

Prevalence of Transfusion Transmissible Infections Among Donors in A Tertiary Care Hospital: A Retrospective Study

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Abstract

Introduction: Blood transfusion is associated with several risks which particularly includes Transfusion Transmissible Infections (TTI's) like Hepatitis B virus (HBV), Hepatitis C virus (HCV), Human Immunodeficiency Virus (HIV), Syphilis and Malaria. The aim of the study was to find out the prevalence and changing trends of these infections among blood donors in the study area.

Materials and Methods: A retrospective analysis of blood donor's records was done from January 2011 to December 2018. HIV, HBV and HCV infections were tested using ELISA (Enzyme linked Immunosorbent assay) technique. Syphilis was tested by RPR (Rapid plasma reagin) test. Malaria is reported after screening the stained blood smears.

Results: Total 14,545 blood donors were screened, comprising of 10,458 voluntary donors and 4,087 replacement donors. The overall seroprevalence of HBV, HIV, HCV and Syphilis was 0.62%, 0.13%, 0.10% and 0.02% respectively with no Malaria infected donor.

Conclusion: Though the prevalence of Transfusion transmissible infections is decreasing, there is a need for adopting strict donor selection criterion and use of sensitive screening tests that can minimize the risk of acquiring these infections.

Keywords: Blood donors; Transfusion transmissible Infections; Prevalence.

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Introduction

Transfusion of blood and its components is life saving as well as it has life threatening hazards.¹ Ensuring the safety of blood is a major concern in transfusion therapy.²

Transfusion Transmissible Infections (TTI's) have been drastically reduced in countries where routine serologic screening of donors is implemented.³ But, blood borne infectious diseases are still a problem because infected blood is collected before the

appearance of serological markers of infection that is immunological window period.⁴

The prevalence of these infections among blood donors varies by geography and directly depends on the prevalence of these viruses in the general population.⁵ Understanding the prevalence of TTI's and its associated factors, and identifying the most common TTI's are critical in the development of screening protocols and proper preventive measures in blood bank programmes.⁶ The present study is done to know the prevalence and changing

trends of TTIs among blood donors which helps in the assessment of epidemiology of these infections in the study population.

Materials and Methods

The blood donor data was recorded retrospectively at Blood bank of a rural tertiary care hospital from January 2011 to December 2018. Participants were either voluntary or replacement donors. Only those participants physically and mentally fit, between 18 and 60 years of age, having a body weight above 50 kg for males and 45 kg for females, Hemoglobin more than 12.5 g/dl were accepted as eligible donors. Consent was taken.

All blood units were screened for transfusion transmitted infections namely: HIV (Human immunodeficiency virus), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis and malaria. Screening was done by enzyme-linked

immunosorbent assay (ELISA) method for HIV, hepatitis B and hepatitis C. Fourth generation ELISA kits were used for screening HIV. Syphilis was tested by Rapid Plasma Reagin (RPR) test and Malaria tested by screening the Leishman stained blood smears.

The serological tests were done according to manufacturer's instructions. All the reactive samples were retested before being reported as positive and the positive blood units were discarded as per NACO guidelines. The prevalence of TTIs was determined by the number of donations with positive TTI serologic markers in a year divided by the total number of blood donations in that year and it is expressed in percentage.

Results

Of the total 14,545 blood donors, 10,458 (71.9%) were voluntary donors and 4,087 (28.1%) were replacement donors (Table 1).

Table 1: Year wise distribution of voluntary and replacement donors

Year	Voluntary	Replacement	Total donations
2011	493	882	1375
2012	1085	533	1618
2013	1015	766	1781
2014	946	737	1683
2015	1156	794	1950
2016	1642	141	1783
2017	2576	234	2810
2018	1545	0	1545
Total	10458	4087	14545

The total number of donors found positive for Transfusion Transmissible Infections was 129 (0.88%, overall prevalence). The disease specific prevalence of HBV, HIV, HCV and Syphilis in the present study was 0.62%, 0.13%, 0.10% and 0.02%

respectively (Table 2). The prevalence of HBV, HIV, HCV and syphilis has decreased from 0.65 to 0.38%, 0.29 to 0.06%, 0.14 to 0.12%, 0.14% to zero respectively. Changing trends of these infections over a period of eight years is depicted in Figure 1.

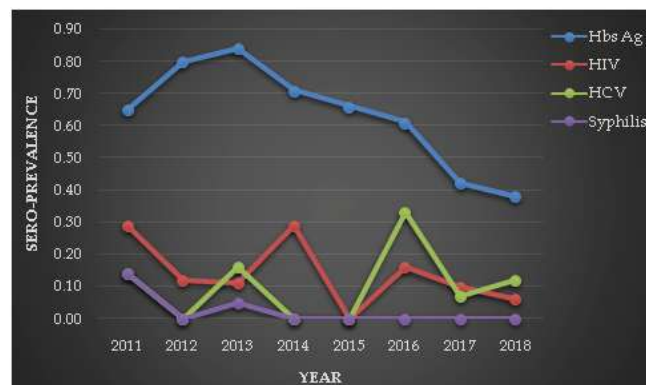


Fig. 1: Trends in seroprevalence of various TTIs

Table 2: Seroprevalence of Transfusion Transmissible Infections (TTI's)

Year	Total donotions	HBV	HIV	HCV	Syphilis	Total TTI's
2011	1375	9 (0.65%)	4 (0.29%)	2 (0.14%)	2 (0.14%)	17
2012	1618	13 (0.80%)	2 (0.12%)	0 (0)	0 (0)	15
2013	1781	15 (0.84%)	2 (0.11%)	3 (0.16%)	1 (0.05%)	21
2014	1683	12 (0.71%)	5 (0.29%)	0 (0)	0 (0)	17
2015	1950	13 (0.66%)	0(0)	0 (0)	0 (0)	13
2016	1783	11 (0.61%)	3 (0.16%)	6 (0.33%)	0 (0)	20
2017	2810	12 (0.42%)	3 (0.10%)	2 (0.07%)	0 (0)	17
2018	1545	6 (0.38%)	1 (0.06%)	2 (0.12%)	0 (0)	9
Total	14545	91 (0.62%)	20 (0.13%)	15 (0.10%)	3 (0.02%)	129 (0.88%)

Among 129, the commonest TTI's was found to be HBV (70.5%), followed by HIV (15.5%), HCV (11.6%) and syphilis was the least (0.02%). None

of the blood donors showed positivity for malarial parasites. Further subdivision among voluntary and replacement donors is shown in Table 3.

Table 3: TTI's among voluntary and replacement donors

	HBV	HIV	HCV	Syphilis	Malaria	Total
Voluntary	55	10	11	0	0	76
Replacement	36	10	4	3	0	53
Total	91 (70.5%)	20 (15.5%)	15 (11.6%)	3 (2.3%)	0 (0%)	129 (0.88%)

Discussion

In the present study, the number of replacement donors (882) was more than voluntary blood donors (493) during the year 2011. However, there was an increasing trend for voluntary blood donations in the next seven years that is between 2012-2018. This increase may be due to blood donor motivation strategies over the years. The World Health Organization (WHO) also encourages blood sourcing from voluntary, nonremunerated blood donors as this is adjudged the most suitable for a transfusion because of its highly reduced chance of harboring TTI's.⁷

The overall positivity of TTI's in the present study was 0.88% which is comparable with the study done by Lathamani *et al.* (0.82%).⁸

The prevalence of HIV in the present study was 0.13%. The study of Sharma DC *et al.*⁹ and Awasthi S *et al.*¹⁰ correlates with our result. Prevalence of HIV has been decreasing in the Indian population which may be because of the increasing awareness about the disease and the preventive aspects.

The prevalence of HBV was 0.62%. A study done by Prakash P *et al.* has reported 0.96% at Mysore.¹¹ Relatively higher prevalence was shown by Sharma DC *et al.* and Awasthi S *et al.* (3.51% and 1.82% respectively).^{9,10} There are chances of missing out occult HBV infection because mere absence of HBsAg in blood may not be sufficient to ensure the

lack of circulating HBV.¹² Despite the availability of vaccines, the HBsAg prevalence is high in India. Compared to Indian studies, the Prevalence is very high in Africa (13.4%).⁹

The prevalence of HCV (0.10%) was almost similar to that of study done by Prakash *et al* (0.15%) and Amrutha kumari *et al* (0.13%).^{11, 13} As transmission of HCV is through blood exposure and in majority of cases progresses to chronic infections, chances of cirrhosis and hepatocellular carcinoma are more than HBV.⁹

The seroprevalence of syphilis in the present study was 0.02%, similar result was noted in a study by Rawat *et al.* (0.06%).¹⁴

In the present study, we noted zero prevalence for malaria. This could be because of the fact that majority of the infected persons will not visit the blood bank and even if they come, will be readily rejected by medical fitness examination and counselling. The study by Raut *et al.* and Chatteraj *et al.*^{15,16} have also shown zero prevalence for malaria.

With this prevalence of TTI's and pit falls in detection methods, there is a need to consider and adopt newer sensitive technologies like Nucleic acid amplification Technologies (NAT) assays.¹⁷ But, cost effectiveness of NAT is poor & which is a concern especially in economically restricted countries.¹⁸ Hence, there is a need for strict donor selection criteria, use of sensitive screening tests which may reduce the risk of TTI's.

Conclusion

Transfusion transmissible infections (TTIs) are still serious hazards of blood transfusion. Estimation of risk of TTIs is essential for monitoring the safety of blood supply. There is a need to adopt a strict donor selection criterion and sensitive screening tests to protect the recipients of blood and its components acquiring these infections.

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