



Sero-prevalence and Associated Risk Factors of Hepatitis B, Hepatitis C and Human Immuno Deficiency Viruses among Blood Donors at Nekemte Blood Bank, West Ethiopia

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Abstract

Blood serves as a vehicle for transmission of Blood-Borne pathogens and hemo-parasites. Transfusion transmissible infections agents such as Hepatitis B, Hepatitis C and HIV Viruses are among the greatest threats to blood safety for the recipients and on the economy of the country. Therefore, the study of sero-prevalence of Hepatitis B, Hepatitis C and HIV Viruses are important to assess the magnitude and risk of Hepatitis disease and HIV transmission and for its prevention and control strategies. The objective of this study was to determine the sero-prevalence and associated risk factors of Hepatitis B, Hepatitis C and HIV viruses' infection among blood donors at Nekemte blood bank. An institutional based cross sectional study was conducted on conveniently selected 97 blood donors from April to May, 2016. The socio-demographic characteristics of blood donors were collected using pre-structured questionnaire. Blood collected from donors were tested as per the protocol for Hepatitis B virus surface antigen, Hepatitis C and HIV viruses' antibody. Data was analyzed to assess the association between independent variables and Hepatitis B, Hepatitis C and HIV viruses' sero-status. A total of 97 blood donors were examined for Hepatitis B, Hepatitis C and HIV viruses' sero-status. Among 97 study participants, 6 blood donors were found to be sero-positive for HBsAg, giving the Sero-positivity of 6.2% for HBV. From the 6 sero-positive donors for HBV, 5 were males and 1 was female giving the prevalence of 5.95% and 7.7% respectively. Majority of them 2(33.3%) were found in age category of 28-32. Urban resident blood donors were more infected (6.8%) than rural residents (4.3%). Proportion of positive HBsAg was high among female than males and in individuals with multiple sexual partners and those individual who have exposure history of liver disease. The prevalence of HBV is considerably higher than HCV and HIV among blood donors at Nekemte Blood Bank. Thus, health education about the transmission, prevention and awareness of viral infections should be strengthened by all concerned bodies to tackle this problem.

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INTRODUCTION

During World War II and the immediate post war, the demand for blood and blood components in the USA increased substantially. This resulted in the establishment and growth of blood banks, transfusion services and other blood laboratory support services (Dhawan *et al.*, 2008).

The discovery of transfusion transmissible infection (TTI) has heralded a new era in blood transfusion practice worldwide with emphasis on to fundamental objective, safety and protection of human life. Hepatitis B virus (HBV), Hepatitis C virus (HCV) and human immune virus (HIV) are of great concern in transfusion medicine because of their prolonged viremia and carrier or latent state (Lion, 1995). Transfusion-transmitted infections (TTIs) remain a major challenge to transfusion services worldwide, particularly in developing countries (WHO, 1997). The greatest threat to the safety of the blood supply is the donation of blood by sero-negative donors during the infectious window period. In developed

countries implementation of more sensitive tests that detect infection earlier, decreases risks of transfusion transmitted viral infection (Glynn *et al.*, 2000).

Hepatitis is an inflammation of the liver, most commonly caused by a viral infection of these viruses, hepatitis B virus and hepatitis C virus infections account for a substantial proportion of liver disease worldwide. These viruses are responsible for liver damages ranging from minor disorders to liver cirrhosis and hepatocellular carcinoma (HCC). Hepatitis B virus is a DNA virus from hepadnaviridae family. It is a highly contagious and relatively easy to be transmitted from an infected individual to another by blood transfusion, during birth, by un-protected sex and by sharing needles. HCV belongs to the family flaviviridae and the genus is hepacivirus. It is RNA virus with lipid coat similar to flaviviridae family. It was recognized as the primary cause of transfusion associated

non-A non-B viral hepatitis worldwide (Houghton *et al.*, 1991).

HCV infection is the most common chronic blood borne infection in the world (Glynn *et al.*, 2000). It causes lifelong persistent infection (Houghton *et al.*, 1991). The natural targets of HCV are hepatocytes and possibly, B-lymphocytes (Gasiorowicz *et al.*, 2006). The factors most strongly associated with infection by HCV are infection during use and receipt of blood transfusion (Alter *et al.*, 2000). HIV virus is a RNA virus from retroviridae family; it is one of the most frequently recorded transfusions transmissible infections (Oklda *et al.*, 2001). HIV screening among blood donors is therefore a key safety issue in addition to screening for other TTIs such HBV and HCV. These three viruses (HCV, HBV, and HIV) have similar routes of transmission namely through blood and blood product, sharing of needles to inject drugs and sexual activity enables the co-infection of these viruses and thereby makes infection or super infection a common event (Alter *et al.*, 2001).

The high prevalence of HBV, HCV and HIV as well as other transfusion transmitted infections has heightened the problems of blood safety in Ethiopia (USAIDS, 2014). Thus, study on the magnitude of transfuse-transmissible infections in blood donors is important for estimating the risk of transfusion-transmissible infections and optimizing donor recruitment strategies to minimize transmission of infectious disease through blood transfusion. The blood transfusion transmission and infection of HBV, HCV and HIV are the major public health problem (Lion, 1995), but there is no published data for the sero-prevalence and associated risk factors for HBV, HCV and HIV infection among blood donors in Nekemte town. Therefore, the aim of these study is determine sero-prevalence of hepatitis B, Hepatitis C and human immune deficiency viruses infection and their associated risk factors in , among blood donors at Nekemte blood bank from April to May 30, 2016.

MATERIALS AND METHODS

This study was conducted at Nekemte blood bank, Oromia region, western Ethiopia from April to May, 2016. Nekemte town is 328 km away from Addis Ababa and has a total population of 104,806. Its geographical location is 9° 14' North latitude and 36° 30' East longitudes. The Nekemte blood bank was established during 2005. This blood bank gives services such as:- Blood donation, screening and diagnosis. An Institution based cross-sectional study was conducted during the study period.

All blood donors who was screened and allowed to donate blood as blood bank criteria during the data collection period. The study subjects were conveniently selected blood donors at Nekemte blood bank, during the data collection period. All blood donors visit Nekemte blood bank during the study period April 15 to May 30, 2016. Thus a total of 97 blood donors were included in the study.

Convenient sampling technique was used and all voluntary blood donors were included as study subjects. Pre-structured questionnaire was used to collect socio-demographic data and other independent variables (associated risk factors) and Laboratory investigations/examination of sero-status of HBV, HCV

and HIV was done and the results was recorded using appropriate table form.

After the donors donated the blood, 5 ml of blood sample was taken from the blood bag. Then, serum was separated from cell by centrifuging at a speed of 3500 rpm for 5 minutes and 2 ml of serum was collected from each sample. Each blood donor's serum was tested for HBsAg, anti-HCV antibody and anti-HIV antibody by using HBsAg ELISA kit which uses antibody sandwich ELISA method and using the human anti-HCV 3rd generation ELISA, respectively.

Data Processing and Analysis

Data was processed and analyzed by using Microsoft excel and descriptive statistics was used to show association between risk factors and HBV, HCV and HIV. Chi-Square and p-value was used to assess the association between independent variables and sero-status of study participants.

Data Quality Control

Data quality was assured by following Standard Operating Procedure at pre-analytical, analytical and post-analytical phases. Data was collected using standardized questionnaire and the completeness of data was checked.

Ethical Consideration

The research was constructed after ethical approval was given from research and ethical review committee of medical laboratory department, college of health science, Wollega University and from Nekemte blood bank. Additionally, after explaining the importance of the study, an informed written consent was obtained from study participants. The benefit and purpose of this study was explained to each study subjects and the result was kept confidential, the blood donor's names were not registered on the questionnaire. Result was notified for the participants that were willing to know their Sero-status.

RESULTS

A total of 97 blood donors were examined for Hepatitis B, Hepatitis C and HIV viruses' sero-status. Out of the 97 blood donors, 84 (86.6%) were males and 13 (13.4%) were females with male to female ratio of 6.5:1. Majority of them (40.2%) were found in the age category of 18-22. Most of the donors belonged to urban residents (76.3%). Majority of them have completed secondary school education (42.3%). From all of the study participants, 61 (62.9%) were single. From 97 study participants, 48.5% were students, 17.5% were private worker and 14.4% were government employees (Table 1).

From the total study subjects, 81 (83.5%) of them have donated the blood voluntarily and 19 (19.6%) of them donated blood for more than one occasion. Blood was not transfused for 80 (82.5%) of our study participants and 5 (5.2%) of them have been exposed to jaundiced patient's secretion and injection drug of abuse users were 8 (8.2%). Some of them 19 (19.6%) have been experienced injection medical procedure. 3 (3.1%) of the study participants have had multiple sex partners and all of them perform safe sexual intercourse. 5 (5.2%) of them were faced liver disease. From all of the study subjects, 9 (9.3%) of them have been extracted their tooth and 4 (4.1%) of them have been experienced traditional surgery. 11 (11.3%) of them have been exposed to needle stick injury and 13 (13.4%) were experienced ritual scarring.

Table 1: Socio-demographic characteristics of blood donors in Nekemte blood bank from April to May 2016.

Variables	Category	Frequency	Percentage
Age	18 – 22	40	41.2
	23 – 27	25	25.8
	28 – 32	14	14.4
	33 – 37	7	7.2
	38 – 42	4	4.1
	43 – 47	2	2.0
	>47	5	5.1
Marital status	Single	61	62.9
	Married	32	3.3
	Separated	4	4.1
Educational status	Un able to read and write	6	6.2
	Read and write	16	16.5
	Primary school	5	5.2
	Secondary school	41	42.2
Occupational status	College (university level)	29	29.9
	Governmental employer	14	14.5
	Private worker	17	17.5
	NGO worker	2	2
	Student	47	48.4
	Merchant	12	12.4
	House wife	1	1
	Military	0	0
Residence	Farmer	4	4.1
	Urban	74	76.3
	Rural	23	23.7
Donor types	Volunteer	81	83.5
	Replacement	16	16.5

Among 97 study participants, 6 blood donors were found to be sero-positive for HBsAg, giving the Sero-positivity of 6.2% for HBV. From the 6 sero-positive donors for HBV, 5 were males and 1 was female giving the prevalence of 5.95% and 7.7% respectively (Table 2). Majority of them 2(33.3%) were found in age category of 28-32 and 1(16.7%) from each age category of 18-22, 23-27, 38-42 and >47 years. Urban resident blood donors more infected (6.8%) than rural residents (4.3%) (Table 3).

From 97 blood donors, only 1(1%) was found to be positive for Anti-HCV antibody and he was male. He was found in the age category of 23-27 and private worker in occupation. But statistically this was not significant ($P=0.645$).

Among 97 blood donors, there were only 2 donors which were positive for HIV antibodies, with prevalence of 2.06%. One was male and the other was female with age category of 18-22 and 28-32 respectively. One was farmer and the rest was merchant in their occupation.

Table 2: Frequency distribution of sero-status for HBsAg, Anti-HCV and Anti HIV among blood donors in Nekemte blood bank from April to May 30, 2016

No	Variables	Frequency	Percentage
1	HBsAg	Reactive	6 6.2
		Non – reactive	91 93.8
	Total	97	100
2	Anti – HCV	Reactive	1 1.03
		Non-reactive	96 98.97
	Total	97	100
3	Anti – HIV	Reactive	2 2.06
		Non-reactive	95 97.94
	Total	97	100

Table 3: Association of HBsAg sero-status with selected socio-demographic variables and risk factors among blood donors at Nekemte Blood Bank from April to May 30, 2016

Characteristics	HBsAg sero – status		Total (%)	X ² -value	P-value
	Reactive	Non-reactive (%)			
Age	18 – 22	1	39	7.413	0.357
	23 – 27	1	24		
	28 - 32	2	12		
	33 – 37	0	7		
	38 – 42	1	4		
	43 – 47	0	2		
	> 47	1	3		
Sex	Male	5	79	0.0128	0.935
	Female	1	12		
Residence	Urban	5	69	0.505	0.452
	Rural	1	22		
Marital status	Single	3	58	0.952	0.7425
	Married	3	29		
	Separated	0	4		
Occupation	Gov't employer	0	14	2.46	0.865
	Students	3	44		
	merchant	1	11		
	Private worker	2	15		
	NGO worker	0	2		
	House wife	0	1		
	Farmer	0	4		
Blood transfusion	Yes	1	16	0.0032	0.965
	No	5	75		
Liver disease	Yes	1	4	1.797	0.328
	No	5	87		
Donors type	Voluntary	4	77	1.315	0.325
	Replacement	2	14		
Multiple sexual partners	Yes	1	2	4.076	0.0425
	No	5	89		
Ritual scarring	Yes	1	12	0.062	0.727
	No	5	79		

DISCUSSION

The present study was aimed at estimating the sero-prevalence of HBV, HCV and HIV among blood donors at Nekemte blood bank, Ethiopia. The sero-prevalence of HBV in the blood donors at Nekemte Blood Bank was 6.2%. In the present study the prevalence of HBV, HCV and HIV was 6.2%, 1% and 2.06% respectively which was comparable with study conducted in Jigjiga Blood Bank in which the overall seroprevalence was HIV, HBV, and HCV was 3.16%, and 9.48%, 0.73% respectively (Melese and Tesfaye, 2016).

Even though there was no significant association observed as seen from the result of this study, HBV, HCV and HIV relatively affects reproductive age groups, which may affect the economy of the country. In this study, HBsAg was relatively more prevalent among private workers (11.7%) followed by merchant (8.3%) and students (6.4%). The proportion of HBV sero-positive individuals among females was higher than males 6.69%

and 5.95% respectively. This is in line with study done in Arba Minch Blood Bank in which the test positivity among male was lower than females (Kabato and Weldearegay, 2016)

The present study result of HBV and HCV prevalence was also in agreement with study done Wolaita Sodo University in which the Prevalence of HBV among study participant was 4.7% while HCV was not detected (Fithamlak *et al.*, 2016).

The present study result was comparable with previous study done in Sudan in which the prevalence of HBsAg, HIV and HCV 10%, 0.8% and is negative respectively and also in line with study done in other country (Abdelsalam *et al.*, 2008 and Tajeldin *et al.*, 2012).

Among the three viral infections, Hepatitis B infection was most common among the studied population with the

prevalence of 6.2% which was also in line with study done in other country in which the prevalence was 9.6% even though it was high (Williams *et al.*, 2014). The prevalence of HCV and HIV in the present study is low (1% and 2.06% respectively) but higher than study done in India (Lathamani *et al.*, 2013).

We were not able to calculate the chi-square to assess the association between risk factors, and HCV and HIV sero-status since the observed counts of Anti-HCV and Anti-HIV antibody cases were too small. With regards to the socio-demographic characteristics and associated risk factors of the studied subjects, it was found that there were no statistical significance of HBsAg positivity with the age, marital status, educational status and type of donors unlike other previously study done (Fithamlak *et al.*, 2016). Therefore, this difference may need study with large sample size. Even though the positive values were obtained, the risk factors such as history of exposure to jaundiced patient's secretion, having multiple sexual partners, history of liver disease, blood transfusion, tooth extraction, and ritual scarring did not have any significance.

CONCLUSIONS

In this study, the prevalence of HBsAg (6.2%), Anti-HCV Antibody (1.02%) and Anti-HIV Antibody (2.06%) were investigated. The prevalence of HBV is considerably higher than HCV and HIV among blood donors at Nekemte Blood Bank. Proportion of positive HBsAg was high among female than males and in individuals with multiple sexual partners and those individual who have exposure history of liver disease. Thus, health education about the transmission, prevention and awareness of viral infections should be strengthened by all concerned bodies to tackle this problem.

Competing interests

Authors declared they have no conflict of interest.

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