

## SEROPREVALENCE OF HIV, HBV, HCV, MALARIA AND SYPHILIS AMONG BLOOD DONORS AT A TERTIARY CARE TEACHING HOSPITAL IN SOUTHERN INDIA

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### Abstract

**Background:** Blood transfusion is a life-saving measure in emergencies and is important for the medical treatment of every patient. Among all adverse effects of transfusion, transfusion transmitted infections (TTI) are very important. Accurate estimations on risk of TTI are needed, in order to monitor the safety of the blood supply. The objective of the present study is to analyse the seroreactivity for TTI of apparently healthy blood donors. **Materials and Methods:** The present retrospective study was carried out at blood bank in Anam Chenna Subba Reddy (ACSR) Government General Hospital, Nellore, Andhra Pradesh. Data regarding age, sex, residence of donors and screening test results were collected from the records of blood bank over a period of 6 years (January 2017 to December 2022). **Result:** A total of 9500 blood donors were screened during the study period, of which 9468 (99.6%) were males and 32 (0.4%) were females. The overall seroprevalence of TTI were 1.75% among these HIV, HBV and HCV were 0.31%, 1.29% and 0.04% respectively; for malaria and syphilis, the seroprevalence was estimated to be 0.04% and 0.04% respectively. **Conclusion:** The risk of TTI remains despite of serological testing because of donor's window period. Steps should be undertaken to prevent these transmissions by careful selection of potential blood donors through a health history questionnaire and create opportunities for self-deferral.

## INTRODUCTION

Transfusion of blood and blood components is a life-saving procedure practiced in modern medicine. There are no substitutes for human blood. Transmission of infections is one of the major complications of blood transfusion. With every unit of transfused blood, there is 1% risk of transfusion related complications including Transfusion Transmitted Infections (TTIs).<sup>[1]</sup>

Blood transfusion increases the risk of transfusion associated infections like Hepatitis B, Hepatitis C, HIV, syphilis, & less commonly malaria, toxoplasmosis, and other viral infections.<sup>[2]</sup> It is quite difficult to prevent the transmission of infectious diseases through blood transfusion in developing countries because the resources required are not always available. Even with effective strategies & policies transmission of diseases still occur because of the inability of the test to detect the disease in the window period of infection, high cost of screening,

lack of trained staff, funds & laboratory testing errors.<sup>[3]</sup>

Hence, this study was undertaken to analyse the seroreactivity for TTI of apparently healthy blood donors and the possible risk of these transmission through blood and blood components. This knowledge can give us an idea of disease burden of society & the basic epidemiology of these diseases in the community.<sup>[4]</sup>

## MATERIALS AND METHODS

This is a retrospective study carried out at the blood bank attached to ACSR Government General Hospital, Nellore. Data over a period of 5 years (Jan 2017- December 2022) was collected from the records of blood bank. Blood donors, fulfilling the criteria for donor selection as per the selection criteria laid down by Drugs and Cosmetics Act, 1940 and Rules, 1945 were considered for the present study.<sup>[5]</sup> A total of 11,234 blood donors were screened during the study period. As 100% voluntary blood donation

is encouraged, majority of the donors are voluntary and very few are replacement blood donors. Data retrieved includes the demographic characteristics of donors such as age, sex, residence and the results of HIV, HBV, HCV, and Syphilis serologies.

**Sample Collection and Laboratory Testing:** 5 ml of whole blood samples were collected from the subjects into plain sterile tubes and were centrifuged. The sera were separated and analysed for different TTI; HIV, HBV, HCV, Syphilis as per the standard operating procedures followed in the blood bank. Samples were analysed for antibodies to HIV1 and HIV 2 (Microlisa HIV, J. Mitra & Co. Pvt. Ltd, New Delhi, India), HBsAg (HEPALISA, J. Mitra & Co. Pvt. Ltd, New Delhi, India), and HCV (Microlisa, J. Mitra & Co. Pvt. Ltd, New Delhi, India), by ELISA. Any serum found reactive by the first assay was retested using a second assay based on different antigen preparations and/or different test principle using the anti-HIV test (HIV TRI-DOT, Diagnostic

Enterprises, Parwanoo, India), HBsAg (Alere Trueline, Alere Medical Pvt. Ltd, Haryana, India) and HCV by the anti- HCV test.

(HCV TRI-DOT, Diagnostic Enterprises, Parwanoo, India) which are immunochromatographic sandwich assays. Test for syphilis was done by RPR (BEACON DIAGNOSTICS PVT.LTD, NAVSARI, India). The validity of the test was assured as per the given criterion and the results were computed.

## RESULTS

A total of 9,500 donors were screened over a period of 5 years from January 2017 to December 2022, of which 9468 (99.6 %) were males and 32 (0.4%) were females. The most common age group of donors was found to be 21 -30 years followed by age group of 18 -20 years while the least age group was 51 – 60 years. [Table 1].

**Table 1: Socio-demographic characteristics of blood donors at ACSR Government General Hospital, Nellore from January 2017 to December 2022 (N =9,500)**

Age group	Number of donors	Percentage
18- 20	2,682	28.2%
21 -30	4,456	47%
31-40	1,518	16%
41-50	657	6.9%
51-60	187	1.9%
Total	9,500	100%
Sex		
Male	9,468	99.6%
Female	32	0.4%
Total	9,500	100%

**Table 2: Age wise sero prevalence of TTIs among blood donors**

Age groups	HIV (%)	HBV (%)	HCV (%)	MP	Syphilis (%)	Total (%)
18-20	4 (16)	20 (80)	-	-	-	25 (15.24)
21-30	18 (18.3)	72 (73.46)	4 (4.08)	4(4.08)	4 (4.08)	98 (59.75)
31-40	7(2.5)	30(76.9)	-	-	-	39 (23.80)
41-50	1(50)	1(50)	-	-	-	2 (1.21)
51-60	-	-	-	-	-	-
Total	30(0.3%)	123(1.3%)	4(0.04%)	4(0.04%)	4(0.04%)	165(100)

HIV-Human Immunodeficiency virus, HBV-Hepatitis B virus, HCV- Hepatitis C virus

**Table 3: seroprevalence of TTIs among blood donors (Gender –wise)**

Blood donors	Total no	HIV	HBV	HCV	MP	syphilis	Total (%)
Male	9468	30	123	4	3	4	164
Female	32	-	-	-	1	-	1
Total	9500	30	123	4	4	4	165

HIV-Human Immunodeficiency virus, HBV-Hepatitis B virus, HCV- Hepatitis C virus

**Table 4: Prevalence and trends of TTI among blood donors during 2017-2022.**

YEAR	No. of donors	HIV (%)	HBV (%)	HCV (%)	VDRL	MP (%)	Total
2017	2,491	4(0.16)	38(1.52)	-	-	-	42(1.68)
2018	2,187	3(0.13)	22(1.0)	-	-	-	25(1.14)
2019	2,029	9(0.44)	30(1.47)	2(0.09)	-	-	41(2.02)
2020	988	3(0.30)	10(1.01)	-	-	-	13(1.31)
2021	811	2(0.24)	11(1.35)	1(0.12)	4(0.49)	-	18(2.21)
2022	994	9(0.90)	12(1.20)	1(0.10)	-	4(0.40)	26(2.61)
Total	9,500	30(0.31)	123(1.29)	4(0.04)	4(0.04)	4(0.04)	165(1.73)

HIV- Human immunodeficiency virus, HBV- Hepatitis B virus, HCV- Hepatitis C virus, Syphilis.

Highest prevalence of transfusion transmitted infection was within the age group of 21–30 years (47%) followed, and the least affected age group

were 51-60 years (0 %) [Table 2] Out of 9,468 male donors 1.7 % were reactive for different TTI and of

32 female donors, 3.1 % were reactive for TTI [Table 3].

Out of all 165 reactive blood donors, HBV infections prevalence observed was 1.29% followed by HIV 0.31%. The prevalence of HCV 0.04% and syphilis is 0.04%. [Table 4].

In the present study, there was gradual increase of all the markers (2.3% to 3%) from 2017 to 2019 and it was declined from 3% to 1.7% from year 2020-2022. [Table 4]

## DISCUSSION

The prevalence of TTI varies from country to country depending on the particular population from where blood units are collected. In the present study, 1.75% of TTI prevalence was observed which was similar to the study done by Chavan SK et al.<sup>[3]</sup> (1.96%) But it was low compared to other studies by Suresh B et al,<sup>[4]</sup> (3.5%) and Disha A et al., (4.03%).<sup>[5]</sup> Majority of the donor population in this study were males constituting 99.6% [Table 1] and this finding is similar to other studies conducted in India by Koram SK et al,<sup>[6]</sup> and Pahuja et al.<sup>[7]</sup> TTI seroreactivity rate was more in 164 male donors (1.7%) than in 01 females (0.01%) [Table 3]. Similar findings were recorded in the study by Chaudhary K. et al.<sup>[8]</sup> This might be attributed to more exposure of males to risk factors for TTI than females. With respect to the age, TTIs were more prevalent in the age group of 21-30 years. Analyzing the individuals TTIs, it was observed that the prevalence of HBV was high in the 31-40 years (76.9%) age group, HCV in the 21- 30 years (4.08%) age group, syphilis in the 21 and 30 years (4.08%) age group and HIV in the 21-30 years (18.3%) age group [Table 2]. The difference of the prevalence of transfusion transmitted diseases among different age groups was statistically not significant ( $p=0.220$ ). This is in contrast to the study done in Maharashtra.<sup>[8]</sup> They observed the prevalence of HBV in <20 years (100%), HCV in 31- 40 years age group (43.90%), syphilis in 41 - 50 years age group (16.66%) and HIV in 21-30 years age group (6.34%).

In this study the prevalence of HIV was observed in blood donors (0.3%) which was higher than reported by Giri et al,<sup>[9]</sup> from rural Maharashtra (0.07%), Chandra et al,<sup>[10]</sup> (0.23%) and lower than the study conducted Singh et al,<sup>[11]</sup> (0.54%) from Delhi. The overall prevalence rate of HBsAg seroreactivity was 1.3% as observed in this study. The HBsAg seroreactivity was decreased from 1.52% in the year 2017 to 1.2% in 2022 [Table 4] which is similar to the findings by Arshad et al.<sup>[12]</sup> Higher prevalence of HBsAg is observed in general may be due to high prevalence of HBV infection in that population and hence the same was observed in the blood donors.

The prevalence of Anti-HCV reactivity was 0.04%, which is similar to Fernandes H et al,<sup>[13]</sup> in which it was 0.06%. In this study the researchers did not observe much variation in the prevalence of anti

HCV seroreactivity during 2017-2022 [Table 4]. The reported variation in the prevalence of anti-HCV antibodies among blood donors in different regions of the world may be attributed to the differences in type, literacy rate and level of awareness among the blood donors. Use of lower sensitivity kits or technical errors may contribute to lower prevalence. The prevalence of malaria in the present study was 0.04%, High prevalence of malaria had been observed in Nigeria by Agboola et al,<sup>[14]</sup> (28%) which may be due to high endemicity of that area. The seropositive cases were observed mainly during rainy season, where the malarial vectors were breeding. In non-endemic countries, donor deferral can be effective, but in endemic countries the problem is far greater as the majority of donors were potentially infected. As there is no appropriate test which can be done easily in screening blood donor for malaria, it has been suggested that anti- malarial drugs may be given to the recipients of blood in highly endemic areas.

Serological test for syphilis is done because the disease is characterized as being sexually transmitted and puts the donor at high risk for possible exposure to hepatitis and HIV and justified in part as a surrogate marker.<sup>[15]</sup> The seroprevalence of syphilis in this study was 0.04%.

## CONCLUSION

In order to achieve a low rate of transmission, effective donor screening and proper testing of blood for TTIs should be done. Necessary precautions should be undertaken to prevent transmission through transfusion such as a careful selection of potential blood donors through a health history questionnaire and create opportunities for self-deferral. Programmes to prevent TTI infected donors should be aimed primarily at reducing high risk behaviours. Detection of infection during window period can be done by Nucleic acid testing (NAT). But NAT is available in a few centres in India. Encouraging female population as well as voluntary blood donors for blood donation will increase the number of donors and safe donor pool. There is need for look back phenomenon and donor notification, donor counselling to prevent further transmission of the infection.

Also improved public health and increased public awareness about the importance of blood donation and associated risk of TTIs will motivate more number of healthy voluntary blood donors in the community thereby minimizing the risk of transmission of infections through blood transfusion and ensuring the safety of blood transfusion services.

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