

Transfusion Transmissible Diseases – Is There a Decreasing Trend in Recent Years?

VIMAL MOUROUGUSSINE, SOWMYA SRINIVASAN, RAMYA GANDHI

ABSTRACT

Introduction: The magnitude of the problem of Transfusion Transmissible Infections (TTI) varies in different communities depending on the load of TTI in that particular population.

Aim: To find the seroprevalence and trend of TTIs among the blood donors in a local community in Southern India.

Materials and Methods: The data of donors who were screened in the blood bank of a tertiary care hospital for TTI including HIV, HBV, HCV, Syphilis (VDRL) and Malarial parasite for a period of 4 years from January 2012 to December 2015 was collected. Both voluntary and replacement donors were included.

Results: Out of total 8136 donors, 2.91% of the blood donors

(0.85% of voluntary donors and 2.06% of the replacement donors) were positive for any of the TTIs. The seroprevalence of HIV, HBV, HCV, Syphilis and Malaria among voluntary donors was 0%, 0.79%, 0.02%, 0.04% and 0% respectively and among replacement donors was 0.06%, 1.49%, 0.11%, 0.36% and 0.04% respectively. None of them had co-infections.

Conclusion: The seroprevalence rate of TTI in our study is generally less than that of other studies from various parts of globe. The seroprevalence rate of HIV in our study is 0 among voluntary donors and is very negligible among replacement donors. None of the donors had co-infections. There is a generalized reducing trend of TTI because of increase in public awareness through social media and organizations.

Keywords: Blood donor, Blood transfusion, Donor awareness, Donor screening, Seroprevalence

INTRODUCTION

Transfusion of blood and its components forms the backbone of the health care delivery system in any country. With the rapid advancements in the medical and surgical fields, need for more blood products is in rise especially in the field of transplantation, cardiothoracic surgeries, cancer management and in the management of many hematological conditions. Meeting such raised needs and simultaneously ensuring the safety of the blood products issued is always a challenging task for developing nations like India where the prevalence rate of Transfusion transmitted Infections (TTI) like HIV (0.5%), HBsAg (1.4%) and HCV (0.4%) is high as compared to that of developed nations like US [HIV (0.0097), HBsAg (0.3%) and HCV (0.07%).

The importance of screening donor blood for infectious diseases was realized in the mid 1982, when the first case of AIDS in Hemophiliacs and first possible case of AIDS in an infant was reported. In 1983, the Centre for Disease Control (CDC) Atlanta, USA recommended the screening tests for detecting blood borne infections [1]. The Drug and Cosmetic Act of 1945 of the government of India, under the guidelines of Ministry of Health and family Welfare made the screening of Blood donors mandatory for Infectious diseases like HIV I and HIV II, Hepatitis B, Hepatitis C, Syphilis and Malaria.

The magnitude of the problem of TTI's varies from nation to nation and within a country varies in different region depending on the load of the TTI in that particular population. In western world, the risk of TTI had declined dramatically in the last two decades because of the effective pre-screening methodologies [2]. However, developing nations still pose a challenge of TTI because majority of the national policies on safe transfusion practices are hospital based and are fragmented. The presence of asymptomatic carriers and donors in window period of the infection further adds to the magnitude of the problem. Though, there are many studies to find the seroprevalence of TTI among blood donors available from the Western world and Northern India, such studies from Southern part of the country is less. Thus, this study was done to find the seroprevalence of TTIs among the blood donors in a local community of Puducherry, in Southern India.

AIM AND OBJECTIVES

This study aimed to find the seroprevalence of TTI like Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis (HCV), Syphilis and Malaria among blood donors (both voluntary and replacement donors) in a Tertiary Health Care Hospital in Puducherry region. This study also

aimed to find the burden of these infectious diseases and their basic epidemiology in the rural community of Southern part of India and also to evaluate the efficacy of meticulous donor screening procedures on the trend of incidence in seroprevalence rate of TTIs.

MATERIALS AND METHODS

This was a retrospective hospital record-based study conducted at the Blood Bank of Sri Manakula Vinayagar Medical College and Hospital, a tertiary care hospital in Puducherry, India. Data were collected for a period of 4 years from January 2012 to December 2015. The blood collections were carried out both from the voluntary as well as replacement donors. The donors were screened with standard blood donor selection criteria using questionnaire as per guidelines of National AIDS Control Organisation (NACO) and Ministry of Health and Family Welfare with emphasis on history of any high risk behavior. This was followed by meticulous physical examination by a Medical Officer, hemoglobin estimation and blood grouping. Blood was collected from the fit donors after obtaining written consent. The blood was then screened for standard test kit

for TTI including HIV, HBV, HCV, syphilis (VDRL) and malarial parasite.

The seropositive blood products were discarded.

STATISTICAL ANALYSIS

The data of the donors positive for each TTI was entered year wise in Microsoft office excel worksheet. The percentage and proportion of donors for each TTI was calculated.

RESULTS

There were a total of 8136 donors screened over a period of 4 years (January 2012 to December 2015). Out of them, 4108 (50.5%) were voluntary and 4028 (49.5%) were replacement donors. Out of the voluntary blood donors, 4071(99.1%) were males and 37(0.9%) were females and in replacement donors also males contributed to 3992(99.1%) and Females were 36(0.8%). The yearly, gender wise distribution of the donors in both voluntary and replacement categories is shown in [Table/Fig-1]. The prevalence of markers of TTI's is shown in [Table/Fig-2]. In the present study, 2.91% of the blood donors (0.85% of voluntary donors and 2.06% of the replacement donors) were positive for any of the TTIs.

Year	Total Donors	Voluntary donors			Replacement donors		
		Male	Female	Total	Male	Female	Total
2012	2055	1077	10	1087	963	5	968
	(%)	(52.4%)	(0.5%)	(52.9%)	(46.9%)	(0.2%)	(47.1%)
2013	1977	973	7	980	986	11	997
	(%)	(49.2%)	(0.4%)	(49.6%)	(49.9%)	(0.5%)	(50.4%)
2014	2126	1065	14	1079	1032	15	1047
	(%)	(50.1%)	(0.7%)	(50.8%)	(48.5%)	(0.7%)	(49.2%)
2015	1978	956	6	962	1011	5	1016
	(%)	(48.3%)	(0.3%)	(48.6%)	(51.1%)	(0.3%)	(51.4%)
Total	8136	4071	37	4108	3992	36	4028
	(%)	(50%)	(0.5%)	(50.5%)	(49.1%)	(0.4%)	(49.5%)

[Table/Fig-1]: Yearly, gender wise distribution of voluntary and replacement donors.

Year	HIV		HBsAg		HCV		VDRL		MP	
	V	R	V	R	V	R	V	R	V	R
2012	0	0	18	37	0	3	1	4	0	1
	(0)	(0)	(0.88)	(1.8)	(0)	(0.15)	(0.05)	(0.19)	(0)	(0.05)
2013	0	1	12	42	0	2	1	3	0	2
	(0)	(0.05)	(0.6)	(2.12)	(0)	(0.1)	(0.05)	(0.15)	(0)	(0.1)
2014	0	1	15	23	0	3	2	10	0	1
	(0)	(0.05)	(0.7)	(1.1)	(0)	(0.15)	(0.1)	(0.5)	(0)	(0.05)
2015	0	3	20	20	2	1	0	13	0	0
	(0)	(0.15)	(1)	(1)	(0.1)	(0.05)	(0)	(0.7)	(0)	(0)
Total	0	5	65	122	2	9	4	30	0	4
	(%)	(0)	(0.06)	(0.79)	(1.49)	(0.02)	(0.11)	(0.04)	(0.36)	(0)

[Table/Fig-2]: Prevalence of markers of transfusion transmissible infections among both voluntary and replacement donors in the study population.

HBsAg: Hepatitis B surface antigen; HCV: Hepatitis C Virus; VDRL: Venereal disease research laboratory; HIV: Human immunodeficiency virus; V: Voluntary donors; R: Replacement donors.

The seroprevalence of HIV, HBV, HCV, Syphilis and Malaria among voluntary donors in the study population was 0%, 0.79%, 0.02%, 0.04% and 0% respectively and among replacement donors, 0.06%, 1.49%, 0.11%, 0.36% and 0.04% respectively.

DISCUSSION

In this study there is a slight predominance of the voluntary donors 4108 (50.5%) as compared to replacement donors 4028 (49.5%). This finding is similar to the study by Bhattacharya et al., [3] but the findings were contrasting to that of other studies by Kakkar et al., [4], Singh et al., [5], Pahuja et al., [6], Singh et al., [7] and Arora et al., [8]. From these results it is evident that in most parts of the countries, replacement donors out-number the voluntary donors. This is due to lack of awareness about blood donation and misconception about blood donation procedures.

The results of the present study is in concordance with similar other studies [6,7,9] that prevalence of TTI is higher among the replacement donors (2.06%) as compared to voluntary donors (0.85%). Some of the studies [8,10] even showed very negligible rate of seropositive voluntary donors. This finding further emphasizes the need for blood donation camps to encourage voluntary blood donation in public.

The overall prevalence rate of TTI among blood donors in this study is 2.91%. The results of the similar studies showed an overall prevalence rate of 0.57% to 9 [Table/Fig-3]. In India the individual reported prevalence of TTI among the blood donor ranges from 0.66% to 12% for Hepatitis B, 0.5% to 1.5% for Hepatitis C, 0.084% to 3.87% for HIV, 0.85% to 3% for syphilis and 0.02% to 0.12% for malaria [10-12].

The present study shows, Hepatitis B to be the most prevalent TTI among the donors (0.79% of voluntary donors and 1.49% of replacement donors) which is similar to other studies from India [5,13-16] inspite of the fact that major concern for

the safety of blood products is focused on transmission of HIV. Hepatitis B infection is a vaccine preventable disease and a potent vaccine is available since 1982. But still the prevalence of Hepatitis B is still higher than other TTI and this can be attributed to the fact that Hepatitis B vaccination is not included as a part of national immunization schedule.

The seroprevalence rate of HIV infection among the donors in the present study is 0.06 among the replacement donors and none of the voluntary donors is seropositive in the study period of 4 years. India harbors a huge load of HIV patients being second in the world next to South Africa and WHO report says that the HIV transmitted through blood transfusion carries a huge viral load and it causes an early full blown disease and death in children and adults [8]. Zero seroprevalence rate of HIV among the voluntary donors in our 4 years study period further emphasizes the need to encourage voluntary blood donation. In our study even the seroprevalence rate of 0.06% among replacement donors is very negligible compared to most of the similar studies [13-20]. Meticulous screening procedures involving a detailed History taking of the donors before blood donation can eliminate the risk of HIV transmission through transfusion to a great extent as in our case.

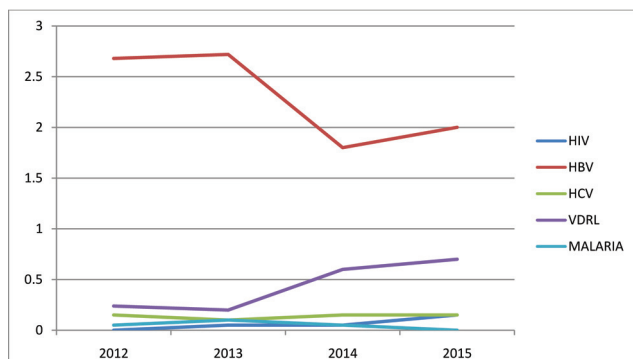
The seroprevalence rate of HCV infection is 0.02 among the voluntary and 0.11 among the replacement donors which is less than that of similar studies [5,13,15,17]. The seroprevalence rate of HCV is less than HBV in most studies and this can be due to the fact that HCV spreads predominantly through blood transfusion. But HCV infection carries a significant rate of chronicity and progresses to cirrhosis and Hepatocellular Carcinoma than HBV infection.

In this study, 0.04% of the voluntary and 0.36% of the replacement donors showed a reactive VDRL and is similar to other studies. Though false positive VDRL can occur in some cases, generally positive VDRL indicates a high risk

Authors	Study period	Years	Total donors	HIV		HBV		HCV		VDRL		MP		Overall Prevalence rate
				V	R	V	R	V	R	V	R	V	R	
Garg et al., [14]	1994 - 1998	5	46957	0.27	0.46	2.57	3.53	0.0	0.32	0.13	0.24	-	-	7.52
Singh et al.,[5]	1997 - 1999	3	52500	0.8	0.8	1.2	1.9	1.3	3.0	-	-	-	-	9
Sharma et al.,[17]	1997 - 2002	7	235461	0.32	0.45	0.91	1.26	0.23	0.52	0.26	0.57	-	-	4.52
Negi et al.,[15]	2000 - 2010	11	53069	0.05	0.23	0.21	1.06	0.20	0.78	0.04	0.39	0.0	0.005	3
Kaur et al.,[13]	2001 - 2005	5	42439	0.15	0.44	0.65	1.07	0.3	0.5	0.14	0.48	-	-	3.73
Rajak et al.,[18]	2001 - 2011	11	146885	0.04	0.29	0.46	1.38	0.02	0.08	0.01	0.3	-	-	1.5
Chattoraj et al.,[19]	2003 - 2005	3	6751	0.13		0.99		0.19		0.62		-		1.93
Bhawani et al.,[20]	2004 - 2009	6	8097	0.39		1.41		0.84		0.08		-		2.72
Fernandes et al.,[24]	2007 - 2009	3	9599	0.04	0.02	0.19	0.14	0.03	0.03	0.07	0.04	0.01	-	0.57
Sunderam et al.,[16]	2008- 2012	5	63803	0.08		1.01		0.14		0.03		0.33		1.6
Present Study	2012 - 2015	4	8136	0	0.06	0.79	1.49	0.02	0.11	0.04	0.36	0	0.04	2.91

[Table/Fig-3]: Comparison of TTI in present study with similar other studies.

HBsAg: Hepatitis B surface antigen; HCV: Hepatitis C Virus; VDRL: Venereal disease research laboratory; HIV: Human immunodeficiency virus
V: Voluntary donors; R: Replacement donors.



[Table/Fig-4]: Comparison of prevalence of Various Transfusion Transmissible infections in different years.

HBV: Hepatitis B Virus; HCV: Hepatitis C Virus; VDRL: Venereal disease research laboratory; HIV: Human immunodeficiency virus.

donor and more chance of having other TTI like HIV and HBV even in the window period. Advanced techniques using Nucleic acid amplification (NAT) can be used for detecting HIV, HBV and HCV antigens even in the window period. But these tests are costlier and cannot be done on all donors in a developing nation like India, but can be reserved for suspected high risk patients.

In this study, 0.04% of the replacement donors were positive for malarial parasite and none of the voluntary donors showed positivity. The detection of this subclinical malarial infection is important because though the donors are asymptomatic with the malarial infection, the severity of the infection will be more pronounced in blood recipients who are previously diseased especially in pregnant women and in children [21].

Few studies have found the prevalence of more than two TTI among donors. Mathai et al., [22] reported 0.03% and Kaur et al., [23] reported 0.05% seroprevalence rate of co-infection among donors in their study. In our study, none of our donors had co-infections.

In this study we found that there is a generalized reducing trend of TTI [Table/Fig-4] and this can be attributed to effective donor screening procedures which includes a detailed history taking and many of the high risk donors are filtered at the screening phase itself. Further increase in public awareness about transmission of these diseases through social media and organizations also contributes for this declining trend.

LIMITATIONS

Limitation of our study is it reflects the trend of TTI in our local community and the reducing trend may also be because of meticulous screening of donors and the rejection of possible TTI positive donors at the screening stage itself. More such studies are needed in various communities to have an overall view about the general trend in the nation.

CONCLUSION

There is a slight predominance of the voluntary donors as

compared to replacement donors. The seroprevalence rate of HBV, HCV, Syphilis and Malaria in our study is generally less than that of other studies from various parts of India. The seroprevalence rate of HIV in our study is 0 among voluntary donors and is very negligible among replacement donors. None of the donors had co-infections. There is generalized reducing trend of TTI because of increase in public awareness about transmission of these diseases through social media and organizations. Meticulous screening procedures involving a detailed history taking of the donors before blood donation can eliminate the risk of TTI to a further great extent.

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