

# “Seroprevalence of Transfusion-Transmitted Infections in Donors”

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## ABSTRACT

### Background

Transfusion-transmitted infections threaten the safety of patients who require a blood transfusion, which in turn imposes serious challenges for the availability of safe blood products that are still affordable in healthcare systems with limited resources.

### Aim of the study

The aim of the study was to determine the seroprevalence of transfusion-transmitted infections in blood donors at TMU Blood Bank and assess the level of safety.

### Method

A laboratory-based descriptive, cross-sectional study was conducted from June 2022 to Dec 2022. A qualitative study was carried out to assess serological analysis of replacement and voluntary donors at TMU Blood Bank. The total number of donors screened during this period was 776. The donors were requested to fill out a detailed questionnaire and were screened for HIV, HBV, HCV, and Syphilis with a rapid immunochromatographic kit. The results were expressed in tables and figures.

### Results

Out of 776 donors, 676(98.7%) were replacement and only 10(1.29%) were voluntary donors. Male donors were predominant constituting 676(87.12%) and only 100 (12.88%) female donors. The seroprevalence of TTIs in the present study was 1.42%. Syphilis (0.77%) was the most prevalent TTI followed by HBV (0.51%). A low prevalence of HCV (0.13%) was found and HIV was not detected in any donors in the present study. The highest prevalence of TTIs was observed in the young age group of 18-25 years followed by 26-40 years.

**Keywords:** Transfusion, Infections, Blood, Donor, Transmission.

## INTRODUCTION

### General Background

Every year more than 90 million units of blood collected worldwide [1]. Transfusion of blood and its components is the life-saving as well as it has life threatening hazards. With every unit of blood there is a 1% chance of transfusion associated problems including transfusion associated diseases [2, 3]. According to the World Health Organization (WHO), safe blood is a universal right, which means that blood will not cause any harm to the recipient and that has been fully screened and is not contaminated by any blood borne diseases such as HIV, hepatitis, malaria and syphilis. Blood donation saves the lives of millions of people worldwide; however, the patients are at potential risks of contacting transfusion transmitted infections (TTIs) which in turn impose serious challenge to the medical provider for the availability of safe and affordable blood products [4].

Morbidity and mortality associated with TTIs reveal long-term effects on the recipients, their families, along with the community. The majority of the problems are due to prevalence of asymptomatic carriers in society

as well as blood donation during the window period of infection. Apparently healthy donor can transmit an infection during asymptomatic phase, further increasing the prevalence of various infections in general populations [4-6].

Transfusion transmitted infections are a great concern of safety for patients. In different countries the magnitude of the TTIs varies from different number of populations [7]. The accurate figures of TTIs in our population are still unknown due to the lack of understanding, unavailability of screening tests, limited access to health facilities and the unavailability of surveillance systems [8]. Accurate estimates of risks of TTIs are essential for monitoring the blood supply and evaluating the efficacy of the currently employed screening procedure [5].

Many diseases are transmitted through the blood transfusion. Among them the important virus transmitted through blood are human immune-deficiency virus (HIV I/II), hepatitis-B virus (HBV), hepatitis-C virus (HCV), Syphilis infection by Spirochetes, and the transfusion associated malarial infection [7].

The blood transfusion service is an integral and indispensable part of health care system. The priority objective of blood transfusion service is to ensure safety, adequacy, accessibility, and efficiency of blood supply at all levels [9]. Measuring their severity, WHO has recommended pre-transfusion blood test for HIV, HBV, HCV, Syphilis and Malaria as mandatory [10]. HIV seroprevalence among blood donors in different regions of UP has been reported to range from 0.019% to 0.42% [11-14]. HBV seroprevalence has been reported to range from 0.3 to 0.4% in the general population of India by various studies conducted from 1990 to 2003 [15-20]. HBsAg seroprevalence among Indian blood donors has been reported to range from 0.45 to 1.26 [11, 21-24]. HCV seroprevalence among Indian blood donors has been reported to range from 0.1 to 1.7% [11, 17-19, 23, 25-28]. Seroprevalence for Syphilis among Indian male donors has been reported as 0.6% but no actual total prevalence of Syphilis was reported in India [15]. The Prevalence of TTIs can reveal the problem of unnoticeable infections in healthy-looking members of the general population and the provided data is important in formulating the strategies for improving the management of a safe blood supply [29].

## **Statement of The Problem**

Transfusion transmitted infections is still a major concern to patients, physicians and policy makers who wish to see a risk-free blood supply. Unsafe blood remains a major threat for the global spreads of TTIs. This study is conducted to screen, monitor and control transfusion related infectious diseases among blood donors of CMC but the study does not represent the general population of the community.

## **Rationale**

Several studies have been carried out on the transfusion transmitted infections among donors around the world. Evaluation of data on the incidence of TTIs among blood donors permits an assessment of the accurate estimation of risk of TTIs, which helps in formulation of long terms strategies to improve public health and prevent spread of disease in local population. The main aim of the present study was to find out the prevalence of transfusion transmitted infection in voluntary and replacement donors in Blood banks associated with our hospital set up. Hence, the present study will help to reduce the seroprevalence of TTIs and will aid in evaluating the safe transfusion of the donated blood.

## **Objectives of the Study**

### **General Objective**

To determine the seroprevalence of transfusion-transmitted infections in donors in the blood bank of TMU.

## **Specific Objectives**

To develop and implement 100% efficiency of screening among blood donors.

Implement quality systems in all aspects of blood screening.

## **Research Questions**

- What was the prevalence of transfusion-transmitted infections in donors attending TMU Blood Bank?

## **Limitations of The Study**

According to WHO, malarial test is also mandatory for pre-screening in blood donors along with HIV, HBV, HCV and Syphilis. However, Indian Red Cross Society does not include malarial test in pre-screening of donors. Hence, malarial test was not performed in any donors who donated blood in the blood bank of TMU Blood Bank. Thus, the present study did not include malarial infection.

Response from the donor's during questionnaire was not always good and could not be verified. None of the donors in blood bank responded positively to any of the risk factors. It is likely that risky behaviours of these blood donors were purposely denied to hide it from family and friends who had approached the donor on behalf of a sick relative requiring transfusion. Such pressure would not be there for voluntary non remunerated blood donors. It is important to point out that the results obtained in this study do not reflect the prevalence of transfusion-transmissible infections in the unselected general population because blood donors are a pre-selected group who donated blood in a single institution and all of them are within the sexually active age group.

## **METHODS**

### **Study Design**

The present was a laboratory-based descriptive cross-sectional study. A qualitative study was carried out to access serological analysis of replacement and voluntary donors at TMU Blood Bank. The study site was Blood Bank and the study population included were all replacement and voluntary donors. The samples were collected from June 2022 to December 2022.

### **Eligibility for donation:**

If you meet the requirements for donating blood, you probably can give platelets, Apheresis donors must; • Be at least 18 years old • Be in good health • Weigh at least 110 pounds. Donor selection Accept only voluntary non-remunerated blood donors if the following criteria are fulfilled. The interval between blood donations should be no less than three months for male donors and no less than six months for female donors. The donor should be in good health, mentally alert, and physically fit and should not be a jail inmate or a person having multiple sex partners, or a drug addict. [30]

### **Sampling Procedure**

A simple random sampling method was carried out for this study.

### **Data Collection Tool and Technique**

Data collection tools: Qualitative

## Ethical Consideration

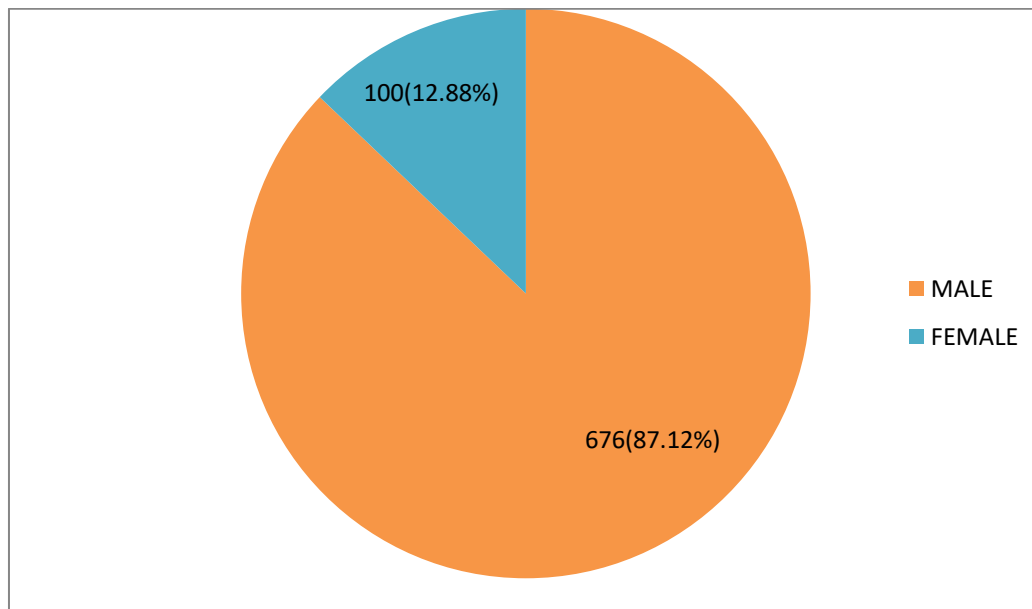
The study was conducted in accordance with existing ethical guidelines. Ethical clearance was sought from TMU Institutional Review Committee (TMU-IRC). Written informed consent was requested from the donor's parents/guardians for participation in the study. Information about the study was given to the participants to ensure that they have the information needed to make an informed consent. A complete description of the aims of the study and assurance of confidentiality for any information was given to all donors who were potential study participants. Appropriate counseling and assurance of confidentiality were given to participants with worries and anxiety about the study.

## RESULTS

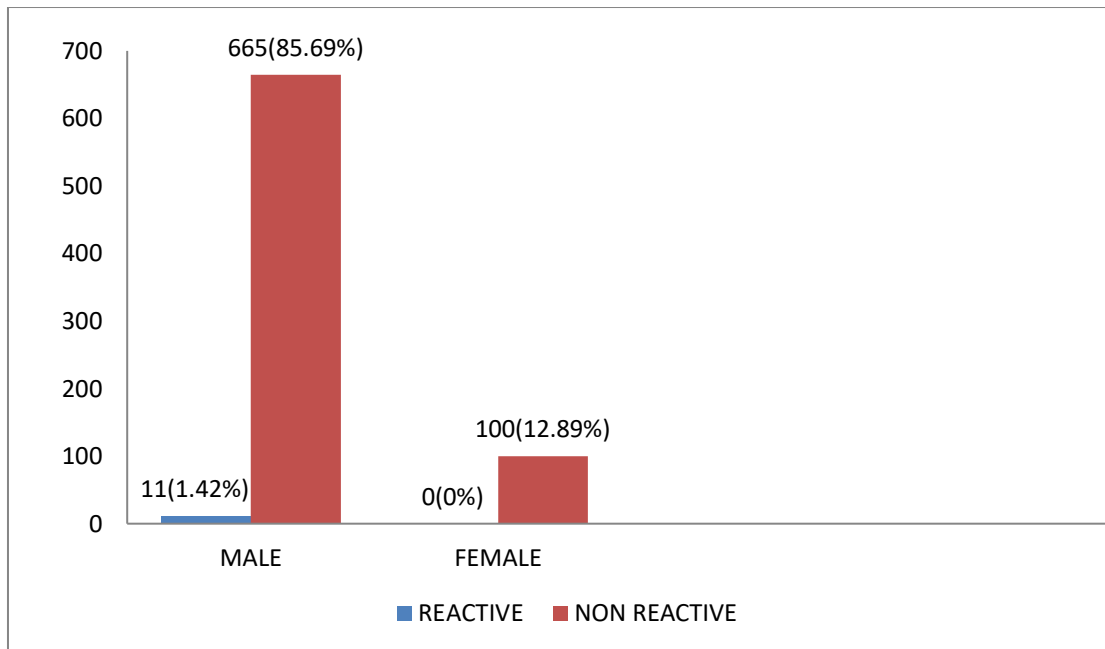
The chapter deals with the analysis and interpretation of the findings of the study. The descriptive, cross-sectional study was conducted from January to July 2017 in TMU Blood Bank. The collected data were analysed and presented in the different figures and tables.

### Results

A total of 776 donors (replacement and voluntary) donated blood in Blood Bank of TMU within a study duration of 6 months. Among them, 676 (87.12%) were males and 100 (12.88%) were females [Figure 1]. Out of 776 blood bag samples, 11 (1.42%) blood bag samples were reactive and all were male donors whereas 765 (98.58%) were non-reactive. None of the female donors were reactive in the present study [Figure 2].



**Figure 1: Gender wise distribution of blood donors**



**Figure 2: Gender wise distribution of seroprevalence of TTIs**

In our study, most of the donors (378) were young age of 18-25years old while 337 donors were in age group of 26-40 years and only 61 donors were above 40 years. Among young age group sero-reactivity for HBV and HCV was detected in 1 donor each and Syphilis in 4 donors. In age group of 26-40 years, only 3 HBV reactive donors were found and sero-reactivity for Syphilis was screened in 2 donors in age group of 41-55 years [Table 1].

**Table 1: Age-wise distribution of seropositive HIV, HBV, HCV, and Syphilis among total blood donors**

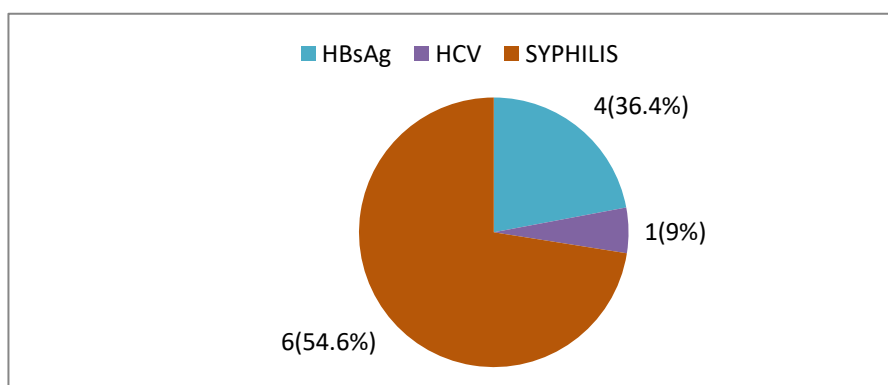
Age group (Years)	Total no. of donors	HIV	HBV	HCV	Syphilis	No. of seropositive donors	%
18-25	378	0	1	1	4	6	0.77
26-40	337	0	3	0	0	3	0.39
>40	61	0	0	0	2	2	0.26
Total	776	0	4	1	6	11	1.42

The seroprevalence of Syphilis is the highest (0.77%) followed by HBV (0.51%). HCV is reactive in 0.13 % of donors. However, HIV reactivity was not found in any donors in our study [Table 2].

**Table 2: Seroprevalence of TTIs**

<b>TTIs</b>	<b>Reactive n(%)</b>	<b>Non reactive n(%)</b>
HIV	0(0%)	776(100%)
HBV	4(0.51%)	772(99.49%)
HCV	1(0.13%)	775(99.87%)
Syphilis	6(0.77%)	770(99.23)
<b>Total n(%)</b>	<b>11(1.42%)</b>	<b>765(98.58%)</b>

Among total 11 seropositive blood bags for various TTIs, the commonest was Syphilis constituting 6(54.5%), whereas HBV and HCV constituted 4(36.4)% and 1(9%) % respectively [Figure 3].

**Figure 3 : Seropositive TTIs**

The present study had only 10 (1.29%) voluntary donors and the remaining all 766 (98.71%) were replacement donors. The overall sero-reactivity of TTIs (HIV, HBV, HCV and Syphilis) in this study was 1.42% (11/776) of which all were replacement donors [Table 3]

**Table 3: Seroreactivity among two types of donors**

<b>Seroreactivity</b>	<b>Type of donors</b>		<b>Total n(%)</b>
	<b>Voluntary n(%)</b>	<b>Replacement n(%)</b>	
Reactive	0(0%)	11(1.42%)	11(1.42%)
Non Reactive	10(1.29%)	755(97.29%)	765(98.58%)
<b>Total n(%)</b>	<b>10(1.29%)</b>	<b>766(98.71%)</b>	<b>776(100%)</b>

## CONCLUSION

The present study showed 1.42% of seroprevalence of transfusion transmitted infections among the apparently healthy donors. This reveals that there is the potential of transmitting these infections through transfusion. A strict and proper implementation of donor selection criteria with thorough history and

examination should be followed. Screening with highly sensitive and specific test kits can help to identify seropositive bags accurately. This may help to avoid of infectious through whole blood and blood products, especially in patients requiring repeated transfusion as a part of therapy.

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Conflicts of interest

**Conflict of Interest:** The authors declared no conflicts of interest.

Ethical approval

**Ethical approval:** Ethical clearance was sought from TMU Institutional Review Committee (TMU-IRC) Moradabad, (U.P) India.

**Author Contribution:** All authors contributed equally and significantly to this paper. All authors have read and approved the final version of the manuscript

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