

SEROPREVALENCE OF TRANSFUSION TRANSMITTED INFECTIONS AMONG THE BLOOD DONORS AND THE TRENDS OF TTI IN LAST THREE YEARS IN A TERTIARY CARE TEACHING HOSPITAL IN MAHARASHTRA

Pathology

Ashwini Morale	Assistant Professor, Department of Pathology, RCSMGMC & CPRH, Kolhapur, Maharashtra.
Supriya Patki	Assistant Professor, Department of Pathology, RCSMGMC & CPRH, Kolhapur, Maharashtra.
Aparna Kulkarni	Associate Professor, Department of Pathology, RCSMGMC & CPRH, Kolhapur, Maharashtra.
Ravindra Ramteke	Professor, Department of Pathology, RCSMGMC & CPRH, Kolhapur, Maharashtra.

ABSTRACT

Background Transfusion of blood and/or its components is a life saving measure but at the same time it has life threatening hazards also and with every unit of blood, there is 1% chance of transfusion- associated problems including transfusion- transmitted diseases. Amongst the blood transfusion complications, transmission of certain infections (TTIs) like HIV, Hepatitis B & C, Syphilis, Malaria are most significant for the long-term detrimental side effects. Blood transfusion services (BTS) is an integral and indispensable part of the healthcare system. As per the guidelines of the Ministry of Health & Family Welfare (Government of India) under The Drug and Cosmetic Act, 1945 (amended from time to time), all the blood donations are to be screened against the five major infections namely HIV, HBV, HCV, Syphilis and Malaria. The objectives of this study were- 1) to assess the seroprevalence of TTI s. 2) yearly comparison of the trends of Transfusion transmitted infections among voluntary donors. 3) Implementing strategies for prevention of these infections so as to ensure safe blood to the recipients. **Materials And Methods** This was a record based observational study from Jan 2019 to Dec 2021. Data regarding the screening-test results, type of donors and demographic data were collected from the blood bank register. **Study Design**- Record based observational study. **Results** Total TTI positivity was found to be 0.93%. In our study we found the overall prevalence of HIV, HBV, HCV and Syphilis were 0.10, 0.73, 0.04, 0.06% respectively, with no case of malaria. **Conclusion** More and more voluntary blood donors are needed which can be done by public awareness programmes, blood donation camps, restriction of donation by professional donors. With the advent of nucleic acid amplification techniques (NAT), western countries have decreased the risk of TTI to a major extent. But the cost-effectiveness of NAT is poor.

KEYWORDS

TTI, Seroprevalence, Voluntary Donors, Blood Centre.

Background

Transfusion of blood and blood components is a specialized modality of patient management which has been saving millions of lives worldwide each year. Transfusion of blood and/or its components is a life saving measure but at the same time it has life threatening hazards also and with every unit of blood, there is 1% chance of transfusion-associated problems including transfusion- transmitted diseases.^{1,2} Amongst the blood transfusion complications, transmission of certain infections (TTIs) like HIV, Hepatitis B & C, Syphilis, Malaria are most significant for the long term detrimental side effects. Meticulous pre-transfusion testing and screening particularly for transfusion transmissible infections (TTI) is the need of the hour.³ India has a population of more than 1.5 billion with 5.7 (reduced to 2.5) million Human Immunodeficiency Virus (HIV) positive, 43 million HBV positive and 15 million HCV positive persons. The risk of transfusion transmission of these viruses is present due to high seroprevalence of HIV, HCV and HBV (0.5%, 0.4%, and 1.4% respectively) among the blood donors.⁴ Blood transfusion services (BTS) is an integral and indispensable part of the healthcare system. The priority objective of BTS is to ensure safety, adequacy, accessibility and efficiency of blood supply at all levels.⁵ As per the guidelines of the ministry of health & family welfare (Government of India) under The Drug and Cosmetic Act, 1945 (amended from time to time), all the blood donations are to be screened against the five major infections namely HIV, HBV, HCV, VDRL and malaria.⁶ Their tests were made mandatory in the year 2001 in India prior to the issue of compatible blood to the patient.⁷ NACO recommended 3rd or 4th generation ELISA HIV I & II test kits which are 100% sensitive should be preferred for use at blood banks for screening donated blood.⁸

The objective of this study is to assess the seroprevalence and the trends of Transfusion Transmitted Infections among voluntary donors.

AIMS AND OBJECTIVES

- To study the seroprevalence of transfusion transmitted infections amongst voluntary blood donors at Blood centre and to assure the safety of collected blood.
- Yearly comparison and study of the trend of incidence of HIV, HBV, HCV & Syphilis positive cases.
- Implementing strategies for prevention of these infections so as to ensure safe blood to the recipients.

MATERIALS AND METHODS

Study Design

The present study was a record based observational study carried out at the blood Centre of a tertiary care hospital in RCSM GMC, Kolhapur, Maharashtra, India. The study was carried on for a period of 3 years from Jan 2019, to Dec 2021. All the voluntary donors attending the blood donation camps & blood Centre were included in the study. Total 29489 (28811 male and 678 female) blood donors were included in our study over a period of 3 years.

Tests Performed

- HIV (Human Immunodeficiency Virus) (ELISA 4th generation)
- HBV (Hepatitis B Virus) (ELISA 3rd generation)
- HCV (Hepatitis C Virus) (ELISA 3rd generation)
- Syphilis Syphicheck- (tulip diagnostics)
- Malaria (J Mitra & co.)

Inclusion Criteria

Clinically healthy individuals between 18 and 65 years of age with a body weight of above 45 kg and haemoglobin more than 12.5 g/dl with no significant medical or surgical history were qualified for the donation process.

Exclusion Criteria

Persons belonging to high-risk groups such as patients with chronic diseases, professional blood donors, drug abusers, dialysis patients, pregnant women, patients treated in thalassemia clinics, sexually transmitted disease clinics, and sex workers were excluded from the donation process. 3 ml of blood collected in EDTA vial and clotted vial each. From the EDTA vial, we have done rapid test for Malaria and from the clotted vial we have obtained serum for serology (HIV, HBV, HCV) and for rapid test for syphilis.

Ethical and Institutional Issues

The study has been approved by institutional ethics committee. Informed consent of the participants were collected while blood donation.

Data Collection Procedure

The data of donors, quality control registers, TTI registers, issue

registers are well maintained. Confidentiality of personal data is maintained. Donors were screened by trained personnel after a complete physical examination and satisfactorily answering the donor's questionnaire as per WHO guidelines/Govt. of India. Donor registration forms, which included a detailed pre-donation questionnaire, were filled by the donors.

RESULTS

In the present study, out of total 29489 blood donors, 28811 (97.7%) were males and 678(2.3%) were females. The most common age group of donors was found to be 21-30 Years (45.25%) followed by age group of 18-20 years (7.26%), 31-40 Years (33.25%), 41-50 Years (11.49%), 51-60 years (2.50%), while the least age group was 61-65 Years (0.25%).

Out of 28811 blood units collected, 288 units tested positive for any of the TTI giving an overall positivity rate 0.93%. Of all the TTI, majority of the donors (218) were found to be positive for Hepatitis B 218 (0.73%), followed by HIV 33 (0.1%), Syphilis 19(0.06 %), Hepatitis C 12 (0.04%), and no case of malaria.

From our study we are seeing that prevalence of Hepatitis B though higher it is decreasing over the period of 3 years, whereas prevalence of HIV was similar over 3 years. Amongst all TTI prevalence of HCV was lowest & no case of malaria.

Table 1. Total Blood Donation Camps and Gender Distribution

Year	Number of camps	Total Collection	Males No. (%)	Females No. (%)
2019	206	12569	12245(97.4)	324 (2.6)
2020	137	8395	8239(98.1)	156 (1.9)
2021	160	8525	8327(97.7)	198(2.3)
Total	503	29489	28811(97.7)	678(2.3)

Year	Total Donors	HIV No. (%)	HBV No. (%)	HCV No. (%)	Syphilis No. (%)	MP No. (%)
2019	12569	15 (0.11)	96 (0.76)	01 (0.007)	02 (0.01)	0 (0)
2020	8395	07 (0.08)	66 (0.78)	05 (0.05)	08 (0.09)	0 (0)
2021	8525	11 (0.12)	56 (0.65)	06 (0.07)	09 (0.1)	0 (0)
Total	29489	33 (0.11)	218 (0.74)	12 (0.04)	19 (0.06)	0 (0)

Table 2. Prevalence of HIV, HBV, HCV, VDRL and Malaria Infections Among Blood Donors Over a Period of 3 Years (2019-2021)

Age	HIV	HBsAg	HCV	VDRL	MP
18-27 Years	09	25	03	02	0
28-37 Years	13	85	05	07	0
38-47 Years	11	94	02	08	0
48-57 Years	0	12	01	02	0
≥ 58Years	0	2	01	0	0
Total	33	218	12	19	0

Table 3. Demographic Characteristics of TTI Positive Cases

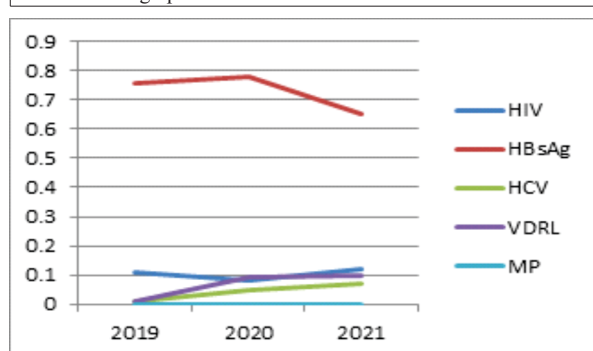


Figure 1. Trends of Transfusion Transmitted Infections in Last Three Years

DISCUSSION

Blood transfusion is an integral and life-saving procedure of modern medicine, but simultaneously it carries the risk of transmitting the life-threatening transfusion transmissible infections. HIV, hepatitis B, and hepatitis C are major public health problems in developing countries. They are transmitted parenterally, vertically, or through high-risk

sexual behaviors and can cause fatal acute and chronic life-threatening disorders. Blood transfusion is a potential route of transmission of these TTIs. Screening of blood is now mandatory for many diseases and is undertaken routinely in blood banks. Transmission of TTIs during the serologically window period still poses a threat to blood safety in environments where there is high rate of TTIs. HBV and HCV are the two established causes of post transfusion hepatitis. The prevalence of TTIs among the Indian blood donors is reported to be ranging as follows; HBV – 0.66% to 12%, HCV – 0.5% to 1.5%, HIV – 0.084% to 3.87%, and syphilis – 0.85% to 3% respectively.⁹

In our present study we found that majority (97.7%) of donors were males (Table no. 1) which is in accordance to the studies done by Suresh B et al (97.1%),¹⁰ Yadav et al (98.38%),¹¹ Pahuja et al.¹² Low number of female donors may be explained due to the high incidence of anaemia especially in the reproductive age and hence are likely to be rejected during screening. We have seen majority of the donors were in the age group of 21-30 years which is more or less similar to the study done by Ahmed et al¹³ who found that the majority of donors (69.8%) were in the age group of 18-30 years followed by 31-45 years.

Majority of the TTI positive donor are in the age group of 38 to 47 (40.00%) years followed by 28 to 37 years age group (39.00%). (Table no. 3). This findings are similar to studies done by Rajat M et al¹⁴. Hepatitis B positive donors were mainly in the age group of 38-47 years and HIV positive donors were in the 28-37 years, Syphilis was tested positive mostly in the age group of 38 to 47 years. HCV was positive mostly in the age group of 18 to 27 years. (Table no. 3). According to Suresh B et al, (10) prevalence of TTI more in the younger group than in the older age group constituting 52.6% (21-30 years), and 0.8% in donors of 51-60 years. Dobariya et al¹⁵ found that most common age group to be sero reactive is 21-30 years of age (43.09% of total) which is not similar to our study which may be due to the higher prevalence of HBV in the age group of 38-47 years.

In our present study we have found that prevalence of TTI to be 0.93% which is lower as compare to the study done by Yadav et al (2.05%),¹¹ Babu S et al (3.5%).¹⁰ TTI sero reactivity was found exclusively among male donors only.

In our study, the overall prevalence of HIV, HBsAg, HCV syphilis and malaria were 0.10, 0.73, 0.04, 0.06, 0.0% respectively. (Table no. 2). According to the study by Pallavi et al³, overall prevalence of HIV, HBsAg, HCV and syphilis were 0.44, 1.27, 0.23 and 0.28%, respectively. No blood donor tested showed positivity for malarial parasite. 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 the Indian scenario.³

In our study, we have seen highest prevalence of HBsAg followed by HIV, Syphilis (Table no. 2) which is similar with most of the studies done by Pahuja et al, Arora et al, Chandra T, Bhattacharya P et al, Fernandes et al where they have found HBsAg to be the most prevalent TTI.^{1,12,16,17,18} Gupta et al has found the HCV positivity about 1.09%, highest of the TTI.¹⁹ In our study we have found a decreasing trend for Hepatitis B whereas HIV infection, Hepatitis C and Syphilis positivity has been more or less same.

CONCLUSION

Our present study shows overall prevalence of TTI is 0.93 %, with HIV (0.10%), HBsAg (0.73%), HCV (0.04%) and syphilis (0.06%) with no case of malaria. Stringent donor selection criteria and vigorous screening procedures can improve the blood safety and reduce the seroprevalence. Availability of safe blood for transfusion is a must for the recipients and the community as well. It may be possible through proper donor selection and education, uniform implementation of laboratory screening tests, and adequate supply of blood through voluntary blood donations along with restriction of donation by professional donors. More and more voluntary blood donors are needed which can be done by public awareness programmes, blood donation camps, restriction of donation by professional donors. With the advent of nucleic acid amplification techniques (NAT), western countries have decreased the risk of TTI to a major extent. But the cost-effectiveness of NAT is poor. The NAT has added benefits, but its high financial cost is of concern, especially in underdeveloped countries like India. Sexually transmitted infections

are widespread in developing countries and constitute a major public health problem. Proper counselling prior to blood donation, brief medical examination of blood donors and awareness about TTI among blood donors may increase the safety of blood as well as community.

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