

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 DURGAPUR

Rajat Mondal¹, Sananda Koley², Isha Aggarwal³, Nikhil Kumar⁴

¹Assistant Professor, Department of Pathology, IQ City Medical College and Hospital, Durgapur, West Bengal.

²Associate Professor, Department of Pathology, IQ City Medical College and Hospital, Durgapur, West Bengal.

³Assistant Professor, Department of Pathology, IQ City Medical College and Hospital, Durgapur, West Bengal.

⁴Assistant Professor, Department of Pathology, IQ City Medical College and Hospital, Durgapur, West Bengal.

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 and replacement 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 April 2015 to March 2018. 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 2%, with majority of replacement donors. In our study we found the overall prevalence of HIV, HBV, HCV and Syphilis were 0.14, 0.45, 0.66, 0.72% respectively with a solitary 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. Increasing prevalence of syphilis in our area shows that sexually transmitted infections are widespread in developing countries and constitute a major public health problem.

KEYWORDS

TTI, Seroprevalence, Voluntary Donors, Replacement Donors, Blood Bank, Syphilis.

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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

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Corresponding Author:

Dr. Sananda Koley,

Associate Professor, Department of Pathology,

IQ City Medical College and Hospital, Durgapur,

Sovapur, Bijra Road,

Durgapur- 713206, West Bengal.

E-mail: drsanandakoley84@gmail.com

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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 1.2 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 may be alarming

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 and replacement donors.

Aims and Objectives

- To study the seroprevalence of transfusion transmitted infections amongst voluntary as well as replacement blood donors at Blood Bank 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 bank of a tertiary care hospital in West Bengal, India. The study was carried on for a period of 3 years from April, 2015 to March, 2018. All the voluntary and replacement donors attending the blood bank were included in the study. Total 7081 (6961 male and 120 female) blood donors were included in our study over a period of 3 years.

Tests Performed

1. HIV (Human Immunodeficiency Virus) (VITROS ECI Immunodiagnostic system, electro chemiluminescence)
2. HBV (Hepatitis B Virus) (VITROS ECI Immunodiagnostic system, electro-chemiluminescence)
3. HCV (Hepatitis C Virus) (VITROS ECI Immunodiagnostic system, electrochemiluminescence)
4. Syphilis Syphichack- WB Modified TPHA (Zephyr bio medicals, tulip diagnostics)
5. 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) in the VITROS ECI machine (Orthoclinical diagnostics) 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 7081 blood donors, 6961 (98.3%) were males and 120 (1.7%) 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 204 (7.26%), 31-40 Years 934 (33.25%), 41-50 Years 323 (11.49%), 51-60 Years 70 (2.50%), while the least age group was 61-65 Years 7 (0.25%). Only 3.7% were voluntary donors and 96.3% were replacement donors.

Out of 7081 blood units collected, 141 units tested positive for any of the TTI giving an overall positivity rate 2%. One co-infection (HBV & HCV) was reported during this study period. Another case of both HIV-I& HIV-II positivity was seen. Of all the TTI, majority of the donors (51) were found to be positive for Syphilis (36.2%), followed by hepatitis C 47 (33.3%), Hepatitis B 32 (22.7%), HIV 10 (7.1%) and a solitary case of malaria (0.7%).

From our study we are seeing that prevalence of Hepatitis B has significantly increased over the period of 3 years, whereas prevalence of syphilis was highest in 2016. HIV is showing a decreasing trend.

Among the total TTI positive donors, 2.83% are voluntary and 97.16% are replacement donors respectively.

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 (98.3%) 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 (36.87%) years followed by 28 to 37 years age group (35.46%). (Table no. 4). 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 whereas Hepatitis B & HIV positive donors were mainly in the age group of 28-37 years. (Table no. 4). 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 al¹⁴ 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 syphilis in the age group of 38-47 years.

In our present study we have found that prevalence of TTI to be 2% which is similar to the study done by Yadav et al (2.05%),¹¹ but low compared to the study by Babu S et al (3.5%).¹⁰

TTI sero reactivity was found exclusively among male donors only.

Voluntary Donors (VD) are motivated blood donors who donates blood at regular intervals and replacement donors (RD) are usually one time blood donors who donates blood only when a relative is in need of blood.¹⁵

Pallavi et al³ has found that 64.78% were voluntary and 35.22% replacement donors and majority of the replacement donors were male whereas in our study we have got only 3.7% of voluntary donors. This is in accordance with the study by Kakkar et al. (94.7%),¹⁶ Pahuja et al. (99.48%)¹² and Yadav et al. (92%).¹¹

It is shown that replacement donors constitute the largest group of blood donors in India,¹⁷ reflecting the lack of awareness amongst the general population.

In our study we have found TTI positivity mostly in the replacement donors and only 4 (1-HBsAg, 2-hcv, 1-Syphilis) out of 141 TTI positive donors were voluntary donors.

Chandra et al¹⁸ have found almost negligible infectivity rate in VD and also no VD was found to be positive for HIV by Arora D et al.¹⁹ People are unlikely to become VD's unless they receive accurate information about blood donation for which voluntary blood donation camps have to be encouraged.¹⁹

In our study, the overall prevalence of HIV, HBsAg, HCV and syphilis were 0.14, 0.45, 0.66, 0.72% respectively with a solitary case of malaria. (Table no. 2). According to the study by Pallavi et al, 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 whereas. 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 found syphilis to be the most prevalent TTI which is in accordance with the study done by Shah R & Dholakia A et al where they have found the highest TPHA positivity (1.65%).²⁰ Kumar A et al²¹ in their study of changing trends of syphilis among blood donors of Bastar for a period of 3 years (2011-13) have found highest prevalence of syphilis (1.05%) among the blood donors and they also showed increased prevalence among replacement donors with a rising trend. Bhattacharya P et al has found syphilis positivity of 0.72% which is almost similar to our study.²²

In our study, we have seen highest prevalence of Syphilis followed by HCV, HBsAg (Table no. 2) which is in contrast 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.^{1,12,18,19,22} Gupta et al has found the HCV positivity about 1.09%, highest of the TTI.²³

In our study we have found a rising trend of Hepatitis B infection whereas decreasing trend is noticed for Hepatitis C and HIV infection. Syphilis positivity has been more or less same.

Year	Total Collection	Voluntary Donors No. (%)	Replacement Donors No. (%)	Males No. (%)	Females No. (%)
2015-16	1436	23 (1.6)	1413 (98.4)	1423 (99.1)	13 (0.9)
2016-17	2392	39 (1.6)	2353 (98.4)	2352 (98.3)	40 (1.7)
2017-18	3253	199 (6.1)	3054 (93.9)	3186 (97.9)	67 (2.1)
Total	7081	261 (3.7)	6820 (96.3)	6961 (98.3)	120 (1.7)

Table 1. Total Blood Donor Types and Gender Distribution

Year	Total Donors	HIV No. (%)	HBV No. (%)	HCV No. (%)	Syphilis No. (%)	MP No. (%)
2015-16	1436	02 (0.14)	02 (0.14)	16 (1.11)	10 (0.69)	0 (0)
2016-17	2392	06 (0.25)	12 (0.50)	14 (0.58)	22 (0.92)	0 (0)
2017-18	3253	02 (0.06)	18 (0.55)	17 (0.52)	19 (0.58)	01 (0.03)
Total	7081	10 (0.14)	32 (0.45)	47 (0.66)	51 (0.72)	01 (0.01)

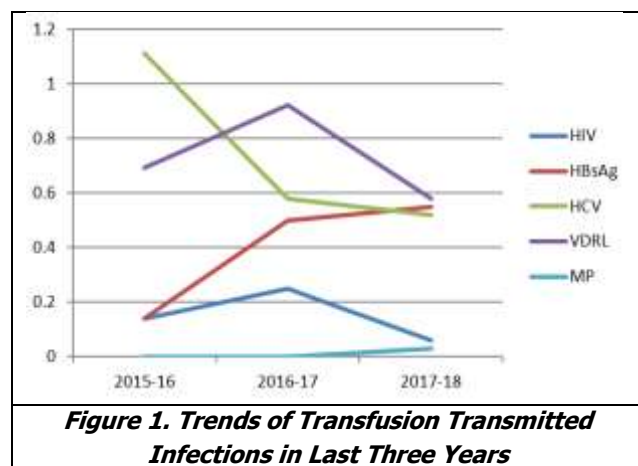
Table 2. Prevalence of HIV, HBV, HCV, VDRL and Malaria Infections Among Blood Donors Over a Period of 3 Years (2015-18)

Year	HIV		HBV		HCV		SYPHILIS		MP	
	V	R	V	R	V	R	V	R	V	R
	No. (%)		No. (%)		No. (%)		No. (%)		No. (%)	
2015-16	0 (0)	2 (0.1)	0 (0)	2 (0.1)	1 (4.3)	15 (1.1)	0 (0)	10 (0.7)	0 (0)	0 (0)
2016-17	0 (0)	6 (0.2)	0 (0)	12 (0.5)	0 (0)	14 (0.6)	0 (0)	22 (0.9)	0 (0)	0 (0)
2017-18	0 (0)	2 (0.1)	1 (0.5)	17 (0.5)	1 (0.5)	16 (0.5)	1 (0.5)	18 (0.6)	0	1 (0.03)
AVERAGE	0	0.1	0.2	0.4	1.6	0.7	0.2	0.7	0	0.01

Table 3. Incidence of TTI Amongst Voluntary and Replacement Donors During 3 Years

Age	HIV	HBsAg	HCV	VDRL	MP
18-27 Years	03	07	19	01	0
28-37 Years	07	13	16	14	0
38-47 Years	0	09	10	32	01
48-57 Years	0	03	02	04	0
≥ 58Years	0	0	0	0	0
Total	10	32	47	51	01

Table 4. Demographic Characteristics of TTI Positive Cases



CONCLUSION

Our present study shows overall prevalence of TTI is 2%, with HIV (0.14%), HBsAg (0.45%), HCV (0.66%) and syphilis (0.72%) with a solitary 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. Majority of the TTI were found in replacement donors only. 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. Increasing prevalence of syphilis among the donors underscores the concern about growing infection of this disease in the community as these blood donors represent the highly selective community. Proper counselling prior to blood donation, brief medical examination of blood donors and awareness about syphilis among blood donors may increase the safety of blood as well as community.

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