ORIGINAL RESEARCH PAPER

Pathology

KEY WORDS:
Seroprevalence, Transfusion transmitted infections, voluntary donors, replacement donors.

TRANSFUSION TRANSMISSIBLE INFECTIONS (TTIS)- TRENDS AND SEROPREVALENCE AMONG BLOOD DONORS AT BLOOD CENTER OF A TERTIARY CARE HOSPITAL- A 5 YEAR STUDY

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ABSTRACT

INTRODUCTION: Blood transfusion services is an integral part of every health care organization. It is the duty of every health care organisation to ensure safe blood for the patients by mandatorily screening blood and products for transfusion transmitted infections like Human Immunodeficiency Virus (HIV) , Hepatitis B Virus (HBV) , Hepatitis C Virus (HCV) , syphilis and malaria. Every unit of blood carries a 1% chance of transfusion transmitted diseases. Despite following WHO guidelines for screening of blood donors and blood, zero risk transfusion is still a distant dream because of the inability of the tests to detect disease in the window period of infection, immunologically variant viruses, immune-silent carriers and inadvertent laboratory testing errors. We conducted this 5 year retrospective study at our hospital based blood center located in National Capital Region of India, to analyse the trend of blood donors and to estimate the seroporevalence of HIV, HBV, HCV, syphilis and malaria among healthy blood donor population.

METHODS: A retrospective review of donor records was carried out over a 5 year period from January 2014 to December 2018. The trends of donors over the 5 year period was analyzed and the seroprevalence of HIV, HBV, HCV, syphilis and malaria was estimated.

RESULTS: A total of 16,855 units of blood were donated during the period comprising of 10,959 (65%) replacement and 5,896 (35%) voluntary donors. There were 16,451 (97.6%) males and 404 (2.4%) females. Total number of seropositive units was 392 (2.3%) . The overall prevalence of HIV, HBV, HCV, syphilis and malaria infections was found to be 0.25%, 1.3%, 0.5%, 0.2% and 0% respectively.

CONCLUSION: Strict criteria of donor selection and screening should be followed to ensure safe blood transfusion. More efforts are needed to encourage voluntary donations as voluntary donors are healthy donors with lowest rate of seroprevalence of TTIs. More female donors should be motivated for blood donation as the seroprevalence of TTI is low in the female donor population.

INTRODUCTION

Blood transfusion services is an indispensable part of every health care organization. Its prime objective should be to ensure safety, adequacy, accessibility and efficiency of blood supply at all levels as safe blood is the right of every patient.1 If proper screening of donated blood is not done infections like Hepatitis B and C, HIV, syphilis, malaria and infrequently toxoplasmosis, brucellosis and viral infections like CMV, EBV and Herpes can be transmitted.2 As per WHO it is mandatory to test blood before transfusion for HIV, HBV, HCV, syphilis and malaria.3 All these diseases are capable of not only causing significant mortality, morbidity but also have undesirable financial implications for both the affected person and the country. An infected person represents a pool for infection and can transmit the disease during its asymptomatic period thereby contributing to an ever broadening pool of infection in the population.4 Every unit of blood carries a 1% chance of transfusion transmitted diseases, the risk being higher in patients undergoing multiple transfusions5,6. Developed countries have successfully lowered the incidence of TTIs (Transfusion Transmitted Infections), however blood safety continues to be a major problem in developing countries.7 Risk of acquiring TTIs can be reduced by following an effective donor screening protocol for donor selection, counselling, using sensitive tests for screening and following effective discarding techniques for units that are reactive.8 The risk of transmitting TTIs has been found to be higher in replacement donors as compared to voluntary donors.9 As per the guidelines of the Ministry of Health & Family Welfare(Government of India) under the Drug and Cosmetic Act, 1945 it is mandatory to screen blood donors for HIV, Hepatitis B, Hepatitis C, syphilis and malaria.10 The donor screening strategies include taking detailed medical history, performing thorough clinical examination and screening for infectious markers which is performed using ELISA or rapid diagnostic kits. Nucleic Acid Testing (NAT) is done at only few centers in India. Despite these strategies transmission of diseases still occurs because of the inability of the tests to detect disease in the window period of infection, immunologically variant viruses, immune-silent carriers and inadvertent laboratory testing errors.

The aim of this 5 year retrospective study was to analyse the trend of blood donors at our hospital based blood center and to estimate the seroprevalence of HIV, HBV, HCV, syphilis and malaria among blood donor population as the prevalence of these diseases among blood donors, who are usually considered as healthy members of the society, reflects the apparent as well as hidden load in the population.

MATERIALS AND METHODS

We carried out a retrospective study at the blood center of our hospital. Records of blood donors which comprised of completely filled donor forms, counselling details and TTI records were analyzed over a 5 year period from January 2014 to December 2018. Blood was collected from apparently healthy donors who were selected by the standard criteria for donor eligibility. Detailed history was taken from the donors along with that thorough clinical examination was done in order to eliminate professional and paid donors. Basic information regarding age, sex, occupation, number of previous donations, complete physical examinations and informed consent was taken, as per the Drugs & Cosmetics Act and NACO guidelines. The donor group included replacement donors who donated for the patients and were family members, close relatives or friends of the recipient.

The voluntary donations primarily were obtained from walk in donors, students and employees of the institution and neighbouring colleges and outdoor blood donation camps. Detailed history was taken from the donors along with that thorough clinical examination was done in order to eliminate professional and paid donors. Basic information regarding age, sex, occupation, number of previous donations, complete physical examinations and informed consent was taken, as per the Drugs & Cosmetics Act and NACO guidelines. At the time of donation, blood samples were collected in one EDTA and one plain vacutainer. The samples were then screened using serological assays. All samples were screened for Hepatitis B surface antigen (ELISA, J.Mitra & Co.), Human Immunodeficiency Virus (ELISA, J.Mitra & Co.), Hepatitis C Virus (ELISA, J. Mitra & Co.), Venereal Disease Research Laboratory test VDRL (RPR, Tulip Diagnostics Ltd.) and Malaria by rapid card test (J.Mitra & Co.). All kits used were FDA approved. Tests were performed according to the manufacturer's instructions. The donated blood was discarded whenever the donor sample was found positive for any TTI.

RESULTS :

A total of 16,855 units of blood were donated during the period, Jan 2014 to Dec 2018 and comprised of 10,959 (65%) replacement and 5,896 (35%) voluntary donors (Table 1). Our donor population consisted of 16,451 (97.6%) males and 404 (2.4%) females. Thus the number of male donors far exceeded that of female donors (Table 2) . Total number of seropositive units was 392 (2.3%) . The overall prevalence of HIV, HBV, HCV, Syphilis and malaria infections was found to be 0.25%, 1.3%, 0.5%, 0.2% and 0 % respectively (Table 3). HBV was the most common TTI (1.3%) , followed by HCV (0.2%) , HIV (0.25%) , syphilis (0.2%) . There was no incidence of malaria in any blood donor. Incidence of TTI was maximum in the age group 18-30 years (Table 4) . Out of 392 seropositive donors, male donors were 384 (98%) and female donors were 8 (2%) (Table 5). Amongst the 392 seropositive donors, 248 (63.3%) were replacement donors and 144 (36.7%) were voluntary donors (Table 6) .

TABLE 1: YEARLY DISTRIBUTION DATA FOR BLOOD DONORS

Year	Total donations	Total voluntary donations N (%)	Total replacement donations N (%)
2014	2115	826 (39)	1289 (61)
2015	3298	1181 (35)	2117 (65)
2016	3753	1212 (32.3)	2541 (67.7)
2017	3686	1149 (37.2)	2537 (62.8)
2018	4003	1528 (38.2)	2475 (61.8)
Total	16,855	5,896 (35)	10,959 (65)

TABLE 2: YEARLY DISTRIBUTION DATA (SEX WISE) FOR BLOOD DONORS

Year	Total donations	Males N (%)	Females N (%)
2014	2115	2,066 (97.6)	49 (2.4)
2015	3298	3,219 (97.6)	79 (2.4)
2016	3753	3,672 (97.8)	81 (2.2)
2017	3686	3,584 (97.2)	102 (2.8)
2018	4003	3,910 (97.7)	93 (2.3)
Total	16,855	16,451 (97.6)	404 (2.4)

TABLE 3: PREVALENCE OF HIV, HBV, HCV, SYPHILIS AND MALARIA IN BLOOD DONORS

Year	Total donations	HIV N (%)	HBV N (%)	HCV N (%)	Syphilis N (%)	Malaria N (%)
2014	2115	14(0.66)	33 (1.56)	20 (0.94)	2 (.09)	0
2015	3298	6 (0.18)	49 (1.48)	18 (0.54)	3 (0.09)	0
2016	3753	6 (0.15)	54 (1.43)	18 (0.48)	17 (0.4)	0
2017	3686	15 (0.4)	39 (1.05)	24 (0.65)	8 (0.22)	0
2018	4003	2 (0.04)	45 (1.12)	14 (0.35)	5 (0.12)	0
Total	16,855	43 (0.25%)	220 (1.3%)	94 (0.5%)	35 (0.2%)	0

TABLE 4: AGE WISE DISTRIBUTION OF HIV, HBV, HCV, SYPHILIS AND MALARIA IN BLOOD DONORS

Age group (Years)	HIV N (%)	HBV N (%)	HCV N (%)	Syphilis N (%)	Total N (%)
18-30	20 (46.5)	120 (54.5)	49 (52.1)	16 (45.8)	205 (39.6)
31-40	13 (30.2)	75 (34.1)	30 (32)	10 (28.6)	128 (24.7)
41-50	7 (16.3)	23 (10.4)	13 (13.8)	3 (8.5)	46 (8.9)
>50	3 (7)	2 (1)	2 (2.1)	6 (17.1)	13 (25.1)
Total	43	220	94	35	392

TABLE 5: SEX WISE DISTRIBUTION OF HIV, HBV, HCV, SYPHILIS AND MALARIA IN BLOOD DONORS

TTI	TOTAL	Males N (%)	Females N (%)
HIV	43	42 (97.7)	1 (2.3)
HBV	220	215 (97.7)	5 (2.3)
HCV	94	94 (100)	0
Syphilis	35	33 (94.3)	2 (5.7)
Total	392	384 (98)	8 (2)

TABLE 6: DISTRIBUTION OF HIV, HBV, HCV, SYPHILIS AND MALARIA ACCORDING TO DONOR TYPE

TTI	Replacement donors N (%)	Voluntary donors N (%)
HIV	30 (69.7%)	13 (30.2%)
HBV	140 (63.6%)	80 (36.4%)
HCV	61 (64.8%)	33 (36.2%)
Syphilis	17 (48.5%)	18 (42.5%)
Total	248 (63.3)	144 (36.7)

DISCUSSION :

Provision of safe blood transfusion services is the duty of every health care organization since transfusion transmissible infectious diseases carry long term consequences for the recipients. The prevalence of TTIs in the apparently healthy blood donor population can give an idea of the unnoticeable infections and provide data which may help in developing strategies for improving the blood safety in blood banks.4 In this 5 year retrospective study carried out at the blood center of our hospital, we found that the number of replacement donors (65%) exceeded the number of voluntary donors (35%). Similar finding was noted in studies by Makroo et al11 and Geethalakshmi et al12 . Giriyan et al reported the number of replacement donors as 63.2 % in their study which is comparable to our findings of 65% replacement donors.13 Replacement donors are usually one time blood donors who donate blood only when a relative or friend is in need while voluntary donors are motivated donors who donate at regular intervals.14 Even though government is taking steps towards promotion of voluntary donation there is a general lack of awareness and understanding among general population about voluntary blood donation. To increase the voluntary donor database Government has allowed private and Corporate blood banks to hold voluntary blood donation camps. However still a lot more needs to be done to spread awareness about voluntary blood donation. Percentage of male donors (98%) far exceeded that of female donors (2%) in our study. Similar trend was noted in the study by Shah et al15 and Pailoor et al16 . Our findings are at par with those of Yadav et al who found the number of female donors in their study to be 1.62%7 . The reasons for a low number of female donors can be because of traditional thinking of Indian society, taboos associated with blood donation and increased deferral rate among female donors due to mostly females being anemic and underweight. Efforts must be taken to improve the number of female donors as the risk of TTIs is usually less among the female donors. In our study we found 2% prevalence of TTIs among female donors as compared to 98% in male donors. Similar findings were seen in studies by Arora et al5 , Makroo et al11 , Chandekar et al17

and Sharma et al1.

Awareness regarding blood donation can be spread among female population by holding voluntary blood donation camps in women's colleges and educating them regarding the benefits of blood donation.

In the present study we found that out of total 16,855 blood units collected, overall seropositivity rate was 2.3%. Mondal et al in their study found an overall seropositivity rate of 2% which is almost similar to our study.19 We found a higher seropositivity rate of TTIs in replacement donors as compared to voluntary blood donors. Similar finding was seen in the studies by Arora et al5 and Singh et al9. That is why there is an emphasis on promoting voluntary non-remunerated regular blood donors. In a hospital based blood bank more than 90% of the blood donors are replacement donors. However since voluntary blood donation camps have been allowed for private and corporate blood banks more voluntary blood donations can be encouraged. The overall seroprevalance of HIV, HBV, HCV, syphilis was 0.25%,1.3% , 0.5 % and 0.2% respectively in our 5 year retrospective study. Studies have reported prevalence rates ranging from : HIV (0.15-0.92%) ; HBV (1.2-3.2%) ; HCV (0.2-0.98%).20,21,22 Makroo et al reported in their study the overall seroprevalences of HIV, HBV, HCV and syphilis as 0.24%, 1.18%, 0.43% and 0.23 % respectively which are almost similar to our findings.

We found a 0% prevalence of malaria in our study. Studies by Sawke et al23 and Chandra et al24 also showed 0% prevalence of malaria. The age group most commonly affected by TTIs in our study was 18-30 years. The prevalence of TTI in this age group was 39.6% followed by 24.7% in the age group of 31-40 years. This may be due to the fact that the period of 18-30 years is period of increased sexual activity and high risk behaviour may be exhibited in this age group. Our findings are concurrent with the findings of Yadav et al.7 Mondal et al also reported in their study increased prevalence of TTIs in the age group of 38 to 47 years followed by 28 to 37 years.

In our study there has been a decline in the prevalence of HIV from 0.66% to 0.04% over the 5 year period. Similar decreasing trend has been noted in studies of Rawat et al8 and Giriyan et al1.

CONCLUSION

Our study shows that seroprevalance of various TTIs at our center is in concordance with that seen in other parts of India. Seroprevalance of TTIs is higher in males as compared to females. Seroprevalence is higher in replacement donors as compared to voluntary donors. Therefore efforts should be made at all levels to encourage voluntary donation. We recommend that strict counseling and high sensitive methods of donor blood screening should be implemented to make transfusion a safe process for the patient and the donor.

FUNDING : Nil

CONFLICTS OF INTEREST : None declared.

ACKNOWLEDGEMENTS : I acknowledge management of Sarvodaya Hospital, my colleagues and family members for their support and encouragement.

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