

## Seroprevalence of Transfusion Transmitted Infections Amongst Blood Donors in Muzaffarnagar—A Study in a Tertiary Care Centre from Western Uttar Pradesh

Anu Jhanji<sup>1</sup>, Pradeep Sharma<sup>2</sup>, Meenakshi Tyagi<sup>3</sup>, Kamna Gupta<sup>4\*</sup>, Alok Mohan<sup>5</sup>, R.K. Thakral<sup>6</sup>

<sup>1</sup>Resident, Pathology, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India

<sup>2</sup>Associate Professor, Pathology, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India

<sup>3</sup>Associate Professor, Pathology, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India

<sup>4</sup>Associate Professor, Pathology, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India

<sup>5</sup>Professor, Pathology, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India

<sup>6</sup>Professor, Pathology, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India

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### Abstract

**Introduction** - A transfusion transmitted infection (TTI) is caused by virus, parasite or other pathogen and can be transmitted to a recipient via transfusion of the infected donated blood. TTI includes mainly Human Immunodeficiency Virus, Hepatitis B Virus, Hepatitis C Virus, Syphilis and Malaria. Blood transfusion is crucial component in the treatment of various diseases. Major concern is the asymptomatic stage in which infection can be transmitted to the recipient. To minimize this, Donor deferral criteria has been established and implemented. **Objective** - Objective of this study was to estimate the seroprevalence of TTI in the tertiary care hospital of western Uttar Pradesh. **Materials and Methods** – The present hospital based cross-sectional study was conducted in the Blood Bank, Department of Pathology, Muzaffarnagar Medical College, Muzaffarnagar from May 2019 to April 2020. During this period, 2887 blood units were screened. **Results** – Seroprevalence of HIV, HBV, HCV and Syphilis was observed to be 0.13%, 1.73%, 2.14% and 0.69% respectively. Seroprevalence for Malaria was nil as no donor was tested positive for Malaria. Majority of the donors were males forming male female ratio of 61.7 : 1 and belonged to the 2<sup>nd</sup> and 3<sup>rd</sup> decade. Seroprevalence of TTI was higher in replacement donors than the voluntary donors but this is not statistically significant. **Conclusion**- Screening of the blood products is essential to decrease the risk of TTI. Promotion of voluntary blood donation and discouragement of professional blood donation are also helpful.

**Keywords:** Transfusion, HIV, safe blood

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### Introduction

Blood is rare but a life saving asset. It is required to be transfused in few life – threatening circumstances but transfusion itself is associated with few side effects causing morbidity and mortality, causing economic burden over the nation. One main example of the side effects of blood transfusion is the risk of acquiring the transfusion transmitted infections (TTI) if the blood to be transfused is not screened properly[1]. That's why a secure and safe blood transfusion is essential to minimise the TTI which is a great challenge in transfusion medicine. Here are few fundamental steps which need to be done in order to render blood transfusion safe. These include proper donor selection, inclusion of various screening tests and pathogen inactivation procedures[2]. However, voluntary blood donation is most harmless and safest to transfuse[3]. In India, as stated in Drugs and Cosmetics Act (1st amendment) Rules 1992 and NACO (National AIDS Control Organisation) guidelines, it is mandatory to screen the blood and blood components for Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Syphilis and Malaria[4].

A person may be healthy carrier of any infection and if the blood or blood component of that person is transfused to anyone, it may further add to the pool of infection in population which indirectly lead to the economic burden over the country[4]. That's why proper screening of blood products is essential prior to any transfusion.

Present study was conducted to estimate the seroprevalence of the transfusion transmitted infections amongst blood donors in the region of western Uttar Pradesh so that the National guidelines for safe blood transfusion can be implemented strictly to this particular region of U.P.

#### Materials and Method

Present study was conducted in the Blood Bank of department of Pathology at Muzaffarnagar Medical College, Muzaffarnagar from May 2019 to April 2020. Institutional Ethics Committee of the present institution approved the study ( ECR/ 1318/Inst/up/2019). It was a hospital based cross-sectional study. A total of 2887 donors were enrolled in the study including voluntary and replacement donors. Donors were selected for phlebotomy according to the standard working strategy of the blood bank. Proper history and physical examination was done. Voluntary and replacement donors who were found healthy included in the study while ineligible donors as per the standard protocol were excluded from the study. Written informed consent was obtained from all the donors.

#### Sample collection

In a labelled pilot tube, 3.0 ml blood was collected from the tubing of a donor bag which was then centrifuged for 5 minutes at 2500 rpm to

\*Correspondence

**Dr. Kamna Gupta**

Associate Professor, Pathology, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India.

E-mail: [drkamnagupta09@gmail.com](mailto:drkamnagupta09@gmail.com)

acquire clear non-hemolysed serum. This serum was subjected to the testing of HIV, HBV, HCV, Syphilis and Malaria as per standard protocols. Testing for HIV, HBV and HCV was done by using an ELISA kit and semiautomated ELISA washer and reader. ELISA is a qualitative assay that is based upon the principal of Sandwich ELISA. For the testing of Syphilis, Rapid test strip were used. Rapid test strip is a qualitative membrane based immunoassay to detect Treponema pallidum antibodies (IgG and IgM) in whole blood, serum or plasma.

Rapid Malaria Ag card was used for testing Malaria. This test is based on the chromatographic immunoassay for the qualitative

determination of Malarial parasite in a blood sample. Data was collected and entered into Microsoft Excel and analysed using the Statistical Package for the Social Sciences (SPSS) software.

**Result**

In the study, total 2887 donor blood units were screened for HIV, HBV, HCV, Syphilis and Malaria. The donor age ranged from 18-60 years, majority of donors (2595) (89.9%) were in 2<sup>nd</sup> and 3<sup>rd</sup> decade of life forming 61.4% and 28.5% respectively. In 2887 donors, 2841 (98.4%) were males and only 46 (1.6%) were females forming male : female ratio 61.7 : 1. (Table 1)

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

Gender	Blood units screened (n)	Percentage (%)
Male	2841	98.4%
Female	46	1.6%
Total	2,887	100%

Out of 2887 blood donors, 2682 (92.9%) were replacement donors and the rest 205 (7.1%) were voluntary donors. (Table 2)

**Table 2: Categorization of blood donors**

Donor	Blood units screened (n)	Percentage (%)
Replacement	2,682	92.9%
Voluntary	205	7.1%
Total	2,887	100%

The prevalence rate of transfusion transmitted infections (TTI) was 4.71% as 136 units were tested seropositive out of 2887 screened blood units. Out of 136 seropositive units, 127 units (4.73%) were of

replacement donors while 09 units (4.4%) belonged to voluntary donors. (Table 3)

**Table 3: Seroprevalence of TTI in voluntary and replacement donors**

Type of donors	No. of donors		No. of seropositivity	
	(n)	(%)	(n)	(%)
Voluntary	205	7.1	09	4.4
Replacement	2682	92.9	127	4.73
Total	2,887	100	136	4.71

The seroprevalence for HIV, HBV, HCV and Syphilis was 0.13%, 1.73%, 2.14% and 0.69% respectively. (Table 4) Seroprevalence for Malaria was nil as none of the blood donor was tested positive for

Malaria. No case of co-infection was found out of 2887 blood units screened.

**Table 4: Seroprevalence of HIV, HBV, HCV and Syphilis in voluntary and replacement donors**

Donor	No.	HIV		HbsAg		HCV		Syphilis	
		(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Voluntary	09	00	(0%)	04	(1.95%)	04	(1.95%)	01	(0.48%)
Replacement	127	04	(0.15%)	46	(1.71%)	58	(2.16%)	19	(0.70%)
Total	136	04	(0.13%)	50	(1.73%)	62	(2.14%)	20	(0.69%)

**Discussion**

In the developed nations, the prevalence of transfusion transmitted infections (TTI) has been drastically decreased over a past few decades because of their effective preventive measures. But the scenario was not the same for the developing countries. In India, one important reason for this was that the National Policy for Blood Transfusion Services started very late[5].

In the present work, the percentage of replacement donors was 92.9%, on the contrary voluntary donors constituted only 7.1%. This is relatable with the study done by Srikrishna et al (98.5%), Kakkar et al (94.7%) and Dr. Anand Kumar Gurupadappa et al (91.6%)[1,3,6]. It is observed that the replacement donors are more as compared to voluntary; this may be due to the misconceptions and fear related to donate the blood. This indicates the need of health education and awareness programs in the health sector of this region. In this study, seroprevalence of HIV, HBV, HCV and Syphilis is 0.13%, 1.73%, 2.14% and 0.69% respectively. None of the blood unit was reported positive for Malaria. HIV is the greatest challenge confronted by the health sector worldwide. In the present work, HIV seroprevalence was 0.13% (4 cases). All the cases were found to be

replacement donors. None of the voluntary donor was affected. However, difference in seroprevalence between replacement and voluntary donors was not statistically significant. This was in concordance with the other study done by Kakkar et al, Dr Anand Kumar Gurupadappa et al and Sundaramoorthy et al [3,6,7]. No voluntary blood unit was detected seropositive for HIV in the present study. It suggests that better implementation programs are necessary to achieve 100 % voluntary donations. In India, presently WHO strategy 1 is followed for the screening of blood donors for HIV. According to this strategy, if the test is negative for HIV antibodies, blood unit is considered free of HIV and if the test is reactive then blood unit is discarded and the donors are directed to Voluntary Counselling and Testing Center (VCTC) for counselling. Same guidelines were followed by us.

In this study, 50 blood units (1.73%) were seropositive for HBV consisting of 46 replacement units (1.59%) and 04 (0.13%) were voluntary units respectively. This finding was similar to the study done by Srikrishna et al, Singh et al, Gupta et al and Arora et al which showed HBV seroprevalence 1.86 %, 1.80%, 1.86% and 1.70% respectively [1,8-10]. Post test counselling was given to

HbsAg positive donors. They were also guided for immunization and screening of family members.

Current study showed 2.14 % seroprevalence of HCV as 62 units out of 2887 blood units tested positive for HCV. Seroprevalence of HCV in replacement and voluntary donors was 2.16% and 1.96% respectively, however the difference was not statistically significant. The study of Srikrishna et al and Arora et al showed 1.0% and 1.02% seroprevalence of HCV respectively but findings similar to this study were observed in the study done by Manchanda GS et al and Kumar M et al [1,10,11,12]. Since the HCV seroprevalence among blood donors is high in this region of western U.P., this suggests the strong need for community based health education.

A constant reduction in the prevalence rate of Syphilis is observed in India. The study done in Chandigarh has shown a major reduction in Syphilis from 10.4% in 1977-1985 to 2.5% in 1995-1996 [13]. In the present work, Syphilis seroprevalence came to be 0.69% which was similar to the study done by Mandal R, Mondal K and Sonawane et al which showed 0.65% and 0.87% Syphilis seroprevalence respectively [14,15].

Malaria prevalence in blood donors is very less. No case of Malaria was found among the screened blood donors in this study. According to the study done by Srikrishna et al, not even a single case came positive for malaria out of 8617 blood units [1]. Dr Anand Kumar Gurupadappa and Sonawane et al also inferred the same result [6,15]. In endemic areas, Malaria screening is important to avoid the cases of post-transfusion Malaria particularly in pregnant women and in immunodeficient patients. In these areas, there is a need for chemoprophylaxis for all the recipients according to the guidelines.

#### Conclusion

Constant fall in the incidence of transfusion transmitted infections (TTI) has been noted after mandatory testing of blood units. However, the risk may not be eliminated because the donors may be in window period and still can transmit the infection. So, to minimise the TTI, there is a need to implement the donor selection guidelines strictly and sensitive screening tests should be applied. Simultaneously, younger population should also be encouraged to increase the voluntary blood donation.

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