*Open Access Library Journal*

# Prevalence of Hepatitis B Virus Infection and Associated Factors among HIV Positive Adults Attending ART Clinic at Hawassa Referral Hospital, SNNPR, Ethiopia

**Fanuel Belayneh**

School of Public Health, Department of Epidemiology, Wolaita Sodo University, Sodo, Ethiopia
Email: fanuelbelayneh@gmail.com

Received 13 April 2015; accepted 28 April 2015; published 4 May 2015



## Abstract

**Background: Hepatitis B and HIV infections are serious global public health problems. Among the estimated 40 million persons infected with HIV worldwide, an estimated 2 - 4 million (5% - 15%) have chronic hepatitis B virus. This co-infection is common due to shared transmission routes of the agents. In Ethiopia, even though, HBV infection is more common in HIV infected individuals, only little is known about the distribution as well as factors associated with the infection. Objective: To assess the prevalence of hepatitis B infection and associated factors among HIV positive adults attending ART clinic at Hawassa University Referral Hospital, Hawassa, Southern Ethiopia. Methods: Hospital based cross-sectional study was conducted from May 2 to July 2, 2014 in Hawassa University Referral Hospital. Samples were taken consecutively to get the calculated sample size of 348 adults living with HIV. Pretested interviewer administered structured questionnaire was implemented. Statistical Package for Social Sciences (SPSS) Version 20 was used for statistical analysis. Result: Among the sample of 348 HIV positive adults, 128 (36.8%) were males and 220 (63.2%) were females with mean (±SD) age of 33.2 (±9.1) years old. Hepatitis B surface antigen was detected in 24 (6.9%) of individuals. The prevalence of HBV infection was 17 (7.7%) among females and 7 (5.5%) among males. About 66% of study participants have poor knowledge regarding Hepatitis B. History of surgical procedure [AOR = 4.6: 95% CI, 1.8 - 11.6] and previous opportunistic infection [AOR = 5.2: 95% CI, 1.1 - 23.2] were significantly associated with the presence of HBsAg. Conclusion: The prevalence of HBsAg was found to be intermediate in HIV positive adults and majority of them had poor knowledge about the disease. We recommend provision of routine screening and vaccination service together with accurate information on risk factors such as opportunistic infection and surgical procedure for transmission of HBV.**

## Keywords

**Hepatitis B Surface Antigen (HBsAg)**

**How to cite this paper:** Belayneh, F. (2015) Prevalence of Hepatitis B Virus Infection and Associated Factors among HIV Positive Adults Attending ART Clinic at Hawassa Referral Hospital, SNNPR, Ethiopia. *Open Access Library Journal*, **2**: e1490.
http://dx.doi.org/10.4236/oalib.1101490

**Subject Areas:** **Epidemiology**

## 1. Introduction

Viral hepatitis is a disease characterized by inflammation of liver and in many cases permanent damage to liver tissue [1]. Common types of hepatitis virus are hepatitis A, B, C, D, E and G. Hepatitis B is the most serious type of viral hepatitis, which can lead to chronic liver disease and put people at high risk of death from cirrhosis of the liver and liver cancer. It is a DNA virus replicates in hepatocytes and damages the liver by immune response to the virus [2].

Hepatitis B virus shares similar transmission route with human immunodeficiency virus (HIV); thus, co-infection with these two viruses is common and both are serious global public health problems. An estimated two billion people around the globe have been contaminated with hepatitis B virus. Persons with HIV infections are disproportionately affected by viral hepatitis. Among the estimated 40 million persons infected with HIV worldwide, an estimated 2 - 4 million (5% - 15%) have chronic HBV [3] [4].

Viral hepatitis progresses faster among persons with HIV and persons who are infected with viruses experience greater liver related health problems than those who do not have HIV infection [1].

Evidences indicated that HIV positive individuals are more likely to be chronic carrier and have a higher HBV replication rate than HIV negative individuals. In addition, it is evident that immuno-suppression brought by HIV infection may cause re-activation or re-infection in those previously exposed to HBV [4]. Furthermore, HIV infection exacerbates liver disease in HBV/HIV co-infected individuals and there is an even greater risk of liver disease when HIV and HBV co-infected patients are treated with HAART [5]. It has been observed that HBV/HIV co-infection leads to increased morbidity and mortality as compared to HIV or HBV mono-infections [6].

Many of the countries with high HIV burden are also affected by high prevalence of hepatitis B infection; leading to frequent HIV/HBV co-infection. The co-infection was reported as high as 10% - 20% in countries where HBV infection is either endemic or intermediate to high HBV cases [6].

Even though, HBV and HIV have common routes of transmission and endemic areas, HBV is about 50-100 times more infectious than HIV. Consequently, in some settings up to two thirds of all HIV-infected people have blood markers of past or present HBV infection [7] [8].

A community based sero-epidemiological survey of Addis Ababa, Ethiopia has shown a 7% sero-prevalence for HBsAg [9]. Other hospital-based studies in the country conducted at St Paul's General Specialized Hospital and Shashemene General Hospital documented a 3.9% to 14% of HBsAg prevalence among HIV positive individuals consecutively [10] [11].

Hepatitis B is avoidable with a readily available and efficacious vaccine [2]. Among the groups for whom CDC recommends vaccination against hepatitis B are persons who have or are at risk for HIV infection, including men having sex with men (MSM); persons who inject drugs; susceptible sex partners of infected persons; persons with multiple sex partners; anyone with a sexually transmitted infection (STI); and health care and public safety workers exposed to blood on the job [1].

Ethiopia is being one of the countries that most hit by HIV infection (prevalence of 2.1%) and is also found in a region classified as high endemic area for HBV; the likelihood of HBV/HIV co infection is highly anticipated [12].

However, in Africa in general and in Ethiopia in particular, information on the magnitude of HBV positivity at different risk groups including people living with HIV/AIDS is scarce.

Because of the significant burden and clinical impact of HBV in HIV-infected individuals, understanding the epidemiologic trends, exposure proportions and associated risk factors have paramount importance to undertake effective prevention measures [13].

## 2. Methods

### 2.1. Study Setting and Study Population

Hospital based cross-sectional study was conducted from May 2 to July 2, 2014 at Hawassa University Referral Hospital. All adults living with HIV, who visited the hospital during the study period and fulfilled the inclusion

criteria, were included in the study using consecutive sampling technique. An interview with pretested structured questionnaire having open and closed ended questions adapted from similar survey reviews that have been carried out inside and outside the country was used for data collection. Three milliliters of venues blood was collected from each patient with standard operational procedure. Serum was separated by centrifugation at 3000 rpm for 5 minutes after the blood has been clotted. The serum was tested for HBsAg by Wondfo one step HBsAg test strip according to the manufacturer's instruction. This test strip had sensitivity and specificity of 96.2% and 99.3% respectively.

The study variables were selected after reviewing relevant literatures according to the objective of the study. The dependent variables were Hepatitis B virus infection status. The independent variables were categorized under socio-demographic characteristics, behavioral, clinical and knowledge related factors.

### 2.2. Data Processing and Analysis

Data was entered into Epi Data version 3.1 then exported to SPSS version 20 for analysis. Summary statistics such as frequencies and percentages were computed. Bivariate analysis was conducted primarily to check association of each variable with the dependent variable. To control for possible effect of confounding, variables found to have association with the dependent variable at P-value of 0.2 were entered into multivariate logistic regression. The variables which had significant association with P-value less than 0.05 in the multivariate logistic regression were considered to be independent factors. The model was diagnosed by Hosmer and Lemeshow goodness of fit tests.

### 2.3. Ethical Consideration

Ethical clearance was obtained from Jimma University, College of Public Health and Medical Sciences. Letter of cooperation was taken from the Department of Epidemiology and Biostatics and from Hawassa University Referral Hospital. Each respondent was informed about the objective of the study and a written consent was obtained. Confidentiality was kept at each step of data collection and processing. In addition, positive HBsAg test results of the study participants were communicated with their physician for farther investigation and better management of the patients.

## 3. Result

From 358 HIV positive adults contacted, 348 of them were included in the analysis with a response rate of 97.2%.

Majority, 220 (63.2%) of the respondents were females, age ranged 25 - 34 years old (52.9%) with mean (±SD) age of 33.2 (9.1) years old. About 92% of them were urban residents (**Table 1**).

The prevalence of HBsAg was found to be 24 (6.9%); of whom 17(7.7%) were females and 7 (5.5%) were males. With respect to age, the prevalence of HBsAg was 3 (7.5%) in age category of 18-24, 15 (8.2%) in age category of 25 - 34 and 6 (4.8%) for above 34 years old. All of the participants with HBsAg positive results live in urban areas.

Concerning to their marital status, the prevalence of HBsAg was 12.3% among singles, 7.2% among married, 2.0% among divorced and 6.2% among widowed participants. Illiterate had a prevalence of 12.8%; while among those with primary and secondary schools the rate was 5.7% and 9.6% respectively (**Table 2**).

Bivariate logistic regression analysis was done using enter method to identify factors for the multiple logistic regression. In the analysis, average family income, WHO stage classification of HIV/AIDS, surgical history, previous history of opportunistic infection and sharing of sharp instruments were selected for the multiple logistic regression analysis based on their P-value of <0.2.

Multivariate analysis revealed that those who have previous history of surgical procedure were 4.6 times more likely to be contaminated with HBV than who did not [AOR = 4.6: 95% CI, 1.8 - 11.6] and those with previous opportunistic infection were about 5 times more likely to show HBV surface antigen marker than who did not [AOR = 5.2: 95% CI, 1.1 - 23.2] (**Table 3**).

## 4. Discussion

In this study, the prevalence of HBsAg was 6.9%. This result is in line with HBsAg prevalence documented

**Table 1.** Socio-demographic and economic characteristics of respondents attending ART clinic at Hawassa University Referral Hospital, Hawassa, South Ethiopia, 2014.

| Characteristics | Frequency | Present (%) |
|---|---|---|
| **Sex** | | |
| Female | 220 | 63.2 |
| Male | 128 | 36.8 |
| **Age (Years Old)** | | |
| 18 - 24 | 40 | 11.5 |
| 25 - 34 | 184 | 52.9 |
| 35 - 44 | 92 | 26.4 |
| ≥45 | 32 | 9.2 |
| **Place of Residence** | | |
| Urban | 322 | 92.5 |
| Rural | 26 | 7.5 |
| **Educational Level** | | |
| Illiterate | 45 | 12.9 |
| Elementary (≤8 grade) | 122 | 35.1 |
| Secondary (9 - 12 grade) | 115 | 33 |
| Higher education | 36 | 10.3 |
| Universities | 30 | 8.6 |
| **Marital Status** | | |
| Single | 56 | 16.1 |
| Married | 165 | 47.4 |
| Separated & Divorced | 63 | 18.1 |
| Widowed | 64 | 18.4 |
| **Average Monthly Income(ETB)** | | |
| ≤500 | 76 | 21.8 |
| 501 - 999 | 63 | 18.1 |
| ≥1000 | 209 | 60.1 |

**Table 2.** Prevalence of hepatitis B surface antigen among the study participants attending ART clinic at Hawassa University Referral Hospital, Hawassa, South Ethiopia, 2014.

| Variables | HBsAg Screening Result | |
|---|---|---|
| | Negative (%) | Positive (%) |
| **Sex** | | |
| Male | 121 (94.5) | 7 (5.5) |
| Female | 203 (93.3 | 17 (7.7) |
| **Age Interval** | | |
| 18 - 24 | 37 (92.5) | 3 (7.5) |
| 25 - 34 | 169 (91.8) | 15 (8.2) |
| ≥35 | 118 (95.2) | 6 (4.8) |

**Continued**

| | | |
|---|---|---|
| **Educational Level** | | |
| Illiterate | 41 (91.1) | 4 (6.7) |
| Elementary School (≤8 grade) | 115 (94.3) | 7 (5.7) |
| Secondary and above | 168 (92.8) | 13 (7.2) |
| **Marital Status** | | |
| Single | 50 (89.3) | 6 (10.7) |
| Married | 155 (93.9) | 10 (6.1) |
| Widowed | 60 (93.8) | 4 (6.2) |
| Separated & Divorced | 59 (93.7) | 4 (6.3) |
| **Avg Monthly Income** | | |
| ≤500 | 74 (97.4) | 2 (2.6) |
| 501 - 999 | 57 (90.5) | 6 (9.5) |
| ≥1000 | 193 (92.3 | 16 (7.7) |

**Table 3.** Risk factors associated with Hepatitis B surface antigen from the multiple logistic regression analysis, among HIV positive adults attending ART clinic at Hawassa University Referral Hospital, 2014.

| Variables | HBsAg Screening Result | | COR (95%CI) | AOR (95%CI) |
|---|---|---|---|---|
| | Negative No (%) | Positive No (%) | | |
| **Avg Monthly Income (ETB)** | | | | |
| ≤500 | 74 (97.4) | 2 (2.6) | 1 | 1 |
| 501 - 999 | 57 (90.5) | 6 (9.5) | 3.9 (0.75 - 20.02) | 3.0 (0.5 - 16.4) |
| ≥1000 | 193 (92.3 | 16 (7.7) | 3.0 (0.68 - 13.66) | 2.8 (0.6 - 13.1) |
| **Surgical History** | | | | |
| Yes | 40 (81.6) | 9 (18.4) | 4.2 (1.7 - 10.3) | 4.6 (1.8 - 11.6)* |
| No | 284 (95.0) | 15 (5.0) | 1 | 1 |
| **Opportunistic Infection** | | | | |
| Yes | 227 (91.2) | 22 (8.8) | 4.7 (1.08 - 20.38) | 5.2 (1.1 - 23.2)* |
| No | 97 (98.0) | 2 (2.0) | 1 | 1 |
| **Sharing Sharp Instruments** | | | | |
| Yes | 153 (91.1) | 15 (9.9) | 1.8 (0.79 - 4.37) | 1.6 (0.7 - 4.1) |
| No | 171 (95.0) | 9 (5.0) | 1 | 1 |

NB: * = Significant at P-value 0.05, Hosmer and Lemeshow goodness of fit test = 0.9.

from the study conducted in India (6.3%). Other similar studies among HIV positive individuals showed that HBV/HIV co-infection prevalence of 5.6% in Malawi, 4.9% in Rwanda and 6% in Kenya which was consistent with the findings of this study [14]-[17].

HBsAg prevalence from this study is also in agreement with previous studies conducted among HIV positive adults in Ethiopia. Studies at Debretabor Hospital and at Gondar University Teaching Hospital showed 6.1% and 5.6% HBV/HIV co-infection respectively [18] [19].

However, the prevalence of HBsAg was found lower compared to HBV/HIV co-infection prevalence of 13.4% in Tehran, Iran, 11.4% among Nigerian HIV-infected individuals and 12.2% among similar population in Gambia [9] [20] [21].

Similarly, it is also lower than the 14.0% reported in Shashemene, 20% among HIV positive immigrants of Israel from Ethiopia and 10.9% at Gondar [11] [22] [23]. The discrepancy might be due to the difference in the diagnostic methods followed in which these studies used ELISA technique, whereas in our study serological test was applied.

In contrast, the prevalence of HBV in this study was higher when compared to the 2.4% and 4.1% prevalence reported from Uganda and Rwanda respectively as well as 3.9% HBsAg prevalence in Addis Ababa [17] [24].

This difference might be due to accessibility of information about mode of transmission and prevention as it can be seen from proportion of participants with poor knowledge score in this study.

In this study previous history of surgical procedure showed significant association with HBV infection. This result is in line with the results of the studies conducted in Ethiopia at Debretabor [18].

Those with previous history of opportunistic infection were about 5 times more likely to be positive for HBV

surface antigen marker than who did not. This result is also in agreement with the previous study at Debretabor Hospital [18]. The association might be due to the fact that HIV/HBV co-infected individuals have weak immunity than those with HIV mono-infected individuals which will make them more prone to opportunistic infection. In addition wounds due to opportunistic infections may increase the chance of infection [25].

## 5. Conclusion and Recommendation

The prevalence of HBsAg was found to be intermediate in HIV positive adults at Hawassa University Referral Hospital. Previous history of opportunistic infection and history of surgical procedures have statistically significant association with hepatitis B infection.

Thus, we recommend provision of routine screening and vaccination service together with accurate information on risk factors such as opportunistic infection and surgical procedure for transmission of HBV.

## 6. Limitations of the Study

In this study HBV DNA was not detected by polymerase chain reaction due to unavailability of resources, which may increase the prevalence of HBV in this study as it would allow early diagnosis of these infections before surface antigen of HBV were detectable in serum.

## References


[1] CDC (2014) Hepatitis Fact Sheet. http://www.cdc.gov/hepatitis/Populations/HIV.htm

[2] Dienstag, J. (2008) Acute Viral Hepatitis. In: Fauci, A. and Braunwald, E., Eds., *Harrison's Principles of Internal Medicine*, 17th Edition, McGraw-Hill, New York.

[3] McGovern, B.H. (2007) The Epidemiology, Natural History and Prevention of Hepatitis B: Implications of HIV Co-Infection. *Antiviral Therapy*, **12**, H3-H13.

[4] Alter, M.J. (2006) Epidemiology of Viral Hepatitis and HIV Coinfection. *Journal of Hepatology*, **44**, S6-S9. http://www.journal-of-hepatology.eu/article/S0168-8278(05)00726-9/fulltext

[5] Burnett, R.J., François, G., Kew, M.C., Leroux-Roels, G., Meheus, A., Hoosen, A.A., *et al*. (2005) Hepatitis B Virus and Human Immunodeficiency Virus Co-Infection in Sub-Saharan Africa: A Call for Further Investigation. *Liver international*, **25**, 201-213. http://dx.doi.org/10.1111/j.1478-3231.2005.01054.x

[6] Thio, C.L. (2009) Hepatitis B and Human Immunodeficiency Virus Coinfection. *Hepatology*, **49**, S138-S145. http://dx.doi.org/10.1002/hep.22883

[7] Almamedova, E., Antonyak, S., Bobrova, A., Bruno, R., Clotet, B., Dodarbekov, M., *et al*. (2011) Management of Hepatitis B and HIV Coinfection. WHO Regional Office for Europe, Copenhagen, 2.

[8] Sulkowski, M.S. (2008) Viral Hepatitis and HIV Coinfection. *Journal of Hepatology*, **48**, 353-367. http://dx.doi.org/10.1016/j.jhep.2007.11.009

[9] Jobarteh, M., Malfroy, M., Peterson, I., Jeng, A., Sarge-Njie, R., Alabi, A., *et al*. (2010) Seroprevalence of Hepatitis B and C Virus in HIV-1 and HIV-2 Infected Gambians. *Virology Journal*, **7**, 230. http://dx.doi.org/10.1186/1743-422X-7-230

[10] Shimelis, T., Torben, W., Medhin, G., Tebeje, M., Andualm, A., Demessie, F., *et al*. (2008) Hepatitis B Virus Infection among People Attending the Voluntary Counselling and Testing Centre and Anti-Retroviral Therapy Clinic of St Paul's General Specialized Hospital, Addis Ababa, Ethiopia. *Sexually Transmitted Infections*, **84**, 37-41. http://dx.doi.org/10.1136/sti.2007.027326

[11] Negero, A., Sisay, Z. and Medhin, G. (2011) Prevalence of Hepatitis B Surface Antigen (HBsAg) among Visitors of Shashemene General Hospital Voluntary Counseling and Testing Center. *BMC Research Notes*, **4**, 35. http://dx.doi.org/10.1186/1756-0500-4-35

[12] Federal Ministry of Health (2007) Guidelines for Management of Opportunistic Infections and Anti Retroviral Treatment in Adolescents and Adults in Ethiopia. Federal Ministry of Health, Ethiopia. http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/--ilo_aids/documents/legaldocument/wcms_125386.pdf

[13] Helen, M., Ann, M., Katherine, H., Alan, R., Nancy, F., Cianflone, C., *et al*. (2010) Epidemiology of Hepatitis B Virus Infection in a US Cohort of HIV-Infected Individuals during the Past 20 Years. *Infectious Diseases Society of America*, **50**, 1-11.

[14] Shrihari, N., Kumudini, T., Mariraj, J. and Krishna, S. (2011) Prevalence of Hepatitis B Infection in HIV Infected Pa-

tients versus HIV Uninfected Patients in a Tertiary Care Hospital. *Journal of Bioscience and Technology*, **2**, 401-404.

[15] Muriuki, B.M., Gicheru, M.M., Wachira, D., Nyamache, A.K. and Khamadi, S.A. (2013) Prevalence of Hepatitis B and C Viral Co-Infections among HIV-1 Infected Individuals in Nairobi, Kenya. *BMC Research Notes*, **6**, 363. http://www.biomedcentral.com/1756-0500/6/363 http://dx.doi.org/10.1186/1756-0500-6-363

[16] Moore, E., Beadsworth, M.B., Chaponda, M., Mhango, B., Faragher, B., Njala, J., *et al*. (2010) Favourable One-Year ART Outcomes in Adult Malawians with Hepatitis B and C Co-Infection. *Journal of Infection*, **61**, 155-163. http://dx.doi.org/10.1016/j.jinf.2010.04.009

[17] Pirillo, M.F., Bassani, L., Germinario, E.A., Mancini, M.G., Vyankandondera, J., Okong, P., *et al*. (2007) Seroprevalence of Hepatitis B and C Viruses among HIV-Infected Pregnant Women in Uganda and Rwanda. *Journal of Medical Virology*, **79**, 1797-1801. http://dx.doi.org/10.1002/jmv.21007

[18] Balew, M., Moges, F., Yismaw, G. and Unakal, C. (2014) Assessment of Hepatitis B Virus and Hepatitis C Virus Infections and Associated Risk Factors in HIV Infected Patients at Debretabor Hospital, South Gondar, Northwest Ethiopia. *Asian Pacific Journal of Tropical Disease*, **4**, 1-7. http://dx.doi.org/10.1016/S2222-1808(14)60304-2

[19] Tessema, B., Yismaw, G., Kassu, A., Amsalu, A., Mulu, A., Emmrich, F. and Sack, U. (2010) Seroprevalence of HIV, HBV, HCV and Syphilis Infections among Blood Donors at Gondar University Teaching Hospital, Northwest Ethiopia: Declining Trends over a Period of Five Years. *BMC Infectious Diseases*, **10**, 111. http://www.biomedcentral.com/1471-2334/10/111

[20] SeyedAlinaghi, S., Jam, S., Mehrkhani, F., Fattahi, F., Sabzvari, F., Kourorian, Z., *et al*. (2011) Hepatitis-C and Hepatitis-B Co-Infections in Patients with Human Immunodeficiency Virus in Tehran, Iran. *Acta Medica Iranica*, **49**, 252- 257.

[21] Babafemi, O., Titilola, S., Georgina, N., Kayode, S., Sudhir, P., Isaac, F., *et al*. (2008) Prevalence of Hepatitis B and C Seropositivity in a Nigerian Cohort of HIV-Infected Patients. *Annals of Hepatology*, **7**, 152-156.

[22] Alkan, M., Maayan, S., Belmaker, I., Arbeli, Y., Mani, N. and Ben-Yshai, F. (1993) Serological Markers for Hepatitis B and Treponemal Infection among HIV Carriers from Ethiopia. *Israel Journal of Medical Sciences*, **29**, 390-392.

[23] Moges, F., Kebede, Y., Kassu, A., Mulu, A., Tiruneh, M., Degu, G., *et al*. (2006) Prevalence of HIV, Hepatitis B Infections and Syphilis among Street Dwellers in Gondar City, Northwest Ethiopia. *Ethiopian Journal of Health Development*, **20**, 160-165.

[24] Yami, A., Alemseged, F. and Hassen, A. (2011) Hepatitis B and C Viruses Infections and Their Association with Human Immunodeficiency Virus: A Cross-Sectional Study among Blood Donors in Ethiopia. *Ethiopian Journal of Health Sciences*, **21**, 67-75.

[25] Hoffmann, C.J., Dayal, D., Cheyip, M., McIntyre, J.A., Gray, G.E., Conway, S. and Martinson, N.A. (2012) Prevalence and Associations with Hepatitis B and Hepatitis C Infection amongst HIV-Infected Adults in South Africa. *International Journal of STD & AIDS*, **23**, e10-e13. http://dx.doi.org/10.1258/ijsa.2009.009340