Original article

Prevalence of hepatitis B surface antigen (HBsAg) among health professionals in public hospitals in Addis Ababa, Ethiopia

Zelalem Desalegn[1], Solomon Gebre Selassie[2]

Abstract

Background: Hepatitis B virus remains a major global health problem. Health professionals are at risk of acquiring infections via exposure to patients' blood and body fluids.

Objectives: The study was intended to assess the distribution of hepatitis B virus surface antigen (HBsAg) and associated risk factors among healthcare workers in public hospitals in Addis Ababa.

Methods: Cross-sectional survey of 254 health workers in St. Paul's and Zewditu Hospitals in Addis Ababa were taken, from November 2010 to January 2011. Socio-demographic characteristics and risk factors were collected using a questionnaire. Blood was collected, centrifuged and the serum analyzed for hepatitis B surface antigen using Instant HBsAg kit.

Results: Among the 254 participants, the sero-prevalence of hepatitis B virus surface antigen was 2.4%. The majority of the study subjects, 184 (72.4%) were exposed to blood and blood products. The prevalence of needle stick and other injuries from sharp objects were 155 (61.2%) and 127 (50%), respectively. Consistent use of gloves was reported by 52.4% of the respondents. Only 9 (3.6%) of the respondents were vaccinated against hepatitis B. Healthcare workers, who did not apply universal precautions, were more likely to have been exposed to the virus (OR=7.96; 95% CI, 1.295-48.966; P= 0.025).

Conclusion: Exposure to potentially infectious body fluids, needle stick and sharp injuries from sharp objects and other risk factors were high in this study. Only very small percentages of healthcare workers were vaccinated. Healthcare workers should be vaccinated and universal precautions should be emphasized for preventing the occupational risk of HBV. [*Ethiop. J. Health Dev.* 2013;27(1):72-79]

Introduction

Hepatitis B virus (HBV) is a serious public health problem worldwide as a major cause of chronic hepatitis, cirrhosis and hepatocellular carcinoma (HCC). It is estimated that about 2 billion people have serological evidence of past or present HBV infection. The burden of HBV infection is the highest in developing countries, particularly in Asia and sub-Saharan Africa (1). According to the World Health Organization (WHO) report, of the 350 million chronically infected people, 65 million of them were from Africa (2).

Blood is the most important vehicle for transmission of HBV, but other body fluids have also been implicated, including semen and saliva. The modes of HBV transmission include percutaneous, sexual, mother-to-infant, tattooing and body piercing (3, 4). HBV is a recognized occupational health hazard among healthcare workers (HCW) who regularly come in contact with blood and other body fluids of patients (5). The risk of contracting HBV by healthcare personnel is four times greater than that of the general adult population who do not work in healthcare institutions. In hospitals, it is estimated that approximately 30 injuries occur per 100 beds per year. However, the discovery of HBV vaccines and the results obtained from their introduction constitute a landmark of great importance for medical practice which indirectly protect against HCC (6). Surgeons, pathologists, dentists, nursing staff, laboratory technicians, and blood bank personnel have a higher incidence of hepatitis exposure. The risk factors for hospital personnel include HBV prevalence in patient population, nature and frequency of blood contact, duration of employment in healthcare settings and their immunization status. While modes of transmission of HBV in patient population may be contamination with infected blood, reuse of disposed syringes, sharing needles, razors, toothbrushes, nail cutters, ear piercing, manicures, acupuncture, tattooing and sexual contacts with infected persons are also possible (7).

Serologic testing for hepatitis B surface antigen (HBsAg) is the primary way to identify persons with HBV infection. Testing for HBsAg is recommended for persons who are the source of blood or body fluid exposures that might warrant post-exposure prophylaxis (e.g., needle stick injury to a health care worker) (8).

Most blood exposures in health settings are preventable through Universal Precautions (UPs), immunization against hepatitis B virus and protective devices (2). Since available treatment for hepatitis B virus infection does

[1]Department of Microbiology, Immunology and Parasitology, School of Medicine, Madawalabu University, P. O. Box: 302, Bale, Goba, Tel. 0912029567, E mail: tzollove@gmail.com;

[2]Department of Microbiology, Immunology and Parasitology, School of Medicine, Addis Ababa University, P. O. Box. 21656/1000; Tel. 0911199637; Addis Ababa, Ethiopia E mail: solomongst@yahoo.com.

not provide a complete cure, prevention remains crucial (9).

In Ethiopia, the prevalence of liver diseases accounts for about 12% of hospital admissions and 31% of the mortality in medical wards (10). A study conducted in Ethiopia among HCWs demonstrated that 51.3% and 9.7% of an overall prevalence and HBsAg prevalence, respectively (11). Although few community-based studies on HBV sero-epidemiology were done, there is still scarcity of information among healthcare personnel in Ethiopia. Thus, the aim of this study was to estimate the prevalence of HBV and potential risk factors among healthcare personnel in public hospitals in Addis Ababa.

Methods

Study Design, Area and Period:

A hospital-based cross-sectional study was conducted to assess the magnitude of HBV and related risk factors among healthcare personnel working in public hospitals. The study was undertaken at St. Paul's and Zewditu Memorial hospitals in Addis Ababa between November 2010 and January 2011.

Study population and sample size determination: A convenient sampling method was employed to get the healthcare personnel from each occupational category. The sample size was determined considering a 5% level of significance and 5% margin of error. Accordingly, a total of 254 healthcare workers, who had frequent contact with blood or other body fluids on duty during the study period were included in the study. Physicians, nurses, health assistants, midwives and laboratory technicians, who worked particularly in the departments of surgery, delivery rooms, operation theatres, medical wards, and emergency OPD, were included in the study. Health professionals who were not available during data collection and those who did not have frequent exposure to blood and other body fluids were excluded from the study.

Data Collection and Laboratory Diagnosis:

A pre-tested questionnaire was used to collect data on the exposure status of healthcare workers for potential risk factors for HBV infection and to assess the sociodemographic characteristics of the study subjects. After consent was obtained, healthcare workers filled the given questionnaire and a 5 ml of blood sample was collected from each subject in disposable tubes under aseptic conditions. The blood was centrifuged and the serum was stored at -20^0C until analyzed. All serum samples were tested for HBV markers using INSTANT HBsAg rapid screening method. A one step test for HBsAg which is rapid, qualitative sandwich immunoassay was used for the detection of HBsAg, a marker for hepatitis B virus infections in serum specimen. The one step test for HBsAg utilizes the principle of immunochromatography. The colored monoclonal anti-HBsAg colloidal gold conjugate make a complex with HBsAg in the sample. This complex was immobilized by another monoclonal anti-HBsAg antiserum coated on the membrane leading to formation of a pink-purple colored band which confirmed a positive test result. Absence of this colored band in the test region indicated a negative test result.

Data management, analysis and interpretation: Data were entered into EPI info version 6 and then exported to the SPSS-16, computer software package. Analysis was done as per the type of data: for categorical data, descriptive statistics, univariate, multivariate logistic regression analysis, and odds ratio (OR) computation was performed. P-value <0.05 was taken as statistically significant.

Ethical Considerations:

This study was approved by the Ethics Committee of the Department of Microbiology, Immunology and Parasitology, Addis Ababa University. A written informed consent was obtained from all study subjects. The result of the research was kept confidential and confidentiality was maintained by numeric coding of serum samples and questionnaires. Results were communicated to the respective individuals for proper counseling and further care.

Results

A total of 257 health professionals were enrolled in this study with a response rate of 254 (98.8%). Of the 254 HCW's, 160 (63%) were from St. Paul's General Specialized Hospital and 94 (37%) from Princess Zewditu Memorial Hospital.

The socio-demographic characteristics of the 254 participants are shown in Table 1. The mean age of the participants was 35±9.40 SD and median of 32 years (range: 23-59). Most of the participants, 114 (44.9%) were between the ages of 20-30 years. Males accounted for 127 (50%) of the study subjects, resulting in an overall male to female ratio of 1:1. Of the total, 149 (58.7%) were married. The duration of service varied between a minimum of one year and a maximum 35 years. The professional distribution of the health professional is summarized in Table 1.

Hepatitis B Virus Prevalence and Socio-demographic Characteristics:

The detection of hepatitis B infection was made by investigating HBsAg in the serum. The presence of this marker was taken as the only marker of HBV infection. Of the 254 participants screened for HBsAg, 6 (2.43%) were positive for HBsAg as the only marker of Hepatitis B infection. The sex specific prevalence rate was higher in males (3%) than females (1.6%) but the difference did not reach statistical significance (Table 1). HBV prevalence by specific age group was determined and

3%, 1.2%, 4.6% was recorded in the age group of 20-29, 30-39, 40-49 years, respectively. At least one sero-positive case for HBsAg was found in all age groups except in the range of 50-59 years. Half of the positive cases (50%) were among health professionals in the age group of 20-29 years. However, a statistically significant association was not detected between HBV infection and age of participants.

Table1: **Socio-demographic characteristics and HBsAg prevalence among healthcare workers in St. Paul's and Zewditu Hospitals, Addis Ababa, January 2011.**

Variable	No (%) tested	HBsAg positive No (%)
Age group (years)		
20-29	98 (38.6)	3 (3.0)
30-39	83 (32.7)	1 (1.2)
40-49	43 (16.9)	2 (4.6)
50-59	30 (11.8)	0 (0.0)
Sex		
Male	127 (50.0)	4 (3.0)
Female	127 (50.0)	2 (1.6)
Marital Status		
Married	100 (39.4)	
Single	149 (58.6)	
Divorced	5 (2.0)	
Job category		
Nurse	128 (50.4)	5 (4.0)
Physician	65 (25.6)	1 (3.8)
Lab Tech	35 (13.8)	0 (0.0)
Midwife	26 (10.2)	0 (0.0)
Duration of Service (in years)		
≤10	165 (65.0)	3 (2.0)
11-20	43 (16.9)	2 (4.6)
>20	46 (18.1)	1 (2.2)

Service period of the health professionals ranged from 1-35 years. Health professionals were assigned to 3 groups according to the employment duration: ≤10, 11-20, and >20 years. The majority of them served for ≤10 years and 3 of the positive cases were detected among these health professionals. HBsAg distribution varied across occupational categories. Occupation specific prevalence rate was highest in nurses (4%) followed by midwives (3.8%). Of the total positive cases, 5 (83.6%) of them were detected among nurses followed by 1 (16.3%) in midwives. Using univariate and multivariate logistic regression, none of the socio-demographic variables were significantly associated with HBV infection.

Frequency of Exposure to Risk Factors and Distribution of HBV Infection:

Only 2 (33.0%) positive cases were recorded among health professionals who resorted to universal precautions and were trained for infection prevention. The prevalence of HBV was 4 (66.0%) among those who didn't know UPs. Using univariate logistic regression analysis, the odds of having HBV infection was 9 times higher among those who had no knowledge of UPs than those who have a good knowledge of UPs (P=0.014, COR: 9; 95% CI:1.603-50.78). Concerning needle stick injury (NSI) and from other sharp injury, 155 (61.0%) and 127 (50.0%) had a history of needle stick injury and sharp injury, respectively. Out of the total participants, 145 (57.1%) did not support needle recapping. Among those who did not agree with needle recapping, only 66 (45.5%) were exposed to needle injection and among those who had positive attitudes 89 (81.6%) encountered needle injection. Health professionals, who were in support of needle recapping were exposed for needle injection 5 times more likely than their counterparts (P = 0.000; COR=5; 95% CI, 2.968-9.560). Of the total 155 needle injected participants, 80 (54.05%) of them failed to report the case to the concerned body, of whom 43 (54.4%) indicated negligence was the main reason for not reporting needle stick injury. The largest numbers of injured participants were in the age group of 20-29 years. Out of the total NSI, risk of exposure to needle injection was slightly higher in males 81 (52.3%) than females, 74 (47.7%) but statistically not significant. The prevalence of HBV was 5/155(3.23%) among those who were exposed to needle injection. However, there was no significant relation between being exposed to needle injection and having HBV (P=0.409, COR: 3.267; 95% CI: 0.376, 28.384).

The prevalence of HBV was 4/127(3.1%) among workers with sharp injury and 5 (3.2%) among those with NSIs. The majority, 72(56.7%) of sharp injuries were reported by nurse professionals followed by physicians in 32 (25.2%) (Table 2).

The study showed that 205 (80.7%) and 108 (42.5%) of HCWs knew about universal precaution guideline and were trained on infection prevention, respectively. The habit of using gloves in this study showed that 152 (59.8%) of the participants were using consistently where as 102 (40.2%) used intermittently. Among consistent glove users, only 2 (1.3%) of them were positive for HBsAg marker. The prevalence of HBV was 4/102(4%) among intermittent glove users.

Of the total participants, 59 (23.2%) and 17 (6.7%) had a history of operations and received blood transfusion, respectively. A statistically significant association was observed between HBV infection and history of operation (COR=7.018; 95%CI: 1.252-39.335; P<0.027). Of the total participants, 135 (53.2%), 184 (72.4%), 153 (60.3%), 162 (63.8%) had splashed a contact a history of counted with liver disease patients, cutaneous exposure to blood or body fluids, and had blood or body fluids splashed on their faces, respectively. Most health professionals who were positive for HBsAg had a history of exposure to blood and other body fluids. In all risk factors displayed in Table 3, nurse professionals had the most risk of exposure.

Table 2: **Frequency of exposure to risk factors and prevalence of HBsAg among healthcare workers in St. Paul's and Zewditu Memorial hospitals, Addis Ababa, January 2011**

Type of exposure	Frequency of exposure	Occupational category				HBV prevalence No (%)
		Physician (%)	Nurse No (%)	Lab. Tech No (%)	Midwife No (%)	
Needle stick injury	155	41 (28.5)	80 (55.6)	18 (12.5)	16 (11.9)	5 (3.2)
Sharp injury	127	32 (25.2)	72 (56.7)	1 (0.8)	12 (9.5)	4 (3.1)
Blood exposure	184	45 (24.5)	98 (53.3)	22 (11.9)	19 (10.3)	5 (2.7)
Body fluid exposure	153	40 (26.1)	82 (53.6)	19 (12.4)	12 (7.8)	5 (3.3)
Operation	59	9 (15.3)	36 (61.0)	6 (10.2)	8 (13.6)	4 (6.8)
Tattooing	34	4 (11.8)	23 (67.6)	3 (8.8)	4 (11.8)	3 (8.8)

HBV Vaccination History and Risk Factors for HBV Infection:

When vaccination statuses of HCWs were reviewed, out of 254 employees, only 9 (3.5%) had a history of vaccination against HBV. Out of the vaccinated health professionals, none were fully vaccinated. Prevalence of HBV was 6/245 (2.4%) among unvaccinated study subjects. Occupation specific vaccination status was higher among physicians, 6 (67%), followed by nurses, 3 (33%) (Table 3). All HBV infected study subjects were not vaccinated. The difference in positivity among vaccinated and unvaccinated groups was not significant.

Using univariate analysis, the following were found to be significant risk factors for HBV infection among the studied hospital personnel: (a) knowledge about UPs (COR=9, p<0.014), (b) tattoo (COR=7, p<0.020), and (c) personal surgery (COR=7, p<0.027). Multiple logistic regression analysis was applied for controlling confounders and for evaluating the effects of risk variables on HBV infection among the studied group. The variables found to be associated with HBV infection in the univariate analysis were entered into the logistic regression model. After analysis, one variable, which was directly related to HBV infection among studied samples, was not knowing about universal precaution at all (COR=7.96; 95% CI: 1.295-48.966, P<0.025) (Table 4).

Table 3: **HBsAg positivity in relation to vaccination status among healthcare workers in St. Paul's and Zewditu Hospitals, Addis Ababa, January 2011**

Vaccination status	No. of subjects	HBsAg positive No (%)
Fully vaccinated	0	0 (0.0)
Incomplete vaccination	9	0 (0.0)
No vaccination	245	6 (2.4)
Total	**254**	**9 (3.5)**

Table 4: **Association of HBsAg seropositivity and risk factors among healthcare workers in public hospitals, Addis Ababa, January 2011**

Risk factors	HBV prevalence No (%)	COR	95%CI	P-value
Knowledge on UPs				
Yes	2 (1.0)	1		
No	4 (8.2)	9.022	1.603-50.78	0.014
Glove use				
Inconsistent	4 (4.0)	1		
Consistent	(1.3)	0.327	0.059-1.818	0.201
Blood contact				
No	1 (1.4)	1		
Yes	5 (2.7)	1.927	0.221-16.795	0.552
Body fluid exposure				
No	1 (1.0)	1		
Yes	5 (3.3)	3.378	0.389-29.352	0.270
NSI				
No	1 (1.0)	1		
Yes	5 (3.2)	3.267	0.376-28.18	0.283
Sharp injury				
No	2 (1.6)	1		
Yes	4 (3.1)	2.033	0.366-11.30	0.410
Operation				
No	2 (1.03)	1		
Yes	4 (6.8)	7.018	1.252-39.335	0.027
Tattoo				
No	3 (1.4)	1		
Yes	3 (8.8)	7.00	1.352-36.229	0.020

COR: Crude Odd's Ratio; CI: Confidence interval; UPs: Universal Precautions

Discussion

The overall prevalence of HBsAg was 2.4% ranging from 0 to 4%. The present prevalence was lower compared to a report of 9.7% by Yimer et al. (11) on HCWs and that of 7% by Abebe et al. (12) on the general population done in Addis Ababa. The lower prevalence in the present study could be because of the declining trend of HBV prevalence among the general population. In addition, it could be due to the use of only HBsAg as a marker of HBV infection. Studies from Senegal, 17.8% (13), Uganda (8.1%) (14) and Yemen, 9.9% (15) demonstrated higher prevalence. However, the present finding was higher than the 1.2% reported from Mexico (16), 1% from Morocco (17) and 0.5% from Pakistan (18).

The age specific HBV prevalence varies slightly among age groups. It was 4.6% in the age group of 40-49 years. It showed progressively increasing prevalence in the age group 20-29 years (3%) and in the 40-49 years (4.6%) and then declined in the age of group 55-59 years. Previous report from Ethiopia showed that the HBsAg prevalence increased from 6.3% in the age group 19-24, to 18% in the age group 40-44 years then progressively declined to 0% in the age group 55-59 years (11). A study from India demonstrated that 8 out of 9 positive cases were below 40 years of age (19). In addition, our study indicated that the majority of health professionals in age the group 20-29 years were exposed to many infections causing risk factors than their counterparts. The high sero-positivity in younger adults may be (in part) explained by few cases studied in the older age groups. Nevertheless, the chance of acquiring infection is higher since they are not well-experienced in their jobs and so contact with blood, blood products, needle, sharp injury and other exposure was more. At older ages, some HBV infections may also clear out spontaneously.

This study revealed that 67% and 33% of the positive cases were detected in males and females, respectively. There were more male HBsAg carrier (1.6%) than females (0.08%) but this did not show a statistical significance. Previous studies from Ethiopia and India had reported significant difference between male and female HBsAg prevalence rate (12, 20). In addition, the finding is in agreement with a study conducted in Africa (21) and Pakistan (7). Higher prevalence of HBsAg in males than females may be attributable to a higher probability of exposure to blood, body fluids, NSI, sharp injury and other risk factors.

The present study showed marked variations in prevalence of hepatitis B sero-markers among the professional categories. Five of 6 positive cases were detected among nurses. The result was in agreement with a study conducted in Moroccan HCWS, in which 2 positive cases and one case were detected among nurses and physicians, respectively out of the 3 positive cases (17). A similar finding was obtained from a study in Sudan where the occupational risk of HBsAg among the HCW in the study was high for the nurses 3/5 cases (21). This suggested that the nurses have more exposure to the needle stick injury or other infectious body fluid from patients than other occupational groups.

HCWs are potentially exposed to blood and body fluids and are at an increased risk to acquire pathogens. Exposure to blood and body fluid in this group of healthcare personnel was quite high, 72.8% and 60.2%, respectively. Previously research in Ethiopia showed that 82.3% and 60.6% exposure to blood and other body fluids (11). This might be as a result of HCWs updated knowledge about the mode of transmission of the virus or forgetting their exposure which resulted in underestimation. Under reporting by our HCWs could be the reason as they did not register the episodes not considering them important enough, again pointing towards the role of their attitude and perception. The result is higher than the 64% report from Turkey (22) where awareness about universal precaution and implementation is expected to be high. In addition, this study investigated the exposure of health professionals to body fluids (CSF, amniotic and pleural fluids) other than blood which accounted for 60.2%. Previous reports from other countries gave several possible reasons for the wide spread presence of exposure to blood and body fluids. These included lack of training, long working hours, working habits, and experience (23). Unprotected handling of the biological specimens and different procedures in healthcare facilities are additional risk factors.

The risk of transmission of HBV infection by NSI is between 6 and 30% for susceptible HCWs without post-exposition prophylaxis or sufficient HBV vaccination (24, 25). This study found that more than 50% of the study subjects encountered NSI and sharp injury. The overall prevalence of NSI and sharp injury were 155 (61.02%) and 127 (50%), respectively. Five of 6 positive cases were detected among needle stick injured HCWs.

Our result is in consistent with a previous report from Addis Ababa, Ethiopia, which showed 59% and 31.1% NSI and sharp injury respectively (11). A study from India reported a significantly higher incidence of HBsAg among those with a history of frequent and occasional needle pricks as compared to those with rare or no needle pricks (19). Also the finding was comparable with a study in Pakistan where 66% of respondents were victims and all needle stick and the sharp injured were positive for HBsAg (26). In contrast, a study from Sudan reported only 38.4% of HCWs were exposed to NSI and most of the positive cases were among needle pricked subjects. Our result was higher than a study in Egypt where 35.6% were exposed to at least one needle stick injury during the preceding 3 months (27). A study from Hawassa, Ethiopia, showed that accidental needle stick injuries sustained by health-care workers were common occupational health hazards and a public health issue in healthcare settings and 30.9% of healthcare workers had

experienced at least one needle stick injury during the previous year (28).

This finding showed needle stick and sharp injuries were quite common workplace accidents and indicated that exposure to blood, body fluid, NSI and sharp injury found to be a considerable burden for healthcare workers and indicated the common mistakes of negligence of common procedure in a hygienic way. In addition, lack of awareness about infection control practices, lack of resources for sterilization and the purchase of new disposable equipment might be the possible explanation for the high occupation related exposure. Clearly, not every NSSI is preventable, but research has shown that 74% of injuries from needle stick can be prevented (29).

Training on infection prevention is very important to prevent HCWs from being infected by HBV. This study found that only 42.7% of the study subjects had training on infection prevention. This is comparable with previous reports from Ethiopia, which showed that only 45.8% of the respondents had participated in any training dedicated to infection prevention after their respective pre-service courses (30). A study from Hawassa reported 41.8% of HCWS were trained on infection prevention (28). A report from Uganda indicated that HCWs with no raining on infection prevention were more likely to have been exposed to hepatitis B virus infection (14). Most of the positive cases were detected among HCWs who did not take training.

Several suggestions have been made for preventing and limiting sharp injuries among HCWs. These include health education, behavior change, introduction of barriers to protect the caregivers, safer techniques, safer devices, and organization factors such as improved staffing levels and implementing teaching programs to educate these lower level personnel and safe handling of disposal devices.

Compliance to universal precaution was assessed by consistent use of glove and 152 (59.8%) consistently used gloves. This indicated that yet there was a problem in compliance to universal precaution. Our finding was higher than the previous study conducted in Ethiopia (10) and reports from Turkey (31) and India (32). This might be due to change in attitude, adherence and practice of HCWs in applying standard precaution. HCWs would have overestimated their knowledge and practices of infection prevention and compliance to standard precautions (SPs). Our current research did not incorporate reasons for not wearing personal protective equipments (PPEs). Previous study reported that HCWs were complaining encountering shortage and ill fitted sizes of personal protective devices and there were no clear rules and regulations that govern the staff, patients and environment.

A majority of the study participants knew about universal precautions and this might be due to an overestimated report from the HCWS. In one study from Saudi Arabia, 43/70(61%) of HCWS were aware of universal precaution guidelines (33).

The discovery of HBV vaccines and the results obtained from their introduction constituted a land mark of great importance for medical practice. Mass immunization lowers transmission rates and hence, pushes back the average age of infection. Reports of previous studies support that hepatitis B immunization decreases the incidence of HBV infection (34).

Risk factor analysis of hepatitis B infection showed that knowledge about UPs, tattoo and personal surgery were statistically significant on, univariate analysis. Instrumentation during surgery might be the source of infection for HCWs. study from Morocco demonstrated HBsAg was detected among HCWs who had a history of invasive surgical procedures (17). One report from Ethiopia revealed significantly a high prevalence of HBsAg was observed among individuals with a history of invasive procedures, like tooth extraction, abortion, ear piercing, tattooing and unsafe injection (35).

In this study the majority of the positive cases were detected among those who did not know about universal precaution. So for the future, intensive training which focuses on universal precaution and infection prevention should be provide to minimize HBV infection among HCWs.

To reduce the occupational exposure to HBV, universal precautions must be adhered to during procedures on patients. Needle stick injury, sharp injury, occupation and duration of service and other risk factors were not found to be risk factor for HBsAg positivity in the present study. The difficulty of avoiding confounding factors in this kind of study design, the small sample size and the sampling methods and the lower positive rate might be the possible explanation for absence of association of these risk factors with HBV infection. Thus, studies enrolling a larger number of study subjects need to be conducted to investigate the burden of the problem among healthcare workers in Addis Ababa hospitals. In addition, a nationwide prevalence of HBV and associated risk factors both on highly risk groups like HCWs and community based studies should be conducted to know prevalence, vaccination status, mode of transmission and associated potential risk factors to implement effective infection prevention strategies to prevent life threatening HBV associated diseases.

Concerning vaccination, the HBV vaccination coverage was 3.5% (p= 0.05) although all HBsAg positive cases were detected among unvaccinated HCWs. In previous study from Ethiopia, the hepatitis B vaccination rate was

found to be 13% and absence of vaccination was the only risk factor associated with hepatitis B infection (p=0.001) (11). This study found that vaccination status was very low compared to that of Saudi Arabia 84% (34), and Egypt, 38% of professionals vaccinated (28). A study from low endemic countries like Iran reported about 86.4% of HCWs were vaccinated and the positive rate of HBsAg among vaccinated and unvaccinated HCWs was 6/299(2%) and 3/47(6.4%), respectively (36). A study from India revealed about 42% of the HCWs had received a partial or full course of vaccination against HBV and the difference in positivity among vaccinated and unvaccinated groups was significant (P<0.001) (19). Where as a study from Sudan reported that all the positive cases were detected among unvaccinated HCWs but there was no significant difference in HBsAg positivity (21).

In conclusion, the prevalence of hepatitis B virus sero-marker (HBsAg) is 2.4% among health professionals in the study sites. The study showed that health professionals were highly exposed to blood, other body fluids, NSI, sharp injury and other risk factors. The study revealed that vaccination status of the study subjects was very poor compared to other countries. Only 9 (3.5%) of the study participants were vaccinated while 42.8% of health professionals were trained on infection prevention.

Occupational exposure prevention should be the primary strategy to reduce the risk of occupational blood-borne pathogen infections. Education for HCW's on handling and processing of infectious specimens, injection safety, prevention of sharps injuries, and universal precautions should be applied. HBV vaccination programs for health care workers are also needed. Proper NSI or blood and body fluid exposure reporting, documentation, post-exposure prophylaxis and a data analysis program should be put in place.

Acknowledgments

We thank Addis Ababa University Graduate study for funding the research project partly and Mada Walabu University for covering my living expense throughout the study period. Our best regards extend to all staff and study subjects of St. Paul's and Zewditu Hospitals without whom the study would have been impossible to accomplish.

References

1. Custer B, Sullivan SD, Hazlet TK, Iloeje U, Veenstra DL, Kowdley KV. Global epidemiology of hepatitis B virus. *J Clin Gastroenterol* 2004;38 (suppl 3): S158–68.
2. World Health Organization (WH). Hepatitis B. WHO/CDS/CSR/LYO/2002.2. Geneva: WHO; Department of Communicable Disease Surveillance and Response, 2002.
3. Anna K, Michael C. Epidemiology of HBV in Africa, its genotypes and clinical associations of genotypes. *Hepat Research* 2002;137:9-19.
4. Wasley A, Grytdal S, Gallagher K. Surveillance for acute viral hepatitis, United States, 2006. *MMWR Surveill Summ* 2008;57(2):1.
5. Sara E, Luckhaup T, Geoffrey M. Deaths due to Blood borne infections and their sequelae among health care workers. *Am J Ind Med* 2008;51:812-824.
6. Ciorlia LAS, Zanetta DMT. HBV in HCWS Workers: Prevalence, vaccination and relation to occupational factors. *Braz J Infect Dis* 2005;9:384-389.
7. Naz S, Ahmad M, Asghar H. Prevalence of hepatitis B among hospital personnel in Combined Military Hospital (CMH), Muzaffarabad. *Int J Agri Biol* 2002;4:227-30.
8. US Centers for Diseases Control (CDC). Recommendations for identification and public health management of persons with chronic hepatitis B virus infection. *MMWR* 2008/57(RR08);1-20.
9. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. *J Viral Hepat* 2004;11:97-107.
10. Tsega E. Epidemiology, prevention and treatment of viral hepatitis with emphasis on new developments. *Ethiop Med J* 2000;38:131-141.
11. Yimer K. Serological and molecular characterization of hepatitis B, C and D viruses infections among health professionals in public hospitals, Addis Ababa, Ethiopia. MSC Thesis: School of Medicine, Addis Ababa University, 2003
12. Abebe A, Nokes DJ, Dejene A, Enqueselassie F, Messele T, Cutts FT. Seroepidemiology of hepatitis B virus in Addis Ababa, Ethiopia: transmission patterns and vaccine control. *Epidemiol Infect* 2003;131:757-770.
13. Romieu I, Sow I, Lu S, Laroque G, Prince-David M, Romet-Lemonne JL. Prevalence of hepatitis B markers among hospital workers in Senegal. *J Med Virol* 1989;27:282-7.
14. Ziraba AK, Bwogi J, Namale A, Wainaina CW, Mayanja-Kizza H. Sero-prevalence and risk factors for HBV infection among healthcare workers in a tertiary hospital in Uganda. *BMC Infectious Diseases* 2010;10:191. http://www.biomedcentral.com/1471-2334/10/191.
15. Shidrawi R, Al-Huraibi MA, Al-Haimi MA, Dayton R, Murray-Lyon IM. Sero-prevalence of markers of viral hepatitis in Yemeni healthcare workers. *J Med Virol* 2004;73:562-5.
16. Kershenobich D, Hurtado R, Collawn C, Bobadilla J, Cabrera G, Borovoy J, et al. Sero-prevalence of viral markers of hepatitis B among health professionals. Multicenter study in Mexico. *Rev Invest Clin* 1990;42:251-6.
17. Djeriri K, Laurichesse H, Merle JL, Charof R, Abouyoub A, Fontana L, et al. HBV in Moroccan health care workers. *Occup Med* 2008;58:419-424.
18. Shagufta H, Niveen A, Shams. HBV and HCV prevalence and prevention awareness among HCWS

in a tertiary care hospital. *Intern J Pathol* 2010;8:16-21.
19. Asok KK, Baghel PK, Shukla CB, Jain MK. Prevalence of HBsAg among HCWs. *Indian J Community Med* 2000;25(2):34-41.
20. Joyee AG, Thyagarajan SP, Reddy EV, Venkatesan *C*, Ganapathy M. Hepatitis B and C viral infections among STD clinic patients in India. *Sex Transm Infect* 2005;81:180.
21. Nail A, Eltiganni S, Imam A. Seroprevalence of Hepatitis B and C among health care workers in Omdurman, Sudan. *Sudan J Med Sci* 2008;3:201-206.
22. Azap A, Ergonul O, Memikoglu KO, Yeşilkaya A, Altunsoy A, Bozkurt GY, et al. Occupational exposure to blood and body fluids among health care workers in Ankara, Turkey. *Am J Infect Control* 2005;33:48-52.
23. Kakizaki M**,** Ikeda N, Ali M, Enkhtuya B, Tsolmon M, Shibuya K, et al**.** Needle-stick and sharps injuries among health care workers at public tertiary hospitals in an urban community in Mongolia. *BMC Research Notes* 2011;4:184.
24. Deisenhammer S, Radon K, Nowak D, Reichert J. Needle stick injuries during medical training. *J Hosp Infect* 2006;63:263-7.
25. Wicker S, Rabenau HF. A review of the control and prevention of needle-stick injuries. *Eur Infect Dis* 2011;5:59-62
26. Morshad MG, Howlader MAR, Sardar MH, Uddin MZ, Khan MA. Incidence of hepatitis B among healthcare professionals due to medical waste handling. *J Dhaka Med Coll* 2009;18:140-143.
27. Talaat M, Kandeel A, El-Shoubary W, Bodenschatz C, Khairy I, Oun S, et al. Occupational exposure to needle stick injuries and hepatitis B vaccination coverage among health care workers in Egypt. *Am J Infect Control* 2003;3:469-474.
28. Tadesse M, Tadesse T. Epidemiology of needle-stick injuries among health-care workers in Awassa City, Southern Ethiopia. *Trop Doct* 2010;40:111-3.
29. Castello A, Vallino A, Argentero P, Zotti C. Preventability of percutaneous injuries in healthcare workers: a year-long survey in Italy. *J Hosp Infect* 2003;55:290-294.
30. Damte M. Assessment of KAP of healthcare workers on universal precaution in North Wollo Zone, Amhara Region, North Eastern Ethiopia. MPH Thesis: Haramaya University, Ethiopia, 2008.
31. Ayranci U, Kosgeroglu N. Needle-stick and sharps injuries among nurses in the healthcare sector in a city of western Turkey. *J Hosp Infect* 2004;58:216-23.
32. Kermode M, Jolley D, Langkham B, Thomas MS, Holmes W, Gifford SM. Compliance with Universal/Standard Precautions among healthcare workers in rural north India. *Am J Infect Control* 2005;33:27-33.
33. Alam M. A study conducted on knowledge, attitude and practices among health care workers on needle-stick injuries, Saudi Arabia. *Ann Saudi Med* 2002;22:396-9.
34. Jefferson T, Demicheli V, Deeks J, MacMillan A, Sassi F, Pratt M. Vaccines for preventing hepatitis B in health-care workers. *Cochrane Database Syst Rev* 2005;4:CD000100.
35. Negero A, Sisay Z, Medhin G. Prevalence of Hepatitis B surface antigen (HBsAg) among visitors of Shashemene General Hospital voluntary counseling and testing center. *BMC Research Notes* 2011;4:35.
36. Bahmani MK, Khosravi A, Mobasser A, Ghezelsofla G. Sero-prevalence of HBV infection and vaccination compliance among HCWS in Fars Province, Iran. *Iranian J Clin Infect Dis* 2010;5:45-5.