



**ORIGINAL RESEARCH PAPER**

**Microbiology**

**SEROPREVALENCE OF TRANSFUSION TRANSMITTED INFECTIONS AMONG VOLUNTARY BLOOD DONORS.**

**KEY WORDS:** blood donors, screening, HBV, HIV

<b>Dr. Naga Sri Latha Bathala*</b>	Associate Professor Of Microbiology, Government Medical College, Kadapa. Andhra Pradesh *Corresponding Author
<b>Mr. A. Sunil kumar</b>	Tutor In Microbiology, Government Medical College, Kadapa. Andhra Pradesh
<b>Dr. Sasidhar Majeti</b>	Professor And Head, Department Of Microbiology, Government Medical College, Kadapa. Andhra Pradesh.
<b>Dr. S. Guruviah</b>	Medical Officer, Blood Bank, Government General Hospital, Kadapa. Andhra Pradesh.

**ABSTRACT**

**Background/ objective:** Transfusion of blood and blood components in reducing mortality and morbidity is an indispensable part of any healthcare system. Thus, while blood transfusion can be life-saving, there are associated risks; particularly the transmission of blood borne infections. Quality assured screening of donated blood for transfusion transmissible infections (TTI) is one of the key elements of health care services. In countries where effective blood screening strategies have been implemented, the risk of TTIs has declined significantly. The aim of present study is to find out presence of TTIs among blood donors and analysis of the TTIs in different age groups.

**Methods:** This was a retrospective cross sectional study carried out in blood bank of Government general hospital, Kadapa, Andhra Pradesh, India involving healthy blood donors between 18 to 65 years. The study includes total 9,202 units collected over a period one year (Jan – Dec 2018) and the record was analyzed. Blood was screened for HIV, HBV, HCV, syphilis and malaria.

**Results:** There was clear predominance of male donors (99.56%). More donors were from the age of 21 – 25 years (37.13%). Among all the screened samples (9202) seropositives for HIV - 0.18%; HBsAg – 1.48%; HCV – 0.06%.

**Conclusion:** HBV was the commonest TTI among blood donors. 1.75% of donors showed seropositive for TTI and reveal potential of transmitting them through transfusion. Strict and proper implementation of donor selection criteria should be followed to prevent TTIs. Screening with higher-generation sensitive ELISA kits and initiation of newer testing methods is essential to identify seropositives accurately.

**INTRODUCTION:**

Transfusion of blood and blood components in reducing mortality and morbidity is an indispensable part of any healthcare system<sup>[1]</sup>. The provision of safe and efficacious blood and blood components for transfusion or manufacturing use involves a number of processes, from the selection of blood donors and the collection, processing and testing of blood donations to the testing of patient samples, the issue of compatible blood and its administration to the patient. There is a risk of error in each process in this "transfusion chain" and a failure at any of these stages can have serious implications for the recipients of blood and blood products. Thus, while blood transfusion can be life-saving, there are associated risks, particularly the transmission of blood borne infections<sup>[2]</sup>. With every unit of blood, there is 1% chance of transfusion-associated problems including TTI<sup>[3]</sup>.

Quality assured screening of donated blood for transfusion transmissible infections (TTI) is one of the key elements health care services. This is possible with Effective screening for evidence of the presence of the most common and dangerous TTIs - HIV, hepatitis B, hepatitis C, Treponema pallidum (syphilis) and, where relevant, other infections that pose a risk to the safety of the blood supply, such as Trypanosoma cruzi (Chagas disease) and Plasmodium species (malaria); can reduce the risk of transmission to very low levels<sup>[2]</sup>. In countries where effective blood screening strategies have been implemented, the risk of TTIs has declined significantly over the last two decades<sup>[4]</sup>. The aim of present study is to find out presence of TTIs among blood donors and analysis of the TTIs in different age groups.

**MATERIAL AND METHODS:**

This was a retrospective cross sectional study carried out in blood bank of Government general hospital, Kadapa, Andhra Pradesh, India involving healthy blood donors between the age group of 18 to 65 years. The study includes total 9,202 units collected over a period one year (Jan – Dec 2018). All blood donors who are included in this study, satisfied the criteria for blood donation as per Drugs and Cosmetic Act 1940 (and rules there under)

supplemented by the Technical Manual 2003 (Directorate General of Health Services, Ministry of Health and Family Welfare, Govt. of India). All the basic information regarding blood donors like demographic data, weight, hemoglobin percentage and result of serological test was recorded and maintained by the blood bank and the record was analyzed.

Blood was screened for HIV, HBV, HCV, syphilis and malaria. The TTIs testing were done with 3rd generation ELISA for HIV, HBV and HCV on pilot tubes samples as well as samples from the bag in case of reactive test results. Test for Syphilis was either of – RPR, TPHA strip test and the test for Malaria was rapid test for antigen detection.

All tests were performed as per manufacturer instructions and standard operative procedures of TTI lab of the blood bank maintaining quality control like use of in-house low positive external controls and participation of the TTI lab in third party international level External Quality Assessment Schemes. The percent of TTIs in the mentioned period was calculated and record of all donors who tested reactive for any of the TTIs was also examined.

**Table 1- TTIs and screened Serological Markers with test method**

Mandatory TTIs	Serological Markers	Test method
Human Immunodeficiency Virus	Antibodies to HIV Type 1 and 2	ELISA
Hepatitis B	Hepatitis B surface antigen (HBsAg)	ELISA
Hepatitis C	Anti-HCV antibody	ELISA
Syphilis	Anti-treponemal antibody	RPR/ TPHA
Malaria	Malaria antigen	Rapid test

**RESULTS:**

In the present study total of 9202 individuals donated blood in the year 2018. Clear predominance of male donors (99.56%) was observed as shown in table 2.

**Table 2 – gender wise blood donors**

Male	Female	Total
9162	40	9202
99.56%	0.44%	

Blood donors from age of 18years to 55 years were present. More donors were from the age of 21 – 25 years (37.13%) followed by

26 -30 years (25.37%). Out of 160 from >45 years 1 was positive for HIV (0.62%) and 3 were HBsAg positive (1.87%). Only 6 were positive for HCV and 1 was for Syphilis. No sample showed positive for malaria. Among all the screened donor samples (9202) seropositivity for HIV - 0.18%; HBsAg – 1.48%; HCV – 0.06%as shown in table 3.

**Table 3 – age group and seroprevalence of presence of TTIs among blood donors.**

Age Group in years	Total samples screened	HIV	HBsAg	HCV	SYPHILIS	MALARIA	Total infected
< 20	1260 (13.69%)	1 (0.08%)	15 (1.19%)	1 (0.08%)	0	0	17 (1.35%)
21-25	3417 (37.13%)	4 (0.12%)	48 (1.40%)	3 (0.08%)	0	0	55 (1.61%)
26-30	2335 (25.37%)	5 (0.21%)	38 (1.62%)	2(0.08%)	1 (0.04%)	0	46 (1.97%)
31-35	1194 (12.97%)	3 (0.25%)	21 (1.76%)	0	0	0	24 (2.01%)
36-40	624 (6.78%)	3 (0.48%)	8 (1.28%)	0	0	0	11 (1.76%)
41-45	212 (2.30%)	0	4 (1.88%)	0	0	0	4 (1.88%)
>45	160 (1.74%)	1 (0.62%)	3 (1.87%)	0	0	0	4 (2.5%)
Total	9202	17 (0.18%)	137 (1.48%)	06 (0.06%)	01 (0.01%)	00	161 (1.75%)

**DISCUSSION:**

Effective screening for TTIs not only screens TTIs but also gives clue about the prevalence of these infections in healthy populations. Evaluation and analysis of data on the prevalence of TTIs among blood donors permits an assessment of the accurate estimation of risk of TTIs, which helps in the formulation of long term strategies to improve public health and to prevent spread of disease in local population. They are the greatest threats to blood safety for transfusion recipients and pose a serious public health problem. Morbidity and mortality resulting from the transfusion of infected blood have far reaching consequences not only for the recipients

themselves, but also for their families, communities and the wider society<sup>41</sup>.

The preponderance of males over females is observed not only in our study but also in several studies in India, which might be due to the fact that many Indian females are having less Haemoglobin levels and are considered medically not fit for blood donation.

Around 65% of donors are from age of less than 30 yrs. This indicating that young people are contributing more and the least by donors who belonged to the age group of > 45 years of age which contributed 1.74%.

**Table 4 – Comparison of seroprevalence of TTIs among blood donors from various studies in India**

Place	HIV%	HBsAg %	HCV%	Syphilis %	Study by
Mathura (UP)	0.139	2.131	0.624	1.301	Chaurasia et al [1]
Coastal Karnataka	0.0	0.4	0.0	0.0	Barla et al [3]
Manglore, karnataka	0.06	0.30	0.06	0.12	Pailoor K et al(4)
Bangalore, Karnataka	0.44	1.86	1.02	1.6	Srikrishna A et al[5]
Ludhiana	0.084	0.66	1.09	0.85	Gupta N. et al[6]
Delhi	0.56	2.23	0.66	-----	Pahuja S et al[7]
West Bengal	0.28	1.46	0.31	0.72	Bhattacharya P et al[8]
Southern Haryana]	0.3	1.7	1.0	0.9	Arora D et al [9]
Lucknow (UP)	0.23	1.96	0.85	0.01	Chandra T et al [10]
Jhalawar, Rajasthan]	0.02	2.56	Nil	0.20	Diwan R et al [11]
Ahmedabad, Gujrat]	0.16	0.98	0.11	0.23	Shah N et al[12]
Indore, Madhya pradesh	0.14	1.77	0.099	0.04	Yadav et al [13]
Present study Andhra pradesh	0.18%	1.48%	0.06%	01 0.01%	

Results of present study are comparable with many other previous studies done. Seropositivity for HBV is found to be highest of all TTIs (1.48%) in this study, which is consistent with results of many studies. The risk of TTI for HBV infection continues to remain considerable although it has been reduced with the introduction of the Hepatitis B surface antigen (HBsAg) testing in the early 1970's. Tests adopted for donor screening to know the presence of HBV is detection of HBV surface antigen (HBsAg), which is the main screening target and usually followed, but it fails to detect the presence of HBV during the 'window period'. Hence, a number of countries have also added the testing for antibodies directed against the HBV core protein (anti-Hbc) and testing for HBV Nucleic acid in plasma pools to the standard screening in an attempt to detect chronic virus carriers with low level viremia who may not have detectable HBsAg levels.

Venereal diseases are widespread in developing countries and constitute a major public health problem these days. It is observed that HIV seroprevalence was found to be less in our study (0.18%) as compared to others except Diwan R et al<sup>[11]</sup> and Gupta N et al<sup>[6]</sup>. This lower prevalence might be because of increased awareness of general population on HIV transmission and effective implementation of Government programmes and policies. It is found that only one sample was reactive for Syphilis (1/9202). It was more in studies by Sri Krishna et al<sup>[5]</sup> (1.6%) and Chaurasia et al<sup>[1]</sup> (1.301%). Even the methods are sensitive for detection of HIV antibodies; these methods cannot detect HIV infection in window period. Hence testing methods, which detect either antigen or nucleic acid of HIV, are required to screen donor blood.

Many studies in India indicate that the seroprevalence of HCV ranges between 0.4 % - 1.09%<sup>[14]</sup>. In the study by Diwan R et al [11] in 2012 showed the lowest (nil) seroprevalence of HCV and it higher (1.09%) in Gupta et al study<sup>[6]</sup>. Whereas it is significantly lower prevalence for HCV of 0.06% (6/9202) has been noted in our study. With the recently launched National viral hepatitis control programme, it is expected that more sensitive and specific methods may be initiated in near future by which all infected with hepatitis viruses can be detected, and also awareness might be increased among public regarding viral hepatitis transmission, diseases/complications, diagnosis, prophylaxis/prevention.

Even though our area is endemic for malaria, samples from blood donors are negative with malaria antigen detection tests; usually when ever malaria antigen is present, the individual will be symptomatic and those individuals are not suitable for blood donation.

In developing nations, blood safety continues to be a major problem due to high prevalence of infectious markers among the blood donors compounded with the problem of limited resources that preclude the use of sophisticated, sensitive, effective technologies for screening of blood products. Availability of nucleic acid detection methods for screening of TTIs can be

expected in recent future by that the infectious agent(s) will be detected even in window periods.

Availability of safe blood for transfusion is must for the recipients and the community as well. This can be achieved by vigorous screening of donors and donated blood. The WHO Recommendations on Screening Donated Blood for Transfusion-transmissible Infections have been developed as a result of the initiative by the Blood Transfusion Safety Team in the WHO Department of Essential Health Technologies.

The constraints and challenges faced by the developing and transitional countries, in implementing national blood screening programmes both at the policy level and at the operational level, shall be overcome by strengthening the effective control strategies including a sensitive and stringent screening of all blood donors, public awareness programs, and institution of adequate public health measures.

An integrated strategy for Blood Safety is required and shall be implemented vigorously for elimination of transfusion transmitted infections (TTIs) and for provision of safe and adequate blood.

#### CONCLUSION:

Thus, to conclude, HBV is the commonest TTI among blood donors, followed by HIV and HCV; 1.75% of donors are seropositive for TTI and reveal potential of transmitting them through transfusion. Strict and proper implementation of donor selection criteria should be followed to prevent TTIs. . Screening with higher-generation sensitive ELISA kits and initiation of newer testing methods is essential to identify seropositives accurately.

**Acknowledgements:** nil

**Conflicts of interest:** nil

#### REFERENCES:

1. Chaurasia RK, Puja, Kumar A, Singh P. Pattern of Transfusion Transmitted Infections in Blood Donors around Bhopal - A 5 years Retrospective Study. *Ann. Int. Med. Den. Res.* 2016; 2(6):PT12-PT15
2. Screening Donated Blood for Transfusion-Transmissible Infections – Recommendations WHO; chapter V 4 Screening for transfusion transmissible infections
3. Barla M, Pailoor K, Keshava MS, et al. Transfusion transmitted infections among voluntary blood donors from rural areas in coastal Karnataka, India. *Hematol Transfus Int J.* 2018;6(4):121-123. DOI: 10.15406/htij.2018.06.00166
4. Pailoor K, Keshava SM, Rai P, D'Cunha O, Lakshmi C (2015) A Retrospective Study of Screening of Common Transfusion Transmitted Infections in the Blood Bank of a Tertiary Care Centre. *J Blood Disorders Transf* 6: 267. doi:10.4172/2155-9864.1000267
5. Srikrishna A, Sitalakshmi S, Damodar P. How safe are our donors? *Indian J Pathol Microbiol.* 1999; 42: 411-6.
6. Gupta N, Kumar V, Kaur A. Seroprevalence of HIV, HBV, HCV and syphilis in voluntary blood donors. *Indian J Med Sci.* 2004; 58:255-257.
7. Pahuja S, Sharma M, Baitha B, Jain M. Prevalence and trends of markers of hepatitis C virus, hepatitis B virus and human immunodeficiency virus in Delhi blood donors. A Hospital based study. *Jpn J Inf. Dis.* 2007. 60:389-391.
8. Bhattacharya P, Chakraborty S, Basu SK. Significant increase in HBV, HCV, HIV and syphilis infections among blood donors in West Bengal, Eastern India 2004-2005. Exploratory screening reveals high frequency of occult HBV infection. *World J Gastroenterol.* 2007;13:3730-3733.
9. Arora D, Arora B, Khetarpal A. Seroprevalence of HIV, HBV, HCV and syphilis in blood donors in Southern Haryana. *Indian J. Pathol. Microbiol.* 2010; 53:308-309.
10. Chandra T, Kumar A, Gupta A. Prevalence of transfusion transmitted infections in blood donors: an Indian experience. *Trop. Doct.* 2009; 39:152-154.
11. Diwan R, Mathur M. Incidence and pattern of transfusion transmitted infection in voluntary donors in a teaching hospital "A four year retrospective study. *Journal of Pharmaceutical and Biomedical Sciences.* 2012; 22(22): 1-4.
12. Shah N, Shah J M, Jhaveri P. Sero prevalence of HBV, HCV, HIV and syphilis among blood donors at a tertiary Care Teaching Hospital in Western India. *Gujarat Medical Journal*, 2013; 68(02):35-39.
13. Yadav BS, Varma AV, Singh P, Kumar R, Bandi PK. Seroprevalence of transfusion-transmitted infections (TTIs) in blood donors: a study from central India. *Int J Med Sci Public Health* 2016;5:1158-1162
14. Kaur P and Basu S Transfusion - transmitted infections: existing and emerging pathogens; *J Post grad med* 2005, 51:46-151.