that HBV sero-prevalence rate was higher among males than females (25).

An increased sero-prevalence of HBV was observed in the age groups of 26 - 35 and 36 - 45 years compared to the age group of greater than 45 years. This was in accordance with previous reports by (26, 27) in which higher prevalence was observed among 18_27 years. This observation is worrisome since the most productive and economically viable age group of the populations is worst hit. There is the need for renewed intensification of preventive programs aimed at high risk behavioral change.

The prevalence of HIV/HBV co-infection in the VCT and PICT population was relatively high (25%), as compared to that of individual HIV or HBV infections. This was comparable with a study done by Burnett *et*

al., (2005*) wh*ich documented an increased occurrence of HBV among HIV positive individuals. This could be due to the shared transmission route of both HBV and HIV infection.

In contrast studies from ART and VCT centers, HIV-positive and HIV-negative people had similar exposure to HBV infections (15). Likewise, several studies from areas of high HBV endemicity reported the absence of any association between HIV and HBV infection (28).

Furthermore, some studies from this region found an association, but it was not as large as results in countries of low HBV endemic region. In the USA, for instance, a more than fourfold increase in HBV infection was reported in patients with HIV (29). This may be because in people living in areas of high HBV endemicity are infected early in childhood. When they reach sexual maturity at which stage they have a higher risk of acquiring HIV, early acquired immunity may protect them from HBV infection. In contrast, most adolescents and adults in low-endemic areas are not protected by antibodies to natural HBV infection; thus, the shared transmission routes result in specific risk groups to acquiring both HBV and HIV at almost the same time. Even though the rate of co-infection of HIV-HBV is not as high as that of low endemic countries, there is relatively high co-infection among HIV positive as compared to HIV negative individuals.

In this study, high prevalence rate of HIV-HBV (25%) was revealed among VCT and PICT clients.On the other hand, in this study 25% co-infection of HIV-HBV was found. This may be due to increased prevalence of hepatitis B virus.

Unlike sex which had a significant association with HBV, no association was observed with other socio-demographic variables like, illiteracy and age. However, a study done in Jimma among pregnant women has shown high HBsAg positivity rate among the illiterate and those with low incomes(2, 3).

In this study no significant association was found between HBV and HIV and number of sexual partner. In contrast data from previous study prevalence of HIV infection correlated with the number of sexual partners where all HIV positive cases except one had history of sexual exposure which was contrary to the present study. In-line with this study, the reported use of condom was not significantly associated with reduced prevalence of HIV infection. Similarly, result from other study prevalence of HBV infection did not show correlation with the number of sexual partners and condom use (1).

Similar result was found from study done in VCT clients who had multiple sexual partners were infected with HBV at higher rate, although the difference was not significant **(30)**. In-contrast, another study showed significantly high prevalence of HBsAg among individuals with history of invasive procedures, like history of medical procedure , blood transfusion history and needle stick injury compared to this study **(31)**.

LIMITATIONS

Because this study was based on a convenient sample rather than on a random sampling frame, and the 2 populations were not matched, selection bias cannot be ruled out. In addition, because our sample was limited to a population of PICT and VCT clients, the generalizability of these results is somewhat limited. The limitations of the majority of serological tests were also considerable to the test kit used by this study. This particularly holds true for HBsAg for HBV due to low specificity and sensitivity compared to the molecular techniques. Another major limitation of this study was the inability to determine the actual stage of HBV infection among the VCT and PICT with further test (anti-Hbc, anti-HBe, and anti-HBs antibodies) and the inability to measure the HBV viral load. Thus, a single determination of HBsAg may not be the ideal way of defining the carrier state. Nevertheless, a prevalence of 14.7% for HBsAg, among healthy clients is still important and significant.

CONCLUSION

Results from this study indicated that prevalence of HBs antigen was 14.7% and25% of the HIV positive were co-infected with HBV. Males were two times at high risk for HBV infection than females (p=0.02). The high prevalence of HBV as well as HIV/HBV co-infection is concerning. Formal guidelines and interventions for hepatitis prevention and management of both HBV and HIV/HBV co-infection are needed. Guidelines and interventions should be comprehensive and include: hepatitis education and prevention, HIV–hepatitis counseling, screening for HBV parallel with HIV testing and overall integration of hepatitis prevention into HIV prevention programs. The usefulness of HBV–HIV co-infection during clinical management and treatment programs should be explored.

CONFLICTS OF INTEREST

We declare that this is our original work and no conflicting interests. **Authors'**

AUTHORS INFORMATION:

Haftamu Weldesenbet,[a] Daniel Asrat,[b]Yimtubezinash W/Amanuel,[c]
a Department of Medical Microbiology and Infectious diseases, Madawalabu University, Bale, Ethiopia.

b MD, MSc, PhD and Associate Professor, Department of Microbiology, Immunology and Parasitology, Faculty of Medicine, Addis Ababa University Postal Code; 9086
c MD, MSc, PhD and Associate Professor, Department of Microbiology, Immunology and Parasitology, Faculty of Medicine, Addis Ababa University Postal Code; 9086

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