

Seroprevalence of Transfusion Transmissible Infections in Blood Donors at Tertiary Care HospitalShruthi H Y¹, Pavan Kumar M², Roopashree G³, Zashank S Joshi⁴¹Senior Specialist, Department of Pathology, Mysore Medical College and Research Institute, Mysore, Karnataka, India²Assistant Professor, Department of Pathology, BGS Medical College and Hospital, Bangalore, Karnataka, India³Assistant Professor, Department of Pathology, BGS Medical College and Hospital, Bangalore, Karnataka, India⁴Assistant Professor, Department of Pathology, Dr. Ulhas Patil Medical College & Hospital, Jalgaon, Maharashtra, India

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Corresponding Author: Dr. Roopashree G

Conflict of interest: Nil

Abstract:**Aims:** (1). To estimate the seroprevalence of TTIs in both healthy and voluntary donors at tertiary care hospital in India. (2). To know the burden of TTIs in the community and to plan effective measures in preventing them.**Methods:** The present retrospective study was held between 2018-2019, a 2 year study done at the blood bank of Chamrajanagar Institute of Medical Sciences, a tertiary care hospital in India. Data regarding prevalence of TTIs like Hepatitis B, Hepatitis C, HIV, syphilis and malaria among both voluntary and replacement donors tested by appropriate methods were retrieved from blood bank records. Statistical analysis was done on seroprevalence of TTIs in blood donors.**Results:** A total of 5750 voluntary and replacement donors were screened for TTIs. Overall seroprevalence of TTIs among blood donors was 45 (0.78%), among them 42 (93%) donors were males and 3 (7%) of them were females. Most common age group of blood donors was found to be between 31-40 years. The overall seroprevalence of Hepatitis B, Hepatitis C, HIV, syphilis and malaria among the blood donors in present study were 0.4%, 0.09%, 0.14%, 0.1% and 0.03% respectively.**Conclusion:** Thus the present study concludes that sero-prevalence of transfusion transferable infections are on decreasing trend which is a great sign. However risk of transmission still occur during window period of infections, due to high cost of testing methods, lack of trained staff or testing errors. Diligent donor selection is the prime factors to increase blood safety and to reduce transfer of infected blood.**Keywords:** Seroprevalence, Transfusion Transmissible Infections (TTIs), Blood donors, Hepatitis B infection, Blood safety.

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Introduction

Blood transfusions plays a vital role in saving lives for a wide range of health conditions like transfusion dependent anaemias, various pregnancy related complications and during childbirth, severe blood loss due to RTIs, and surgical procedures. The need for blood is constant. Blood and its components are also regularly required for maintenance therapy in patients with conditions such as sickle cell disease, thalassemia and to treat hemophilia.

Blood products in sufficient quantity are a key component of an effective health system. Around 118.5 million units of donated blood are collected globally every year. India requires 13.1 million blood units annually to meet nation's basic blood requirements WHO2009b. Donation of just 1 unit

of blood can save up to 3 lives. Blood donors can be voluntary non-remunerated blood donors, family/replacement donors or paid/commercial donors. Studies have reported significantly lower prevalence of transfusion-transmissible infection markers among voluntary donors compared with other types of donors [1,2].

Blood transfusion can be a boon in saving lives also carries its own immediate and delayed complications. Transfusion transmissible infections results from introduction of a pathogen into a person through blood transfusion. A wide variety of organisms, including bacteria, viruses, prions, and parasites can be transmitted through blood transfusions. Blood transfusion carries risk of TTIs like hepatitis

B, hepatitis C and HIV which are major public health concerns. Less commonly syphilis, malaria, toxoplasmosis and other viral infections are also associated with blood transfusion [3].

Strict haemovigilance by maintaining safe and effective procedures around the collection, storage and use of donated blood is essential throughout the entire blood transfusion chain to standardize the use of blood in healthcare. Mandatory screening tests recommended for all the collected blood units by WHO includes ELISA for HIV I & II, hepatitis B surface antigen and antibody to hepatitis C, VDRL/RPR for syphilis, malarial parasites by card method. One of the main reasons for TTIs among blood recipients was found to be occult hepatitis, non-seroconverting or delayed seroconversion, which has to be taken into consideration. Present study aims at estimating the seroprevalence of various TTIs among blood donors at a tertiary care unit and to undertake effective measures for safe blood transfusion service.

Materials And Methods

A 2 year retrospective study was held between 2018-2019, at the blood bank of Chamrajanagar Institute of Medical Sciences, a tertiary care hospital in India.

Serum of voluntary & replacement donors were screened for Hepatitis B, Hepatitis C, HIV, syphilis and malaria. A total of 5750 blood units were collected & tested. No professional/ paid donor was tested. Exclusion criteria for blood donation was any serious illness, History of any medication, major surgical procedure, recent blood transfusion, weight <50 kg, age <18/>60 yrs, pregnant & lactating women.

All the collected blood samples were screened for hepatitis B surface antigen (III generation ELISA), Hepatitis C (III generation ELISA), HIV (IV generation ELISA), VDRL method for syphilis and rapid card method for malarial parasites. Tests were done according to manufacturer's instructions. All

the reactive samples were repeated and rechecked before labeling them as seropositive. The donated blood samples were discarded whenever the donor sample was proved to be positive for any of the transfusion transmitted infection.

Results

In the present study, out of total 5750 voluntary & replacement donors, 3629 (63%) were males & 2121 (37%) were females (Table 1). A Chi-square test of independence was performed to find the relation between gender and the total study population. The difference of prevalence by sex was statistically significant ($p = 0.05$.) Male donors were more in number than female donors.

Overall seroprevalence of TTIs among blood donors was 45 (0.78%), among them 42 (93%) donors were males and 3 (7%) of them were females. Present study reveals that TTIs are more common among male donors compared to females.

The age range in our study was 18-60 years. It was observed that highest prevalence of seropositive donors was found within the age group of 31-40 yrs. The overall cumulative seroprevalence was lowest in donors of age <20 years, then increased upto 40 years of age followed by a decline with increasing age (Table 2).

The prevalence of HBsAg, anti HCV, anti HIV, syphilis and malaria among the blood donors in the study population is shown in (Table 3). The overall seroprevalence of HBV & HCV was 0.4% & 0.09% respectively, while the prevalence of HIV was 0.14%, syphilis was 0.1% and malaria was in 0.03% respectively. The prevalence rate was highest for HBV followed by HIV, syphilis, HCV and malaria in decreasing order. We observed that number of blood donors progressively increased from 2018 to 2019; however there was a decrease in prevalence of all the TTIs screened positive with successive years. Thus the year wise trend of seroprevalence was statistically significant in the present study ($p < 0.05$).

Table 1: Distribution of donors based on gender

Donor Type	Males	Females
Voluntary donors	2124	1640
Replacement donors	1505	481
Total	3629	2121

Table 2: Distribution of donors based on age group

Age group (years)	Sero-positive donors	Sero-negative donors	Total
18-30 yrs	8	1282	1290
31-40 yrs	24	2991	3015
41-50 yrs	8	882	890
51-60 yrs	5	550	555

Table 3: Seroprevalence of TTIs among blood donors in the study population

Year of study	Hepatitis B	Hepatitis C	HIV	Syphilis	Malaria
2018	15	4	5	4	2
2019	9	1	3	2	-
Total	24 (0.4%)	5 (0.09%)	8 (0.14%)	6 (0.1%)	2 (0.03%)

Abbreviations: TTIs= Transfusion transmitted infections.

Table 4: Comparison of age wise distribution of TTIs with other studies

Study	Common age group (years)
Mukherjee S et. al.	20-40
Sharma R I et. al.	25-35
Mandal et. al.	26-35
Present study	31-40

Abbreviations: TTIs= Transfusion transmitted infections.

Table 5: Comparison of gender wise distribution of TTIs with other studies

Study	Males	Females
Giri PA et al.	95%	5%
Chaudhary IA et al.	90%	10%
Present study	93%	7%

Abbreviations: TTIs= Transfusion transmitted infections.

Table 6: Comparison of transfusion transmitted infections prevalence rate with other studies

Studies	HBsAg %	HCV%	HIV%	Syphilis%	Malaria%
Chadekar et al.	1.3	0.25	0.26	0.28	-
Anjali et al.	1.5	0.4	0.6	0.1	-
Tafuri et al.	8.3	4.5	1.5	1.5	-
Pallavi et al.	1.27	0.23	0.44	0.28	-
Present study	0.4	0.09	0.14	0.1	0.03

Abbreviations: TTIs= Transfusion transmitted infections, HIV = Human immunodeficiency virus, HBsAg = Hepatitis B surface antigen, HCV = Hepatitis C virus.

Discussion

In the present study we found male dominance among blood donors, similarly, seen in the study done by Flavia adu- poker et al. [5]- Male (98.3%), female (1.7%); Mukherjee S et. Al [6] male 98.12% and female 1.87%; Qureshi M Z et al. [7] male 97.8% and female 2.2%; and Biswal M et al. [8] male 99.08% and female 0.92%. Male predominant blood donation may be explained by increased frequency of fear, anaemia, vasovagal reaction, post donation fatigue and other health related issues in females. Also they lack the awareness regarding blood donation. The fear about blood donation among females can be overcome by educating them about the advantages of blood donations. Anaemia and other health related issues can be improved by good nutritional diet and iron supplements.

In the present study most common age group of TTIs were found between 31 to 40 years of age. The study done by Mukherjee S et al.[6] showed common age group of 20 to 40 years, Sharma RI et al. [9] had most common age group between 20 to 35 years and Mandal et al. [10] showed common age group of 26 to 35 years (Table 4). The increase rate of infection among this age group may be attributed

with sexually active group and other high risk behaviour.

Regarding sex distribution, the present study found that TTIs were more prevalent among males than females which was in concordance with the study done by Giri PA et al. [11], Chaudhry IA et al [12] (Table 5). This may be due to increased blood donations among males and comparatively high risk behaviour seen among male donors.

Among TTIs screened positive blood samples we found highest prevalence of HBV followed by HIV, syphilis, HCV and malaria in decreasing order, which was in concordance with study done by Chadekar et al. [13], Anjali et al. [14], Tafuri et al. [15], and Pallavi et al [16] (Table 6).

Present study revealed overall decline in seroprevalence of all transfusion transmitted infections. This may be due to more public awareness regarding the disease, proper donor selection as per NA-CO guidelines and use of new generation kits with improved sensitivity and specificity. Use of NAT testing gave an additional advantage in detecting very low level of viral RNA or DNA present in the blood sample during window period.

Conclusion

Thus the present study concludes that seroprevalence of transfusion transferable infections are on decreasing trend which is a great sign. This is attributed to more public awareness, systematic way of donor selection and sensitive screening test by using NAT new-generation kits education and rational use of blood, with motivational programme for volume donation and vigilance of error.

Diligent donor selection is the prime factors to increase blood safety and transfer of infected blood. However, it is advantages to motivate women for blood donation as they are at low risk in transmission of infections.

Author's Contributions

1. Dr Shruthi H Y

GROUP 1: Conception of the work **AND/OR** Design of the work **AND/OR** Acquisition of data **AND/OR** Analysis of data **AND/OR** Interpretation of data.

2. Dr Pavan Kumar M

GROUP 4: Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

3 Dr Roopashree G

GROUP 2: Drafting the work **AND/OR** Revising the work critically for important intellectual content.

4 Dr Zashank S Joshi

GROUP 4: Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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