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Original Research Article

Course and frequency of TTI among blood donors- A five year experience in a tertiary care hospital

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Abstract

Blood transfusion forms an indispensable part of medical and surgical therapy; therefore transmission of infectious diseases through donated blood is of concern to transfusion safety.

Objectives: 1) To screen all the blood donors for transfusion transmissible infections (TTI) HIV, HBV, HCV, Syphilis and Malaria during the 5 years study period from 2013-2017.; 2) To estimate the seroprevalence and study the trend of these 5 TTI among the donors over a period of five years.; 3) To estimate and compare the blood donors by type of donation (indoor or outdoor) and gender wise.

Materials and Methods: A total of 78,733 donors were analyzed and tested for the prevalence of Transfusion Transmitted
Infections (TTI) over a period of 5 years study period.

Result: Out of 78,733 bags screened, 71,966 were collected in outdoor blood donation camps whereas 6,767 donations were collected indoors, in our blood bank. With 69,473 donations (88%), male donors clearly outnumbered female donors (12%). Seroprevalence was overall highest for HBsAg (1.05%) followed by HCV (0.44%), HIV (0.25%), syphilis (0.05%) and malaria (0.01%). The overall seropositivity in males was higher (1.89%) as compared to females (1.16%). Seropositivity was higher for all TTI in the indoor donors.

Conclusion: The latest study highlights that blood transfusion is still one of the major means of contracting infections like HIV, HBV, HCV and syphilis. Male voluntary donors dominate the donor subpopulation. HBV is the most and syphilis the least common TTI affecting blood donors. All TTI except syphilis are showing a significant downtrend in overall seroprevalence through the study years.

Introduction

Blood transfusion forms an indispensable part of medical and surgical therapy; therefore transmission of infectious diseases through donated blood is of concern to transfusion safety. Blood transfusion carries the risk of transfusing transmissible infections (TTI) like HIV, hepatitis, syphilis, malaria and infrequently toxoplasmosis, and some viral infections like herpes, EBV and CMV.[1] It is recommended by WHO that mandatory screening for HIV, hepatitis B, hepatitis C, and syphilis should be done for all blood donations prior to use according to the quality system requirements.[2] Among all infections HIV and hepatitis are the most dreadful. 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 according to the National AIDS Control Organization (NACO) guidelines.[3] Maintaining a risk free supply of blood and its units is vital and is a major concern for policy makers.

Aims and Objectives

1. To screen all the blood donors for transfusion transmissible infections (TTI) HIV, HBV, HCV, Syphilis and Malaria during the 5 years study period from 2013-2017.
2. To estimate the seroprevalence and study the trend of these 5 TTI among the donors over a period of five years.
3. To estimate and compare the type of blood donors based on type of donation (indoor or outdoor) and gender.

Materials and Methods

The purpose of this study is to estimate the seroprevalence of transfusion transmittable diseases namely HIV, HBV, HCV, Syphilis, Malaria and their trends over a 5 year period, among Indoor and Outdoor blood donors at the blood bank of an urban tertiary healthcare hospital in western India. A total of 78,733 donors were analyzed and tested for the prevalence of Transfusion Transmitted

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Infections (TTI) over a period of 5 years from Jan 2013 to Dec 2017.

The indoor donors comprised mainly of donations given by family members, close relatives or friends of ailing patients in the hospital who are motivated by our blood bank staff, with a small contribution to this group from walk-in donors, employees and students of our institution who donated voluntarily. While the outdoor donations were obtained from organizing blood donations camps which included voluntary donors. Donors were carefully selected for donation after a complete physical examination and thorough clinical history was obtained as per the donor's questionnaire. Tests were routinely done on every blood unit to exclude HIV, HBV, HCV, syphilis and malaria. The screening of all blood units was performed by third generation Enzyme Linked Immuno Sorbent Assay (ELISA) for HBsAg, HIV and HCV. Rapid diagnostic test was used to detect malaria antigens, while Rapid Plasma Regain test kit was used for detection of syphilis. The data regarding gender and serology were retrieved from blood bank records and analyzed to evaluate the overall seroprevalence as well as distribution of seroprevalence according to sex of donors, type of donor, type of infection and the trend over 5 years.

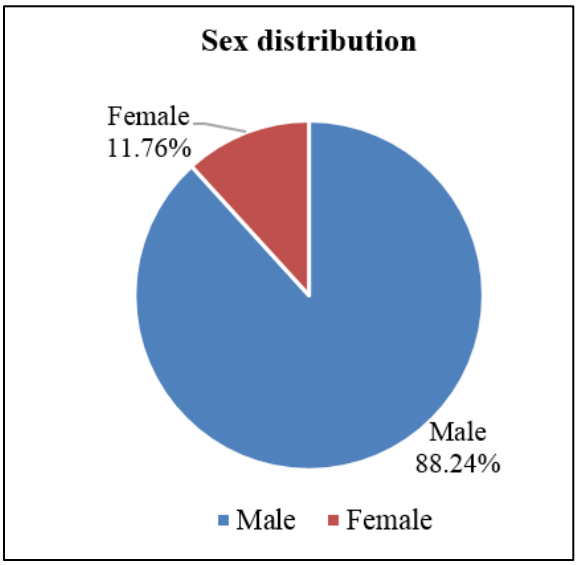
Result

A total of 78,733 blood donors were screened for transfusion transmittable infections. Out of these, an overwhelming majority of bags, 71,966 were collected in outdoor blood donation camps whereas 6,767 donations were collected in our blood bank. With 69,473 donations (88%), male donors clearly outnumbered female donors (12%). Overall seropositivity was highest for HBsAg (1.05%) followed by HCV (0.44%), HIV (0.25%), syphilis (0.05%) and malaria (0.01%). The year wise distribution shows that there is a decline in the overall seroprevalence of TTI among the donors over the period of 5 years which has reduced to about 1.51% in the fifth year of study as compared to 2.16% in the first year. Also, there is a decreasing trend in the seroprevalence of individual infections except syphilis. Seropositivity of HIV, HBV and HCV decreased from 0.42%, 1.19% and 0.52% in the year 2013 to 0.18%, 0.87% and 0.38% in 2017 respectively. However, syphilis showed slight increase in seropositivity, rising from 0.03% in 2013 to 0.08% in 2017. Males were affected more than females; the overall seropositivity in males was 1.89% as compared to 1.16% in females. Although there were significantly more number of outdoor donors as compared to donations received indoor, seropositivity was higher for all HIV, HBV, HCV, syphilis in the indoor donors. There was one case of concomitant positivity for HBV and HCV.

Table 1: Distribution of outdoor and indoor donors

Year	Total no of Donors (n)	Outdoor (%)	Indoor (%)
2013	15,657	14380 (91.84%)	1277 (8.16%)
2014	16,289	14960 (91.84%)	1329 (8.16%)
2015	15,169	13932 (91.85%)	1237 (8.15%)
2016	17,424	16270 (93.88%)	1154 (6.62%)
2017	14,194	12424 (87.53%)	1770 (12.47%)
Total	78,733	71966 (91.41%)	6767 (8.59%)

Graph 1: Sex distribution of total blood donors



Graph 2: Distribution of Seropositivity of TTI

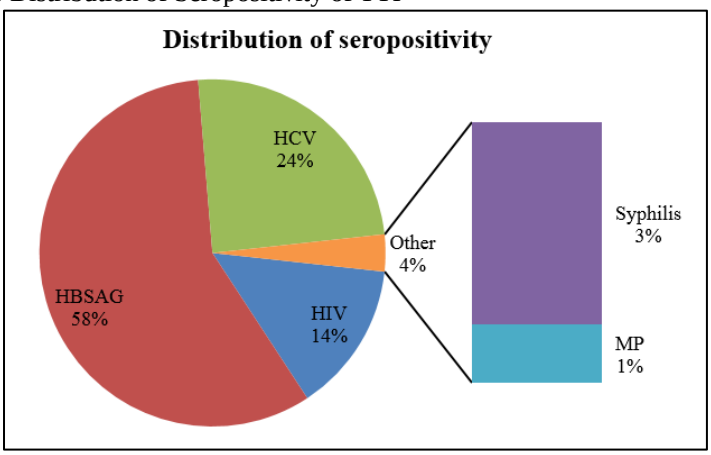


Table 2: Year wise distribution of TTI

Years	Total no of Donors (n)	HIV (%)	HBSAG (%)	HCV (%)	Syphilis (%)	MP (%)	Total Seroprevalence
2013	15,657	65 (0.42%)	187 (1.19%)	82 (0.52%)	4 (0.03%)	-	2.16%
2014	16,289	44 (0.27%)	178 (1.09%)	114 (0.70%)	1 (0.01%)	-	2.07%
2015	15,169	32 (0.21%)	160 (1.05%)	47 (0.31%)	-	10 (0.07%)	1.64%
2016	17,424	33 (0.19%)	175 (1.00%)	53 (0.30%)	22 (0.13%)	1 (0.01%)	1.63%
2017	14,194	26 (0.18%)	124 (0.87%)	54 (0.38%)	11 (0.08%)	-	1.51%
Total	78,733	200 (0.25%)	824 (1.05%)	350 (0.44%)	38 (0.05%)	11 (0.01%)	**1.8%**

Graph 3: Five year trend of overall seropositivity

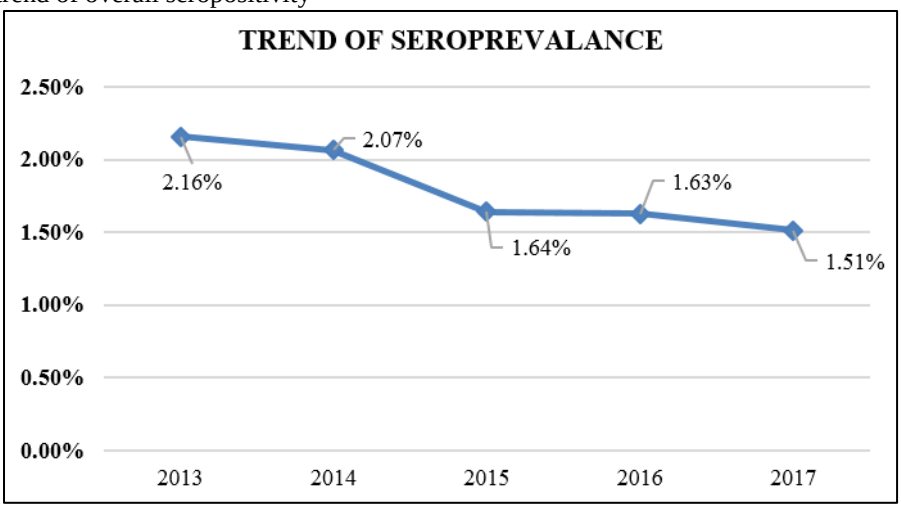


Table 3: Gender-wise distribution of individual TTI

	Total no of affected donors	HIV	HBV	HCV	Syphilis	Malaria
Male donors	1,316	0.26%	1.12%	0.43%	0.05%	0.01%
Female donors	107	0.15%	0.47%	*0.5%*	0.002%	0.00%

Graph 4: Gender-wise distribution of seropositive donors

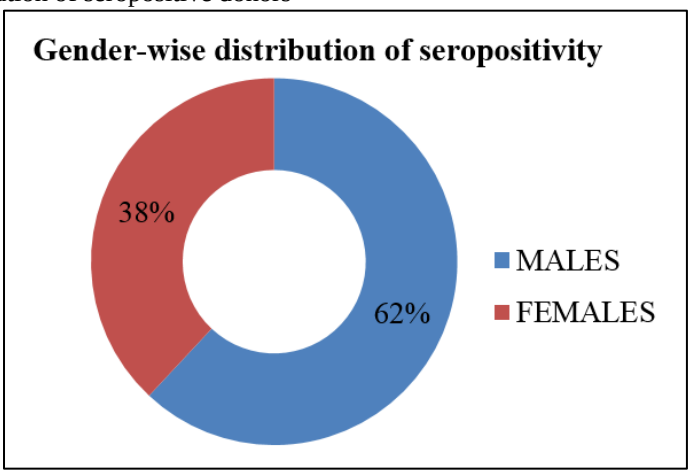


Table 4: Distribution of seropositivity in indoor and outdoor donors

Seropositivity	Indoor Donors	Outdoor Donors	Total Donors (n)	
HIV	30 (0.44%)	170(0.24%)	Indoor 6767	Outdoor 71966
HBSAG	105(1.55%)	719(1.00%)		
HCV	31 (0.46%)	319 (0.44%)		
Syphilis	5(0.07%)	33(0.05%)		
MP	3(0.04%)	8 (0.01%)		

Discussion

The current study involved testing a total of 78,733 indoor and outdoor blood donors over a period of 5 years; these were tested in the Blood Bank of a tertiary urban referral hospital in western India. In our study, male donors (88%) were more than female donors (12%) (Graph 1). This happens to be the case with all the studies compared.[4-10] For instance, study by Parveen et al[4] had 89% male and 11% female donors. Although the major focus of blood safety is HIV infection, the current study revealed hepatitis B to be the most prevalent infection of all (almost 4 times higher) (Table 2) and similar trends were seen in almost all other studies from India.[4,6-10] Kalpana et al in their study also found HBV prevalence to be 4 times that of HIV. As far as sex difference in seropositive cases was concerned, majority were males (62%) as compared to female donors (38%) (Graph 4). Seroprevalence for HIV, hepatitis B, hepatitis C, syphilis and malaria was 0.26%, 1.12%, 0.43% ,0.05% and 0.01% respectively in males and corresponding figures in females were 0.15%, 0.47%, 0.5%, 0.02% and 0.00% respectively. As the figures suggest, seroprevalence of all the TTI was higher in males except hepatitis C which was slightly higher in females (Table 3). Studies done on Hepatitis C conclude that risk of contracting Hep C is higher in males, in addition to that, females show better clearance of Hep C virus.[11-13] However, we were unable to formulate any plausible hypothesis for the findings observed in our study. Makroo et al[8] observed in their study that the risk of being reactive was three times higher in male donors as compared to female donors. Karmakar et al.,[6] and Sulhyan et al[7] also observed similar results of high seropositivity in males. As a whole, 1423 seropositive donors were identified from a total of 78,733 donations, corresponding to a summed-up seroprevalence of 1.8% (Table 2). Seroprevalence of HIV, HBV, HCV and syphilis in the study was 0.25%, 1.05%, 0.44% and 0.05% respectively (Table 2). However, a downgrading trend in overall seroprevalence of TTI was elicited over observed 5 years (Table 2), (Graph 3). A similar decreasing trend over the study years of 2013 to 2017 has been observed by Sulhyan et al[7] in Sangli, Maharashtra. Also, Mandal et al.,[9] in his study from years 2010-2013 found statistically significant reduction in overall seroprevalence and also, a downscaling tendency in seroprevalence of HBV ($p = 0.0126$) and syphilis ($p < 0.0001$), over the projected years had noteworthy statistical significance. As per NACO 2015, HIV prevalence in India is 0.26%.[14] Similar percentage was found in our study (0.25%). All TTI except syphilis showed a declining trend, syphilis was showing inconsistent rise in the past 2 years. Not only in India but studies from other countries also showed dramatic rise in cases of primary and secondary syphilis in the past few years.[15,16] There was one seropositive donor (Indoor) with co-infectivity for both HCV and HBV. Similar results of were seen by Sulhyan et al[7] and Parveen et al.[4] Kaur et al in his study detected 23 donors with co-infection, out of which 20 were from replacement donors, the difference was statistically significant.[10] A total of 11 cases of vivax malaria were encountered, all in male donors. Not surprisingly, all these cases were detected during the monsoon season from July to September. Although the number of indoor donors was very

Table 9: Comparison with similar studies from India

S. No.	Blood bank	Area	Year	HIV	HBV	HCV	Syphilis
1	Parveen et al(4)	Mumbai, Maharashtra	2001-2005	1.30	3.05	1.04	0.57
2	Kaur et al(10)	Chandigarh	2001-2005	0.6	1.7	0.8	0.7
3	Makroo et al(8)	New Delhi	2005-2013	0.24	1.18	0.43	0.23
4	NACO (17)	Maharashtra	2015	0.19	1.09	0.28	0.04
5	Sulhyan et al(7)	Sangli, Maharashtra	2013-2017	0.24	1.15	0.11	0.00
6	Current study	Mumbai, Maharashtra	2013-2017	0.25	1.05	0.44	0.05

Table 10: Comparison with similar studies from India

S. No	Blood bank	Area	Indoor donors	Outdoor donors	Seroprevalence (Indoor donors)	Seroprevalence (Outdoor donors)
1	Parveen et al(4)	Mumbai, Maharashtra	34.33%	65.55%	7.67%	5.08%
2	Kaur et al(10)	Chandigarh	55%	45%	5.08%	1.29%
3	Mandal et al(9)	New Delhi	23%	73%	3.28%	2.81%
6	Current study	Mumbai, Maharashtra	**8.59%**	**91.41%**	**2.56%**	**1.74%**

less compared to outdoor donors, the seroprevalence was significantly higher in the indoor group (Table 4). The difference between seroprevalence of Indoor and Outdoor donors was statistically significant ($p < 0.001$). The Indoor donors in our study are considered as replacement donors in the other studies, who reported similar higher seropositivity in this group.[1,7-10] Makroo et al also found the risk of blood being reactive for one or more infectious markers was 2.1 times higher in replacement donors when compared with the voluntary donors.[8] Table 9 & 10 shows comparison of current study with similar studies done in different parts of India.[4,10,8,11,7]

Conclusion

To sum up, the latest study highlights that blood transfusion is still one of the major means of contracting infections like HIV, HBV, HCV and syphilis. Male voluntary donors predominate the donor subpopulation. HBV is the most common TTI affecting blood donors. All TTI except syphilis are showing a significant downtrend in overall seroprevalence through the study years. Syphilis has recently returned to the global health scene as re-emerging public health concern. Replacement donors are at a higher risk of transmitting TTI than voluntary donors. Most importantly, motivating for voluntary blood donations is the most effective way of maintaining safe supply of blood.

Conflict of Interest: None.

Source of Interest: None.

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