

Seroprevalence and Trends of HIV, HBV, HCV and Syphilis Markers Among Blood Donors In Western Vidarbha Region

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Abstracts: Background: Transfusion transmissible diseases continue to be a threat to safe transfusion practices. We analyzed the prevalence and trends of HIV, HBV, HCV and Syphilis markers among voluntary and replacement blood donors in a 6 years retrospective study from January 2010 till December 2015 at the blood bank Government Medical College and Hospital Akola, Maharashtra. Aims & objectives: To access the seroprevalence and trends of HIV, HBV, HCV and Syphilis markers among blood donors and access the level of blood safety. Methods: A total of 36781 healthy blood donations were screened for Anti-HIV IgG and IgM antibodies (ELISA method using fourth generation Microlisa HIV Ab detection), HBsAg (Hepalisa Microwell ELISA), Anti- HCV IgG and IgM (third generation HCV Microlisa Microwell ELISA) and Rapid Card test for Treponema pallidum. Result: Out of these, 31904(86.74%) were voluntary donors and 4877 (13.26%) were replacement donors. Total 605 bags tested positive for transfusion transmissible infections. The average prevalence in percentage was found to be 1.64%. The overall seroprevalence rate of HIV, HBV, HCV and syphilis among the blood donors was 0.24%, 1.24%, 0.15% and 0.005% respectively. Conclusion: The screening of blood is the only way to prevent transfusion associated complications and this should be rigorously implemented. There is a need to stress more stringent donor selection criteria to ensure a safer blood supply. [Ajay J NJIRM 2017; 8(3):7-11]

Key Words: Seroprevalence, Blood donors, Transfusion transmissible infections (TTIs) and Enzyme linked Immunosorbent assay (ELISA)

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Introduction: Blood transfusion is an integral part of medical treatment and blood safety remains an issue of major concern in transfusion medicine. The discovery of transfusion transmissible infections (TTIs) has heralded a new era in blood transfusion practice worldwide with emphasis on two fundamental objectives, safety and protection of human life.¹ Even during asymptomatic phase an apparently healthy donor can transmit an infection thus increasing the prevalence of various infections in general population, hereby putting an additional burden on the nation's economy in terms of health care services.²

Blood transfusion carries the risk of major infections such as hepatitis, human immunodeficiency virus (HIV), syphilis and malaria. In minority cases viral infections such as cytomegalovirus, herpes virus and Epstein bar virus along with toxoplasmosis and brucella may be transmitted.^{3,4} HIV, hepatitis B virus (HBV) and hepatitis C virus (HCV) are of great concern because of their prolonged viremia and carrier or latent state. They also cause fatal, chronic and life threatening disorders. Blood transfusion accounts for 5-10% of HIV infections in sub-Saharan Africa.⁵ In India there are 2-3 million HIV infected people with the prevalence of 0.31% among adults.⁶ Infection by HBV and HCV viruses is the most common cause of

post transfusion hepatitis. 12.5% of patients who received blood transfusions are at risk of post transfusion hepatitis.⁵ The national average for HBV positivity in healthy donor population in India is around 4.7%.⁶ whereas prevalence rate of HCV in India is approximately 1.8% - 2.5%.⁶ Routes of transmission of HBV are transfusion of infected blood, during birth and by unprotected sex, also by sharing infected needles and has relatively higher prevalence in tropics and is highly contagious.^{7,8}

Syphilis is believed to have infected 12 million people worldwide in 1999, with greater than 90% cases in the developing countries.⁹ Syphilis is a systemic disease caused by *Treponema pallidum* which can be spread by sexual contact, blood transfusion and via vertical transmission.⁵

The continuous monitoring of the magnitude of transfusion transmissible infections in blood donors is important for estimating the risk of transfusion. Knowledge of area wise prevalence of TTIs will explain the density of infection and help in development of donor recruitment strategies to minimize infectious disease transmission and safe blood transfusion. Hence the study was conducted to determine the seroprevalence and trends of HIV, HBV, HCV and

syphilis infections among blood donors in western vidarbha region of central India.

Methods: The study was carried out in the blood bank, Department of Pathology, Government Medical College and Hospital Akola over a period of 6 years from January 2010 to December 2015. It was a retrospective study. All blood donations collected during this period were included. A total of 36781 healthy blood donors (Both voluntary and replacement) were reviewed for hepatitis B, hepatitis C, human immunodeficiency virus (HIV) and syphilis from the records of the blood bank of the institute.

The donor were selected and screened thoroughly, as per the National Aids Control Organization and State Blood Transfusion Council guidelines. All the blood donors were pre counseled and they were asked to fill a form as a part of routine blood donation screening procedure. In this form, the donors give their consent and they authorized the blood bank to test their blood as per the law and to use it as it was deemed fit. Donors with Hb level less than 12.5 gm% or known seropositive for any of TTIs were excluded and deferred. The information regarding the risk factors like history of surgery, hospitalization, blood transfusion, high risk behavior and tattoo marks were specially taken. All the reactive samples were repeat tested before they were labelled as seropositive.

Donors samples were screened for:

1. ABO blood grouping and RH typing. ABO and RH groups determination was carried out using monoclonal blood grouping antisera; anti-A, anti-B, anti-AB and anti-D by Biotech Laboratories Ltd, Great Britain.
2. Laboratory diagnosis of HIV I and HIV II. Anti-HIV IgG and IgM antibodies, by ELISA method using fourth generation Microlisa HIV Ab detection Kit by Transasia, Pvt, Ltd.
3. Laboratory tests for HBsAg and HCV antibodies. HBsAg, using Hepalisa Microwell ELISA by Transasia, Pvt,Ltd. Anti- HCV IgG and IgM, using third generation HCV Microlisa Microwell ELISA by Transasia, Pvt, Ltd.
4. Laboratory tests for syphilis. Card test for Treponema pallidum by Bio Diagnostics, Pvt, Ltd. The data retrieved was tabulated annually. The statistical analysis was done using SPSS software and prevalence is expressed in terms of percentage.

Result: A total 36781 units of blood were collected over a period of 6 years. Among these 86.74% from voluntary donors whereas 13.26% were from replacement donors. The number of donation increased during the past 6 years from 5378 in 2010 to 7468 in 2015. Out of these 36370 (98.88%) were males while females comprised 411 (1.12%) [Table 1].

Table 1: Distribution of blood donors in study population

Year	Total	Replacement (%)	Voluntary (%)		Males (%)	Females (%)
			Blood Bank	Camp		
2010	5378	533 (9.91)	2689 (50)	2156 (40.09)	5276 (98.10)	102 (1.90)
2011	5888	599 (10.17)	3297 (56)	1992 (33.83)	5757 (97.78)	131 (2.22)
2012	5882	499 (7.63)	4138 (70.35)	1295 (22.02)	5836 (99.22)	46 (0.78)
2013	5744	804 (14)	3582 (62.36)	1358 (23.64)	5708 (99.37)	36 (0.63)
2014	6421	1185 (18.46)	3386 (52.73)	1850 (28.81)	6364 (99.11)	57 (0.89)
2015	7468	1307 (17.50)	3928 (52.60)	2233 (29.90)	7429 (99.48)	39 (0.52)
Total	36781	4877 (13.26)	21020 (57.15)	10884 (29.59)	36370 (98.88)	411 (1.12)

The overall seroprevalence rate of HIV , HBV, HCV and syphilis among the blood donors was 0.24%, 1.24%, 0.15% and 0.005% respectively [Table 2]. It is evident that there is decrease in positivity rate of HIV since last 6 years. Also HBV and HCV is also showing declining trend over last 5 and 4 years respectively. Out Of all donated blood during the study period, 605 (1.64%) had serological evidence of infection with at least one pathogen. Out of total 605 seropositive cases, HBsAg constitute major load of 457 bags

(75.54%), followed by HIV positive cases 89 (14.71%) while HCV accounts for 57 (9.42%) and VDRL positive only in 2 (0.33%) cases [Table3].

Discussion: In the present retrospective study, we evaluated the seroprevalence of HIV, HBV, HCV and syphilis among the blood donors in western vidarbha region. This study gave an overview of the epidemiology of the diseases in the community.

Table 2 : Trends in seroprevalence of HIV, HBV, HCV and syphilis among the blood donors.

Year	Total No. of blood donors	HIV		HBsAg		HCV		VDRL	
		No	%	No	%	No	%	No	%
2010	5378	30	0.56	77	1.43	13	0.24	0	
2011	5888	17	0.29	97	1.65	5	0.08	0	
2012	5882	21	0.36	79	1.34	18	0.31	2	0.03
2013	5744	6	0.10	72	1.25	16	0.28	0	
2014	6421	9	0.14	62	0.97	4	0.06	0	
2015	7468	6	0.08	70	0.94	1	0.01	0	
Total	36781	89	0.24	457	1.24	57	0.15	2	0.005

The figures from the epidemiology studies in different regions of India were compared. The data will help in evaluating the seroprevalence of the TTIs in India. The majority of blood donors (86.74%) in our study were voluntary, while 13.26% were replacement donors which is comparable with other studies^{10,11}.

Table 3: Distribution of Transfusion transmissible infections among seropositive donors.

TTI	No. of cases	%
HIV	89	14.71
HbSAg	457	75.54
HCV	57	9.42
VDRL	2	0.33
TOTAL	605	100

The female donor comprised only 1.12%; the remaining 98.88% were male donors. Various studies in India showed that more than 90% donors are males.^{4,10,12,13,14,15}

Out of total 36781 donors; 1.64% (605) were seropositive for TTIs. HBV being most common TTI accounts for 75.54% (457) of total TTI, followed by HIV seropositive cases 14.71% (89). HCV seropositivity detected in 9.42% (57) whereas syphilis was least common TTI being 0.33% (2) among seropositive blood donors.

Various studies raise serious concerns regarding the HBV and the HCV prevalence in the country. The seroprevalence of HBV was found to be 1.24% among

the donors. The HBV transmission is showing a decreasing trend over last 5 years in our study. Seroprevalence of HBV among blood donors differs. Variable results of 4.7%¹, 1.77%⁴, 0.78%⁵, 1.32%¹⁶, 1.27%¹⁷, have been reported in various other studies from India. Worldwide prevalence of HBV ranges from 1/270,000 in United States²¹, 0.46% in

Nepal²², 4.2% in Philippines²³, 4.61% in Thailand²⁴, 8.1% in Nigeria²⁵.

For hepatitis C, the estimated prevalence in this study was 0.15%, similar to that reported by other studies 0.21%¹⁷, 0.33%⁵, 0.23%¹⁶, 0.35%¹⁸, 0.27%¹⁹. Whereas other studies reported high prevalence 0.7%¹, 0.98%¹⁰, 1.02%¹⁹, some studies showed very low as 0.098%⁶, 0.099%⁴, 0.1%²⁰. Our study showed decreasing trend in the seroprevalence of Hepatitis C over last 4 years. The overall prevalence of HCV in our study was 0.15% where as the prevalence of HCV in India is approximately 1.8% - 2.5%.⁶

The low seroprevalence rate of hepatitis B as well as hepatitis C might be due to high awareness of blood born viral infections among the donors and comprehensive vaccination programme against hepatitis B. Still the inclusion of the antibody to the hepatitis B core antigen and other sensitive markers to the screening protocol, and better donor recruitment is the need of the hour.

In the present study, prevalence of HIV was found to be 0.24%, which is in accordance with other reports which shows 0.21%⁵, 0.30%¹⁷. HIV in India reported to be as 0.08%⁶, 0.14%⁴, 0.27%¹⁹, 0.32%¹⁸, 0.49%¹⁶, 0.92%¹⁰. Worldwide prevalence of HIV is noted as 1/21,35,000 in United States²¹, 0.006% in Philippines²³, 0.12% in Nepal²², 0.69% in Thailand²⁴, 3.1% in Nigeria²⁵.

For Syphilis, seroprevalence was found to be very low as 0.005%, however other studies noted it to be 0.04%⁴, 0.09%⁶, 0.16%¹⁹, 0.25%¹⁷, 0.28%¹⁶, 0.34%⁵, 0.35%¹⁸, 0.44%¹⁰, 1.3%¹. Syphilis reported to be 1.1% in Nigeria²⁵.

There is difference in various authors results, this may be due to various confounding factors with respect to

study like differences in the sensitivity of assays used & testing methodology, the criteria of positivity, types of donors and the literacy rate and the self exclusion of high risk donors. Averting transfusion transmittable infections can be accomplished by reducing unnecessary transfusions, using only regular voluntary donors, excluding donors with specific risk factors and systematic screening of all donated blood for infections using specific and sensitive methods.

Transmission of transfusion transmissible infections during the serologically negative window period still pose a threat to blood safety in environments where there is high rate of transfusion transmissible infection. Therefore, strict selection of blood donors with the emphasis on getting voluntary donors and comprehensive screening of donors blood for HIV, HBV, HCV and syphilis using standard methods are highly recommended to ensure the safety of blood to recipient.

Conclusion: 1.64% of healthy donors were seropositive for transfusion transmissible infections and reveal potential of transmitting them through transmission. HBV is the commonest TTI among apparently healthy donors, followed by HIV, HCV and syphilis. Although, we observed decreasing trend of seropositivity over a period of last 6 years, transmission of transfusion transmissible infections during a serologically negative window period still pose a threat to blood safety. Therefore, strict selection of blood donors with the emphasis on getting 100% voluntary donors and comprehensive screening of donors blood for HIV, HBV, HCV and syphilis using standard methods are highly recommended to ensure the safety of blood to recipient.

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