

Research Article

SEROPREVALENCE OF TRANSFUSION TRANSMITTED INFECTIONS (TTIS) AMONG BLOOD DONORS OF NEPAL RED CROSS SOCIETY (NRCS), DHARAN SUB-METROPOLITAN CITY, NEPAL

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ABSTRACT

BACKGROUND: Besides medical treatment of patients in various hospitals, blood transfusion is one of the life-saving measures for medical emergencies. However, blood receivers can be at great risk of infection in the window period. **OBJECTIVE:** This study was focused on to evaluate the seropositivity of HIV, HBV, HCV, and Syphilis in blood donors at Blood Transfusion Service of Nepal Red Cross Society (NRCS), for a period of 1 year from June 2016 to June 2017. **METHODOLOGY:** During the study period, all the blood samples collected from donors were screened for Syphilis and Hepatitis B (HBsAg), Syphilis by using ABON™ and Hepacard respectively and for HIV and HCV and HIV, Tri-dot test kits were used respectively. **RESULT:** A total of 8030 blood samples from volunteer blood donors were examined during this study. Among these, 83.4% of samples were from males and 16.6% were from females. The HIV, HBV HCV and Syphilis seroprevalence were found to be 5 (0.06%), 26 (0.32%), 34(0.42%) and 28(0.34%) respectively. Among the 1329 female blood donors, only 1 female was HIV positive, 5 female were found to be HBV, 4 were HCV, and 5 were syphilis positive with seroprevalence (0.075%), (0.37%), (0.30%), and (0.37%). Among the 6701 male blood donors, only 4 male were HIV positive, 21 male were found to be HBV, 4 were HCV and 5 were syphilis positive with of seroprevalence (0.059%), (0.31%), (0.44%) and (0.34 %) respectively. **CONCLUSION:** Unsafe blood transfusion poses an increased risk of TTIs. The prevalence of TTIs found was in low rates but the chance of multiple infections is still a problem to the recipients. Screening of blood and blood products would reduce the chances of transfusion-transmitted infection and it also has great public health importance.

Keywords: HIV, HBV, HCV, Syphilis, Seroprevalence.

INTRODUCTION

Transfusion of blood or its components is a life-saving intervention and millions of lives are saved each year globally through this procedure but at the same time, it has a critical role in patient management and may cause life-threatening hazards and is not 100% safe for transfusion.¹ Moreover the measures are not risk-free. There is an estimated 1% likelihood of transfusion-linked risk in some developing countries like Nepal.² There is a risk of transfusion-associated problems including the transmission of transfusion-transmitted infections (TTIs) with each unit of blood which can lead to adverse consequences.³ Although millions of people's lives worldwide can be saved through blood donation, the recipients are at potential risk of transfusion-transmissible infections (TTIs). Therefore, Blood banks and transfusion facilities may carry a sustainable threat of TTIs such as HIV, HBV, HCV, and Syphilis.⁴ Transfusion-transmitted infections (TTIs) may cause a serious public health problem. Unsafe blood transfusion proves very costly for both the recipient thus screening TTIs is essential for safety and for protecting human life.⁵ Blood transfusion is a life-saving procedure but can cause acute and delayed complications and blood donors are the resources of a safe supply for the needed patients. There may be mild to life-threatening complications of blood transfusions therefore, screening for transfusion transmissible infections and meticulous pre-transfusion testing is mandatory.⁶ AIDS is the end stage of the virus-mediated protracted pathogenic process which attacks and destroys certain white blood cells in which the immune system of an infected person

and its ability to control infections or malignant progressive disorders are progressively destroyed.⁷ Hepatitis B and C are highly infectious and pose a major public health problem worldwide. One of the most serious and common blood transmitted infectious diseases is Hepatitis B among others. About 2 billion people worldwide have HBV infections that are responsible for 500,000 to 700,000 deaths annually.⁸ Prevalence of co-infection of HIV, HBV, and Syphilis with HCV was detected in the blood donors of Kathmandu, Nepal. To estimate co-infections among other regions of the country, further investigations can be carried out with larger sample size and in high-risk groups with other infections sharing common modes of transmission.⁹ Replacement donors had a higher prevalence of transfusion-transmitted infection (HIV, HBV, HCV, VDRL, and malaria) than voluntary donors. Extensive donor selection and screening procedures will help in improving blood safety.¹⁰ This study was focused on estimating the seroprevalence of TTIs among the voluntary and relative blood donors of Nepal Red Cross Society (NRCS), Dharan Sub-metropolitan City, Nepal over one year.

MATERIALS AND METHODS

Study design and setting

This was a descriptive cross-sectional study conducted at Blood Transfusion Service of Nepal Red Cross Society (NRCS), for a single year from June 2016 to June 2017. This study included all voluntary blood donors. The blood donors age ranged from (18-60) years and other criteria for donor selection was done according to the standard operating procedure of NRCS. During the study period, all the blood donors were screened for Hepatitis B virus (HBsAg), and Syphilis by using Hepacard and ABON™ respectively, and for HIV and HCV, Tri-dot test kits were used.

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Statistical Analysis

All the collected Data were analyzed by using SPSS version 20.0 and Microsoft Excel 2007 whenever applicable.

RESULTS

A total of 8030 blood samples were included in this study. Among these, 6701 (83.4%) blood samples were from males and 1329 (16.6%) blood samples were from female blood donors.

Age and Gender wise distribution of total blood donors

Among the total 8030 blood donors, 6701 (83.4%) were male donors and 1329 (16.6%) were female blood donors. The highest number of male blood donors 2909 (85.10%) was observed in the age group 20-30 years followed by 2101(80.87%) in the age group 30-40 years and least i.e., 149 (92.55%) was seen in the age group 50-60 years. Similarly, 509(14.89%) blood donors were the highest number of female in the age group 20-30 years followed by 497 (19.13%) in the age group 30-40 years and least i.e., 12 (7.45%) in the age group 50 and above (Table 1).

Table 1: Age and gender-wise distribution of total blood donors

Age group	Sex		Total
	Female	Male	
Below 20 years	148(17.62%)	692(82.38%)	840
20 to 30 years	509(14.89%)	2909(85.10%)	3418
30 to 40 years	497(19.13%)	2101(80.87%)	2598
40 to 50 years	163(16.09%)	850(83.91%)	1013
50 and above	12(7.45%)	149(92.55%)	161
Total	1329(16.44%)	6701(82.90%)	8030

Age group and gender-specific seroprevalence of HIV

Out of total 8030 blood donors, 5 (0.06%) were found to be HIV positive. Among them, 4 blood donors were HIV-positive males and 1 were syphilis-positive females. The highest number of HIV positive (0.068%) was observed in the age group 20-30 years followed by (0.11%), (0.14%) in the age group 40-50 years and below 20 years. The P- values were found to be statistically insignificant (0.604) (Table 2).

Table 1: Age group and gender-specific seroprevalence of HIV

Age Group	Male		Female		Total	p-value
	Positive	Negative	Positive	Negative		
Below 20 years	1(0.19%)	691(82.26%)	-	148(17.62%)	840	0.604
20 to 30 years	2(0.06%)	2907(85.05%)	1(0.03%)	508(14.86%)	3418	
30 to 40years	-	2101(80.87%)	-	497(19.13%)	2598	
40 to 50 years	1(0.10%)	849(83.81%)	-	163(16.09%)	1013	
50 and above	-	149(92.55%)	-	12(7.45%)	161	
Total	4(0.05%)	6697(83.40%)	1(0.01%)	1328(16.54%)	8030	

Seroprevalence of HBV

Out of total 8030 blood donors 8030, 26 (0.32%) were found to be HBV positive. Among them, 21 blood donors were HBV positive males and 5 were HBV positive females. The overall highest seroprevalence of HBV positive male (0.33%) was observed in the age group (30-40) years followed by age group 20-30 years (0.17%), age group 40-50 years (0.47%), and age group below 20 years (1.34%). In females, the highest seroprevalence (0.58%) was observed in the age group 20-30 years followed by the age group 30-40 years (0.20%) and below 20 years (0.67%). The P- values were found to be statistically insignificant (0.211).

Table 2: Age group and gender-specific seroprevalence of HBV

Age Group	Male		Female		Total	p-value
	Positive	Negative	Positive	Negative		
Below 20 years	3(0.36%)	689(82.02%)	1(0.12%)	147(17.50%)	840	0.211
20 to 30 years	5(0.15%)	2904(84.96%)	3(0.09%)	506(14.80%)	3418	
30 to 40years	7(0.27%)	2094(80.60%)	1(0.04%)	496(19.09%)	2598	
40 to 50 years	4(0.39%)	846(83.51%)	-	163(16.09%)	1013	
50 and above	2(1.24%)	147(91.30%)	-	12(7.45%)	161	
Total	21(0.26%)	6680(83.19%)	5(0.06%)	1324(16.49%)	8030	

Seroprevalence of HCV

Out of total 8030 blood donors, 34 (0.42%) were confirmed to be HCV positive. Among them, 30 blood donors were HCV-positive males and 4 were HCV-positive females. The overall highest seroprevalence of HCV positive in male (0.55%) was observed in the age group 20-30 years followed by age group 30-40 years (0.28%) and age group below 20 years (0.57%) followed by age group 40-50 years (0.35%). While in females, the highest seroprevalence (0.39%) was observed in the age group 20-30 years followed by age group 30-40 and 40-50 years (0.20%) and (0.613%) respectively. The P- values were found to be statistically insignificant (0.636).

Table 3: Age group and gender-specific seroprevalence of HCV

Age group	Male		Female		Total	p-value
	Positive	Negative	Positive	Negative		
<20	4(0.48%)	688(81.90%)	-	148(17.62%)	840	0.636
20-30	16(0.47%)	2893(84.64%)	2(0.06%)	507(14.83%)	3418	
30-40	6(0.23%)	2095(80.64%)	1(0.04%)	496(19.09%)	2598	
40-50	3(0.30%)	847(83.61%)	1(0.10%)	162(15.99%)	1013	
>50	1(0.62%)	148(91.93%)	-	12(7.45%)	161	
Total	30(0.37%)	6671(83.08%)	4(0.05%)	1325(16.50%)	8030	

Seroprevalence of Syphilis

Out of total blood donors 8030, 28 (0.34%) blood donors were found to be syphilis positive. Among them, 23 blood donors were syphilis-positive males and 5 were syphilis-positive females. The overall highest seroprevalence of syphilis positive in male (0.61%) was observed in the age group 30-40 years followed by age group 40-50 years (0.47%) and age group 20-30 years (0.103%) followed by age group below 20 years (0.28) while in females, the highest seroprevalence (0.39%) was observed in the age group 20-30 years followed by (0.613%) in the age group 30-40. The P- values were found to be statistically insignificant (0.078).

Table 4: Age group and gender-specific seroprevalence of Syphilis

Age Group	Male		Female		Total	p-value
	Positive	Negative	Positive	Negative		
Below 20 years	2(0.24%)	690(8.21%)	-	148(17.62%)	840	0.078
20 to 30 years	3(0.09%)	2906(85.02%)	2(0.06%)	507(14.83%)	3418	
30 to 40years	13(0.50%)	2088(80.37%)	1(0.04%)	496(19.09%)	2598	
40 to 50 years	4(0.39%)	846(83.51%)	2(0.20%)	161(15.89%)	1013	
50 and above	1(0.62%)	148(91.93%)	-	12(7.45%)	161	
Total	23(0.29%)	6678(83.16%)	5(0.06%)	1324(16.49%)	8030	

DISCUSSION

TTIs are considered the greatest threat to blood transfusion safety for the recipient and constitute serious public health problems.¹¹ According to the WHO, safe blood transfusion is a public right. Monitoring the magnitude of this in blood donors is a valuable process for measuring the risk of transfusion furthermore ongoing improvement and application of donor selection criteria and sensitive or sophisticated tests in the blood bank can lower the risks of acquiring transfusion-transmitted infections (TTIs).¹² This study was carried out for the detection of HBsAg and anti- HCV, HIV, and syphilis antibodies in a population of apparently healthy blood donors. Out of 8030 blood donors screened, a total of 26 (0.32%) blood donors were reactive for HBsAg antibody. The total seroprevalence of HBsAg among the blood donors was found to be 0.32%. The gender-wise distribution showed that the HBV infection rate was higher among the males (0.26%) than the females (0.06%). The gender distribution in another study done by Adekeye et al., (2013)¹³ in Nigeria showed that higher seroprevalence of HBsAg was found in males. A study was carried out by Easow et al., (2010)¹⁴ in Western Nepal showed a higher prevalence of HBsAg in males than in females which were in agreement with this study.

This may be probably due to lifestyle variations between both gender groups. Also, males are actively more exposed to risk factors than females. The next reason for this may be due to the larger number of samples from males than females used in the study. Most of the donors having HBsAg positive were less than 40 years, and a similar finding was reported by Alam et al., (2007).¹⁵ Various studies have been done to reveal different percentage prevalence of HBsAg in Nepal. This study showed that 0.32% of total blood donors were the seroprevalence of HBsAg in Dharan Sub metropolitan city of Nepal. According to Chander and Pahwa (2003),¹⁶ slightly higher prevalence of HBsAg (0.45%) was detected among blood donors of Universal College of Medical Sciences, Bhairahawa. Among the 8030 blood donors screened, the overall seroprevalence of Anti HCV antibody was observed to be 0.42% (30/8030) which was slightly higher than the study by Mutlu et al., (2004)¹⁷ in Turkey (0.37%), Yanase et al., (2007)¹⁸ in the Phillipines (0.3%). The seroprevalence was higher among male donors (0.44%) than among female donors (0.30%). This might be due to the difference in the risk factors and predominant modes of transmission among male and female donors. HIV seroprevalence observed (0.06%) was lower than that reported as 0.12% in Kathmandu valley. Prevalence was even lower than in

Bhairahawa, Nepal (0.13%) but similar to Morang (0.019%), Banke (0.095%), and Kaski (0.05%) in 2008. The lower prevalence may be due to stringent donor selection criteria; self-exclusion of the high-risk associated groups from blood donation and increased public awareness. The results of this study were determined lower than that of the similar studies carried out in rest of the world i.e. in Ethiopia (4.5%), Tanzania (8.7%), Nigeria (0.87%), Thailand (0.69%), Uganda (3.9%). However in this study HIV seroprevalence was higher than that reported by Ludhiana India (0.084%), Philippines (0.006%), Mexico 0.02%, Pakistan (0.001%). The Overall seroprevalence of syphilis was observed to be 0.87% in both males and females. A prevalence of 6.2% was among the donors of age group 51 to 60 years. Syphilis seroprevalence observed in this study (0.87%) was lower than reported in Tanzania (12.7%), Mongolia (2%), and similar to Ludhiana (0.85%) and Calcutta (0.67%).¹³ Blood transfusion therapy has been used since 1930 for various indications with a well-established treatment in various hospitals.^{19,20} With the introduction of blood banks and better storage techniques, it became a more widely used procedure in medical science.²¹ Though blood donation saves millions of lives of people worldwide; however, the recipients are at potential risk of exposure to transfusion-transmissible infections (TTIs).²² During the process of transfusion, infectious agents such as viruses, bacteria, and parasites can all be transmitted via blood.²³ Improved quality transfusion services, modulated infrastructure, and properly trained staffs are the basic need for providing safe blood components.²⁴ The public health problem due to both HBV and HCV was highest in Morang, Nepal. The higher seroprevalence showed a higher risk of transmission of blood-borne infections during the serological window period.²⁵ Therefore, the Ministry of Health, Nepal Government should carry out some counseling and educative activities such as donor selection criteria, effective donor education, community education, which might be useful in reducing seroprevalence in blood donors.

CONCLUSION

This study was conducted among the blood donor volunteers of blood transfusion service of NRCS, Dharan. The overall seroprevalence rates of HIV, HBV, HCV, and Syphilis infections among the blood donors in Sunsari district were found to be 0.06%, 0.32%, 0.42%, and 0.34% respectively. This study revealed a relatively lower seroprevalence of TTIs among blood donors compared to previous similar studies conducted in Nepal. In this study, we analyzed the data of screening tests on blood donations examined the presence of HBsAg, anti-HCV, anti-HIV, and anti-TP among blood donors of Nepal Red Cross Society (Dharan).

DATA CONFIDENTIALITY

The author ensures that all the information taken from the patient is only for research purpose. The confidentiality of privacy among patients under study is our first priority and we ensure that all information and related to patient is completely based on informed consent.

FINANCIAL SUPPORT

None

CONFLICT OF INTEREST

We declared that there is no conflict of interest in this study

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