Research Article

INTERNATIONAL JOURNAL OF CURRENT MEDICAL AND PHARMACEUTICAL RESEARCH

ISSN: 2395-6429, Impact Factor: 4.656
Available Online at www.journalcmpr.com
Volume 7; Issue 10(A); October 2021; Page No. 6006-6009
DOI: http://dx.doi.org/10.24327/23956429.ijcmpr2021101063

STUDY OF PREVALENCE OF TRANSFUSION TRANSMITTED INFECTIONS AMONG BLOOD DONORS IN A TERTIARY CARE HOSPITAL

Karthik S*., Shiva Prasad Gajulapalli., Karthigeyan T and Pavithra R

Karpaga Vinayaga Institute of Medical Sciences & Research centre, Chinnakolambakkam, Tamilnadu

ARTICLE INFO

Article History:
Received 10th July, 2021
Received in revised form 2nd August, 2021
Accepted 26th September, 2021
Published online 28th October, 2021

Key words:
Blood donors, Transfusion Transmitted Infections.

ABSTRACT

Transfusion Transmitted Infections (TTIs) are one of the major concerns for the blood transfusion services, which are an integral part of the current medical field. This study is intended to estimate the prevalence of TTIs among all the blood donors. This is a retrospective observational study carried out in the blood bank of a tertiary care hospital from January 2014 to December 2018 based on the records maintained in the blood bank. Total of 4499 blood donors were included in the study with 67% of them being replacement donors and 98.6% being male donors. The overall TTI positivity rate was 1.02% with HBV accounting for 0.97% and syphilis accounting for 0.04% of the positive cases. There were no seroreactivity for HIV, HCV and malaria. TTIs were observed exclusively in Male donors with the common age group being 21-30 years of age and 91.3% of the TTI positive blood donors were replacement donors. Adoption of stringent donor selection criteria and implementation of Nucleic Acid Amplification based Tests (NAT) for screening will help in reducing the incidence of TTIs.

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).[(1)] The major objective of blood transfusion services is to ensure adequacy, safety, accessibility and efficiency of blood supply at all levels of healthcare system. As per the recommendations of Ministry of Health and Family Welfare (Government of India) under the Drugs and Cosmetics Act 1945, mandatory screening tests should be done on donor blood for the presence of Human Immunodeficiency Virus (HIV), Hepatitis-B virus (HBV), Hepatitis- C virus (HCV), Malaria and Syphilis prior to the issue of compatible blood to the patients.[(2)] Evaluation of TTIs is necessary for assessing the safety of blood transfusion services and also for ensuring the efficiency of screening procedures practiced in the blood bank.[(3)] This study is intended to estimate the prevalence of TTIs among all the blood donors in a tertiary care hospital.

MATERIALS AND METHODS

This is a retrospective observational study carried out in the blood bank of a tertiary care hospital. The study period was 5 years from January 2014 to December 2018.

Inclusion criteria

All the eligible blood donors including both voluntary and replacement donors who had donated blood in the blood bank during the study period were included in the study.

Exclusion criteria

- Donors less than 18 years and more than 60 years of age
- Voluntary donors having frequency of blood donation less than 3 months
- Donors with any chronic medical illness

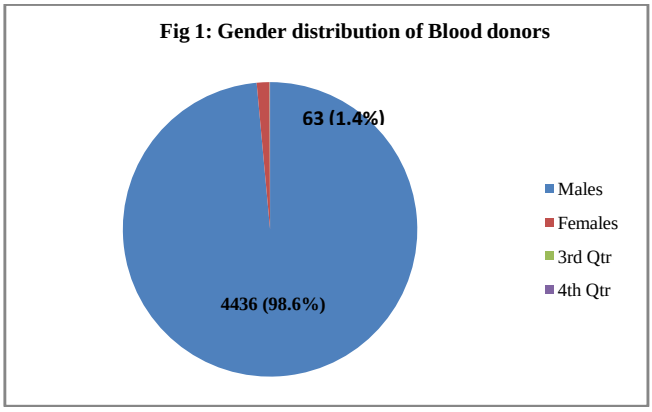
METHODOLOGY

The study was approved by the Institutional Ethics Committee. Informed consent was collected from all donors during blood donation. Data was collected from the records and registers maintained in the blood bank that included donor registration forms, donor registers, TTIs screening registers, issue registers and discard registers. Confidentiality of personal data was maintained throughout the study. All the blood samples collected from the donors were screened for the five major TTIs namely HIV, HBV, HCV, syphilis and malaria. The screening test results were documented in the TTI screening register. The screening methods were as per WHO guidelines. HIV, HBV and HCV were tested by Enzyme Linked Immunosorbent Assay (ELISA) while Syphilis and Malaria were tested by Immunochromatographic card method. All samples with positive results were tested in duplicate before labeling the sample as seropositive.

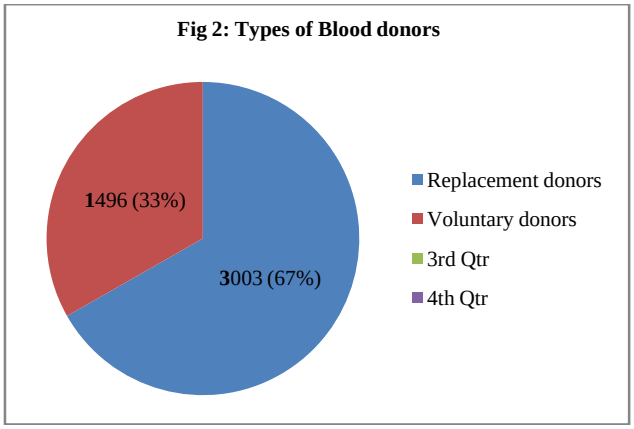
Corresponding author:* **Karthik S
Karpaga Vinayaga Institute of Medical Sciences & Research centre, Chinnakolambakkam, Tamilnadu

RESULTS

Total number of blood donors who had donated blood during the 5 years study period were 4499, out of which 4436 (98.6%) were male donors and 63 (1.4%) were female donors. (Fig 1)

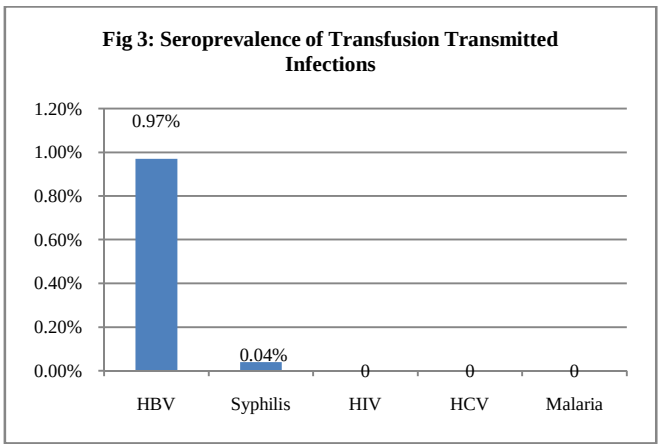


Among the blood donors, 3003 (67%) were replacement donors while 1496 (33%) were voluntary donors. (Fig 2)



Out of total 4499 blood units, 46 units tested positive for atleast one of the TTIs accounting for an overall TTI positivity rate of 1.02%.

Majority of the donors (44 donors) were found to be positive for HBV and the seroprevalence of HBV was 0.97%. Two of the donors were positive for syphilis and its seroprevalence was 0.04%. In the present study, all the blood units tested negative for HIV, HCV and malaria. (Fig 3)



Among the TTI positive blood donors, 91.3% were replacement donors and 8.7% were voluntary donors. HBV was positive in 40 replacement donors and 4 voluntary donors while both the cases of syphilis seroreactivity were seen in replacement donor blood samples. (Table-1)

Table 1 Relationship of Transfusion Transmitted Infections to type of blood donors

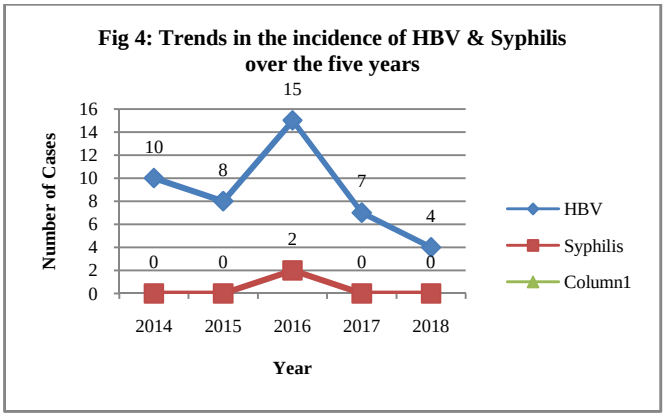
S. No	Transfusion Transmitted Infections (TTI)	Replacement donors	Voluntary donors	Total
1	HBV	40	4	44
2	Syphilis	2	0	02
3	HIV	0	0	0
4	HCV	0	0	0
5	Malaria	0	0	0
	Total	42 (91.3%)	4 (8.7%)	46 (100%)

All the 46 cases of TTIs were observed exclusively in Male donors in the present study with the common age group being 21-30 years of age. (Table-2)

Table 2 Age distribution of Transfusion Transmitted Infections

S. No	Age	HBV	Syphilis	HIV	HCV	Malaria	Total
1	≤ 20 years	4	0	0	0	0	4
2	21-30 years	24	2	0	0	0	26
3	31-40 years	15	0	0	0	0	15
4	41-50 years	1	0	0	0	0	1
5	> 50 years	0	0	0	0	0	0
	Total	**44**	**2**	**0**	**0**	**0**	**46**

The trend in the seroprevalence of HBV varied over the 5 years study period with a peak incidence of 15 cases observed in the year 2016. Both the cases of syphilis were recorded in the year 2016. (Fig 4)



DISCUSSION

Blood transfusion is an integral part of modern healthcare system and is considered as a life-saving measure in various medical and surgical emergencies. The indications for blood transfusion are varied and its necessity is ever-growing owing to the advancements in the medical field. Approximately 30 million units of blood components are transfused every year throughout the world.[4] However blood transfusion also carries the risk of transmitting infections like HIV, HBV, HCV, syphilis and malaria.

In the present study, replacement donors constituted the major fraction accounting for 67% which was comparable with other similar studies. Replacement donors constituted 60.2% and 64.7% in the studies of Gupta *et al*[5] and Pallavi *et al*[6] respectively. This may be due to lack of public awareness and motivation regarding voluntary blood donation. However in the study of Prerna Mahajan *et al*[7] from Haryana, voluntary

blood donors constituted the major fraction of 95.3% among the total blood donors.

Female donors accounted for only 1.4% of the total blood donors in the current study in concordance with the studies of Rajat mondal *et al* (1.7%) and Saroj Pachori *et al* (0.83%).[1,2] During the selection of blood donors, deferral of female donors is high due to anemia and other physiological causes like lactation, pregnancy etc.

The overall prevalence rate of TTI was 1.02% in this study comparable to other studies conducted in various parts of India. In the study conducted by Sethi *et al*[8] in Uttarakhand, the overall TTI prevalence rate was 1.05% while Dobariya *et al*[9] reported an overall TTI prevalence rate of 1.34% in their study conducted in Gujarat. The present study was carried out in a tertiary care hospital in Tamilnadu and Sundaramurthy *et al*[10] conducted similar study in Tamilnadu with an overall TTI prevalence rate of 1.12%. Chandra *et al*[11] from Lucknow reported a high prevalence of TTIs accounting for 3.05%. Thus there were regional differences in the prevalence of TTIs which was influenced by the various cultural factors, social factors, public awareness and improved personal health.

Majority of TTIs was observed among young donors in the age group of 21-30 years accounting for 57% in the present study similar to the studies of Suresh B *et al* (52.6%) and Dobariya *et al* (43.09%).[9,12] This may be due to the high number of eligible blood donors belonging to the age group of 21-30 years while the number of blood donors progressively reduces with advancing age due to high deferral rate related to medical illness etc. However Rajat mondal *et al* reported high incidence of TTIs among blood donors in the age group of 38 to 47 years and syphilis was the most prevalent TTI in their study that affected the donors in the age group of 38 to 47 years.[1] Thus personal sexual practices also plays an important role in the prevalence of TTIs since majority of the TTIs like HIV, HBV, syphilis etc are also transmitted via sexual transmission.

Rajat mondal *et al*[1] reported TTI seroreactivity exclusively among male donors similar to the present study which again is influenced by the high deferral rates of female blood donors.

About 91.3% of TTIs was reported among replacement blood donors in the present study similar to the studies of Rajat *et al*[1] and Chandra *et al*.[11] In these studies, replacement donors constituted the major fraction of the total blood donors. However in the study of Prerna Mahajan *et al*, 90.5% of TTI seroreactivity was reported in voluntary blood donors who constituted the major fraction among the total blood donors in their study.[7] Thus the prevalence of TTIs among the type of blood donors is directly proportional to the major fraction of blood donors registered in the respective studies. Studies with more number of replacement blood donors compared to voluntary blood donors reported correspondingly high percentage of TTI positivity among the replacement donors and vice versa.

Hepatitis-B virus (HBV) constituted the major TTI in the present study with a prevalence rate of 0.97% while syphilis accounted for 0.04% of TTIs. These observations were comparable to several other similar studies carried out in different parts of India. Unlike other studies, there were no seroreactivity for HIV and HCV in this study. (Table-3)

Table 3 Comparison of prevalence of TTIs in various studies in India

TTIs	Present study	Sethi *et al*[8]	Dobariya *et al*[9]	Saroj Pachori *et al*[2]	Rajat Mondal *et al*[1]
HIV	Nil	0.19%	0.08%	0.1%	0.14%
HBV	0.97%	0.63%	0.98%	1.22%	0.45%
HCV	Nil	0.2%	0.09%	0.14%	0.66%
Syphilis	0.04%	0.02%	0.16%	0.4%	0.72%
Malaria	Nil	Nil	Nil	Nil	1
Overall TTI	1.02%	1.05%	1.34%	1.87%	2%

Several prevention strategies implemented in India have resulted in the absence of seroreactivity for malaria in the majority of studies carried out in different parts of India similar to the present study in Taminadu. Also any donor with history of fever in the preceding three months period is deferred from blood donation thereby minimizing the risk of malaria related TTIs.[13]

Prerna Mahajan *et al* reported a unique scenario of HIV & HCV co-infection in a voluntary blood donor at the sametime.[7] However in this study there was no co-infection reported. Several factors favour HIV and HCV co-infection including high degree of epidemiological similarities in their mode of transmission. Around 2-4 million cases of chronic HBV co-infection and 4-5 million cases of chronic HCV co-infection have been reported in HIV infected persons.[7]

Rajat mondal *et al*[1] found an increasing trend in the incidence of HBV infection while the incidence of HIV and HCV exhibited decreasing trend with syphilis reactivity remaining at the same level during their study period. In the present study, there was varied incidence of HBV infections over the five year study period with the maximum number of cases recorded in the year 2016. Interestingly both the cases of syphilis were also reported in the year 2016 with no cases in the remaining years.

CONCLUSION

Blood transfusion services are indispensable in the modern healthcare system. However TTIs threaten the safety in the recipients of blood and blood components globally. Transmission of TTIs during the window period along with genetic variability of the viral strains poses a real challenge to blood transfusion services.[1] Prevalence of TTIs is much higher and far from attaining "zero risk" level in developing countries in accordance with several published data.[2] In western countries, the risk of TTIs has reduced considerably with the advent of the more sensitive Nucleic Acid Amplification based Tests (NAT).[1] Thus the risk of TTIs can be reduced by adopting stringent donor selection criteria, meticulous pre-transfusion testing and implementation of the more sensitive Nucleic Acid Amplification based Tests (NAT) for screening of TTIs in developing countries. 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.

Acknowledgements & source of funding: Nil

Conflict of interest: Nil

References

1. Rajat Mondal *et al*. Seroprevalence of Transfusion Transmitted Infections among the blood donors and the trends of TTI in last three years in a tertiary care teaching hospital in Durgapur. J. Evid. Based Med. Healthc. 2019; 6(5): 252-256.
2. Pachori S, Pachori P, Tiwari D, Purohit N. Seropositivity of transfusion transmitted infections in blood donors in blood bank, tertiary care centre of pediatric institute SPMCH hospital, Jaipur. Int.J.Med.Sci.Educ 2020;7(5):28-34.
3. Jeremiah ZA, Koate B, Buseri F, Emelike F. Prevalence of antibodies to hepatities C virus in apparently healthy Port Harecourt blood donors and association with blood groups and other risk indicators. Blood Transfus. 2008; 6:150-5.
4. Pulkit Bist *et al*. To analyse the prevalence of Hepatitis-B & Hepatitis-C in blood donors at tertiary health care centre. Saudi J Pathol Microbiol. Feb 2019; 4(2): 87-91.
5. Gupta R. Singh B, Singh DK, Chaugh M Prevalence and trends of transfusion transmitted infections in a region blood transfusion center Asian Transfix Ser, 2011 Jul Deo, 5 (2): 177-8.
6. Pallavi P, Ganesh CK, Jayashree K, *et al*. Seroprevalence and trends in transfusion transmitted infections among blood donors in a university hospital blood bank: a 5 year study. Indian J Hematol Blood Transfus 2011; 27(1):1-6.
7. Prerna Mahajan *et al*. Prevalence of major Transfusion-Transmissible infections among blood donors at a rural tertiary healthcare teaching hospital of north India. Saudi J Pathol Microbiol. Jan 2019; 4(1): 9-13.
8. Sethi B, Kumar S. Butola K, Mishra J. Kumar Y. Seroprevalence patterns among blood donors in a tertiary health care center. Internet Journal of Medical Undate. 2014: 9 (1): 10–15.
9. Dobariya GH, Raja KA. Unagar CA, Pandya AN, Patel JN. Jarag MA, *et al*. Prevalence and trends of transfusion transmitted infections among blood donors of blood bank attached to government hospital of South Gujarat. India Int J Res Med Sci 2016, 4: 4123–7.
10. Sundaramurthy R, Arunagiri R. Ganesan V. Perumal S, Tiruvanamalai R. Charles J. Seroprevalence of transfusion transmissible infections among blood donors by chemiluminescent assay in a tertiary care center. J of Infect Dev Ctries. 2018; 12 (01): 31.
11. Chandra T, Kumar A. Gupta A. Prevalence of transfusion transmitted infections in blood donors: an Indian experience. Tropical Doctor 2009; 39 (3): 152-4.
12. Suresh Babu B, Sreedhar Babu KV, Chandra Mouli P. Seroprevalence and trends of transfusion transmissible infections among blood donors at a tertiary care referral teaching hospital in southern India. National Journal of Laboratory Medicine. 2015;4(4):72-76.
13. G.M.Thamilselvi and S.Senthamarai. Prevalence of Transfusion Transmitted Infections in our tertiary care hospital, Kanchipuram, Tamilnadu. Int. J. Adv. Res. 2019; 7(2): 137-141.

How to cite this article:

Karthik S *et al* (2021) 'Study of Prevalence of Transfusion Transmitted Infections among Blood Donors in A Tertiary Care Hospital', *International Journal of Current Medical and Pharmaceutical Research,* 07(10), pp 6006-6009.

****