



RESEARCH ARTICLE

SEROPREVALENCE OF TRANSFUSION TRANSMITTED INFECTIONS AMONG APPARENTLY HEALTHY BLOOD DONORS IN A TERTIARY CARE TEACHING HOSPITAL

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Abstract

Blood transfusions today are vital part of many medical and surgical therapies. Transmission of blood and blood products carry unwanted complication of transmission of dreadful infections. The diseases transmitted by blood are Human Immunodeficiency Virus (HIV), hepatitis B Virus (HBV), Hepatitis C Virus (HCV), syphilis, malaria commonly and infrequently Human T cell Lymphotropic Virus (HTLV) cytomegalovirus, Epstein Barr virus, brucellosis, Parvovirus B19. In recent years there are many newly discovered emerging infectious agents including viruses and prions. A retrospective cross sectional study was done from 2012 to 2014 where all the donor records were analyzed to know the seroprevalence of Transfusion Transmitted Infections. Blood sample was collected and tested for HBV, HCV, HIV, Syphilis and Malaria. Slide agglutination (Rapid Plasma Reagin) was used for Syphilis screening. Peripheral blood smears were examined for Malaria. Patient serum sample is separated in two sets for each and subjected for ELISA and ID-NAT respectively and concurrently. Seroprevalence of HIV, HBV, HCV and Syphilis are 0.14%, 1.1%, 0.05% and 0.005% respectively. In countries with a high incidence of infection like India it is mandatory to implement strict donor selection criteria, use of sensitive screening tests and strict guidelines for transfusion for reducing the incidence of TTI. So to reduce the risk of HBV transmission 100% voluntary donation, advanced technology such as nucleic acid testing (NAT) for donor screening, other factors such as public awareness, educational programs and mass immunization programs may help in decreasing the infection.

Keywords: Blood donors, Seroprevalence, Transfusion Transmitted Infections,

INTRODUCTION

Blood transfusions today are vital part of many medical and surgical therapies. Transmission of dreadful infections following a blood transfusion was reported way back in 1943 when there were series of seven cases of jaundice following transfusion of whole blood and plasma¹. However, it wasn't until a decade later that the National Blood Policy mandated a voluntary (unpaid) donation system in the United States to avoid these hazards². Despite the risk of hepatitis transmission, blood utilization continued to increase.

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and infrequently cytomegalovirus, Epstein Barr virus, brucellosis, Parvovirus B19. In recent years there are many newly discovered emerging infectious agents namely Transfusion Transmitted Virus (TTV), Human Herpes Virus 8 (HHV 8), Hepatitis G Virus (HGV), Sen Virus, West Nile Virus, and Prions present a unique challenge in assessing potential risk they pose to the safety of use of blood and blood products³.

Safe blood is the ultimate goal of all blood transfusions. WHO suggests integrated strategy of collection of blood from only from voluntary, non-remunerated blood donors, screening for all TTIs and reduction of unnecessary transfusion for providing safe blood and blood products⁴.

MATERIALS AND METHODS

A retrospective cross sectional study was done from January 2012 to December 2014. Study was conducted in Shimoga Institute of Medical Sciences Blood bank of McGann teaching hospital. All the blood donor records from January 2012 to December 2014 were analyzed. The permission from ethical committee was obtained.

Inclusion criteria

All the healthy blood donors screened and certified by a medical officer of blood bank. Donors of both genders with age group between 18 to 60 years were included in the study.

Exclusion criteria

Exclusion criteria are based on the criteria based on NACO guidelines. Apparently unhealthy or malnourished subjects, Subjects with previous history of HBV, HIV, HCV and other infections and routine exclusion criteria for rejecting any donor.

Methods

Blood sample was collected and tested for serology for HBV, HCV, HIV, Syphilis and blood smear examination for Malaria. Slide agglutination (Rapid Plasma Reagin) was used for Syphilis screening. Peripheral blood smears were prepared and screened for Malaria. Serum sample separated in two sets for each patient and subjected for ELISA and ID-NAT respectively and simultaneously. One serum sample was used for detecting anti HIV, anti HBV and anti HCV by ELISA (Enzyme Linked Immuno Sorbent Assay) and another serum sample of same donor was sent for IDNAT (Individual Donor Nucleic Acid Test) to higher centre in Bangalore. ELISA was done using third generation kits. ID-NAT was done by transcription-mediated amplification (TMA) by using The Procleix System by Gen-Probe and Novartis Diagnostics. Reports collected by mail and post. Thus we used both ELISA (Enzyme Linked Immuno Sorbent Assay) and ID NAT (Individual Donor Nucleic Acid Test) as double testing strategy to rule out any early infections. All the ELISA positive and ELISA negative, NAT positive samples are included in the study.

Statistical analysis

All the data obtained was subjected for appropriate statistical analysis.

RESULTS

There were total 18,684 blood donors during the study period. The donor group comprised predominantly of males (97.33%) and females accounting for 2.67%. There were 86% of voluntary donors and 14% of replacement donors in the study. Distribution of all the donor group is given in table 1. Out of these, 243 (1.3%) were positive for sero-markers for Transfusion Transmitted Infections (Table 2). Five of the sero positive voluntary donors were females.



Seroprevalence of HIV, HBV, HCV and Syphilis are 0.14%, 1.1%, 0.05% and 0.005% respectively (Table 3). No case of malaria was detected in any donor.

The numbers of blood donors have increased and sero-positivity for Transfusion Transmitted Infections (TTI)s decreased from 2012 to 2014. Voluntary donors have less frequency (1.14%) of TTI markers when compared to replacement donors (2.1%).

Table 1.Total blood collection and gender distribution of donors

Yr	VD	RD	TOTAL	Male	Female
2012	5293	1276	6569	6401	168
2013	5229	647	5876	5724	152
2014	5535	704	6239	6061	178
TOTAL	16,057(86%)	2,627(14%)	18,684(100%)	18,186(97.33%)	498(2.67%)

Table 2.TTI among blood donors

Year	Seropositive	Seronegative
2012	88	6481
2013	83	5793
2014	72	6171

Table 3. Incidence of HIV, HBV, HCV and Syphilis in blood donors

Year	Total	HIV	HBV	HCV	SYPHILIS	Total
2012	6569	15(0.23)	67(1.02)	05(0.07)	01(0.02)	88
2013	5876	04(0.07)	76(1.29)	03(0.05)	NIL	83
2014	6239	07(0.11)	63(0.93)	02(0.03)	NIL	72
TOTAL	18,684	26(0.14%)	206(1.1%)	10(0.05%)	01(0.005%)	243



Table 4. Comparison of prevalence of TTI in different parts of India

Place	HIV	HBV	HCV	Syphilis	Reference
Ludhiana	0.084	0.66	1.09	0.85	Gupta N et al ¹¹
Delhi	0.56	2.23	0.66		Pahuja S et al ⁸
Lucknow(UP)	0.23	1.96	0.85	0.01	Chandra T et al ¹⁸
South Haryana	0.3	1.7	1.0	0.9	Arora D et al ⁵
West Bengal	0.28	1.46	0.31	0.72	Bhattacharya P et al ⁶
Bangalore	0.44	1.86	1.02	1.6	Srikrishna A et al ¹⁰
Mysore	0.44	1.27	0.23	0.28	Pallavi G et al ¹²
Ahmadabad	0.16	0.98	0.11	0.23	Shah N et al ¹⁶
Present study	0.14	1.1	0.05	0.005	2015

DISCUSSION

The burden of TTI is still continues in developing countries when compared to western world where it has declined dramatically over two decades. Each blood transfusion carries 1% risk of transfusion associated complications including TTI⁵.

In the present study the numbers of blood donors have increased and sero-positivity for TTIs decreased from 2012 to 2014. VDs (Voluntary Donor) have less frequency of TTI markers when compared to RDs (Replacement Donor). In the present study total seropositivity is 1.3%. Majority (97.33%) of the donors in our study were males which is comparable to the studies done by others. Out of the total blood donors VD constituted 86%, while RD was 14%. This is comparable to the study done by Bhattacharya et al. who has noticed a predominance of VD⁶. Similar various studies have showed high seropositivity rate in RD compared to VD, which is an expected finding and similar findings was noted in our study^{7,8,9}. Data of TTI prevalence rate in different parts of India (Table 4).

In the present study we found that highest numbers of blood donors were having Hepatitis B (1.1%) followed by HIV (0.14%), hepatitis C (0.05%) and syphilis (0.005%). The sero-prevalence was <1% for all TTIs. Among these, highest prevalence was for hepatitis B but its prevalence was less as compared to 1.86 % which was found in Bangalore¹⁰ and 2.23% in Delhi⁸. Several surveys suggest that seroprevalence of HBV is different in different parts of India and higher rates seen in western and southern parts^{5,6}. Lowest prevalence rate is found in study by Gupta N et al¹¹. Our study is comparable to studies done by Pallavi et al¹². Jain R et al¹³ in their study detected 8(0.034%) new cases of HBV among seronegative donors. In our study seropositivity has decreased from 1.02% to 0.93% over three years and with a peak amidst



(1.29%). This irregular trend might be due to detection of more asymptomatic donors and detection of window period donations by IDNAT.

According to Indian National AIDS Control Organization (NACO) based report in 2005 an overall prevalence of HIV is 0.91% in India with 0.25% in Delhi^{8,14,15}. Indian blood donors are considered as third main source of HIV and the seroprevalence of HIV infection in the general population is 0.3%¹⁰. Our study reported a low prevalence of 0.14% which is comparable to study by Shah N et al¹⁶ (0.16%). In study by Leena MS et al the HIV seroprevalence was 0.27%¹⁷. The reported seroprevalence is far less than other studies from various parts of India (Table 4).

Seropositivity of HIV has decreased 0.23% to 0.11%. Our study correlates with the decreasing trend in the prevalence of HIV nationally^{14,15}. Low prevalence is attributed to avoidance of replacement donors. There have been strict screening measures and awareness is being created to reduce incidence of HIV.

The seroprevalence of Hepatitis C according to our study is 0.05%. It is comparable to study by Chandra T et al.¹⁸ (2009) in Lucknow. Seropositivity in present study reduced from 0.07% to 0.03% gradually over three years. Reduction in the HCV prevalence could be due to reduction in the replacement donors and younger voluntary donors. Similar smaller rate of prevalence (0.098%) is reported by K. Lathamani et al¹⁹. From 2013 onwards there were no new cases of syphilis in our study. Demographic data suggests that many studies have confirmed lower rate of prevalence of both HCV and Syphilis. This low rate of prevalence may be influenced by the awareness of blood borne viral infections among the blood donors. The incidence of syphilis is reduced over the study duration and the prevalence is very low being 0.005%. According to study by Turbadkar D et al Syphilis HIV and occur as coinfection and hence counseling and confirmatory tests are required to detect new cases of HIV²⁰. Chandra T et al. (2014)²¹ and Chandra T et al. (2009)¹⁸ in their study detected lowest seropositivity of Syphilis in Lucknow. Variation in the seropositivity of Syphilis could be due to the variation in the use of tests for Syphilis. Different VDRL or RPR (Rapid Plasma Reagin) kits may also contribute to the discrepancies in the results. No donor was tested positive for Malaria in our study which is similar to study done in Bangalore¹⁰. There are very few studies available for prevalence of Malaria.

CONCLUSION

Seroprevalence of TTI is found to be low in our study. This reduced TTI prevalence is an encouraging sign which shows the effectiveness of the changes introduced in the National Blood Transfusion Services. In countries with a high incidence of infection like India it is mandatory to implement strict donor selection criteria, use of sensitive screening tests and strict guidelines for transfusion for reducing the incidence of TTI. Even though the seroprevalence is low in our study, but among TTI's HBV infection is highest and it is nearly double in replacement donors compared to voluntary donors. So to reduce the risk of HBV transmission 100% voluntary donation, advanced technology such as nucleic acid testing (NAT) for donor screening, other factors such as public awareness, educational programs and mass immunization programs may help in decreasing the infection. NAT testing has helped in enhancing blood safety but zero percent of TTI remains a distant dream.



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