

Original article:

**RETROSPECTIVE STUDY OF SEROPREVALENCE OF TRANSFUSION TRANSMISSIBLE
INFECTIONS AMONG BLOOD DONORS IN A TERTIARY CARE CENTRE IN THANE DISTRICT OF
MAHARASHTRA**

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Abstract

Background:

Blood transfusion is an integral part of health care as well as one of the life saving procedure. But it carries risk of certain infections, especially viral, known as transfusion transmissible infections (TTIs).

Aim:

To study seroprevalence of TTIs (HIV, HBsAg, HCV, and syphilis & malaria) in a tertiary care centre in Thane district of Maharashtra.

Study design: Hospital based retrospective observational study

Methodology:

The retrospective study was conducted by accumulating and analysing the data regarding TTIs from blood bank records. Total 20270 blood units were collected in 10 years period from January 2010 to December 2019. All blood units were screened by respective immunological methods.

Results:

On analysis of the data of all screened blood units, it was observed that 89 tested positive for HIV (0.44%), 463 were positive for HBsAg (2.28 %) & 115 were positive for HCV (0.56%). The seroprevalence for syphilis and malaria was 0.07% & 0.02% respectively. The overall

seropositivity was 3.39%. The HBsAg seroprevalence was the highest among the blood donors.

Conclusion: In order to avoid wastage of blood units, application of strict criteria for selection and deferral of donors with emphasis on TTIs along with mandatory Nucleic Acid Test (NAT) for screening of TTIs is required.

Keywords: Blood donors, Blood transfusions, Transfusion Transmissible Infections,

Introduction:

Millions of lives are saved globally by blood transfusion which forms an integral part of medical & surgical management¹. But, It is estimated that there is 1% risk of transfusion associated complications including Transfusion Transmissible Infections (TTIs) like Hepatitis B & C, HIV, Syphilis, Malaria & rarely EBV and CMV^{2,3}. As per recommendations of WHO, all donated blood units should be screened before use.

Out of >300 million global HBV infected population, maximum belongs to Asian population around 75%⁴. In India, National average for HBV prevalence & HIV prevalence in the healthy donors is around 4.7% & 0.3% respectively⁵. The global prevalence of HCV is around 2% as compared to 1.8% to 2.5% in India⁶.

These TTIs carry many serious consequences like cirrhosis & cancer of liver and immunodeficiency which ultimately becomes a financial burden to government. Thus WHO has made screening of donor units for TTIs like HIV, HBV, HCV, syphilis and malaria.

This study aims to estimate the prevalence of these TTIs in the donated blood and to study trends of prevalence of these infections.

Material & Methods:

The present study is a retrospective study conducted in a tertiary care centre at Thane, Maharashtra over a period of 10 years from January 2010 to December 2019.

The blood was collected from the healthy donors from blood camps and from healthy replacement donors. All demographic information, i.e. Name, Age, Sex, Date of Birth, Address, Contact Number & last date of blood donation, was collected. Blood

donors were selected using selection & deferral criteria. After taking informed consent from donor, the blood is collected using aseptic precaution. Each blood was give unique identification number.

In a period of 10 years, total 20270 blood units were collected. All units were screened for TTIs, i.e. HIV, HBV , HCV , Syphilis & Malaria. For HIV, HBV & HCV, ELISA test was used. For Syphilis & malaria, Rapid Plasma Reagin (RPR) test & malaria antigen card test were used. Data regarding TTIs was accumulated, tabulated and analysed from the records of blood bank using Microsoft Office Excel 2007 worksheet.

Results:

Table 1: Total number of donors

Year of collection	Total number of donors
2010	1909
2011	1788
2012	1780
2013	1617
2014	1751
2015	2055
2016	1881

2017	2212
2018	2971
2019	2306
Total	20270

In the present study, total 20270 blood units were collected. There is steady overall increase in the trend from year 2016.

Table 2: Sex-wise distribution of blood donors.

Year of collection	Total number of donors	Male donors	Female donors
2010	1909	1787	122
2011	1788	1618	170
2012	1780	1686	94
2013	1617	1509	108
2014	1751	1617	134
2015	2055	1921	134
2016	1881	1763	118
2017	2212	2149	63
2018	2971	2717	254

2019	2306	2230	76
Total	20270	18997(93.7%)	1273(6.3%)

From table 2 , it is observed that, 18997 (93.7%) were male donors & 1273(6.3%) were female donors.

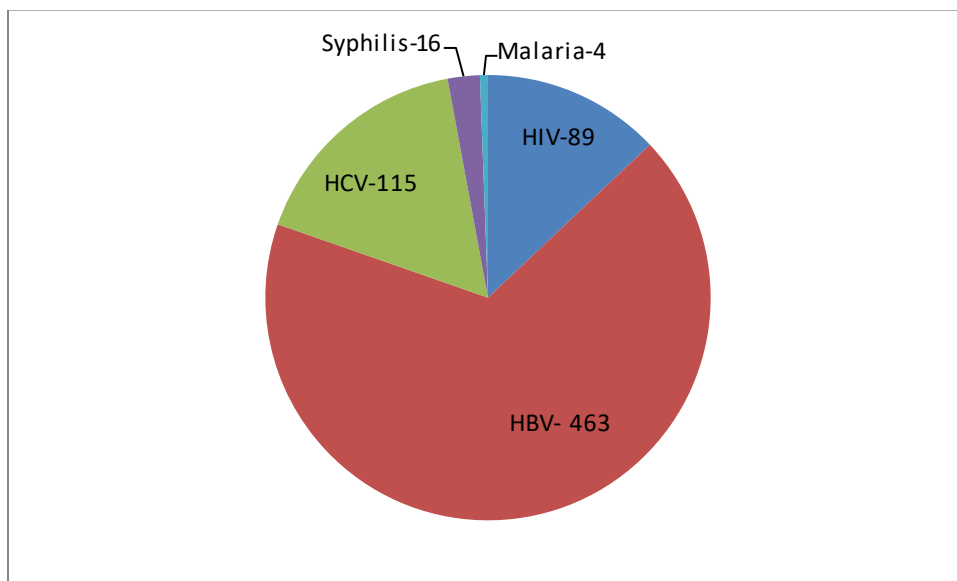
Table 3: Year- wise seropositivity & percentage

Year	HIV No(%)	HBV No (%)	HCV No (%)	Syphilis No (%)	Malaria No (%)	Total seropositivity (%)
2010	9 (0.49)	61(3.19)	5(0.26)	2(0.1)	0	4.3
2011	3(0.16)	41(2.29)	6 (0.36)	0	0	2.8
2012	6 (0.33)	45 (2.52)	8 (0.45)	1(0.06)	0	3.37
2013	4 (0.25)	38(2.35)	6 (0.37)	0	0	2.97
2014	17 (0.97)	32(1.83)	25 (1.43)	2 (0.11)	1(0.06)	4.39
2015	17(0.83)	59 (2.87)	11(0.53)	2(0.10)	0	4.33
2016	5(0.27)	39 (2.07)	6(0.32)	1(0.05)	1(0.05)	2.76
2017	7(0.32)	40(1.81)	5(0.23)	1 (0.4)	0	2.39
2018	16(0.54)	56(1.85)	18(0.61)	4(0.13)	2 (0.07)	3.23

2019	5(0.22)	52(2.25)	25 (1.08)	3 (0.13)	0	3.69
Total	89(0.44)	463(2.28)	115(0.56)	16(0.07)	4(0.02)	3.39%

As per table 3 and Figure 1, Total seropositivity for all TTIs is 3.39%. The seroprevalence for HBV is highest (2.28%) among all TTIs. There is overall increase in prevalence of HCV infection from 2010 to 2019 except for year 2014.

Figure 1: Number of TTIs in blood units over 10 years



Discussion:

Though blood transfusion is a life saving procedure, it is associated with long term morbidity and mortality due to infectious agents like HIV, HBV and HCV. For HIV blood collected in window period is still infectious despite antibody tests⁷. More sensitive test like Nucleic Acid Test (NAT) should be made mandatory by the government. But major barriers in implementing NAT testing in India is high cost and lack of technical expertise in majority

of blood banks. The government must provide adequate resources to all government blood banks for NAT testing.

There is 1% risk of transfusion associated complications including TTIs³. This study has not included the follow up of blood transfused patients for estimating the risk of complications including the TTIs.

In present study, 98% of total donors were males which is comparable to the study done by Rao et al in Pune⁸, Rose et al in Vellore⁹, Archana bombade et al¹⁰ in Aurangabad, Maharashtra. Majority of females were rejected due to anemia.

Knowing the seroprevalence of TTIs will help to form an integrated strategy for safe blood and blood product transfusion. Many studies have reported overall seroprevalence of TTIs is ranging from 1.35% to 5.8%^{11,12,13,14}. In present study, it was 3.39% which is within the range.

We found 0.44% HIV seroprevalence which is comparable to study done by Gagandeep Kaur et al¹⁵, Dimple Arora et al¹⁶ and Sujata Kumbhar et al¹⁷ as seen in table 4. There are few studies which reported prevalence of HCV 1.0% and 0.8%^{15,16}. In our study, this prevalence was 0.56% which low. For unknown reasons, there is increase in prevalence of HCV infection (1.43%) in Year 2014.

The prevalence of HBV infection was found to be higher (2.28%) as compared to other studies which reported a range of 1.55% to 1.72%. Thane (Maharashtra) is newly developing city with many migrations from village for jobs which can lead to high risk sexual activities in the migrants. This can be a reason for high prevalence of HBV infection.

The seroprevalence of syphilis was found to be 0.07% which is lowest as compared to other seroprevalence studies ^{16, 17}. Gauravi Dhruva et al¹⁸ reported 0.037 % malarial prevalence which is 0.02% in the present study.

Table 4: Comparison of seroprevalence in the similar studies

Studies	HIV	HBV	HCV	VDRL
Sujata Kumbhar et al ¹⁷	0.3%	1.55%	0.08%	0.02%
Gagandeep Kaur et al ¹⁵	0.6%	1.7%	0.8%	-
Dimple Arora et al ¹⁶	0.3%	1.7%	1.0%	0.09%
Present study	0.44%	2.28%	0.56%	0.07%

In our study, the seroprevalence of HBV was found to be highest (2.28%) followed by HCV (0.56%). This prevalence can be reduced by implementing stringent donor selection criteria & taking proper history to rule out TTIs in resource limited institutions like ours. Repeated focused training of the counsellors, who select the donors, & sensitisation among them to adhere to strict donor criteria can reduce prevalence of TTIs. Promotion of voluntary blood donation, self- deferral in high risk donors, health education, counselling of donors and mandatory NAT testing for screening in blood bank can avoid TTIs. Ultimately, all these will prevent the wastage of blood, time, manpower & money.

Conclusion:

The blood and blood product safety can be ensured by adhering to the donor selection criteria. The implementation of NAT to detect infections in latent period is highly recommended along with donors and counsellors sensitisation regarding TTIs.

Conflict of interest: Nil

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