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Original Research Article

Prevalence of Seropositive Cases among Blood Donors: A 10 Years Retrospective Study in a Tertiary Care Hospital

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Abstract

Due to long term morbidity and mortality associated with transfusion transmissible infections (TTI), the present study was undertaken to find out the prevalence of transfusion transmissible seropositive infections among both voluntary and replacement blood donors over a period of ten years at a tertiary care hospital. ***Aim:*** The aim of this study is to determine the seroprevalence of transfusion transmissible infections among blood donors. ***Material and methods:*** This is a retrospective study conducted on all voluntary and replacement blood donors in a tertiary care hospital for a period of 10 years from 2010 to 2019. Blood samples were screened for HIV, HBV, HCV by ELISA, for syphilis by rapid plasma reagin test and malarial parasites. All seroreactive blood bags considered as positive for TTIs were discarded. ***Result:*** Out of total 18490 donor's blood units screened using standard blood tests for transfusion transmissible infections, replacement donors constituted 26.2% and 73.8% were voluntary blood donors. A total of 161 samples (0.87%) were found to be positive for TTIs. Seroprevalence of HIV, HBV, HCV and Syphilis was found to be 0.13%, 0.62%, 0.08% and 0.02% respectively. No donors were found positive for malaria parasites. ***Conclusion:*** Overall seroprevalence of TTI was 0.87% with high prevalence of HBV infection when compared to other TTIs. Safe blood transfusion is still a challenge with this prevalence rate. Hence there is a need of more sensitive screening tests especially in screening HBV infection to minimize TTIs along with strict donor selection criteria.

Keywords: Blood donors, seroprevalence, transfusion transmissible infections.

INTRODUCTION

The Indian subcontinent is classified as an intermediate HBV endemic zone (HBs Ag carriage 2-7%) and has the second largest global pool of chronic HBV infections. Indian population has 5.7 million HIV positive, 43 million HBV positive, and 15 million HCV positive persons [1]. With every unit of blood, there is 1% chance of transfusion-associated problems including transfusion-transmitted diseases [2]. Though blood transfusion is a therapeutic intervention, it is associated with some risks of transfusion transmissible infections to the recipients especially when blood was collected during window period [3]. Preventing transmission of these infectious diseases through blood transfusion presents one of the greatest challenges of transfusion medicine [4]. In order to curtail this NACO has made mandatory screening tests for Human Immunodeficiency Virus (HIV), Hepatitis B Virus(HBV), Hepatitis C Virus (HCV), Syphilis and Malaria on all donated blood and any unit of whole blood or blood components that test positive should be discarded[5]. With this background we conducted a retrospective study to determine the prevalence of seropositive cases among both voluntary and replacement blood donors in a tertiary care hospital blood bank.

MATERIAL AND METHODS

Source of data: A 10 years retrospective study was conducted at the blood bank of a tertiary care hospital Adichunchanagiri Institute of Medical Sciences, Bellur, Karnataka. All data were collected from blood bank records from 2010 to 2019.

Sample size: A total 18490 donor's blood units were screened using standard blood tests for transfusion transmissible infections which included 4855 replacement blood donors' and 13635 were voluntary blood donors'.

INCLUSION CRITERIA

Healthy voluntary and replacement donors

EXCLUSION CRITERIA

Blood donors who are unfit to donate blood according to standard blood donor's criteria

METHODS

All donor samples were screened for

- Hepatitis B surface antigen by HEPALISA. J.Mitra & co. Pvt. Ltd (microwell ELISA)
- HIV by MICROLISA J.Mitra & co. Pvt. Ltd (microwell ELISA)
- HCV by MICROLISA J.Mitra & co. Pvt. Ltd (microwell ELISA)
- Syphilis by RPR test (BEACON diagnostics)
- Malarial parasite by peripheral smear.

All tests were performed according to the manufacturer's guidelines. Reactive samples were repeated in different test with different principle before labelling them seropositive. The donated blood discarded whenever the donor sample was found positive for any TTI.

The statistical analysis was done using the appropriate tests.

RESULTS

The study analysed a total of 18490 blood donor units screened for HIV, HBV, HCV infection, and syphilis and malaria parasite. Out of that majority, i.e. 73.8% (13635) were voluntary donors and 26.2% (4855) were replacement donors. Year-wise distribution of seropositive cases among blood donors showed progressive decline in the seropositive cases. (Table 1, Figure 1).

Table-1: Year-wise distribution of seropositive cases among blood donors

Year	Total blood donation	HIV infection	HBV infection	HCV infection	Syphilis	Total	Seroprevalence of TTIs
2010	2126	4	17	0	0	21	**0.98**
2011	1619	4	9	2	2	17	**1.05**
2012	1677	2	13	0	0	15	**0.89**
2013	1781	2	15	3	1	21	**1.17**
2014	1683	5	13	0	0	18	**1.06**
2015	1950	0	13	0	0	13	**0.66**
2016	1783	3	11	6	0	20	**1.12**
2017	2810	3	12	2	0	17	**0.6**
2018	1545	1	6	2	0	09	**0.5**
2019	1516	1	7	1	1	10	**0.65**
Total	**18490**	**25**	**116**	**16**	**4**	**161**	**0.87**

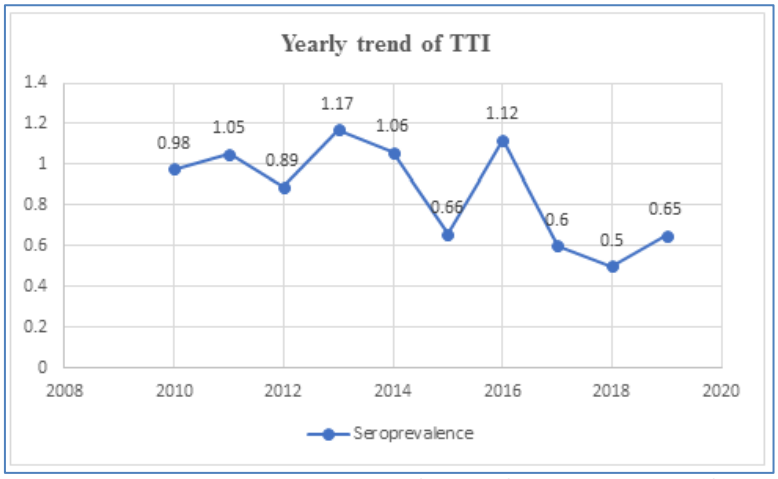

Fig-1: Yearly trend showing seroprevalence of all transfusion transmissible infections

There were 161 seropositive patients with an overall prevalence of 0.87%. Among the seropositive patients 25 were HIV positive, 116 were HBV positive, 16 were HCV positive and 4 were syphilis with a seroprevalence of 0.13%, 0.62%, 0.08% and 0.02% respectively. No donors were found positive for malaria parasites.

In the percentage distribution of TTI, HBV infection had a major share among both voluntary blood donors and replacement donors (Table 2).

Table-2: Percentage distribution of TTI in voluntary blood donors and replacement donors

TTI	Number of voluntary donors (%)	Number of replacement donors (%)	Total (%)
HIV	20 (13.9%)	5 (29.4%)	25
HBV	104 (72.2%)	12 (70.6%)	116
HCV	16 (11.1%)	0	16
Syphilis	4 (2.8%)	0	4
Total	**144 (100%)**	**17 (100%)**	**161**

In the present study, out of total 161 positive samples, the majority were positive for hepatitis B infection 116 (72%), followed by HIV infection 25(15.5%), HCV infection 16(10%) and syphilis 4 (2.4%) (Figure 2).

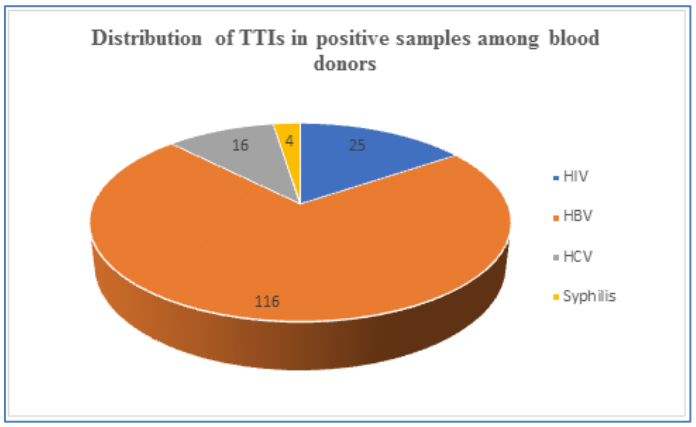

Fig-2: Distribution of various transfusion transmitted infections in positive samples among blood donors

DISCUSSION

The present study was conducted with the aim to determine the seroprevalance of transfusion transmissible infections among blood donors.

WHO recommends voluntary over replacement blood donation. In the present study, out of 18490 blood donors, 73.8% (13635) were voluntary donors and 26.2% (4855) were replacement donors, which is similar to the study done by Ahmed K *et al*. [1], Sehgal S *et al*. [6] and Soumya TS *et al*.[7] All these studies had major percentage of voluntary blood donors. Increase in voluntary donation may be due to propagation of voluntary blood donation by National AIDS Control Organization (NACO), Non-Government Organizations and also due to increasing public awareness. But studies conducted by Makroo, *et al*. [8] and Arora *et al*. [9] had major contribution from replacement blood donation. Hence it is essential to create awareness among people regarding benefits of voluntary blood donation and encourage becoming voluntary blood donors.

Out of 18490 donor's blood units screened, 161 (0.87%) blood units were positive for TTI. It is almost similar to the study conducted by Lathamani, *et al*. [10] which was 0.82%. Studies conducted by Soumya TS *et al*. [7] (0.94%), Ahmed K, *et al*. [1] (1.4%) and Sehgal S *et al*. [6] (2.18%) showed higher prevalence of TTIs as compared to the present study. This difference may be due to strict donor selection criteria in the present study which led healthy donors to donate blood.

In the present study overall seroprevalence of HIV, HBV, HCV and syphilis was 0.13%, 0.62%, 0.08% and 0.02% respectively. Seroprevalence of hepatitis B infection was highest among all the TTI.

Lathamani *et al*. [10] in their study found prevalence of HIV as 0.08%, HBV as 0.5%, HCV as 0.09%, and syphilis as 0.09%.

Jashim, *et al*. [11] in Bangladesh, found the prevalence of HIV as 0.135%, HBV as 1.4%, HCV as 0.13%, and syphilis as 0.46%.

Ahmed K *et al*. [1] found prevalence of HBV, HIV, HCV, and Syphilis to be 1.06%, 0.2%, 0.14%, and 0.05%, respectively.

Study by Shah, *et al*. [12] seroprevalence of HIV, HBV, HCV, and syphilis was found to be 0.15%, 0.9%, 0.1%, and 0.2%, respectively.

In all these studies prevalence of HBV infection was high in comparison with other TTIs, which is similar to the observation of the present study.

In India, transfusion associated HBV infection was estimated to be approximately 50% or more in patients who have received a multiple transfusion. They

found that in apparently healthy individuals absence of HBsAg in the blood may not be sufficient to ensure lack of circulating HBV. Blood containing anti-HBc antibodies with or without detectable presence of HBsAg might be infectious. They suggest that routine anti-HBc screening of blood donations could prevent some transfusion transmitted HBV infections [13]. This significant increasing trend in HBV infection can be controlled by using strict aseptic conditions in all procedures involving contact with blood and blood products.

In the present study, no donors were found positive for malaria parasites. This finding is same as that observed by Srikrishna *et al*. [4], Sonawone *et al*. [14], Farnandez *et al*. [15] and Pallavi *et al*. [16]. This observation may be due to the result of considering peripheral blood smear for screening which is less sensitive technique as it requires presence of at least 100 parasites/µl of blood to be detected microscopically. Hence more sensitive technique has to be incorporated to avoid post transfusion malaria.

CONCLUSIONS

Out of 18490 healthy donor samples, 161 cases screened positive with prevalence of 0.87%. Voluntary donors form the majority 73.8% in the present study; this shows awareness in the population about voluntary blood donation. Overall prevalence of HIV, HBV, HCV, and Syphilis was 0.13%, 0.62%, 0.08%, and 0.02% respectively showing high HBV prevalence. Safe blood transfusion is still a challenge with these prevalence rates. Hence there is a need of more sensitive screening tests especially in screening HBV infection to minimize TTIs along with strict donor selection criteria. And also encouraging healthy voluntary blood donors to continue the practice of donation.

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