

Prevalence of HIV-I/II, HCV, HBsAg & Syphilis in Blood Donors Of Western Region In India

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Abstract: Background & Objective: The high prevalence of HIV, HBV, HCV and syphilis has heightened the problems of blood safety in India. TTIs cause fatal, chronic and life-threatening disorders because of their prolonged viraemia and carrier or latent state. Serologic tests utilized routinely in the screening of blood donors, totally not guarantee the absence of these infections among blood donors. **Methodology:** Samples of HIV, HBsAg, HCV were tested by ELISA and samples of syphilis were tested by RPR method following manufacturer's instructions. **Results:** Prevalence of HBV was highest within at the age groups 26-35 years, HCV within the age group between 36-45 years, syphilis within the age group between 46-55 years and HIV between 26-35 years. The prevalence of hepatitis B and syphilis was higher among males as compared to females, while for hepatitis C and HIV, it was higher among females as compared to males. **Conclusion:** Availability of safe blood for transfusion can be achieved by vigorous screening of donors and donated blood. Screening of blood is now mandatory for many diseases and is undertaken routinely in blood banks. The prevalence of TTIs among the Indian blood donors is reported to be ranging as follows; HBV – 0.66% to 12%, HCV – 0.5% to 1.5%, HIV – 0.084% to 3.87%, and syphilis – 0.85% to 3% respectively. Hence strict selection of blood donors with stringent screening and safe methods of detection can minimise risk if TTI. [Shah M NJIRM 2016; 7(1):12-15]

Key Words: Prevalence of TTI, Blood Donors, comprehensive screening of donors

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Introduction: The discovery of transfusion-transmitted 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

Human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) are of great concern because of their prolonged viraemia 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 Africa². Similarly, 12.5% of patients who received blood transfusion are at risk of post transfusion hepatitis³. HBV is highly contagious and relatively easy to be transmitted from one infected individual to another by blood transfusion, during birth, by unprotected sex, and by sharing needles and has a relatively higher prevalence in the tropics^{4,5}. Syphilis is also a systemic disease caused by *Treponema pallidum* which can be spread by sexual contact, blood transfusion and via vertical transmission⁶.

The high prevalence of HIV, HBV, HCV and syphilis has heightened the problems of blood safety in India. Thus, continuous monitoring of the magnitude of transfusion-transmissible infections in blood donors is important for estimating the risk of transfusion and optimizing donor recruitment strategies to minimize infectious diseases transmission. Therefore, this study was conducted to determine the seroprevalence, risk factors and trends of

HIV, HBV, HCV and syphilis infections among blood donors at Department of Immunohematology and Blood Transfusion, B.J. Medical College, Civil Hospital, Ahmedabad.

Infection by the hepatitis B (HBV) and hepatitis C (HCV) viruses is the most common cause of post transfusion hepatitis. Studies show that a co-infection by HBV and HCV is as frequent in Asia, as it is in western countries, varying from 10% to 15% in patients who are chronically infected by HBV. The high prevalence of HBV and HCV may result in an increase in the risk of transmission of these viruses through the transfusion of hemocomponents. Serologic tests utilized routinely in the screening of blood donors, totally not guarantee the absence of these infections among blood donors. We evaluated the prevalence of HBsAg, anti-HIV-I/II and anti-HCV and Syphilis co-infection in voluntary & replacement blood donors.

Few studies have been carried out in recent years on the co-infections with HIV, HBV, and HCV and syphilis among blood donors in India, but none has analyzed the procedures used for ensuring blood safety. Knowing the prevalence of these viruses among blood donors will explain the extent to which these infections are present in India. Additionally, identifying safety issues in blood donation procedures will guide health factors to urgently develop and implement efficient strategies for ensuring blood safety.

Material and Methods: A prospective & retrospective study was done in the Department of IHBT, BJMC and Civil hospital Ahmedabad during January 2010 to October 2014. Donors were selected according to standard criteria recommended by National Aids Control Organization.

Laboratory diagnosis for HIV 1 and 2

Each donor's serum sample was screened for HIV-1 and HIV-2 using SD BIO STANDARD DIAGNOSTICS PVT.LTD HIV following the manufacturer's instructions.

Laboratory tests for HBsAg and HCV antibodies

Sera were checked for the presence of hepatitis B surface antigen (HBsAg) using ELISA, MicroscreenHBsAg (SPAN Diagnostics Ltd). Similarly, IgG antibodies to HCV were detected using an ELISA technique (Qualisa) according to the manufacturer's instructions.

Laboratory diagnosis for syphilis

Serum from all donors was tested for the presence of treponemal antibodies using rapid plasma reagin test (RPR) following the

Manufacturer's instructions. (RPR, Tulip Diagnostics Pvt.Ltd)

Results:

Table:1 Distribution of voluntary blood donors in the study population.

Year	Total	Male	Female
2010	20310	20119	191
2011	23462	23237	225
2012	28288	28029	259
2013	30623	30361	262
2014	29574	29304	270
Total	132257	131050	1207

In the present study, out of total 132257 blood donors, 131050 (99.08%) were males and 1207(0.91%) were female which shows predominance of males as compared to females for the studied years.

Table 2: Prevalence of HBsAg, anti-HCV, VDRL, and anti-HIV among blood donors in the study population.

Year	Total no. of blood donors	HbsAg		HCV		VDRL		HIV	
		No.	%	No.	%	No.	%	No.	%
2010	20310	165	0.81	47	0.23	121	0.60	56	0.28
2011	23462	206	0.88	100	0.43	76	0.32	56	0.24
2012	28288	254	0.90	122	0.43	95	0.34	57	0.20
2013	30623	199	0.65	74	0.24	83	0.27	50	0.16
2014	29574	205	0.69	95	0.32	42	0.14	50	0.17

Seroprevalence of HIV, HBV, HCV and syphilis

The overall seroprevalence rate of HIV, HBV, HCV and syphilis was 12.45%, 47.82%, 20.35% and 19.38% respectively. Of all donated blood during the study period, 607 (9.5%) had serological evidence of infection with at least one pathogen and 2152 (1.62%) had multiple infections. Among those with multiple infections, the most common combinations were HIV-syphilis 03 and HIV - HBV 05.

Table 3: Distribution of blood donors with transfusion transmitted infections according to the age.

Age Years	HbsAg		HCV		VDRL		HIV		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
18-25	25	75.76	0	0.00	4	12.12	4	12.12	33	1.53
26-35	798	50.44	222	14.03	344	21.74	218	13.78	1582	73.48
36-45	196	39.04	210	41.83	50	9.96	46	9.16	502	23.32
46-55	10	29.41	4	11.76	19	55.88	1	2.94	34	1.58
56-65	0	0.00	2	0.00	0	0.00	0	0.00	2	0.09
Total	1029	47.79	438	20.34	417	19.37	269	12.49	2153	100

With respect to the individual TTIs, it is observed that the prevalence of HBV was highest within at the age groups 26-35 years (50.44%), HCV within the age group between 36-45years (41.83%), syphilis within the age group between 46-55 years (55.88%) and HIV between 26-35 years (13.78%).

Table 4: Distribution of blood donors with transfusion transmitted infections according to the sex.

Sex	HbsAg		HCV		VDRL		HIV		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Male	1009	49.15	415	20.21	410	19.97	219	10.67	2053	95.40
Female	20	20.20	23	23.23	7	7.07	49	49.49	99	4.60
Total	1029	47.82	438	20.35	417	19.38	268	12.45	2152	100

As mentioned in Table 4 that the prevalence of hepatitis B and syphilis was higher among males as compared to females (49.15% and 19.97%) respectively, while for hepatitis C, it was higher among females as compared to males (23.23%).

Discussion: Blood transfusion is an integral and life-saving procedure of modern medicine, but simultaneously it carries the risk of transmitting the life threatening transfusion transmitted infectious. HIV, hepatitis B, hepatitis C and syphilis are major public health problems in developing countries. They are transmitted parenterally, vertically, or through high-risk sexual behaviours and can cause fatal acute and chronic life-threatening disorders. Blood transfusion is a potential route of transmission of these TTIs.[10,11]Screening of blood is now mandatory for many diseases and is undertaken routinely in blood banks. Transmission of TTIs during the serologically

window period still poses a threat to blood safety in environments where there is high rate of TTIs. HBV and HCV are the two established causes of post transfusion hepatitis. The prevalence of TTIs among the Indian blood donors is reported to be ranging as follows; HBV – 0.66% to 12%, HCV – 0.5% to 1.5%, HIV– 0.084% to 3.87%, and syphilis – 0.85% to 3% respectively.¹²

The present study revealed seroprevalence of HBV at 0.78% among the donors which is similar to findings by Chatteraj *et al.*¹² Kaur *et al.*¹³ and Singh B *et al.*,¹⁴. Variable results of 0.66%,¹⁵ 2.45%,⁷ 3.44%,¹⁶ 5.86%,¹⁷ 25%¹⁸ have also been reported in various other studies. Seroprevalence of HBV among blood donors differs. The major route of HBV transmission is parenteral and it is most infective among blood-borne viruses and chronic carrier state is associated with chronic liver disease, cirrhosis and hepatocellular carcinoma.

HCV infection is an evolving public health problem globally. For hepatitis C, the estimated prevalence in this study was 0.33%, similar to that reported by the other studies 0.79%¹², 0.88%¹⁹ and 0.78%¹³; whereas a few studies reported much lower level of prevalence such as 1.09%,¹⁵ 1.57%,²⁰ 2.8%,²¹ and 6.21%¹⁷ and a yet another set of studies reported it to be at higher levels of 0.28%¹⁶ and 0.50%.¹⁴ Transmission of HCV is primarily through blood exposure and majority of the infected persons progress to chronic infection and chance of cirrhosis and hepatocellular carcinoma is more as compared to HBV. Blood is one of the main sources of transmission of Hepatitis C; hence, donor selection is of paramount importance.

In the present study, the prevalence of HIV was found to be 0.21%. Similar findings by Gupta *et al.*,¹⁵ and Tiwari *et al.*,²² reported 0.084% and 0.054% prevalence of HIV among blood donors, whereas lower seroprevalence of 0.0%¹⁷ and higher seroprevalence of 0.13%¹², 0.19%²³, 0.26%¹³, 0.47%¹⁶, 3.8%²⁴ and 11.7%¹⁸ have been reported.

For syphilis, the seroprevalence was found to be 0.34% in the present study, which was much lower than reported by other studies 0.85%¹⁵ and 1.2%¹⁷.

Regarding sex, the study found that blood transfusion transmitted diseases are more prevalent among males than females; a sex-wise difference in seroprevalence might be due to differences in the risk behaviour.

Availability of safe blood for transfusion is a must for the recipients and the community as well. This can be achieved by vigorous screening of donors and donated blood. Effective control strategies including a sensitive and stringent screening of all blood donors, public awareness programmes, and institution of adequate public health measures are urgently needed. It may be possible through proper donor selection and education, uniform implementation of laboratory screening tests, and adequate supply of blood through voluntary blood donations along with restriction of donation by professional donors.

Conclusion: Blood is still one of the main sources of transmission of hepatitis B, hepatitis C, HIV, and syphilis. The majority of donors in our country are voluntary, relatives or friends, who are apparently healthy, but this study found that these diseases are prevalent among donors. Hence, strict selection of blood donors with the emphasis on getting voluntary donors and comprehensive screening of donors for TTIs using standard methods are highly recommended to ensure the safety of blood for recipient.

References:

1. Klein HG. Allogenic transfusion risk in the surgical patients. *AMJ surg.* 1995;170:21–26. doi: 10.1016/S0002-9610(99)80054-3.
2. UNAIDS. Report on the global AIDS epidemic. Geneva, Joint United Nations program on HIV/AIDS; 2002.
3. Fasola FA, Otegbayo IA. Post-transfusion hepatitis in sickle cell anaemia; retrospective-prospective analysis. *Nig J ClinPract.* 2002;5:16–19.
4. Drosten C, Nippraschk T, Manegold C, Meisel H, Brixner V, Roth WK, Apedjinov A, Gunther S. Prevalence of Hepatitis B virus DNA in anti-HBcpositive/HBsAg- negative sera correlates with HCV but not HIV serostatus. *J ClinViro.* 2004;29:59–68. doi: 10.1016/S1386-6532(03)00090-8.
5. Finlayson MDC, Hayes PC, Simpson KJ. In: Davidson's principles and practice of medicine. Haslett C, Chilvers ER, Hunter JAA, editor. Churchill Living stone, London; 1999. Diseases of the liver and biliary system: Hepatitis; pp. 706–715.
6. Murray P, Rosenthal K, Kobayashi G, Pfaller M. *Medical Microbiology.* 4. Mosby company, St.Louis; 2002. pp. 379–380.
7. Klein HG. Allogenic transfusion risk in the surgical patients. *AMJ surg.* 1995;170:21–26. doi: 10.1016/S0002-9610(99)80054-3.

8. Mujeeb SA, Kausar A, Khalid M. Seroprevalence of HBV, HCV, and HIV infection among college going voluntary donors. *J Pak Med Assoc.* 2000;50:269–70.
9. Kar HK. Global and National overview of HIV/AIDS epidemic. In: Sharma VK, editor. *Sexually transmitted diseases and HIV/AIDS.* 2nd ed. New Delhi: Viva Books Pvt. Ltd; 2009. pp. 99–109
10. Irshad M, Peter S. Spectrum of viral hepatitis in thalassaemic children receiving multiple blood transfusions. *Indian J Gastroenterol.* 2002;21:183–4.
11. Mollah AH, Nahar N, Siddique MA, Anwar KS, Hassan T, Azam MG. Common transfusion-transmitted infectious agents among thalassaemic children in Bangladesh. *J Health Popul Nutr.* 2003;21:67–71.
12. Chattoraj A, Bhel R, Kataria V. Infectious disease markers in blood donors. *Med J Armed Forces India.* 2008;64(1):33–5.
13. Kaur H, Dhanon J, Pawar G. Hepatitis C infection amongst blood donors in Punjab – a six year study. *Indian J Hematol Blood Transfus.* 2001;19:21–2.
14. Singh B, Verma M, Verma K. Markers of transfusion associated hepatitis in North Indian blood donors: Prevalence and trends. *Jpn J Infect Dis.* 2004;57:49–51.
15. Gupta N, Vijay Kumar, Kaur A. Seroprevalence of HIV, HBV, HCV, and Syphilis in voluntary blood donors. *Indian J Med Sci.* 2004;58:255–7.
16. Garg S, Mathur DR, Garg DK. Comparison of seropositivity of HIV, HBsAg, HCV and syphilis in replacement and voluntary blood donors in Western India. *Indian J PatholMicrobiol.* 2001;44:409–12.
17. Mumtaz S, Rehman MU, Muzaffar M, Hassan MU, Iqbal W. Frequency of seropositive blood donors for hepatitis B, C and HIV viruses in railway hospital, Rawalpindi. *Pak J Med Res.* 2002;41(2):19–2.
18. Dessie A, Abera B, Fissehawale Seroprevalence of major blood borne infections among blood donors at FelegeHiwot referral hospital, Northwest Ethiopia. *Ethiop J Health Dev.* 2007;21:68–9.
19. Bagga PK, Singh SP. Seroprevalence of hepatitis C antibodies in healthy blood donors-a prospective study. *Indian J PatholMicrobiol.* 2007;50:429–32.
20. Jain A, Rana SS, Chakravarty P, Gupta RK, Murthy NS, Nath MC, et al. The prevalence of hepatitis C virus antibodies among voluntary blood donors of New Delhi, India. *Eur J Epidemiol.* 2003;18:695–7.
21. Sood G, Chauhan A, Sehgal S, Agnihotri S, Dilawari JB. Antibodies to hepatitis C virus in blood donors. *Indian J Gastroenterol.* 1992;11:44.
22. Tiwari B, Ghimire P, Karkee S, Rajkarnikar M. Seroprevalence of human immunodeficiency Virus in Nepalese blood donors: A study from three regional blood transfusion services. *Asian J Transf Sci.* 2008;2:66–8.
23. Karkee S, Ghimire P, Tiwari B, Shrestha A. Seroprevalence of HIV and Hepatitis C coinfection among blood donors in Katmandu valley, Nepal. *Southeast Asian J Trop Med Public Health.* 2009;40(1):66–70.
24. Matee M, Magesa PM, Lyamuya EF. Seroprevalence of human immunodeficiency virus, Hepatitis B and C viruses and Syphilis infections among blood donors at the Muhimbili National Hospital in Dar es Salam, Tanzania. *BMC Public Health.* 2006;6:21.

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