

SEROPOSITIVITY OF TRANSFUSION TRANSMITTED INFECTIONS IN BLOOD DONORS IN BLOOD BANK, TERTIARY CARE CENTRE OF PEDIATRIC INSTITUTE SPMCH HOSPITAL, JAIPUR

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ABSTRACT

Introduction: Transfusion transmitted infections can cause major risk to safe blood transfusion can cause acute or delayed complications including HIV, hepatitis B and C, syphilis, malaria etc. hence, to prevent transmission of these disease screening tests on blood bags is an important step for blood safety. **Objective:** To Study the Seroprevalence of Transfusion Transmitted infections in healthy blood donors in blood bank, tertiary care centre of pediatric institute SPMCH hospital, Jaipur. **METHODS:** This retrospective study was carried out in blood donors in blood bank over a period of 14 months from August-2018 to September 2019. Serum samples were screened for hepatitis b surface antigen (HBsAg), Antibodies to Human immunodeficiency virus (HIV I & II), HCV, syphilis and malaria. **Results:** A total of 6540 healthy donors were included in the study. The overall seroprevalence was 122 (1.87%). Out of which HIV was 7 (0.107%), HBsAg was 80 (1.22%), HCV was 9 (0.137%), VDRL was 26 (0.40%) and malaria was 0 (0%). **Conclusion:** Methods to ensure a safe blood supply should be encouraged. For that, stringent donor selection criteria and NAT technology should be implemented.

Keywords: Hepatitis B Surface Antigen, hepatitis C virus, human immunodeficiency virus, seroprevalence, transfusion transmitted infections.

INTRODUCTION

Transfusion of blood and blood products is a life-saving modality but it is also an important mode of infection to the recipient so it should be judiciously used. The magnitude of the problem of transfusion-transmitted disease (TTD) varies from different population and area depending on the diseases prevalence. (1)

In developing countries prevalence of transfusion transmitted disease (TTD) is much higher and far from attaining “Zero risk” level at the present occasion. (2) Each unit of transfusion can carry 1% chance of transfusion transmitted infections (TTIs).

There are many infectious agents like viruses, parasites and bacterias which can be transmitted through blood transfusion. Among them important transfusion transmitted viruses are human immunodeficiency virus (HIV-1/2), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Parvovirus B19, and Cytomegalovirus (CMV) etc.

Since a donor can transmit an infectious disease during in its asymptomatic phase, an infection can contribute to ever-widening pool of infection in the society.(3) In present time in spite of more sensitive methods to detect markers of TTIs, the problem of false negative results occurs due to prevalence of asymptomatic carriers in society,

blood donation during “Window Period”, high genetic variability in viral strains and technical mistakes. Preventions of TTIs is one of the greatest challenge of transfusion medicine. (4)

As per guideline of ministry of health and family welfare (government of India) under Drugs and Cosmetic Act, 1945, all blood donors are screened to be against five major infections HIV 1 and 2, HBs Ag, HCV, Syphilis and Malaria.

12.5% of patients who received blood transfusion are at risk of post-transfusion hepatitis.(5) Hepatitis B is one of the most common disease transmitted by blood and infected million people worldwide including an estimated 400 million chronically infected cases (6). Individual with chronic infections have a high risk of developing liver cirrhosis and hepatocellular carcinoma. (7)

Blood transfusion has been the root of transmission in upto 15 % of the total patients infected with human immunodeficiency virus (HIV). (8)

Evaluation of TTIs are essential for assessing the safety of blood supply and monitoring the efficiency of currently employed screening procedures. (9)

This study was carried out to determine the seroprevalence and trends of TTIs among blood donors of Blood bank tertiary care centre of paediatric institute SPMCH Hospital, SMS Medical college, Jaipur.

MATERIAL AND METHODS

A Retrospective study was carried out at our institution where data were analyzed over a period of 14 months from August-2018 to September-2019.

Blood was collected from apparently healthy individuals after detail history and examination, aged 18-60 years, weight >45 Kg, Hemoglobin Concentration >12.5 gm%. All Blood donors sample

were screened for HIV I &II, Hepatitis B Surface Antigen (HBs Ag), HCV, Syphilis by following techniques:

- A. Anti HIV IgG and IgM antibodies and p24 antigen detection by ELISA method by using 4th Generation HIV Antigen and Antibodies detection Kit.
- B. For detection of (HBsAg) 4th Generation sandwich ELISA technique was used.
- C. For detection of Anti HCV IgG and IgM 3rd Generation ELISA kit was used.
- D. For screening of Syphilis rapid plasma reagin method for antibody detection was used.
- E. For Malaria, Rapid visual Malaria Antigen card test was used.

Tests were performed as per manufacturer instructions. All the reactive samples were tested again before labeling them Seropositive and were discarded as per the guideline.

RESULTS

Total 6540 donors were screened and studies who have been donated for their patients/relative in Blood Bank and those who had donated in various indoors and outdoors camps organized by JK Ion (SPMCH) hospital blood bank.

Among total 6540 donations 5721 donors were replacement donors with percentage prevalence of 87.47 and 819 donors were belongs to voluntary blood donors group with percentage prevalence of 12.53. Donors belonged to age group ranging from 18 to 60 years. Maximum donors were in 18-30 years age group with percentage prevalence of 62.7%.

Table 1 Profile of seropositive blood donors

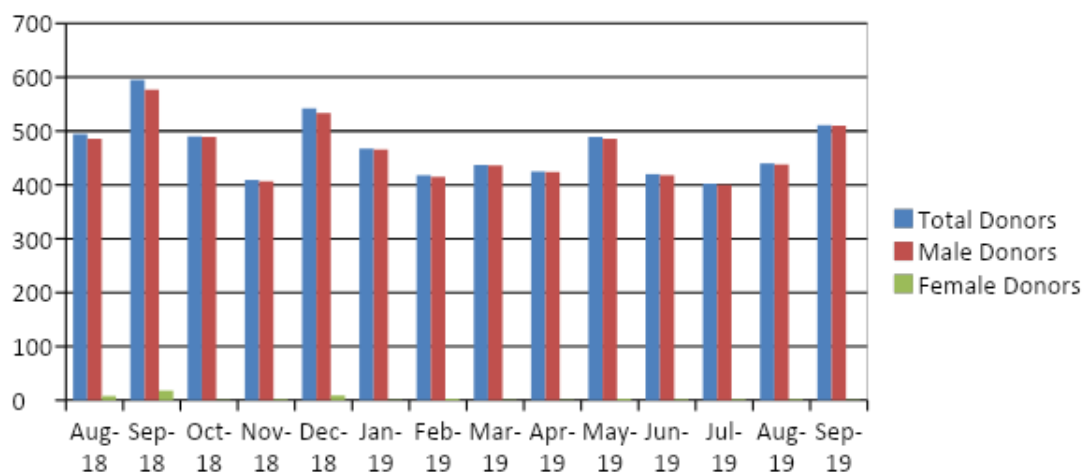
Characteristics	HIV	HBsAg	HCV	Syphilis	
Age Group	18-30	03 (0.04%)	45 (0.68%)	07 (0.10%)	10 (0.15%)
	31-40	04 (0.06%)	26 (0.39%)	01 (0.01%)	10 (0.15%)
	41-50	00 (0.00%)	07 (0.10%)	01 (0.01%)	03 (0.04%)
	51-60	00 (0.00%)	02 (0.03%)	00 (0.00%)	03 (0.04%)
Gender	Male	7 (0.107%)	78 (1.19%)	09 (0.14%)	25 (0.38%)
	Female	00 (0.00%)	02 (0.03%)	00 (0.00%)	01 (0.015%)

Out of total 6540 donations, 6486 were male and 54 were female donors

Table 2: Monthly male-female donors

Month	Total Donors (%)	Male (%)	Female (%)
Aug-18	494 (100)	486 (98.4)	8 (1.60)
Sep-18	595 (100)	577 (97.0)	18 (3.00)
Oct-18	490(100)	489 (99.7)	1 (0.30)
Nov-18	409(100)	407 (99.5)	2 (0.50)
Dec-18	542(100)	533 (98.3)	9 (1.70)
Jan-19	467(100)	466 (99.7)	1 (0.30)
Feb-19	418(100)	415 (99.3)	3 (0.70)
Mar-19	437(100)	436 (99.8)	1 (0.20)
Apr-19	425(100)	424 (99.8)	1 (0.20)
May-19	489(100)	486 (99.4)	3 (0.60)
Jun-19	420(100)	418 (99.5)	2 (0.50)
Jul-19	402(100)	400 (99.5)	2 (0.50)
Aug-19	440(100)	438 (99.7)	2 (0.30)
Sep-19	511(100)	510 (99.8)	1 (0.20)
Total	6540	6486 (99.17)	54 (0.83)

Fig. No. 1: Monthly male-female donors

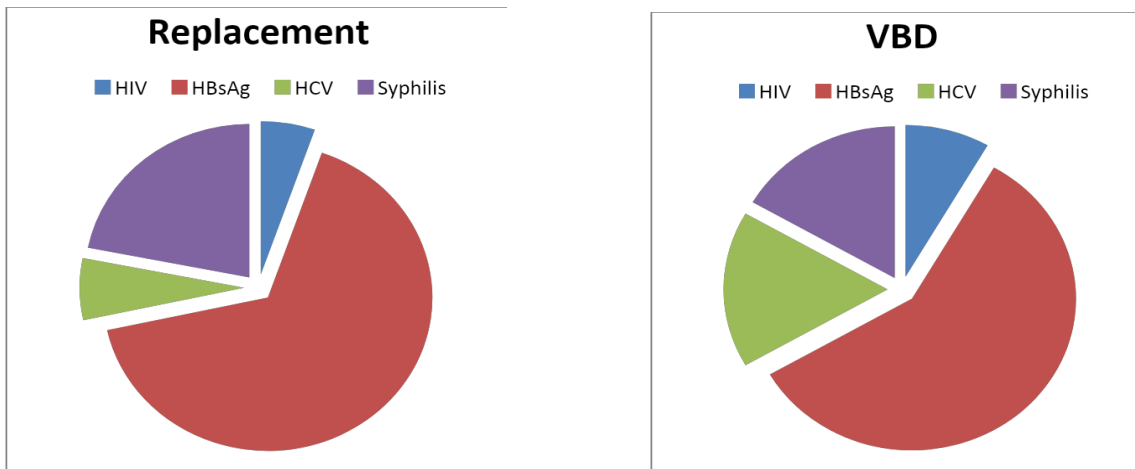


122 (1.87 %) Blood donors had serological evidence of infection with at least one pathogen, Seroprevalence of HIV, HBsAg, HCV, Syphilis is 0.107%, 1.22%, 0.14%, 0.40% respectively, No case was found malaria Positive. Seroprevalence of TTI in replacement donors are more than voluntary blood donors respectively 1.69 % and 0.18%

Table No. 03: Seroprevalence of TTI in replacement donors are more than voluntary blood donors

TTI	Replacement		Voluntary		Total	
	Donors No.	%	Donors No.	%	Donors No.	%
HIV	06	0.09	01	0.015	07	0.107
HBsAg	73	1.12	07	0.107	80	1.220
HCV	07	0.11	02	0.030	09	0.137
Syphilis	24	0.37	02	0.030	26	0.400
Total	110	1.69	12	0.182	122	1.870

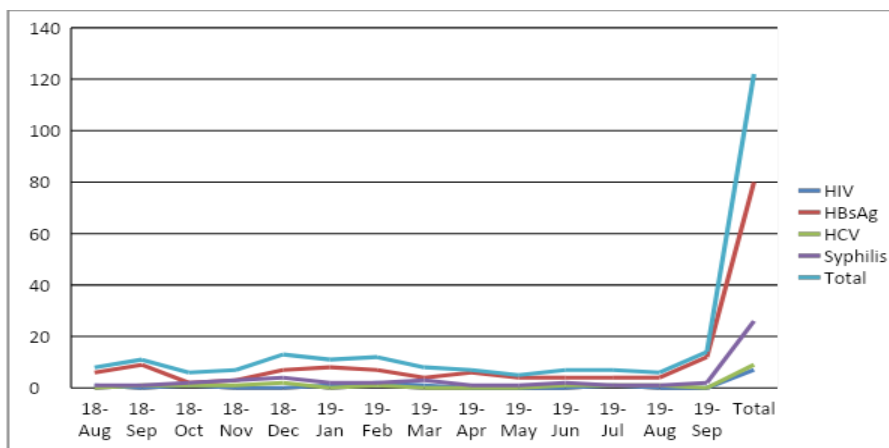
Fig No. 2: Seroprevalence of TTI in replacement donors are more than voluntary blood donors



The Trends in Seroprevalence of HIV, HBsAg, HCV, Syphilis of the 14 months period are shown in Table 04: Trends in Seroprevalence of HIV, HBsAg, HCV, Syphilis

	HIV	HBsAg	HCV	Syphilis	Total
Aug-18	1	6	0	1	8
Sep-18	0	9	1	1	11
Oct-18	1	2	1	2	6
Nov-18	0	3	1	3	7
Dec-18	0	7	2	4	13
Jan-19	1	8	0	2	11
Feb-19	2	7	1	2	12
Mar-19	1	4	0	3	8
Apr-19	0	6	0	1	7
May-19	0	4	0	1	5
Jun-19	0	4	1	2	7
Jul-19	1	4	1	1	7
Aug-19	0	4	1	1	6
Sep-19	0	12	0	2	14
Total	7	80	9	26	122

Fig. No. 3: Trends in Seroprevalence of HIV, HBsAg, HCV, Syphilis



DISCUSSION

TTIs continue to be a threat to safe transfusion practices. With every one unit of blood there is a 1% possibility of transfusion-associated risk including TTIs (10). Professional donors and donors with high-risk behavior such as drug addict, homosexuals, and prostitutes constitute the major risk segment. The risk of TTI has declined dramatically in high-income nation over the past two decades. But the same may not hold good for the developing countries. The national policy for blood transfusion services in our country is of recent origin and the transfusion services are hospital-based and fragmented (11).

In current study replacement donors (87.47%) were more as compared to voluntary donors (12.53%) which is comparable with most of the similar studies in India where percentage of replacement donors was more than the voluntary donors. Prevalence of replacement and voluntary donors in Gupta et al (12) is 60.2% and 39.7%, in Makroo et al (13) 96.9% and 3.06% respectively. Cause of less voluntary donations maybe lack of awareness and presence of social and cultural interdiction in society.

A better response towards blood donation in the present study was seen in the younger age group i.e. (62.7%) in 18-30 years followed by (25.3%) in 31-40 years which is comparable with the study by Sethi et al (14) where majority of donors (41.12%) were from age group of 18- 25 years. The reafter, the contribution towards blood donation decrease with increase in age in both voluntary as well as replacement donors, the donors beyond 50 years

contributing the least. Females donors contribute very less which are 54(0.83%) only. The prevalence of female donors in current study is comparable to Makroo et al(13), Dobariya et al(15) where prevalence was around 4.14 % and 2.84% respectively. Since more males qualified following the criteria of fitness and a higher proportion of males came for voluntary donations, especially in camps. During donor screening deferral rate of females was higher than males because of anemia, during menstruation and other fitness issues like lactation etc.

Over all seroprevalence of TTI in study population reported was 122 (1.87%). Seroprevalence of HIV, HBsAg, HCV, Syphilis was 7(0.107%), 80(1.22%), 9(0.13%), 26(0.40%) respectively. Prevalence of infections (HIV, HBsAg, HCV, Syphilis) in present study among replacement donors were 06(0.09%), 73(1.12%), 07(0.11%), 24 (0.37%) respectively while in that of voluntary donors were 01(0.015%), 07(0.107%), 02(0.030%), 02(0.030%) respectively. Studies like Makroo et al (13), Jain et al (16) replacement donors have shown high seropositivity rates of TTI compared to voluntary donors. A similar finding was observed in present study. This emphasizes the importance of repeat, non-remunerated, regular voluntary donations. The discrepancy of TTI seropositivity in replacement / relative versus voluntary donors in various studies including present study may be due to the large number of replacement / relative donors compared to the voluntary donors. Lack of knowledge about TTI probably accounted for high infection in replacement blood donors.

Table 5 Comparison of Prevalence of TTI in Various Studies in India

Study/year	Study Region	Total TTI	HIV	HBsAg	HCV	Syphilis
Makroo et al ¹³ (2014)	Delhi	2.09%	0.24%	1.18%	0.43%	0.23%
Sethi et al ¹⁴ (2014)	Uttarakhand	1.05%	0.19%	0.63%	0.20%	0.02%
Dobariya et al ¹⁵ (2016)	Gujrat	1.34%	0.081%	0.98%	0.09%	0.16%
Giri et al ¹⁷ (2012)	Maharashtra	1.97%	0.07%	1.09%	0.74%	0.07%
Sastry et al ¹⁸ (2014)	Pune	0.92%	0.28%	1.23%	0.41%	-
Leena et al ¹⁹ (2012)	South India	1.35%	0.27%	0.71%	0.14%	0.10%
Sundaramurthy et al ²⁰ (2016)	Tamilnadu	1.12%	0.13%	0.42%	0.56%	-
Chandra et al ²² (2009)	Lucknow	3.05%	0.23%	1.96%	0.85%	0.01%
Present Study	Jaipur	1.87%	0.107%	1.22%	0.14%	0.40%

In the present study seropositivity of HIV was reported in 07(.0107%) donors, which is comparable to other studies from India those reported lower or almost similar prevalence of present study like

Dobariya et al (15), Giri A et al(17) 0.081%, 0.07% respectively. While Sastry et al (18), Leena et al (19), Sundramurthy et al (20) reported higher prevalence rate of HIV among blood donors than

current study that was 0.28%, 0.19%, 0.24%, 0.27 %, 0.13% respectively. All the HIV seropositive donors were males and no female donor was found to be HIV seropositive. With replacement donor constituting 06 (0.09%) and voluntary donor 01(0.015%).

Seroprevalence of hepatitis B in present studies noted was 1.22% which is higher than certain previous studies done in various regions in India like Dobariya et al (15), Sethi et al (14), Makroo et al (13) and Giri et al (17) where seroprevalence of Hepatitis B was reported 0.98%, 0.63%, 1.18%, 1.09% respectively. Whereas seroprevalence of Hepatitis B in current studies was lower than certain studies which were done in various regions of country like Bommanahalli et al (21), Chandra et al (22), Chandekar et al (23) where prevalence rate was 2.12%, 1.96%, 1.30% respectively. In India the highest prevalence has been reported among the aborigines of Andaman as well as from Arunachal Pradesh (24). HBsAg reactive females are very less in numbers which are only two in entire study. The highest rate of HBsAg positivity in the 18-30 years old age group which is 45 (0.68%), Whereas the finding of Mustapha and Jibribn 25 noted maximum seropositivity was in the 41-50-year-old age group.

Seropositivity of HCV among present study population was 0.14% which is lower than other studies in India as Chandekar et al (23), Sundramurthy et al (20), Sastry et al (18), Sethi et al (14), Makroo et al (13) and Giri et al (17), was 0.25%, 0.56%, 0.41%, 0.20%, 0.43%, 0.74%, respectively. Seroprevalence rate of HCV drastically varies in different parts of India. No female donors were found reactive for HCV in entire study. Maximum seropositivity was seen in 18-30-year-old age group which was 07(0.10%). Transfusion syphilis being a nosocomial infection, can easily be acquired in where blood is not screened for syphilis or stored before use as in the case of fresh whole blood transfusion. Seropositivity of syphilis in present study population was 0.40%, which was second highest after HBsAg. Prevalence rate of syphilis in current study was higher than various other studies done in India like as Chandekar et al (23), Makroo et al (13), Dobariya et al (15), where seroprevalence was 0.28%, 0.23%, 0.16% respectively only one female donor was found reactive for syphilis. Both age groups 18-30 years old and 31-40 years old had same seropositivity that was 10 (0.15%).

CONCLUSION

Blood safety is vital for the prevention and control of transfusion transmitted infections. It is well to reduce the incidence of TTI's in Indian scenario with the implementation of strict donor selection criteria and use of sensitive screening tests. Since most of the need of blood is fulfilled by replacement donor, great efforts are required to create awareness among people to help narrow the gap between the demand and supply of blood. This can be ensured by education the general population about the benefits of donation, clearing the myths associated, advertising the ever increasing demand and assuring a felicitous environment.

Though the risks of infections associated with blood transfusions are declining, a lot is still to be done to improve access and accountability of the health services. Achievements of these goals are only possible through greater awareness, motivation to participate and supplying the laboratories with advanced and affordable technologies. More sensitive and more specific Nucleic Acid Testing (NAT) based screening systems for TTIs should be introduced in blood bank to screen donors.

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