

## **Pattern of transfusion transmissible diseases infectivity amongst blood donors in a tertiary care teaching hospital in rural eastern Uttar Pradesh**

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### **Abstract**

**Introduction:** Transfusion of whole blood (WB) and blood components is a lifesaving procedure. The process of blood donation requires detailed history taking in preformed questionnaire and screening for the TTI. With every unit of donated blood there is 1% chance of transfusion associated problem including transfusion transmitted diseases. Even with strict donor screening protocol the risk of TTI’s like HIV/ HCV/ HBV/ Syphilis/ Malaria cannot be ruled out.

**Methodology:** The present study (record-based retrospective study) was conducted in the Blood Centre of Hind Institute of Medical Sciences, Safed Abad, Barabanki U.P. from July 2019 to June 2022. Data was retrieved from the blood bank documents taking information on all the blood collected during this period, including both voluntary and replacement donors.

Donors with H/O febrile illness/ weight loss/ jaundice/ Cardiovascular or pulmonary ailments/ epilepsy/ malignancy/ blood transfusion within one year/consumption of drugs/ history of recent blood donation/ surgical intervention, age <18yr /> 60yrs, pregnancy /lactation were excluded from the study.

**Results:** Total 4453 units of blood were collected and screened for HIV, hbsag, HCV, Syphilis and Malaria of which 812 (18.19%) was from voluntary donors and 3641 (81.58%) from replacement donors. Majority of the donor cohort was constituted by males. The overall seroprevalence of HIV, HCV, hbsag, and Syphilis was 0.06, 0.40, 0.92 and 0.29. No blood donor was positive for Malaria parasite.

**Conclusion:** The present study highlighted that ttis seroprevalence was on higher side among replacement donors in comparison to voluntary blood donors,

suggesting the need to increase the voluntary blood donations. HBV is most common & HIV is least common TTI affecting blood donors. Compulsory testing for HCV/HIV/hbsag /syphilis/malaria needs to be done. Strict donor selection criteria along with strict blood transfusion guidelines and use of sensitive screening tests can help in decreasing the TTIs incidence.

**Keywords:** Transfusion Transmitted Infections, Seroreactivity, Prevalence, Blood Donors.

### Introduction

Transfusion of whole blood (wb) and blood components is a lifesaving procedure. Persons willing to donate blood can be either voluntary donor (blood donation without any remuneration/ monetary gain) or replacement donor (requested by patient's relatives/ friends to donate) [1]. The person willing to donate blood should be a healthy donor and must fulfill certain criteria: age  $\geq 18$ yr or  $\leq 60$ yrs, weight  $\geq 45$ kgs, b.p. $>100/60$  or  $<180/100$  mm of hg, pulse rate  $-70-80$  bpm, hb $\geq 12.5$  g/dl and free from any active disease [2]. The process of blood donation requires detailed history taking in preformed questionnaire and screening for the tti. With every unit of donated blood there is 1% chance of transfusion associated problem including transfusion transmitted diseases [3]. Even with strict donor screening protocol the risk of tti's like hiv /hcv /hbv /syphilis /malaria cannot be ruled out because of:

- A) failure to detect the infection in the window period,
- B) false negative results,
- C) genetic variability among viral strains,
- D) asymptomatic carrier and
- E) technical error [4].

To guarantee a perfectly safe blood donation and transfusion for both donor and recipient is very difficult

and our primary objective must be to provide safer blood donation for transfusion.

### Objective

This study is undertaken to determine the prevalence of tti's among voluntary and replacement donors coming to our institute so as to provide safe and adequate blood to the patients by recognizing the donor base having low seropositivity with tti's.

### Material & methods

The present record-based retrospective study was conducted in the blood center of hind institute of medical sciences, Safed Abad, Barabanki up. From July 2019 to June 2022. Data was retrieved from the blood bank documents taking information on all the blood collected during this period, including both voluntary and replacement donors. All blood samples were screened using:

- 1) Elisa screening methods using iii<sup>rd</sup> generation Elisa kits for hiv-1 & 2, hbsag & hcv,
- 2) Rapid immunoassay test (aspen) for syphilis and
- 3) Card test for malaria.

Donors with h/o febrile illness/ weight loss/ jaundice/ cardiovascular or pulmonary ailments/ epilepsy/ malignancy/ blood transfusion within one year/ consumption of drugs/ history of recent blood donation/ surgical intervention, age $<18$ yr or  $>60$ yrs/ pregnancy/ lactation were excluded from the study.

### Inclusion criteria

Donors with age $>18$ yr / $<60$ yrs, wt. $> 45$ kgs, b.p. $> 100/60$  to  $<180/100$ mm of hg, pulse rate -  $70-80$  bpm, hb $\geq 12.5$ g/dl. Free from any active disease.

### Exclusion criteria

Donors with age $<18$ yr / $>60$ yrs wt. $< 45$ kgs, b.p. $<100/60$  to  $>180/100$ mm of hg, hb $\leq 12.5$ g/l. Any active disease was excluded from the study.

## Results & discussion

From July 2019 to June 2022 total 4453 units of blood were collected and screened for HIV, hbsag, hcv, syphilis and malaria of which 812 (18.19%) was from voluntary donors and 3641 (81.58%) from replacement donors (**Table-1**).

Among voluntary and replacement donor's majority of the donor cohort was constituted by males with 799 (98.39%) among voluntary and 3626 (99.58%) in replacement donor group whereas number of females in voluntary group was 13(1.60%) and in replacement group there was 15 (0.41%) females (**Table 2**). Total 4453 blood units was screened for transfusion transmitted infections (ttis) of which 75(1.68%) units were positive, with a prevalence rate of 1.68%. The seropositivity rate among voluntary and replacement donors was 16(1.97%) and 59(1.6%) respectively. (**Table - 3**).the overall seroprevalence of hiv, hcv, hbsag, and syphilis was 0.06, 0.40, 0.92 and 0.29.no blood donor was positive for malarial parasite.(**Figure – 1**) of the total 812 units collected from voluntary donors seropositivity rates for hiv, hcv, hbsag and syphilis was 1(0.12%), 4(0.49%), 9(1.10%), 2(0.24%) respectively.(**Table - 4**) among 3641 units collected from replacement donors seropositivity rate for hiv was 2(0.05%), hcv 14(0.38%), hbsag 32(0.87%), syphilis 11(0.30%). (**Table - 5**)

In the current practice of medicine, transfusion of blood and blood components is considered as one of the important lifesaving procedures, however it is also responsible for transmitting blood transmitted infections to the recipients. Donors with high-risk behavior such as drug addict, commercial sex workers, prisoners and homosexuals carry more risk of tti positivity [5]. Screening for tti's is essential for safer blood transfusion

but even after following strict screening protocols tti's still continue to affect the safer blood transfusion services because of transmission of the infectious agent in the asymptomatic phase, false negative results and genetic variability among the viral agents.[4]in this study among the total 4453 donations 18.19% was from voluntary donors and a major portion of the donation i.e., 81.58% was constituted by replacement donors. This is also seen in the study conducted by kakkar et al (94.7%) [6], singh et al (84.5%) [7]and srikrisna et al (98.5%) [8], in contrast major portion of the voluntary donors was noted in studies done by bhattacharya et al (94.65%) [9]and pallavi et al (64.78%) [10]. Hence, it can be interpreted that due to presence of misconception, lack of awareness, lack of health education and associated fears with blood donation a larger portion of blood donors in india is still constituted by replacement donors [11].

Total seroprevalance among various tti's in the study was measured as 3.57% which is also been observed by studies done by mathai et al (3.1%) [12],koshy et al (2.9%) [13]&karmakar et al (2.79%) [14].

As mentioned in india hiv establishment 2019 report, the hiv prevalence has been declining in india since the epidemic peak in year 2000 and has been stabilizing in recent years. The estimate for this indicator was 0.22% (0.17-0.29%) [15]. HIV seroprevalance varied from 0.16-0.8% among different studies performed in india by kakkar et al(0.2%) [6]matee et al (3.8%) [16]farnandes et al (0.06%) [17]kaur et al (0.6%) [5]srikrishna et al(0.44%) [8]and pallavi et al(0.44%)[10]. In our study hiv seroprevalance was 0.12% among voluntary and 0.05% among replacement donors. Hbv, hcv, hiv and syphilis infection among donors in this study has been estimated as 0.92%,0.40%, 0.06%, 0.29% respectively.

The most frequently encountered tti in the present study was hbv infection similar to other studies done by Sinha et al [18] and Garg et al [19] who encountered relatively much higher proportion of hbsag seropositivity whereas lower hbsag seropositivity was reported by Unnikrishnan et al [20]and Adhikari et al [21].

Transfusion associated hepatitis is caused by hepatitis b and c virus. In the present study out of total 4453 screened blood units 41sera were hbsag positive, among the 41 seropositive 9 was positive in voluntary and 32 among replacement collections giving the seroprevalence of 1.10 and 0.87% respectively. The overall seroprevalence for hbsag in present study was 0.92% which correlates with the similar studies being done by arora et al [22]and Bhattacharya et al [9].

The seroprevalence of hcv in India shows large variations in different studies with some studies showing significant increase in hcv seroprevalence and some showing decrease in the seroprevalence. These variations can be due to use of different generations of Elisa kits used for hcv screening having different sensitivity and specificity [10].in the present study of the total 4453

collected screened blood units 4(0.40%) was hcv positive among voluntary and 14(0.38%) among replacement donors with 0.49% and 0.38 % seroprevalence respectively. Studies done by Sing et al [23], Bogga et al [24] and Matee et al [16] noted lesser seroprevalence of HCV in voluntary than replacement donors indicating safer blood transfusion by voluntary donors.

In the present study the seroprevalence of syphilis was 0.29%, among the total 4453 blood donors 2 were seropositive in voluntary and 11 among replacement with seropositivity rate being 0.24% & 0.30% respectively showing low seroprevalence of syphilis among voluntary donors. These findings can be due to declining trends in syphilis prevalence.

In our study none of the blood unit was positive for malaria, these findings were also reported by studies conducted by Sonawane et al [25], Srikrishna et al [8], Pallavi et al [10] and Fernandez et al [17]. The negative percentage can be due to use of less sensitive techniques for screening so, improvement needs to be done to increase the sensitivity [11].

Table 1: Year wise collection of blood (voluntary and replacement donors) for the period July 2019 to July 2022

	2019 (July-Dec)	2020 (Jan-Dec)	2021 (Jan-Dec)	2022 (Jan-June)	Total
Total collection	913	1228	1569	743	4453
Voluntary collection	162	331	257	62	812 (18.19%)
Replacement collection	751	897	1312	681	3641 (81.58%)

Table 2: Year wise Voluntary and Replacement donor blood collection according to Gender for July 2019 to June 2022

	2019 (July-Dec)	2020 (Jan-Dec)	2021 (Jan-Dec)	2022 (Jan-June)	Total (%)
Voluntary Male	161	324	254	60	799 (98.39%)
Voluntary female	1	7	3	2	13 (1.60%)
Replacement male	746	894	1306	680	3626 (99.58%)
Replacement female	5	3	6	1	15 (0.41%)

Table 3: TTI Seroprevalence in voluntary and replacement donors

Donors	No.	Hbsag (%)	HCV (%)	Syphilis (%)	HIV (%)	Malaria (%)	Total+VE (%)
Voluntary	812	9 (1.10%)	4 (0.49%)	2 (0.24%)	1 (0.12%)	0	16 (1.97%)
Replacement	3641	32 (0.87%)	14 (0.38%)	11 (0.30%)	2 (0.05%)	0	59 (1.6%)
Total	4453	41(0.92%)	18(0.40%)	13(0.29%)	3(0.06%)	0	75(1.68%)

Figure 1: Seroprevalence of Transfusion Transmitted Infections

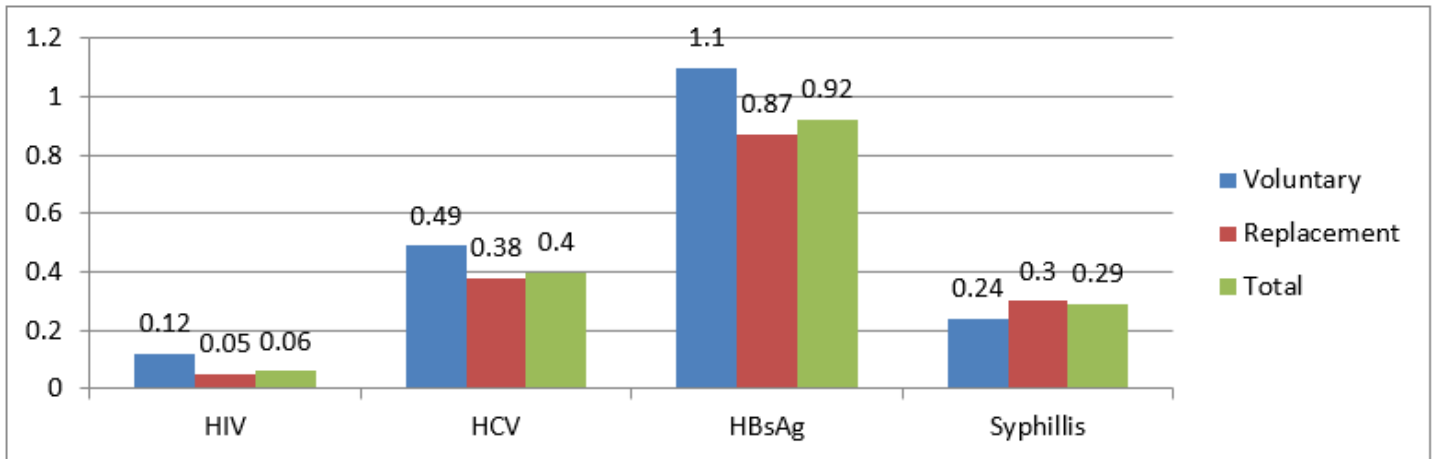


Table 4: Year wise Seropositivity for TTI's in Voluntary donors from July 2019 to June 2022

	2019 (July-Dec)	2020 (Jan-Dec)	2021 (Jan-Dec)	2022 (Jan-July)	Total voluntary donors (%)	% in total 4453 donors
Voluntary collection	162	331	257	62	812(18.19)	18.23
Seropositivity HIV	0	0	1	0	1(0.12)	0.02
Seropositivity HCV	2	0	1	1	4(0.49)	0.08
Seropositivity hbsag	1	1	6	1	9(1.10)	0.20
Seropositivity VDRL	0	0	2	0	2(0.24)	0.04

Table 5: Year wise Seropositivity for TTI's in Replacement donors from July 2019 to June 2022

	2019 (July- Dec)	2020 (Jan- Dec)	2021 (Jan- Dec)	2022 (Jan- July)	Total replacement donors (%)	% in total 4453 donors
Replacement collection	751	897	1312	681	3641(81.58)	81.76
Seropositivity HIV	0	0	0	2	2(0.05)	0.04
Seropositivity HCV	3	6	2	3	14 (0.38)	0.31
Seropositivity hbsag	4	0	19	9	32(0.87)	0.71
Seropositivity VDRL	0	0	9	2	11(0.30)	0.24

**Conclusion**

The present study highlighted that ttis seroprevalence was on higher side among replacement donors in comparison to voluntary blood donors, suggesting the need to increase the voluntary blood donations so as to achieve safer blood units. In order to supply safer blood units to the recipient all units of blood must be tested for tti's. Hbv is most common & HIV is least common tti affecting blood donors. Compulsory testing for hcv/ HIV / hbsag / syphilis and malaria needs to be done, but because of associated risk factors, window period these cannot be completely eliminated, therefore to diagnose cases of HIV in window period HIV Elisa iv<sup>th</sup> generation Elisa kits should be used which detects the HIV antibody and HIV p<sup>24</sup> antigen, so that in window period when the antibodies are not secreted HIV antigen can be detected. Strict donor selection criteria need to be implemented along with strict blood transfusion guidelines and use of sensitive screening tests can help in decreasing the ttis incidence.

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