



ORIGINAL RESEARCH PAPER

Transfusion Medicine

SEROPREVALANCE OF TRANSFUSION TRANSMITTED INFECTIONS AMONGST BLOOD DONORS IN TERTIARY CARE HOSPITAL IN U.P

KEY WORDS:

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ABSTRACT

Background: The evaluation of the data of the prevalence of transfusion transmissible infections (TTI) among blood donors permits an assessment of the acquisition of the infections in the blood donor population and consequently safety of the collected donations. It gives an idea for the epidemiology of these infections in the population. **Objectives:** To study seroprevalence of HIV, HBV, HCV, Syphilis and malaria in blood donors. **Methods:** Total of 4529 units of blood were collected from voluntary and replacement donors during three years study period from Jan 2019 to dec 2021. All the blood samples were screened for HIV, HbsAg, HCV, Syphilis and malarial parasites. **Results:** Out of the total 4529 blood donors, replacement donors were (79.50%) more compared to voluntary donors (20.40%). The overall seroprevalence of TTI was 4.10%. The seroprevalence of HIV, HbsAg and HCV was 0.04%, 1.81% and 2.16% in total donors respectively. No voluntary donor was found to be positive for HIV. The prevalence for HbsAg and HCV was more in replacement donors 1.67% and 2.03% respectively as compared to voluntary donors 0.14% and 0.13% respectively. No donors were found positive for Syphilis and Malaria. **Conclusion:** Replacement donors were found to be more seropositive for TTI as compared to voluntary donors. Hence, more attention should be given for motivation of voluntary donors

INTRODUCTION

Blood transfusion involves transfer of biological material from man to man. Many infectious diseases are likely to be transmitted by blood transfusion. Preventing transmission of these infectious diseases through blood transfusion presents one of the greatest challenges of transfusion medicine.^[1]

According to NACO guidelines, all mandatory tests should be carried out on donors blood samples for Human immunodeficiency virus (HIV), hepatitis B virus (HBV), Hepatitis C virus (HCV), syphilis and malaria. The whole blood or components from any unit that tests positive should be discarded.^[2]

The evaluation of the prevalence date for transfusion transmitted infections (TTI).

HIV, HBV, HCV, syphilis and malaria, among blood donors permits an assessment of the acquisition of the infections in the blood donor population and consequently the safety of the collected donations. It also gives an idea for the epidemiology of these infections in the community.^[3]

Voluntary non-remunerated blood donation is the source of the safest blood supply to the transfusion service. In the Indian setup where voluntary donations are fewer and poorly structured, safety of blood could still be compromised.^[4]

Infectious agents that pose a serious threat to transfusion recipients are those that persist in the circulation of asymptomatic individuals who are healthy enough to be blood donors^[1] Hence this study is undertaken to find out the seroprevalence of TTI among voluntary and replacement blood donors.

MATERIALS AND METHODS

This was a cross-sectional study involving retrospectively collected data of blood donors carried out in blood bank of Saraswathi Institute of Medical Sciences (The study duration was three years which started from January 2019 to dec 2021)

which is licensed blood bank with average annual collection of 2000 units of blood from healthy blood donors annually.

Study population

During the study blood u nits were screened for HIV, HBsAg, HCV, syphilis and malaria. The blood units were collected from voluntary and replacement donors. A voluntary donor is one who donates voluntarily and is not paid for it. A replacement donor is nonremunerated donor who donates blood for a particular patient admitted in hospital.

Inclusion criteria

Healthy voluntary and replacement donors those meeting all criteria's for eligibility of blood donation as mentioned in SOP, Blood Bank, SIMS HAPUR

Exclusion criteria

Donor's blood who were not undergone testing of TTIs due to hemolysis or other reasons are excluded from the study.

Data collection procedure

The data were collected by studying all the registration book of blood donors from 2019 to 2021 maintained in the blood bank.

Data of all blood donors both voluntary and replacement were noted. Blood donors were requested to fill the donor card and a prestructured questionnaire was filled up. Information regarding age, sex, previous history of surgery, chronic illness, hospitalization, blood transfusion, jaundice, high-risk behavior, history of vaccination, etc., were recorded. After satisfaction of answers by blood bank medical officer and medical examination, donors were allowed to donate blood. Data was analyzed with the help of IBM SPSS version 20, USA (Statistical Package for the Service Solutions).

Method of testing for TTIs

Two ml of blood sample was collected in labelled pilot tube at the time of collection of blood from donor tubing of blood bag, The sample was further centrifuged at 3500 rpm for 5 minutes to obtain clear non hemolyzed serum. The samples were

tested for HIV, HBsAg, HCV, syphilis. Malaria was screened by thick and thin blood smears. The reactive cases of HBsAg, HCV, and HIV were retested before marked as reactive and discarded maintaining standard biomedical waste disposable procedure.

RESULTS

The present study was carried out in Blood Bank, Department of pathology of Saraswathi institute of medical sciences Hapur during the period from Jan 2019 to Dec 2021.

SEROPREVALENCE OF TTI:

During the study total 4529 donors blood units were screened for HIV, HBsAg, HCV, Syphilis and Malaria. Out of the 4529 blood donors, 3603(79.50%) were replacement donors and remaining 926(20.40%) were voluntary donors.

Out of the total 4529 screened blood units 182 units were seropositive for transfusion transmissible infections (TTI), giving prevalence rate of 4.01%. Out of this 162 were replacement donors and remaining 20 were voluntary donors.

Out of the total 4529 donors, males constituted 4326(95.51%) and only 203 (4.48%) donors were females. The donor age ranged from 18-60 yrs, majority (80.74%) in the age group of 18-35 yrs.

Table 1: Type of donors, Age and sex wise distribution of donors.

Donors	No of screened blood units (%)	HIV (%)	HbsAg (%)	HCV (%)
Voluntary	926 (20.40%)	00 (00%)	06 (0.14%)	06 (0.13%)
Replacement	3603 (79.50%)	02 (0.04%)	76 (1.67%)	92 (2.03%)
Total	4529 (100%)	02 (0.04%)	82(1.81%)	98 (2.16%)
SEX				
Male	4326 (95.51%)	02(100%)	79(96.35%)	88(95.65%)
Female	203 (4.48%)	00(00%)	03(3.65%)	04(4.34%)
Total	4529(100%)	02(100%)	82(100%)	92(100%)
Age in years				
18-25	2055 (45.37%)	00(00%)	23(28%)	33(36%)
26-35	1602 (35.37%)	02(100%)	46(56%)	42(46%)
36-45	560 (12.36%)	00(00%)	07(13%)	14(15%)
46 and above	312 (6.88%)	00(00%)	06(03%)	03(03%)
Total	4529 (100%)	02(100%)	82(100%)	92(100%)

CHART TITLE

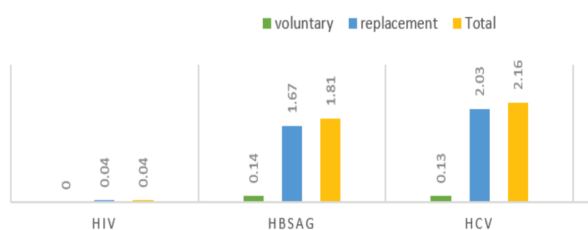


Figure 1: Seroprevalence of TTI

SEROPREVALENCE OF HIV IN BLOOD DONORS

Out of the total 4529 donors only two HIV positive donors, with

seroprevalence of 0.04%. Both were replacement donors and males.

SEROPREVALENCE OF HBsAg IN BLOOD DONORS.

Out of the total 4529 blood donors 82 (1.81%) were positive for HBsAg. Out of 82 positive donors, 76 were replacement donors, 6 were voluntary donors and 96.35% of them were males.

Among total 82 HBsAg positive donors 84 % were in the age group of 18-35 years. Out of the total, 79 were males and 3 were female donors and 84 % were married and remaining 15.8% were un married.

The seroprevalence of HBsAg among voluntary donors and replacement donors was 0.14% and 1.67% respectively.

SEROPREVALENCE OF HCV IN BLOOD DONORS

Out of the total 4529 blood donors 92 (2.16%) were positive for HCV. Out of 92 positive donors, 86 were replacement donors, 6 were voluntary donors and 95.65% of them were males.

Among total 92 HCV positive donors 82 % were in the age group of 18-35 years. Out of the total, 88 were males and 4 were female donors and 80 % were married and remaining 20% were un married.

The seroprevalence of HCV among voluntary donors and replacement donors was 0.13% and 2.03% respectively.

SEROPREVALENCE OF SYPHILIS AND MALARIA IN BLOOD DONORS.

No donors were found positive for Syphilis and Malaria.

DISCUSSION

The risk of TTI has declined dramatically in developed nations over the past two decades, primarily because of extraordinary success in preventing HIV and other established transfusion transmitted viruses from entering the blood supply. But same may not hold good for the developing countries. The National Policy for Blood Transfusion Services in our country is of recent origin and the transfusion services are hospital based and fragmented.^[5]

The present study was carried out in the Blood Bank, Department of pathology, SIMS Hapur from Jan 2019 to Dec 2021. During the study period, total 4529 blood units were screened for HIV, HBsAg, HCV, Syphilis and Malaria.

The donors age ranged from 18-60 yrs. Similar age range was observed in other studies. In our study 95.51% donors were males while only 4.4% donors were females. This could be explained on the basis that Indian women have a very high incidence of anemia, especially in the child bearing age and hence are likely to face disqualification while being screened for blood donation.

In the present study replacement donors, constituting 79.60% and only 20.40% were voluntary donors. This is comparable to study done by Srikrishna et al (98.5%)⁶ and Patil et al (81.8%)⁷. In contrast predominance of voluntary donors was noted by Bhattacharya et al (94.6%)⁸, Bhutia et al. (64.7%)⁹ and Adhikary et al. (68.28%)¹⁰.

It is shown that replacement donors constitute the largest group of blood donors in India reflecting lack of awareness among the general population, the presence of misconceptions and fears associated with donating blood, the lack of health education and the indifferent attitude of the health sector.

Table 2. Percentage of voluntary and replacement donors in different studies.

Authors (yrs)	TOTAL		HIV		HBsAg		HCV	
	Voluntary	Replacement	Voluntary	Replacement	Voluntary	Replacement	Voluntary	Replacement
Srikrishna et al (1999)6	1.5%	98.5%	00%	0.44%	0.42%	1.44%	0.18%	0.84%
Kaur et al (2001)4	-	-	-	-	0.30%	1.36%	00%	0.7%
Bhattacharya et al (2007)8	94.6%	5.4%	0.08%	0.11%	-	-	-	-
Rawat et al. (2014)10	-	-	0.15%	0.17%	0.14%	1.47%	0.14%	0.59%
Bhunia et al. (2017)9	64.78%	35.22%	0.06%	0.09%	0.30%	0.61%	00%	0.22%
Patil et al. (2018)7	18.20%	81.80%	00%	0.13%	0.58%	0.44%	00%	0.14%
Sharma et al. (2018)14	-	-	00%	0.03%	00%	0.29%	00%	0.35%
Adhikary et al. (2020)10	68.28%	31.72%	00%	0.01%	00%	0.28%	00%	0.12%
Present study (2021)	20.40%	79.60%	00%	0.04%	0.14%	1.67%	0.13%	2.03%

SEROPREVALENCE OF HIV

The sexual contact is a major mode of HIV transmission, however blood donation is also important mode of infection.¹¹ Globally HIV is one of the biggest challenges faced by the health services. Worldwide the estimated adult prevalence of HIV is around 0.8% in general population.¹²

In India, according to the latest estimates the National adult HIV prevalence is 0.34% in general population and in blood donors 0.28%¹³. **NACO 2009.**

In the various Indian studies, the seroprevalence of HIV among blood donors varies from 0.16% to 0.8%. In our study the seroprevalence for HIV was 0.04% in total donors. The seroprevalence in a replacement donors was 0.04%. No voluntary donors were positive for HIV.

The seroprevalence of HIV in our study in total donor was 0.04%, which is comparable to the study by Patil *et al.* (2018)⁷. The seroprevalence in replacement donors was 0.13% which is comparable to the study by Patil *et al.* (2018)⁷. In our study no voluntary donor was found to be positive for HIV, which is similar to the finding of Patil *et al.* (2018)⁷, Sharma *et al.* (2018)¹⁴ and Adhikary *et al.* (2020)¹⁰.

The seroprevalence of HIV in various Indian studies ranged from 0.06 to 3.8%. In our study seroprevalence of HIV is slightly less compared to national data (0.28%). This can be attributed to strict donor selection criteria In our study all the seropositive donors were males, which is similar to study by Sharma *et al.* (2018)¹⁴ and Adhikary *et al.* (2020)¹⁰.

Since no voluntary donor blood units show seropositivity to HIV in our study, we suggest the need for implementing programmes to achieve 100% voluntary donations.

In India presently WHO strategy 1 is followed for screening blood donors for HIV. According to this strategy, if the test is negative for HIV antibodies, the blood unit is considered free

of HIV and if reactive the unit is discarded. The donors found reactive for by initial assay are directed by blood transfusion services to linked voluntary counseling and Testing centres (VCTC) for counselling and further confirmatory testing without repeating test in blood bank.

In our present study we followed the same strategy. The seroreactive donors were given the post test counseling and were advised to modify high risk behavior and to self exclude from future donations. They referred to VCTC for counseling and further confirmatory testing.

SEROPREVALENCE OF HBV

Hepatitis B virus is the most important causative agent of transfusion associated hepatitis. India has been placed in the intermediate zone for prevalence of hepatitis B by WHO (2 - 7%) In previous Indian studies by Patil *et al.* (2018)⁷, Sharma *et al.* (2018)¹⁴ and Rawat *et al.* (2014)¹³ observed the seroprevalence of HBsAg among the blood donors was 1.027%, 0.29% and 1.61% respectively. They concluded that voluntary donors are comparatively safe donors.

In the present study out of the total 4529 screened blood units 82 were seropositive for HBsAg with 06 being voluntary donors and 76 being replacement donors, giving the seroprevalence of 0.14% and 1.67% among voluntary and replacement donors respectively.

The overall seroprevalence HBsAg in our study (1.81%) correlated well with those of Patil *et al.* (2018)⁷ and Rawat *et al.* (2014)¹³. while seroprevalence in voluntary donors was 0.14%, is similar to those of Rawat *et al.* (2014)¹³. The seroprevalence among replacement donors (1.67%) in our study correlates with that of Rawat *et al.* (2014)¹³.

The difference in the seroprevalence of HBsAg among voluntary and replacement donors in the present study suggests, the need for the concrete and non remunerated voluntary blood donors base in India.

The seropositive HBsAg donors were given post test counseling and were enquired about the past history of jaundice. They were advised to undergo liver function tests and serology marker for HBsAg to know the status of their infectivity. They have been also advised about screening of their family members for HBsAg and immunization.

SEROPREVALENCE OF HCV

As the screening for HCV has been made mandatory since June 2001, information on HCV infection among blood donors is sketchy and only few studies available.

Prevalence of post-transfusion hepatitis in India is around 1%.¹⁶ In HCV infection 75-80% reported to progress to chronic hepatitis of which 10- 20% may progress to cirrhosis and hepatocellular carcinoma.¹³

World wide it is estimated that 3% of the population have been infected with HCV which means there are 170 million chronic carriers the prevalence of HCV antibodies in blood donors in developed countries ranges from 0.4% to 2%.¹⁷

The wide variations of HCV seroprevalence in different studies in India might due to the use of different generation of ELISA test kits, having different sensitivities and specificities. The prevalence estimated to be 1.5% in India.¹⁸ Srikrishna *et al.* (1999)⁵ and Kaur *et al.* (2001)⁴ observed the seroprevalence of HCV as 1.02% and 0.7% respectively among the blood donors.

Srikrishna *et al.* (1999)⁵ and Rawat *et al.* (2014)¹³ noted that the seroprevalence of HCV in voluntary donors was less than that in replacement donors, suggesting that the voluntary donors are safe donors.

In the present study of the total 4529 screened blood units, 98 units were seropositive for HCV (2.16%). 92 seropositive blood units were from replacement donors (2.03%) and 8 from voluntary donors (0.13%).

The observed seroprevalence of HCV of 2.16% in the present study is comparatively high among all the comparable studies in which 0.13% were voluntary and 2.03% were from replacement donors showed seropositivity, the study suggests the need of screening both voluntary, replacement donors.

Seroprevalence of Syphilis And Malaria In Blood Donors.

No donors were found positive for Syphilis and Malaria.

CONCLUSION

It has been established that the incidence of TTI decreased considerably after mandatory testing of blood units for HIV, HbsAg, HCV, Syphilis, and Malaria.

However, the risk of TTI cannot be eliminated completely even after mandatory testing of blood units because of risk associated with donations during window period. With advent of nucleic acid amplification techniques (NAT) western countries have decreased the risk of TTI to a major extent. This decrease the window period and hence decrease in incidence of TTI. But the cost effectiveness of the NAT is poor. Its high cost is of concern especially in economically restricted countries. Our study showed that the seroprevalence of TTI was more in replacement donors compared to voluntary donors. However it was statistically not significant.

These results suggest that voluntary blood donors services should be augmented. There should be an establishment of nationally coordinated blood transfusion services. All blood should be tested for TTI with reduction in unnecessary blood transfusion thus ensuring safe blood supply to the recipients. 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 TTI in Indian scenario.

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