

Seroprevalence of human immunodeficiency virus, hepatitis B and hepatitis C among blood donors at a tertiary care hospital in North India

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ABSTRACT

Background: The prevalence of transfusion transmitted infections (TTIs), in blood transfusion services are a major problem across blood banks and hospitals in the world. In, India, the effort to provide safe transfusion to patients is a heightened problem for various reasons. In this study, seroprevalence of Transfusion transmitted infections such as human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) was investigated in a pool of blood donors.

Methods: The data collection was carried out for a period of two years from, January 2017 to December 2018, and total sample size of donors was 38,142. We studied the frequency, gender wise distribution, donor (first time vs repeat) wise distribution and yearly trend of seroprevalence of TTIs in blood units donated at our hospital.

Results: A total of 37,457 (98.2%) males and 685 (1.79%) females donated blood during the study period. The results suggest that among the blood donors, the prevalence of HCV was highest (0.77%) followed by HBV (0.46%) and HIV (0.13%). Seropositivity was found to be more in first-time donors (0.83%) as compared to repeat-donors (0.52%). Seropositivity was found to be more among males (1.35%) than females (0.01%). The discussion suggests underlying reasons for the results along-with future direction of research.

Conclusions: The need of the hour is to encourage repeat voluntary blood donors in order to maintain safe supply of blood and its components to donors. Efforts should be made to include females in the blood donor pool by increasing awareness and through dedicated efforts to improve female health and nutrition.

Keywords: Transfusion transmitted infections, Human immunodeficiency virus, Hepatitis B virus, Hepatitis C virus, Blood donors

INTRODUCTION

Blood Transfusion services strive to provide safe blood and blood components for transfusion to patients. Transfusion transmitted infections are a major problem all over the world. In India, testing of blood units for

human immunodeficiency virus (HIV-I and II), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis and malaria is mandatory.¹ According to every year almost 108 million units of blood are collected worldwide & from these units there is 1% chance of transfusion associated problems including transfusion transmitted infections (TTIs).² The HIV seroprevalence in India in

adult population (15-49 years) has been estimated to be 0.22% (0.16% to 0.30%).³ As for HBV, India falls in the intermediate endemicity zone showing a prevalence of 2–7%, with an average of 4%.⁴ The estimated prevalence of HCV infection in India is about 0.5–1.5%.⁵ The aim of this study was to investigate the seroprevalence of HIV, HBV, HCV among blood donors at our centre.

METHODS

The study was carried out in the Department of Transfusion Medicine, Government Medical College and Rajindra Hospital Patiala for a period of 2 years from January 2017 to December 2018. The donors were healthy individuals and were subjected to pre-donation screening and counselling by trained medical professionals. There donors donated blood within the blood bank as well as outdoor blood donation camps. Donors who did not fulfil the criteria for blood donation as well as those with history of high-risk behaviour were deferred and special care was taken to defer paid professional donors. The screening for all donated blood was done by enzyme linked immunosorbent assay (ELISA) for HIV, HBV and HCV.

Statistical analysis

Microsoft office 2007 was used for the analysis. Descriptive statistics were used for the analysis.

RESULTS

A total of 38,142 blood units were collected from January 2017 to December 2018. A total of 37,457 (98.2%) males and 685 (1.79%) females donated blood. 25,192 donors were repeat donors out of which 24,963 (99.09%) were males and 229 (0.9%) were female repeat donors (Tables 1 and 2).

Table 1: Distribution of donors according to gender.

Year	Total donors	
	Male (%)	Female (%)
2017	17565 (98.3)	297 (1.66)
2018	19892 (98.08)	388 (1.91)

Table 2: Distribution of donors according to type (first time, repeat, total donors).

Year	First time donors		Repeat donors		Total
	Male (%)	Female (%)	Male (%)	Female (%)	
2017	5766 (32.2)	199 (1.11)	11799 (66.05)	98 (0.54)	17862
2018	6728 (33.1)	257 (1.26)	13164 (64.9)	131 (0.64)	20,280

TTI positive units were 521/ 38,142 making the overall seroprevalence of TTIs to be 1.36%. Out of these 521

seropositive donors, 50 (0.13%) were HIV positive, 177 (0.46%) were HBsAg positive and 294 (0.77%) were positive for HCV (Table 3).

Table 3: Year wise distribution of seropositivity for TTIs (HIV, HBV, HCV) among donors.

Year	HIV (%)	HBsAg (%)	HCV (%)	Total units collected
2017	19 (0.10)	90 (0.50)	132 (0.73)	17862
2018	31 (0.15)	87 (0.42)	162 (0.79)	20280
Total	50 (0.13)	177 (0.46)	294 (0.77)	38142

A total of 685 females donated blood, out of which 6 (0.87%) were seropositive and out of the 37457 males that donated blood, 515 (1.37%) were seropositive. 201 (38.5%) out of the total 521 seropositive donors were repeat donors and 320 (61.4%) were first time donors. Distribution of TTIs among first time and repeat donors is shown in (Tables 4, 5).

Table 4: Distribution of TTIs among first time donors.

Year	HIV (%)	HCV (%)	HBV (%)	Total first time donors
2017	10 (0.16)	91 (1.52)	59 (0.98)	5965
2018	18 (0.25)	85 (1.21)	57 (0.81)	6985
Total	28 (0.21)	176 (1.35)	116 (0.89)	12950

Table 5: Distribution of TTIs among repeat donors.

Year	HIV (%)	HCV (%)	HBV (%)	Total repeat donors
2017	9 (0.07)	41 (0.34)	31 (0.26)	11897
2018	13 (0.09)	77 (0.57)	30 (0.22)	13295
Total	22 (0.08)	118 (0.46)	61 (0.24)	25192

DISCUSSION

Blood transfusion is a lifesaving intervention that plays an important role in patient management. Since Blood transfusion is a potential source of infection for patients, transfusion transmissible infections (TTIs) pose a huge challenge to blood transfusion services. In our study we found highest seropositivity with HCV (0.77%) followed by HBV (0.46%) and HIV (0.13%). (Table 6) shows comparison of different studies of TTIs.

Majority of the donors in our study were male donors (98.2%) as compared to females' donors (1.79%). Various

Indian studies have also observed a higher percentage of male donors as compared to female donors as shown by Shaikh et al (99.23%),¹¹ Makroo et al (95.86%),⁷ Shah et al (97.12%).¹² This reflects a general trend of more male blood donors in our population. Poor nutritional status and low haemoglobin levels in females in our population and sociocultural factors leads to more deferral and lesser blood donation by females.

Table 6: Shows comparison of different studies of TTI.

Study	Year of study	Seropositivity (%)		
		HBV	HIV	HCV
Kaur et al ⁶	2001-2005	1.7	0.6	0.8
Makroo et al ⁷	2005-2013	1.18	0.24	9.87
Jency et al ⁸	2008-2010	1.11	0.27%	1.53
Patil et al ⁹	2008-2014	1.48	0.40	0.37
Mandal et al ¹⁰	2010-2012	1.24	0.42	0.62
Our study	2017-2018	0.46	0.13	0.77

Out of the total 685 females that donated blood, 6 (0.87%) were seropositive and out of the total 37457 males that donated blood 515 (1.37%) were seropositive. These findings were similar to those of Parveen et al who found more seropositivity in males (6.24%) than females 3.80%.¹³ Similarly Makroo et al found that the risk of TTIs was three times more in male donors when compared to female donors.⁷ According to Karmakar et al, this higher prevalence might be due to differences in sexual behavior.¹⁴ Choudhary et al suggested that this could be due to the fact that males work outdoors and away from their homes and have more chances to get infections.¹⁵

In our study majority of the donors were repeat donors (25192/ 38142). Out of the total 521 seropositive donors 201 (38.5%) were repeat donors and 320 (61.4%) were first time donors showing a higher seropositivity among first time blood donors than repeat donors in our study. These findings were similar to those of Dhar et al who also found higher seropositivity in first time donors than repeat donors (0.001%).¹⁶ Qureshi et al found 0% seroreactivity in repeat voluntary donors.¹⁷ Anusha P et al found higher seroreactivity in repeat donors as compared to first time donors for HIV (25% for first time donors vs 75% for repeat donors) and HBV (38.9% for first time donors vs 61.1% for repeat donors).¹⁸ The results provide additional support to the general notion, widespread in blood transfusion literature, that first-time donors constitute a high risk group. This position is premised on the suggestion that these donors have ambiguous motive to donate and have had no previous pre-donation screening for TTIs. Moreover, the possibility of accessing

screening for particular TTIs (HIV for instance) may incentivise some individuals to donate blood.^{19,20}

CONCLUSION

Provision of safe blood for transfusion is of great importance in blood banking. Blood donors should be selected based on detailed questionnaire and examination to rule out donors at risk of TTIs. Emphasis should be laid on repeat, voluntary blood donors who understand the importance of safe blood donation and have been repeatedly tested for TTIs. First time donors have uncertain or untested motive to donate, and, by definition, have had no prior transfusion screening. Indeed, many first-time donors use donation as a means to access HIV testing, itself an unavoidable donation incentive. At the same time increasing awareness among general population regarding benefits of blood donation and harms of donating blood by individuals at risk for TTIs thereby promoting self-deferral can go a long way in ensuring safe blood supply. Changing the socio-cultural beliefs and improving the nutritional status of females in our society can help add to the blood inventory by bringing in large number of female donors who are otherwise willing to donate but cannot due to various cultural, physiological and nutritional factors.

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