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Research article

HEPATITIS B AND C VIRAL INFECTIONS AMONG BLOOD DONORS AT BAHIR DAR, ETHIOPIA

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ABSTRACT

Background: Hepatitis B virus and hepatitis C virus are the major public health problem world wide that affects billions of people. In the study area, there is lack of available information on this issue. **Aims:** the aim of the study was to assess seroprevalence of HBV and HCV among blood donors. **Method**: A cross sectional study was conducted among blood donors attending Bahir Dar Felege Hiwot Referral Hospital. Five milliliters of blood samples were collected and screened with ELISA tests for detecting hepatitis B surface antigen and anti hepatitis C virus antibody. Chi-squared and fisher exact tests were used for the analytical assessment. **Results:** Out of 2384 blood donors examined, 108(4.5%) were seropositive for at least one of the two Hepatitis diseases markers of which five were co-infected. The prevalence of HBs Ag and anti-HVC was 4.11% and 0.63%, respectively. High seropositivity of HBV (8.3%) was noticed among >45 years old and HBV positivity were significantly higher among males (4.4%) than females (1.45%) (P =0.04). HCV prevalence was significantly higher in >45 years old (2.5%, p=0.01). **Conclusion:** The prevalence of HBV and HCV were high and the diseases were still major health problem in elderly people in the study area, which alerts public health intervention as soon as possible.

Keywords: Ethiopia, Hepatitis B virus, Hepatitis C virus, Seroprevalence, Blood donors

INTRODUCTION

Hepatitis B virus (HBV) and hepatitis C virus (HCV) are the main causes of serious liver disease, like hepatocellular carcinoma (HCC) and life threatening disorders of liver disease. Globally there are about 360 million chronic HBV infections and 5.7 million HBV related cases.[1] Cirrhosis, liver failure and hepatocellular carcinoma develop in 15–40% of chronically infected hepatitis B virus individuals.[2] Approximately 3% of the world's population was infected with HCV and of which higher prevalence reaching 4% to 6% found in some

parts of Africa. Over 80% persists as HCV chronic infection. [3] In Ethiopia, report indicated that the prevalence of anti-HCV among patients with chronic hepatitis, cirrhosis of the liver and HCC was found to be 21%, 36% and 46% respectively. Furthermore, about 50% of healthy individuals had at least one of HBV marker by the age of 20–24 years old.[4, 5]

Blood transfusion, vertical transmission during pregnancy and sexual or nosocomial exposure are risk factors for HCV and HBV infections and they remain considerable risk for transfusion transmissible infection.[6] Even though now a days the risk of blood transfusion transmitted infections is lower than ever, providing safe blood products remains subjected to contamination with many human pathogens.[7] Hepatitis B virus and HCV are the major concern of blood transmissible infections because of their prolonged viraemia and carrier state.[8] Hepatitis B virus is highly contagious and relatively easy to transmit from infected individual to another by blood transfusion and in tropics there is relatively higher HBV prevalence.[9, 10]

Accurate estimate of the prevalence of these viruses in a particular population is very important to monitor the safety of the blood supply and plan effective preventive strategies. In Ethiopia, especially in the study area there is lack of available information on this issue. Therefore, the aim of the study was to assess the seroprevalence of HBV and HCV infections among blood donors in two years at Bahir Dar Felege Hiwot Referral hospital, North West Ethiopia.

METHODS

Ethics: The study was reviewed and approved by the Institutional Review Board of the School of Biomedical and Laboratory Sciences, University of Gondar and official permission was obtained from Bahir Dar Felege Hiwot Referral Hospital. Written informed consent was taken from each prospective blood donor recruited into the study. Individual records was coded and accessed only by the research team.The collected data of the study were analyzed anonymously. Individuals confirmed as seropositive for one or both of HBV and HCV infections were evaluated and managed according to the current standard of care in Ethiopia.

Study Design and Area: A cross sectional study was conducted at the blood bank of Bahir Dar Felege Hiwot Referral Hospital from January 2007 to December 2008. The hospital is located at Bahir Dar town in North West Ethiopia. The Hospital is a referral hospital serving a population of about 7 million people in North West Ethiopia.

Sample Size and Sampling Technique: All (2384) blood donors who donated blood at Bahir Dar Felege Hiwot Referral Hospital between January 2007 and December 2008 were eligible for this study. Individuals who satisfy the blood donation screening's criteria: age between 18 and 65 years, body weight over 50 kg, normal body temperature, hemoglobin level, blood pressure and absence of signs of an acute infections, no history of infectious and chronic diseases, donate blood. Those blood donors who did not meet the criteria for blood donation stated in the inclusion criteria were excluded from the study. Therefore, all study participants recruited in this study were without any history of known or noticeable risk factor.

Data collection and processing: Data from each study participant were collected after taking written informed consent. Structured questionnaire based interviews of the study participant was used to collect necessary socio-demographic information of blood donors, gender, age, and residence, types of donor, occupation and marital status. From each blood donor about 5ml of blood sample was collected from the collection bag using a sterile capped tube. The blood was centrifuged and plasma was separated and stored at -20 ^{o}C until tested. Samples were brought to room temperature prior to testing. All blood samples were screened for Hepatitis B surface antigen (HBsAg) and anti-

HCV antibodies based on established screening procedures according to manufacturer's recommendations at the Blood bank laboratory of Bahir Dar Felege Hiwot Referral Hospital. Each plasma sample was tested for HBsAg and anti-HCV antibodies using enzyme linked immunosorbent assay (ELISA) kits. For each run of the test internal quality controls was performed.

Statistical Analysis: Data were manually cleaned, categorized, coded and entered and analyzed using SPSS version 20 software. A descriptive analysis was used to determine demographic characteristics and seroprevalence of HBV and HCV. The differences in proportions of risk factors associated with the seroprevalence of HBV and HCV were tested by the chi-square test and fisher exact test. Significance levels were chosen at 0.05 level with a two-tailed test.

RESULTS

Table1: Sociodemographic characteristics of blood donors recruited at Bahir Dar

Variable		Frequency	(%)
Gender	Male	2177	91.3
	Female	207	8.7
Age in years	18-25	1233	51.7
	26-35	758	31.8
	36-45	272	11.4
	>45	121	5.0
Residence	Urban	1632	68.4
	Rural	752	31.6
Type of blood donor	Volunteer	3	0.1
	Commercial	1356	56.9
	Relative of recipient	1025	43.0
Occupation	Daily laborer	1356	56.9
	Farmer	739	31.0
	Student	132	5.5
	Employed	78	3.2
	Merchant	18	0.7
	House wife	61	2.5
Marital status	Single	1514	63.5
	Married	870	36.5

Table.2: Serological test result blood donors recruited at Bahir Dar

Variables	Status	Number (%)
HBsAg	Positive	98 (4.11)
	Negative	2286(95.9)
Anti –HCV antibody	Positive	15(0.63)
	Negative	2369(99.4)
Co-infected	Positive	5(4.6)
Total	Positive	108(4.5)
	Negative	2276(95.5)

The seroprevalence rate of HBV infection was 4.11% where 95 (4.4%) out of 2177 males and three (1.45%) of the 207 females were having HBV infections. The overall prevalence rate of HCV infection in the study was 0.63% and all were males. The highest seroprevalence of HBV was observed in blood donors whose age is greater than 45years old (8.3%) followed by 36-45 years old donors 14 (5.9%). Similarly, high seroprevalence of HCV 3(2.5%) was observed in age groups of whose age is greater than 45. Among blood donors whose residence was from urban, the seroprevalence of HBV and HCV were 68(4.1%) and 10(0.6%) respectively. Among 1356 commercial blood donors, 62(4.6%) for HBV and 10(0.7%) for HCV were seropositive (table 3).

Associated risk factors for seropositivity of HBV and HCV: The difference in proportions of seroprevalence of HBV 95(4.4%) in male versus 3(1.4%) in female was statistically significant (χ^2=4.074, p=0.04). However, there was no statistical significant association between seroprevalence of HCV infection and gender (p=0.63). The highest seroprevalence of HCV was observed in blood donors aged greater than 45 years old (2.5%) followed by 18-25 years old donors (0.8%). The difference of seroprevalence of HCV among different age groups was statistically significant (χ^2 =10.57, P=0.01). However, age distribution and seroprevalence of HBV was not significantly associated (χ^2 =7.3, P=0.06). In case of occupation of the blood donors the higher seroprevalence of HBV was observed in day laborers 62(4.6%) followed by farmers 28(3.8%), and students 4 (3.1%). Nonetheless, this differences in the proportion of the seroprevalence of HBV among donors occupations was not statistically significant (χ^2 =2.67, P=0.75). Moreover, there was no significant association between residence, types of blood donors, occupations and marital status and seroprevalence of HBV and HCV (table 3).

Table 3. Seroprevalence and associated risk factors of HBV and HCV among blood donors

Variable	N (%)		HBV sero-positive		χ^2	P	HCV sero-positive		χ^2	P
			Yes(%)	No (%)			Yes (%)	No (%)		
Gender	Male	2177(91.3)	95 (4.4)	2082(95.6)	4.07	0.04	15 (0.7)	2162(99.3)		0.63
	Female	207 (8.7)	3 (1.45)	204 (98.6)			0.00	207(100)		
Age in year	18-25	1233(51.7)	43(3.5)	1190(96.5)			10(0.8)	1223(99.1)		
	26-35	758 (31.8)	31(4.1)	727(95.9)	7.3	0.06	1(0.2)	757(99.8)	10.57	0.01
	36-45	272 (11.4)	14(5.9)	256(94.1)			1(0.4)	271(99.6)		
	>45	121 (5)	10(8.3)	111(91.7)			3(2.5)	118(95.5)		
Residence	Urban	1632(68.4)	68(4.1)	1564(95.9)	0.04	0.83	10(0.6)	1622(99.4)		1.00
	Rural	752 (31.6)	30(3.4)	722(96.6)			5(0.66)	747(99.4)		
Types of blood Donor	Volunteer	3 (0.1)	0(00)	3(100)			0(00)	3(100)		
	Commercial	1356(56.9)	62(4.6)	1294(95.4)	1.79	0.41	10(0.7)	1346(99.3)	0.6	0.74
	Relative of recipient	1025 (43)	36(3.5)	989(96.5)			5(0.5)	1020(99.50		
Occupation	Day laborer	1356(56.9)	62(4.6)	1294(95.4)			10(0.7)	1346(99.3)		
	Farmer	739 (31)	28(3.8)	711(96.2)			5(0.7)	734(99.3)		
	Student	132 (5.5)	4(3.1)	128(96.9)			0	132(100)		
	Employed	78 (3.2)	2(2.6)	76(97.4)	2.67	0.75	0	78(100)	2.11	0.83
	Merchant	18 (0.7)	0(00)	18(100)			0	18(100)		
	Housewife	61 (2.5)	2(3.2)	59(96.8)			0	61(100)		
Marital status	Single	1514(63.5)	64(4.2)	1450(95.8)	0.06	0.80	11(0.7)	1503(99.3)	0.27	0.6
	Married	870 (36.5)	34(4.0)	832(96)			4(0.5)	866(99.9)		

DISCUSSION

In the present study, 4.11% and 0.63% of subjects were positive for HBsAg and HCV antibodies respectively. A higher (6%) seropositivity of HBV was reported previously from Ethiopia, December to February 2003.[11] This implies that there has been appreciable change in the seroprevalence of HBV in the area over the last decade. When the finding of the current study were compared with results reported from similar study subjects of other countries, a comparable prevalence of HBV has been reported such as in Kosovo (4.2%) [12] and Egypt (4.3%).[13] The prevalence of HBsAg in this study was lower than the findings reported from Nigeria ((14.3%).[14] Nevertheless, this finding is higher than the seroprevalence rate reported in India (2.2%), [15] Turkey (1.38% and 1.8%), [16, 17] Libya (1.28%),[18] and Iran (1.07%).[19] The socio-cultural difference may be the possible factors for these differences.

Regarding HCV infection, the overall prevalence of HCV antibody was 0.63% in the present study, which was significantly lower as compared with reports from Tunisia (1.4 %),[20] Egypt (2.7%),[13] and Senegal (0.8%).[21] The seroprevalence of anti-HCV antibodies was comparable with findings reported among blood donors from Libya (0.69%)[17] and India (0.7%), [15] but this result was higher as compared with findings in Kosovo (0.3%)[12] and Turkey (0.35%). [16] In the present study, despite the large number of female donors tested (207 subjects), none was positive for HCV antibodies. Regarding co-infection, low prevalence was found (five cases out of 2384 blood donors tested) which indicated that HBV positive donors in this study do not have much risk of exposure to HCV infection. The hepatitis co-infection pattern was higher among blood donors whose age is greater than 45 years compared to other age categories.

The demographic analysis of the 98 blood donors who were seropositive for the HBV infections indicated that it had significantly higher in males (4.4%) as compared to females (1.45%) (p=0.04). A recent study which was done in Southwest Ethiopia showed a statistically significant difference in the seroprevalence of the HBsAg between the male and the female donors (2.5% in males vs. 0.8% in females).[22] Similarly, in the general population from Addis Ababa Ethiopia the prevalence of HBsAg in males (8.6%) was significantly higher than in females (4.6%). [5] We found an increasing prevalence of HBsAg and anti HCV antibody with the increasing age of blood donors, which was similar to the findings, anti-hepatitis B core antibody, of the study which was reported from Vietnam,[25] this might be due to as age increases the risk of exposure to HBV and HCV increases in parallel. Therefore, this finding can suggest that HBV and HCV infections may enhance susceptibility to gender due to risk-behavior differences by gender as well as the raising in age with time.

Other important findings we observed were high occurrence of HBsAg (4.6%) and HCV antibodies (0.74%) among commercial blood donors and HBsAg (4.6%) in daily laborers as compared to other type of blood donors. The prevalence of HBsAg and HCV among the commercial blood donors in this study is comparable with figures reported from previous studies in Gondar Ethiopia[24] but lower than result reported from Nigeria in which the prevalence of HBV was11%.[25] In the present study only three volunteers (0.1%) donated blood in the study period. This implies that there is lack of knowledge or awareness about blood donation in the community.

CONCLUSIONS

The seroprevalence of HBV and HCV were considerably high among blood donors in our study and male blood donors are more affected

than females. Moreover, the seroprevalence of HBV and HCV were higher among elderly people and commercial blood donors. Since there were significant proportions of HBsAg and HCV antibody positive blood donors, strict blood donor selection should be considered. Promoting and awareness creation to the community regarding volunteer donation of blood should be considered rather than using commercial blood donors.Therefore, health care associated risk prevention and health education among population should be considered as the main interventions that might help reducing the spread of these blood-borne infections.

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