

Seroprevalence of Transfusion Transmitted Infections among Blood Donors – A 5-Year Tertiary Care Hospital Study at Western Ahmedabad

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Abstract

Background: Transfusion transmitted infections (TTIs) are still a major threat to society as screening methods employed are not 100% full proof and long window periods of these infections.

Aim: The aim of this study is to estimate the seroprevalence of major TTIs in Western Ahmedabad and to highlight the important measures to reduce its prevalence rate.

Materials and Methods: This retrospective study was conducted at GMERS Medical College and Civil Hospital, Sola, Ahmedabad, from September 2012 to August 2017 with strict blood donor screening criteria. Serum of the accepted donors was tested for hepatitis B surface antigen (HBsAg), antibodies to human immunodeficiency virus (HIV) Type 1 and 2, hepatitis C virus (HCV) using the third generation enzyme-linked immunosorbent assay kits; syphilis using rapid plasma reagin card test, and malaria by peripheral smear study.

Results: A total of 8844 donors were accepted. Majority (97.98%) were male donors. Voluntary donors were more than replacement donors. Overall, seroprevalence of TTIs was 1.27%. Among TTIs hepatitis B had highest seroprevalence (0.75%), followed by HCV (0.23%), HIV (0.14%), and syphilis (0.13%). No donors were positive for malaria. There was increasing yearly trend of hepatitis B during 5-year study. TTI prevalence was higher in replacement donors (0.89%) as compared to voluntary donors (0.38%).

Conclusion: We should ensure safe blood supply to the recipients and lower the rate of TTIs by focusing on four key measures: Stringent donor screening, encouraging voluntary donor recruitment, introducing highly sensitive screening tests, and proper education of seropositive donors.

Key words: Blood donor, Hepatitis B virus, Hepatitis C virus, Human immunodeficiency virus, Syphilis and malaria, Transfusion transmitted infections

INTRODUCTION

As a part of integrated strategy of any well-organized blood transfusion service to provide safe blood supply to the recipients, blood should be collected from voluntary

non-remunerated donors tested for transfusion transmitted infections (TTIs) and unnecessary blood transfusions must be avoided.^[1] It has claimed that with every unit of blood, there is a 1% chance of transfusion-associated complications including transfusion transmitted diseases.^[2] Unsafe blood transfusions ultimately cost human lives and communities in terms of morbidity, mortality, and socioeconomic consequences. Human immunodeficiency virus (HIV) prevalence in adult population in India is 0.2–0.3%,^[3] hepatitis B surface antigen (HBsAg) prevalence varies from 1% to 3% with an average of 4.7%,^[4] hepatitis C virus (HCV) carries in India are around 12–13 million.^[5] As per drug and cosmetic act, 1945 (amended from time to

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time) and NACO (National AIDS Control Organization) guidelines, it is mandatory to test every single blood unit for HIV, hepatitis B virus (HBV), HCV, syphilis, and malaria.^[6] In India, NACO has recommended the third and fourth generation enzyme-linked immunosorbent assay (ELISA) testing for antibodies to HIV I and II.^[7] The present study was conducted with the aim to assess the seroprevalence of TTIs among apparently healthy blood donors (BDs) at our blood bank and to emphasize the critical importance of measure to reduce the rate of TTIs.

MATERIALS AND METHODS

This retrospective study was conducted over a period of 5 years from September 2012 to August 2017 at the blood bank of GMERS Medical College, Civil Hospital, Sola, Ahmedabad, Gujarat, after Approval of Ethical Committee of our institute. Data were collected from the records of blood bank. All voluntary donors (in-house donors and outdoor blood donation camps organized by blood bank) and replacement donors (from relatives and friends of the patients admitted at Sola Civil Hospital) were included in the study. Predonation counseling and screening was done as per “donor registration and consent form” and standard operating procedure of our blood bank. Donors aged 18–60 years with weight >45 kg and hemoglobin concentration > 12.5 g% were accepted. Hemoglobin concentration was measured by Hemocue 301 instrument. Serum samples of all BDs were allowed to clot manually at room temperature and then centrifuged at 2500 rpm for 5 min to obtain serum and then tested for HIV, HBV, HCV, syphilis, and malaria. For HIV, HBsAg, and HCV third generation,

ELISA kits (for Anti-HIV Type I and II - Erba Lisa HIV by Transasia Biomedicals Ltd.; for HBsAg – Merilisa by Meril Diagnostics Pvt., Ltd.; and for HCV - Erba Lisa HCV by Transasia Biomedicals Ltd) were used. Syphilis was tested by rapid plasma reagin card test by Reckon Diagnostics Pvt., Ltd. Malaria testing was done by thick

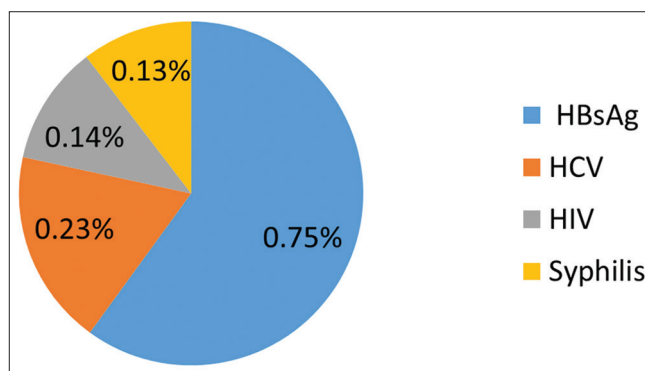


Figure 1: Pattern of seroprevalence in the prFGCsent study

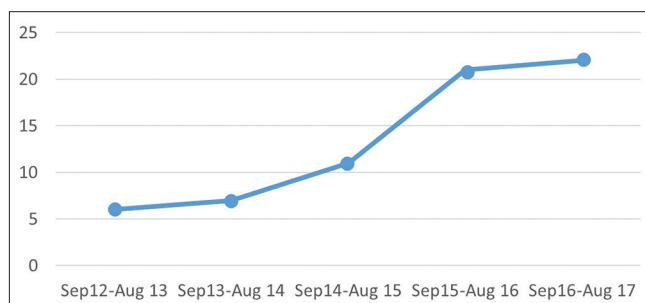


Figure 2: Yearly increasing trend of hepatitis B virus seropositivity

Table 1: Age and sex wise distribution of non-reactive and reactive donors

Age group	Male		Female		Total	
	Number of donors	Reactive	Number of donors	Reactive	Number of donors	Reactive
18–20	1214	07	38	00	1252	07
21–30	3029	40	76	00	3105	40
31–40	2169	29	40	00	2209	29
41–50	1250	26	15	01	1265	27
51–60	1004	10	09	00	1013	10
Total	8666	112	178	01	8844	113

Table 2: Year wise trend of voluntary and replacement donors with their TTI status

Year	Voluntary donors		Replacement donors		Total	
	Number of donors	TTI positive	Number of donors	TTI positive	Number of donors	TTI positive
Sep 12-Aug 13	1187	11	206	04	1393	15
Sep13-Aug 14	1243	03	447	10	1690	13
Sep14-Aug 15	1334	05	334	13	1668	18
Sep15-Aug 16	1234	04	327	29	1561	33
Sep16-Aug 17	1637	01	895	23	2532	24
Total	6635	34	2209	79	8844	113

TTI: Transfusion transmitted infection

and thin peripheral smear examination using Field's stain. Collected data were entered into Microsoft Excel sheet. Statistical analysis was done by Statistical Package for the Social Sciences Version 17. Qualitative data were assessed by frequency and percentage table. The association among various study parameters was determined by Chi-square test and $P < 0.05$ was considered as statistically significant.

RESULTS

A total of 8844 donors were accepted. Most of them were male (8866–97.98%); female donors were only 178 (2.02%) [Table 1]. Voluntary donors were more (6636–75.02%) as compared to replacement donors (2209–24.98%) [Table 2]. Age group wise distribution of the donors show that majority (5314–60%) of BDs were from 21 to 40 years age group with 69 (61% of total positive) seropositive donors among them [Table 1]. Of total BDs, 113 (1.27%) were seropositive. Among them, 13 donors were HIV positive, 67 donors were HBsAg positive, 21 donors were

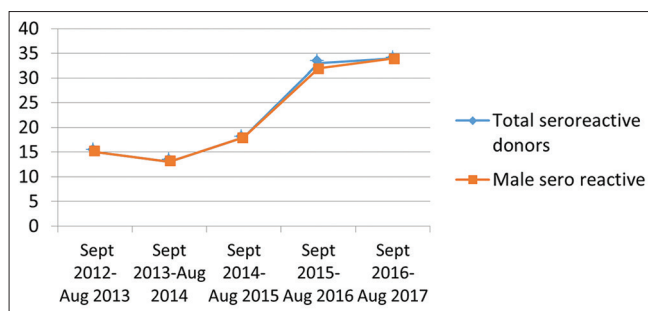


Figure 3: Increasing yearly trend of seroprevalence in male donors

Table 3: Year wise trend of seroprevalence of TTIs

Year	HIV	HBV	HCV	Syphilis	Malaria	Total
Sep12-Aug 13	04	06	03	02	00	15
Sep13-Aug 14	01	07	04	01	00	13
Sep14-Aug 15	00	11	05	02	00	18
Sep15-Aug 16	02	21	04	05	00	32
Sep16-Aug 17	06	22	05	02	00	35
Total	13	67	21	12	00	113
Seroprevalence (%)	0.14	0.75	0.23	0.13	0.00	1.27

TTI: Transfusion transmitted infection, HIV: Human immunodeficiency virus, HBV: Hepatitis B virus, HCV: Hepatitis C virus

Table 4: Comparison of seroprevalence of TTIs among other studies in India

Author and year	Place	HIV (%)	HBV (%)	HCV (%)	Syphilis (%)
Bhawani et al. 2004–2009	Andhra Pradesh	0.39	1.41	0.84	0.08
Jasani et al. 2004–2011	Piparia-Vadodara	0.25	1.35	0.16	0.90
Chandekar et al. 2007–2012	Mumbai	0.26	1.3	0.25	0.28
Karmakar et al. 2009–2011	Kolkata	0.60	1.41	0.59	0.23
Arya et al. 2010–2015	Bikaner	0.10	1.60	1.18	0.89
Present study 2012–2017	Ahmedabad	0.14	0.75	0.23%	0.13%

TTI: Transfusion transmitted infections, HIV: Human immunodeficiency virus, HBV: Hepatitis B virus, HCV: Hepatitis C virus

HCV positive, and 12 donors were positive for syphilis [Table 3]. Hence, overall estimated seroprevalence for TTIs is 1.27% and that of HIV, HBsAg, HCV, and syphilis were 0.14%, 0.75%, 0.23%, and 0.13%, respectively [Figure 1]. Of all seropositive donors, 34 were voluntary donors and 79 were replacement donors having overall seroprevalence of 0.38% and 0.79%, respectively [Table 2]. Increasing yearly trend of HBsAg during 2012–2017 was observed [Figure 2]. All the donor tested were negative for the presence of malarial parasite.

DISCUSSION

Among BDs, dominance of male donors (97.98%) and voluntary BDs (75.02%) was observed. In developing countries like India, because of social taboo and cultural habits, female donors hesitate to donate blood as well as iron deficient and menstruating age group females are deferred during screening because of low hemoglobin percentage. Male donors also showed increasing yearly trend of seropositivity [Figure 3]. Overall, seroprevalence of TTIs was 1.27%. HBV showed highest seroprevalence (0.75%) which is statistically significant ($P < 0.001$). HCV, HIV, and syphilis had seroprevalence of 0.23%, 0.14%, and 0.13%, respectively [Figure 1]. These findings are comparable with other Indian studies like Bhawani et al.,^[8] Jasani et al.,^[9] Chandekar et al.,^[10] Karmakar et al.,^[11] and Arya et al.^[12] [Table 4]. All these studies show highest prevalence of hepatitis B among TTIs. The present study also showed increasing yearly trend of HBV during 5 years [Figure 2]. HBV positivity suggests either a carrier state or an active infection. HIV transmission is possible during “window period” even if each unit is tested for HIV antibodies. This can be minimized by better selection of low-risk donors by stringent screening. Overall, seroprevalence was lower in voluntary non-remunerated donors (0.38%) than in replacement donors (0.89%). All BDs were found negative for malaria as presenting symptoms of malaria such as fever; weakness renders the patients from donating blood as well excluded by screening and examination.

CONCLUSION

In the present study, overall, seroprevalence of TTIs was 1.27% with highest rate and increasing yearly trend of HBV was observed. Replacement donors were found harboring more TTI rate. This alarms us about the fact that TTIs are inevitable in health care setups and we must take adequate measures to lower the risk and prevalence of TTIs such as strict donor screening, voluntary donor recruitment, and retention strategies access to highly sensitive assays such as nucleic acid testing and effective education of reactive donors.

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