

Original Research Article

The incidence and spectrum of transfusion transmitted infections among the blood donors

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Received: 26 December 2017

Accepted: 27 January 2018

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ABSTRACT

Background: Transfusion Transmitted Infections (TTIs), particularly through the viruses lead to the major health problems and challenges faced by the transfusion services for the supply of safe blood and blood components. The objective of the study is to assess the incidence and spectrum of five TTIs like Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Human Immunodeficiency Virus (HIV), Malaria Parasites (MP) and Syphilis among both voluntary and replacement blood donors in a span of seven years.

Methods: Total 1, 38,994 voluntary and replacement blood donors were screened and 1,012 (0.73%) cases were seropositive of which 631 cases (0.64%) were found in voluntary donors and 381 cases (0.94%) were seen in replacement donors.

Results: Majority of the donors were reactive for HBV infection (0.5%) followed by HCV (0.17%), HIV (0.052%), Syphilis (0.001%) and malaria (0.0005%). There was increase in the trend of seroprevalence of TTIs from 0.35% (2010) to 1.43% (2016) over the period which is a matter of consideration.

Conclusions: It is therefore very important to continue preventive measures to combat this problem along with screening of donated blood units with highly sensitive test methods and post donation counselling of the seropositive donors for the prevention of further transmission risks.

Keywords: Hepatitis B virus, Hepatitis C virus, Human immunodeficiency virus, Seroprevalence, Transfusion transmitted infection

INTRODUCTION

Transfusion of blood and blood components is a life saving measure at the same time it is frequently accompanied by the risk of transmission of Transfusion Transmitted Infections (TTIs). The viruses, parasites responsible for TTIs have prolonged incubation period and survive in the stored blood.¹ TTIs can exist as silent killer being asymptomatic in the hosts.

Acquisition of infections during the window period from the blood donors can be a serious threat to the safety of collected blood. Among TTIs, the most common

infections are Hepatitis B virus and the Hepatitis C Virus which are responsible for post transfusion Hepatitis.

HIV is considered to be a common risk next to Hepatitis followed by less commonly transmitted disease like Syphilis.² Malaria should not be overlooked though the risk of transmission is low. We have studied the seroprevalance and the trend of HBV, HCV, HIV, Syphilis, Malaria with co-existence of these dreaded diseases like HIV and HBV, HIV and HCV over a period of seven years. This gives the information about safety associated with blood transfusion and accurate measurement of risks versus benefits of blood transfusion.³

METHODS

The study was conducted from January 2010 to December 2016 over 1,38,994 healthy voluntary and replacement blood donors in the Department of Transfusion Medicine in a tertiary care center, Sriram Chandra Bhanja (SCB) Medical College and Hospital, Cuttack, in the State of Odisha in India. The donors were requested to fill up the donor questionnaires, to determine whether they are eligible to donate as per the guidelines of World Health Organization (WHO), along with giving consent for the donation and screening of the donated blood and disclosure to them in case of any unfavourable findings prior to the blood collection. Blood samples of three millilitres collected in a clean and dry test tube for the TTIs screening were centrifuged for serum and then tested for HBsAg (by ERBA LISA PICO HBsAg) and anti-HCV antibody (by ERBA LISA HCV), anti-HIV 1+2 (by ERBA LISA HIV 1+2 By TRANSASIA Bio-Medicare Pvt Ltd). Rapid kit tests were performed for Syphilis (by Carbogen TULIP Diagnostic Pvt Ltd) and Malaria antigen to Plasmodium Falciparum (HRP-2, LDH My Test by Bio-footprints Health Care Pvt Ltd). Quality control of the reagents was done before hand along with the incorporation of appropriate negative control in all procedures. All the data was stored for future reference.

RESULTS

In the present study total 1,38,994 blood donors, constituting 98,485 (70.85%) number of voluntary donors and 40,509 (29.15%) number of replacement donors were screened (Figure 1).

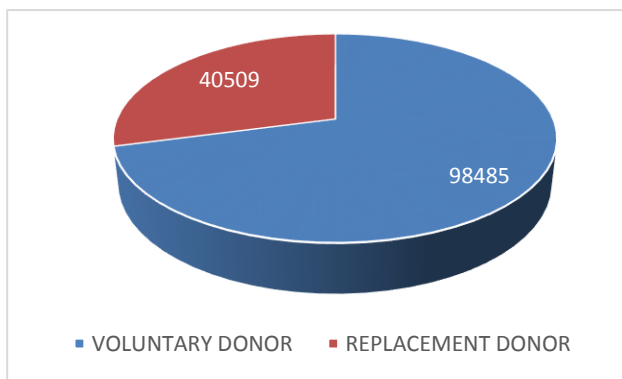


Figure 1: Number of voluntary and replacement donors.

The majority were male donors 1,31,420 (94.55%) in number, in comparison to female donors 7,574 (5.45%) in number (Figure 2). Total 1,012 (0.73%) cases were seropositive of which 631 cases (0.64%) were found in voluntary donors and 381 cases (0.94%) were seen in replacement donors (Figure 3). There was slight increase in the trend of seroprevalence of TTIs from 51 (0.35%) in 2010, 37 (0.23%) in 2011, 68 (0.40%) in 2012, 93 (0.43%) in 2013, 112 (0.52%) in 2014 and 307 (1.27%)

in 2015 to 344 (1.43%) in 2016 (Table 1). The seroprevalance of HBV, HCV, HIV, Syphilis and Malaria for this seven-year period were found to be 692(0.5%), 242(0.17%), 72(0.052%), 04 (0.001%), 02(0.0005%) respectively (Figure 4).

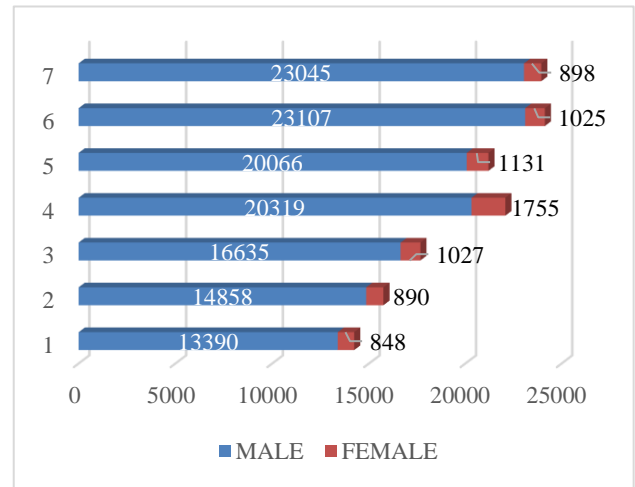


Figure 2: Number of male and female donors.

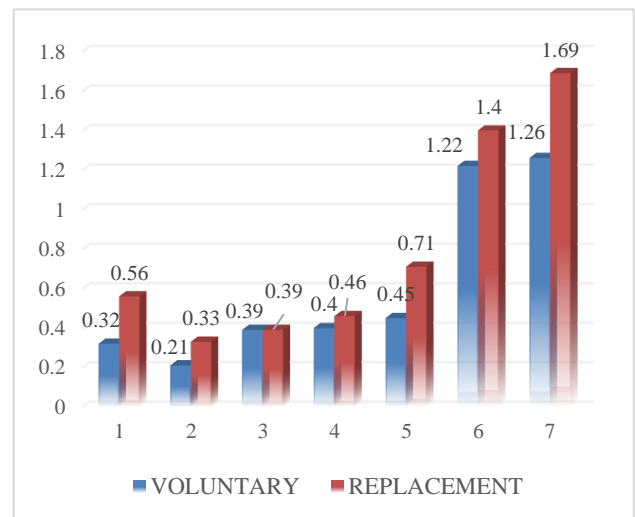


Figure 3: Trend of seroprevalence of TTIs among voluntary and replacement donors.

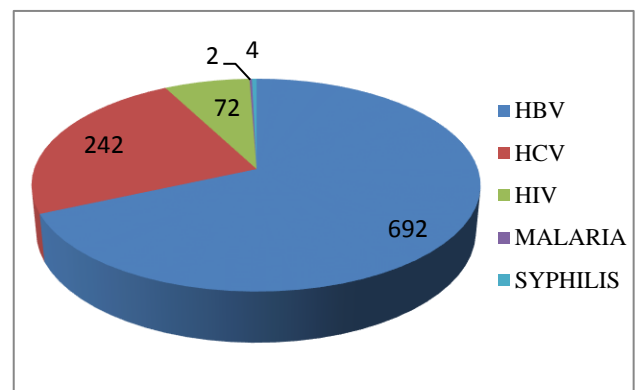


Figure 4: Spectrum of TTI among blood donors.

Table 1: Prevalence of TTIs among male and female donors in seven years.

Year	HBV		HCV		HIV		malaria		syphilis		Total
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
2010	23	7	5	2	1	0	0	0	0	0	51 (0.35%)
V R	7	4	2	0	0	0	0	0	0	0	
2011	17	4	3	2	1	0	0	0	0	0	37 (0.23%)
V R	7	2	1	0	0	0	0	0	0	0	
2012	49	0	1	0	1	0	0	0	0	0	68 (0.38%)
V R	17	0	0	0	0	0	0	0	0	0	
2013	58	1	0	0	3	0	0	0	0	0	93 (0.42%)
V R	28	0	0	0	3	0	0	0	0	0	
2014	50	0	12	0	3	0	0	0	3	0	112 (0.53%)
V R	34	0	8	0	2	0	0	0	0	0	
2015	116	0	74	0	15	0	1	0	0	0	307 (1.27%)
V R	55	1	33	0	9	1	1	0	1	0	
2016	115	3	48	0	13	0	0	0	0	0	344 (1.43%)
V R	94	0	51	0	20	0	0	0	0	0	
	670	22	238	4	71	1	2	0	4	0	1012

DISCUSSION

Blood transfusion being a life-saving procedure should be practiced with proper donor screening and testing practices for the supply of safe blood for transfusion free from TTIs.⁴ In the present study, the male donors (94.55%) outnumbered the female donors (5.45%). Indian females are subjected to more number of deferral at the time of blood collection due to various reasons like malnutrition, underweight, anaemia leading to reduced number of female blood donors. Hepatitis B virus and C virus have acquired worldwide importance as these are the commonest TTIs which are highly infectious and are the commonest cause of chronic liver diseases.¹ In the present study higher prevalence of HBV (0.5%) and HCV (0.17%) were seen among the blood donors. Viral Infections by HBV and HCV cause serious mortality and morbidity.⁵ A dual infection of HIV and HBV was seen in a donor in the present study whereas more number of dual infections were found in few previous studies.^{4,6} Prevalence of HBV varies from 1.86% to 4% in various Indian studies whereas we found the seroprevalence of 0.5% of HBV in our study may be due to proper pre-donation screening and counseling.⁷⁻⁹

WHO has estimated that more than two billion people in the world have been infected with HBV and about 257 million people are living with HBV infection (surface antigen positive) with majority in developing countries of Asia and Africa.¹⁰ About 3.9 million of people are affected by HCV with increased risk of liver cirrhosis.

Prevalence of HBV reactive donors differ in various countries. It is as low as 0.1 % to 0.5%, in United States and Western Europe whereas ranging from 5 to 20% in far Eastern and some tropical countries. There is variation in the seroprevalence of HCV being lowest in United States (0.1%) and highest in Egypt (24.8%).⁶ Various Indian studies indicate seroprevalence ranging from 0.4%-1.09%.^{7,11,12} Whereas in our study, we found the prevalence of HCV to be 0.17%. There is gradual increase in trend of prevalence of TTIs from 0.35% (2010) to 1.43% (2016). The reason may be due to overall increase in number of blood donors and use of third generation ELISA kit for screening of HIV, HCV and HBV testing instead of second generation kits used previously. There were more seropositive cases in replacement donors (0.94%) in comparison to voluntary donors (0.64%) similar to few other studies.¹³

This observation is consistent with the WHO viewpoint that remunerated blood donors and familial replacement donors are more likely to transmit transfusion-transmissible infections, compared to voluntary donors.

This encourages one to be focussed on promoting more voluntary blood donation camps which will decrease the incidences of seroprevalence and enhance the transfusion of safe blood and blood products. Despite various studies suggesting increase in the hepatitis infection not many steps have been taken for its prevention. The emphasis should be lead on the increase the knowledge and to change the attitude of the people.

The most important aspect is to handle the HIV transmission leading to social stigma along with many fatal complications by highlighting proper pre-counselling questionnaires, with deferring the donors after getting the slightest hint regarding their medical history and referring the seropositive HIV cases to Integrated Counselling and Testing Centre (ICTC) for counselling and treatment after the repeat test. To decrease the seroprevalence of TTIs, various measures like strict donor selection criteria, with donor counselling in a closed room to give him more privacy, dissuading donors with high-risk lifestyles and advice for TTIs screening, use of sensitive tests like Nucleic acid Amplification Test (NAT) with judicious use of blood and its components, should be implemented. The public awareness should be increased through enhancement of Information Education Communication (IEC), identification of high-risk subjects along with formulation of preventive strategies at both state and national levels to reduce the seroprevalence.

CONCLUSION

In future, the research work can be focused on comparison of NAT positive cases with ELISA seronegative cases, to propagate the use of these advance techniques for the screening of TTIs in the window period. Keeping in the increasing trend of seroprevalence of TTIs our ultimate goal should be to adopt fourth generation ELISA kits and more sophisticated technology like NAT to achieve supply of adequate number of safe blood to the patients and to avoid any further transmission of transfusion related dreaded infections.

Keeping in the increasing trend of seroprevalence of TTIs our ultimate goal should be to adopt fourth generation ELISA kits and more sophisticated technology like NAT to achieve supply of adequate number of safe blood to the patients and post donation counselling of the seropositive donors for the prevention of further transmission risks. In future, the research work can be focused on comparison of NAT positive cases with ELISA sero-negative cases, to propagate the use of these advance techniques for the screening of TTIs in the window period.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Mahapatra S, Ray GK, Panigrahi R, Parida P. The incidence and spectrum of transfusion transmitted infections among the blood donors. Int J Res Med Sci 2018;6:904-7.