

Seroprevalence and trends of transfusion transmissible infections among voluntary and replacement donors—an institutional retrospective study

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Abstract

Introduction: Transfusion transmitted infections are major problem associated with blood transfusion. There are several infectious as well as non-infectious risks associated with transfusion of blood. **Aim and Objective:** The present study was carried out to find out the sero-prevalence and changing trends of various TTIs in blood donors. **Material and Methods:** A record based study was conducted from January 2008- December 2010. Data were collected from therecords of blood bank which also included data of blood donation camps. Data regarding sex, screening testresults and type of donors were collected from the records. **Results:** Out of 17640 donors, voluntary donors (78.4%) were more in comparison to replacement donors (21.6%). Out of all TTIs, prevalence of HBV (2.14%) was highest followed by, HCV (0.66%), HIV (0.6%), Malaria (0.14%) and Syphilis (0.05%). TTIs were more prevalent in replacement donors than voluntary donors. The number ofvoluntary donors has fallen from 2008 -2010, but there is male preponderance in both voluntary and replacement donors. **Conclusion:** From results it has been concluded that prevalence of transfusion transmitted infection (HIV, HBV, HCV, VDRL, and malaria) was more in replacement donors in comparison to voluntary donors. With the implementation of strict donor selection criteria, use of sensitive screening tests and establishment of strict guidelines for blood transfusion it may be possible to reduce the incidence of transfusion transmitted infection in the Indian scenario.

Key words: Seroprevalence, Transfusion-transmitted infection, Replacement donors, Voluntary donors

Introduction

A well organised blood transfusion service is a vital component of patient management in any health care delivery system. When used correctly it can save life, nevertheless in addition it carries the risk of transmission of wide number of infectious agents as well. It has been estimated that every two seconds someone needs blood [1] and one-third of all patients admitted to intensive care units (ICUs) in the developed world receive a blood transfusion [2]. According to WHO, safe blood is a universal right, Globally, more than 81 million units of blood is donated annually. More than 18 million units of blood are not screened for these transfusiontransmissible infections. With every unit of blood transfused, there is a 1% risk of transfusion associated problems including transfusion transmitted diseases [3].

Transfusion transmitted infections (TTIs) are a major problem associated with blood transfusion. An integrated strategy for blood safety is required for elimination of these transfusion transmitted infections and for provision of safe and adequate blood transfusion services to the people. The main component of an integrated strategy include collection of blood only from voluntary non-remunerated blood donors, but this mode of collection though ideal is not always practically implementable in our country due to various factors such as illiteracy, negative attitudes towards blood donation, and fear of weakness and disease.

Due to these factors our blood banks depend also on replacement donation which is not entirely voluntary, as the patients relatives are under pressure to replace the blood transfused to the patient. . Voluntary donors are preferred over replacement donors because replacement donor may tend to conceal some history with the

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intention of benefitting their patient, out of ignorance that they are putting someone's life at risk [4]

There are basically 3 types of blood donors: voluntary/unpaid; family/replacement and paid.

1. Voluntary non-remunerated donors: A donor who gives blood, plasma or other blood components freely and voluntarily without pursuing any remuneration.
2. Family / family replacement donors: A donor who gives blood when it is required by a member of donor family or community.
3. Commercial/professional/paid donors: A donor who gives blood in return for money or other form of payment.

There are four main groups of micro-organisms known to cause infections namely viruses, bacteria, protozoa and fungi. There is a long list of the first three groups of microbes namely – viruses, bacteria and protozoa - reported to be transmitted by blood transfusion. Individuals with fungal infections are usually too sick to be accepted as blood donors. Among them, important transfusion transmitted viruses are human immunodeficiency virus (HIV-I/II), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis infection by Spirochetes, and transfusion associated malaria infection

It is important to note that the problem of TTIs is directly proportionate to the prevalence of Infections among the blood donor community. Thus the present study was conducted with an aim to assess the percentage of voluntary as well as replacement blood donors and to find out the sero-prevalence and changing trends of various TTIs among blood donors.

Results

During the study period, a total of 17640 donors were screened during the three-year period from January 2008-December 2010 for TTIs. Among them, 15770 (89.4%) were males and 1870 (10.4%) were females. A total of 13820 (78.4%) were voluntary donors which included donors at the blood bank of J.J. Hospital, Mumbai and also donors at the blood camps organized by the blood bank. and 3820 (21.6%) were replacement donors.

Table-1: Sex wise distribution of Voluntary donors.

Year	Voluntary Donors		Total Voluntary Donors No. (%)
	Male No. (%)	Female No. (%)	
2008	10871(87.03%)	1619(12.96%)	12490(100%)
2009	415(84.00%)	79(15.99%)	494(100%)
2010	740(88.51%)	96(11.48%)	836(100%)
Total	12026(87.01%)	1794(12.98%)	13820(100%)

Out of 13820 voluntary donors 12026 (87.0%) were males and 1794 (13%) were females. Among the 3820 replacement donors, 3744 (98.0%) were males and 76 (2.0%) were females.

Materials and Methods

Place and Type of Study: This retrospective cross-sectional study was carried out at the Blood Bank of Sir J.J Group of Hospital, Grant Medical College, Mumbai. Institutional clearance was obtained from the ethical committee of the hospital.

Sampling Methods and Collection: Data were collected from the records of the blood bank from January 2008- December 2010. Donors were carefully screened by trained personnel after a complete physical examination and satisfactorily answering the donor's questionnaire.

Inclusion Criteria: The study was conducted on all voluntary and replacement donors for a period of three years from January 2008 to December 2010. Written consent was also taken from them prior to donation.

A total of 17640 blood units (Voluntary and replacement) were collected from January 2008 to December 2010.

Exclusion Criteria: For blood donation were age <18 years and >60 years, weight < 45kg, current history of medication, recent blood transfusion, any infection, anaemia and recent history of any surgical procedure.

Data regarding voluntary blood donation at the blood bank as well as various blood donation camps organized by the blood bank were analyzed. In the blood bank each donor blood sample was screened for five infections - HIV, HBV, HCV, Syphilis and Malaria. Donor blood was screened for HIV, HBV, HCV, Syphilis and malarial parasite using rapid kits and ELISA.

Table-2: Sex wise distribution of Replacement Donors.

Year	Replacement Donors		Total Replacement Donors No. (%)
	Male No. (%)	Female No. (%)	
2008	2414(96.94%)	76(3.05%)	2490(100%)
2009	800(100%)	0(0.00%)	800(100%)
2010	530(100%)	0(0.00%)	530(100%)
Total	3744(98.01%)	76(1.98%)	3820(100%)

This shows the predominance of males as compared to females in blood donation during the study (**Table 1&2**)

Table-3: Year wise trend of Sero-prevalence of TTIs from 2008-2010.

Year	Number of donors	HIV	HBV	HCV	Syphilis	Malaria
2008	6774	36(0.55%)	171(0.52%)	35(0.52%)	2(0.03%)	5(0.07%)
2009	6055	35(0.58%)	123(2.03%)	41(0.68%)	2(0.03%)	20(0.33%)
2010	4811	34(0.7%)	85(1.77%)	41(0.82%)	2(0.04%)	0(0.00%)
Total	17640	105	379	117	6	25
Percentage of individual infection		0.60%	2.14%	0.66%	0.05%	0.14%

The year wise proportion (in percentages) of different TTIs among blood donors has been shown in (**Table 3**). With respect to individual TTIs, it was observed that out of total 17640 donors screened, the maximum number of donors 379 were found positive for HBV infection followed by 117 donors for HCV, 105 donors test positive for HIV, 25 donors for malaria and 6 donors test positive for syphilis.

Thus the proportion (in percentages) of TTIs among blood donors at blood bank during three year period was found maximum for HBV (2.14%) followed by HCV (0.66%), HIV (0.6%) malaria (0.14%) and least for syphilis (0.05%).

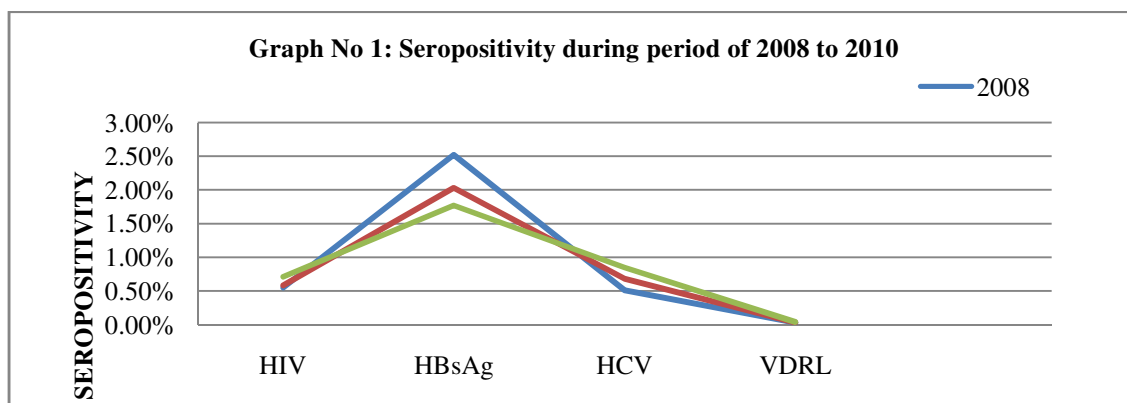
Table-4: Distribution of seropositive cases in voluntary donors (VD) and Replacement donors (RD).

Year	HIV		HBsAg		HCV		Syphilis		Malaria	
	VD	RD	VD	RD	VD	RD	VD	RD	VD	RD
2008	7	29	57	114	15	20	1	1	2	3
2009	4	31	18	105	6	35	0	2	4	16
2010	9	25	25	60	11	30	0	2	0	0
Total	20	85	100	279	32	85	1	5	6	19
Grand Total	105		379		117		6		25	

Out of 12118 screened donors, overall 632 (3.58%) were seropositive cases. Overall, prevalence of Hepatitis B was highest among all TTIs tested followed by hepatitis C, HIV, malaria and syphilis respectively.

Seropositivity for all TTIs was higher among replacement donors than voluntary donors. Pattern of TTIs with respect to donors depicted high prevalence of TTIs in replacement donors as compared to voluntary donors.

Out of 105 HIV positive cases (Replacement Donors = 85, Voluntary Donors = 20); 379 HBV cases (RD=279, VD=100); 117 HCV cases (RD=85, VD=32); 6 Syphilis cases (RD=5, VD=1); 25 Malaria cases (RD=19, VD=6) (**Table 4**).



Our study showed a rising trend of HIV and HCV infections among blood donors from 0.55% in 2008 to 0.71% in 2010 for HIV, from 0.51% in 2008 to 0.85% in 2010 for HCV respectively. There is decreasing trend for HBs Ag from 2.52% in 2008 to 1.77% in 2010 and stationary trend for VDRL from 0.03% to 0.04% in 2010. This year wise changing trend of seroprevalence of individual TTI's from Jan 2008 to December 2010 is plotted in **Graph 1**.

Total number of donors per year was 6774, 6055 and 4811 from January 2008 to December 2010 respectively

Discussion

Blood transfusion is an essential component of modern health care system when used optimally saves millions of lives every year. Clinical usage of blood should be based on national guidelines; taking the individual patient's needs into consideration, with minimum cost and wastage, optimum safety and efficacy [3].

Every country needs to meet its requirements for blood and blood products and ensure safe blood supplies that are free from HIV, hepatitis viruses and other life-threatening infections which can be potentially transmitted through unsafe transfusion practices.

Despite of counseling and medical tests, conducted prior to blood donation, the presence of TTIs is inevitable in donated blood. Since a person can transmit infections during its asymptomatic phase (window period), transfusions can contribute to an ever-widening pool of infection in the general population. Extensive donor selection and sensitive screening tests will help in improving the blood safety and hence ensure the elimination, or at least reduction, of the risk of acquiring TTIs.

Blood safety is integral to the WHO HIV/AIDS plan to combat the spread of HIV infection and to the achievement of the health-related Millennium Development Goals to reduce child mortality, improve maternal health, combat HIV and develop global partnership for development [5].

Accurate estimates of risk of TTIs are important for monitoring safe blood supply and in evaluating the efficacy of the currently employed screening procedures "[6].

The prevalence of TTIs among blood donors in a structured health care system with a well-organized blood establishment can be used as a statistical tool for against those infectious agents that can be transmitted through blood and blood products and hence forth can contribute to statistical estimation of these viruses in the general population "[7].

WHO promotes voluntary over replacement donation. In the present study, 78.4% were voluntary and 21.6% were replacement donors. Similar predominance of voluntary donors was noted by Shah et al [8] in their study. This reflects the presence of blood donation awareness among the general population. In a study done in western Ahmedabad by Patel et al voluntary blood donors were reported as 95.56% [9], but a study from Karnataka and from Haryana reported it as 58% and 31.4% respectively [10,11]. People should be motivated to become voluntary blood donors for which blood camps are organized.

In our study, males (89.4%) outnumbered females (10.4%). This is similar to other studies done in India by Pallavi P et al., in which 97.84% were males [12], by Patel PA et al., in which 85% were males [9], by Arora D et al., in Southern Haryana [11], by Singh K et al., in Coastal Karnataka [13] noting more than 90% of the male donors.

The present study revealed that TTIs were more prevalent in replacement donors than voluntary donors. Similar observations with high sero-positivity in replacement donors was observed by Singh et al [14] and Pahuja et al [15]. On the other hand Chandra et al. [16] have found almost negligible infectivity rate in

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voluntary donors and also no voluntary donor was found to be positive for HIV by Arora Det al [11].

The sero-prevalence of TTIs in the present study was highest for HBV infection (2.14%). This Finding was similar to study conducted by Chandra et al. [16], Sawke et al [17] and Bhawani et al [18] who have also found HBV to be the commonest TTI among the donors in different percentages being 1.96%, 2.90% and 1.41% respectively. The prevalence of HCV infection in donors was next to HBV infection being 0.66% in the present study.

The third highest prevalence of TTI in the present study was HIV being 0.60%. Other studies reported HCV prevalence as 0.34%, 0.57%, 0.84% and 1.09%. [16-18] For HIV, India is second only to South Africa in terms of overall number of people living with HIV [15]. The prevalence of HIV in various parts of India is different with high rate in western and southern parts [14]. In the present study the prevalence of HIV in donors was found to be 0.60%. Other studies conducted in various parts of India reported HIV prevalence in donors as 0.23%, 0.51%, 0.39% and 0.08% [16-18].

A WHO report states that the viral dose in HIV transmission through blood is so large that one HIV positive transfusion leads to death, on an average, after 2 years in children and after three to 5 years in adults. The least prevalence of TTI in the present study was for syphilis being 0.05%. Other studies reported syphilis prevalence in donors as 0.01%, 0.23%, 0.08% and 0.90% [16-19].

Conclusion

Out of 17640 donors, voluntary donors (78.4%) were more, in comparison to replacement donors (21.6%). TTIs were more prevalent in replacement donors than voluntary donors. The number of voluntary donors have decreased from 2008 -2010, but there was male preponderance in both voluntary and replacement donors.

Out of all TTIs, prevalence of HBV (2.14%) was highest in the donors followed by, HCV (0.66%), HIV (0.6%), Malaria (0.14%) and Syphilis (0.05%). The pattern of TTIs among blood donors from 2008-2010 has shown a rising trend for HIV and HCV infections.

Voluntary donation should be encouraged for the prevention of transfusion transmitted infections. Replacement and voluntary donors should be screened thoroughly before blood donation and professional donors should be out rightly rejected.

With the implementation of strict donor selection criteria, use of sensitive screening tests and establishment of strict guidelines for blood transfusion it may be possible to reduce the incidence of transfusion transmitted infection in the Indian scenario.

What this study add to existing knowledge: Since the present study undertaken aimed to review the sero-prevalence of blood donors in our hospital.

Being the largest study on replacement and voluntary donors from India, it is likely to reflect changing trends in TTIs in major cities of the country.

Notes: Contribution of different authors;

1. Santosh Meena: Data collection and Compilation.
2. Veena Maheshwari: Manuscript writing.
3. Deepti Gupta: Statistical analysis

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