

Pattern of Transfusion Transmitted Infections in Blood Donors around Bhopal - A 5 years Retrospective Study.

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ABSTRACT

Background: Blood transfusion has become an essential part of treatment in number of medical or surgical emergencies. It is also true that blood transfusion is an important mode of transmission of infection to recipients. Present study was planned to know the seroprevalence and pattern of such infections among voluntary as well as replacement donors in this area. Culture and molecular techniques have demonstrated that it is associated with increased prevalence of bacteria. This study was conducted to determine the sero-prevalence of transfusion transmitted infections (TTIs) among the blood donors at Chirayu medical college and Hospital, Bhopal over a period of 5 years. All blood units received from replacement as well as voluntary blood donations at Blood Bank, Chirayu medical college and associated Hospital, Bhopal during the period from February 2011 to January 2016 were selected for the study. **Methods:** A 5 year retrospective study was conducted at the blood bank of Chirayu medical college Bhopal Madhya Pradesh. All data were collected from blood bank records maintained as per Drugs and Cosmetic Act of India and included records of 4208 voluntary and 10852 replacement donors from February 2011 to January 2016. Screening of blood units was done by enzyme-linked immune sorbent assay (ELISA) method for HIV, malaria and hepatitis B and C. Fourth generation ELISA kits were used for HIV testing while Syphilis was tested by latex agglutination assay. Any sample found reactive was retested for confirmation and seropositive units were discarded. **Results:** Overall TTIs incidence in voluntary donors and replacement donors was found to be 1.568% (66/4208) and 5.215% (566/10852) respectively. Seroprevalence of HIV, HBV, HCV, Syphilis and Malaria was found to be 0.071% (3/4208), 0.712% (30/4208), 0.119% (5/4208), 0.665% (28/4208) and 0.00% in voluntary blood donors as against the figures of 0.166% (18/10852), 2.681% (291/10852), 0.82% (89/10852), 1.548% (168/10852) and 0.00% of replacement blood donors respectively. It is clear from this data that the seroprevalence of HIV, HBV, HCV and syphilis is higher in replacement blood donors as compared to voluntary blood donors. The highest seroprevalence of TTI was found to be in the age group of 18-30 years. **Conclusion:** Prevalence of TTI is less in voluntary blood donors as compared to replacement donors. Hence, efforts should be made to increase the number of voluntary donors and reduce replacement donations to a minimum. A strict selection of all donors and proper testing of a donor's blood by using standard methods is highly recommended to ensure safety for the recipient.

Keywords: Transfusion transmitted infections, Seroprevalence.

INTRODUCTION

Transfusion medicine is a new branch that has recently developed over the last half of the last century.^[1] Transfusion of blood and blood components in reducing mortality and morbidity is an indispensable part of any healthcare system. But transfusion of blood is also associated with a risk of transmission of many infections.^[2]

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Measuring their severity, WHO has recommended pre-transfusion blood test for Human immuno

deficiency virus (HIV), Hepatitis B virus (HBV), Hepatitis C Virus (HCV) and Syphilis as mandatory.^[3] According to NACO guidelines, all mandatory tests should be carried out on donor's blood samples for HIV, HBV, HCV, syphilis and malaria. The whole blood or components from any unit that tests positive for these should be discarded.^[4] Only continuous improvement and implementation of donor selection, sensitive screening tests and effective inactivation procedures can ensure the elimination, or at least reduction of the risk of acquiring TTIs.^[5] For this NACO recommended use of 3rd or 4th generation ELISA HIV I & II test kits which are 100% sensitive at blood banks for screening donated blood.^[6] Blood transfusion departments not only screen TTIs but also give clue about the prevalence of these infections in healthy populations.^[7] Evaluation of

data on the prevalence of TTIs among blood donors permits an assessment of the accurate estimation of risk of TTIs, which helps in the formulation of long-term strategies to improve public health and to prevent spread of disease in local population.^[8] The aim of present study was to find out pattern of TTIs in blood donors of Bhopal district and analysis of the same in different age groups.

MATERIALS AND METHODS

The study was conducted at Chirayu Medical College and Hospital associated blood bank, Bhopal for a period of 5 year from Feb 2011 to Jan 2016. All the information of donors like personal details, demographic details, occupation details and medical history regarding risk factor like history of previous surgery, hospitalization, blood transfusion were recorded by Medical officer in registration form and entered in blood bank records. The donors were then screened according to blood donor selection criteria and guidelines from drug and cosmetic act NACO.^[9, 10] The blood donors who were unfit to donate blood according to standard blood donors selection criteria (As per the Drugs and Cosmetics Act, 1999) were excluded.^[11] Haemoglobin estimation was performed. This screening procedure was very helpful to exclude the professional donors. The total no. of 15060 donors were considered medically fit and accepted for blood donation during the study period. On completion of blood donation, the units were screened for the five commonest TTIs namely HIV I & II, HbsAg, HCV, syphilis and malaria. All sera were initially tested for Hepatitis B Surface antigen (HbsAg), anti-HIV antibody, anti-HCV antibody,

and malaria by enzyme linked immuno-sorbent assay (ELISA) test using a commercial kit by Tulip diagnostic Qualisa Microwell enzyme immune assay third generation. An internal positive and negative control along with external control, which is a known positive sample, was tested while performing the ELISA. Syphilis was tested by latex agglutination assay. The data were recorded on specially formed Performa, tabulated and analyzed. Any sample found reactive was retested for confirmation and seropositive units were discarded. Permission for accessing records was taken from medical superintendent of Chirayu Hospital.

RESULTS

In the present study, out of 15060 voluntary and replacement donors, 14469 (96.076%) were males and 591(3.924%) were females which shows predominance of male donors. The most common age group of donors was found to be 18-30 years (54.821%) as shown in [Table 1].

Table 1: Age wise distribution of total donors from 18 years to 60 years.

Age group in years	Cases (%)
18-30	8256 (54.821%)
31-40	4502(29.894%)
41-50	1940(12.882%)
46-60	362 (02.403%)
Total	15060(100%)

Highest prevalence of transfusion transmitted infections was within age group of 18-30 years (2.337%) followed by in 31-40 years (1.242%) as shown in [Table 2].

Table 2: Age wise distribution of infected cases of HIV, HBsAg, HCV and Syphilis.

Age group in years	Total number of donor	HIV	HBSAg	HCV	Syphilis	Malaria	Total infected	%
18-30	8256	12	201	58	81	00	352	2.337%
31-40	4502	08	85	28	66	00	187	1.242%
41-50	1940	01	30	06	42	00	79	0.525%
51-60	362	-	05	02	07	00	14	0.093%
Total	15060	21	321	94	196	00	632	4.197 %

The overall prevalence of TTI (HBV, HCV, Syphilis and HIV) among Voluntary and replacement donors in this study is 4.197% (632/15060). Out of total 15060 donors, 4208 were voluntary donors and 10852 were replacement donors. The seroprevalence of HBV was highest to be 2.131% (321/15060) and lowest for HIV0.139 (21/15060) in all the donors. No donor was found to be positive for Malaria. Results also show that sero-positivity for all TTI is significantly high in replacement donors as compared to voluntary donors [Table 3].

DISCUSSION

With every unit of blood, there is 1% chance of transfusion-associated problems including TTI. The risk of TTI has declined dramatically in high income nations over the past two decades, but the same may not hold true 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. Voluntary donors (VD) are motivated blood donors who donate blood at regular intervals while replacement donors (RD) are usually one time blood donors who donate blood only when a relative or a friends in need of the blood.

Results of present study are comparable with many other studies done. Seropositivity for HBV was found to be highest among all TTI in this study, which is consistent with results of many other studies [12, 14-19]. The risk of TTI for HBV infection continues to remain considerable although it has reduced with the introduction of the hepatitis B surface antigen (HbsAg) testing in the early 1970's. Tests to detect HBV surface antigen (HbsAg), the

main screening target are routinely included in the donor screening, but fail to detect the presence of HBV during the 'window period'. Hence, a number of countries have also added the testing for antibodies directed against the HBV core protein (anti-Hbc) and testing HBV NAT in plasma pools to the standard screening in an attempt to detect chronic virus carriers with low level viremia who may not have detectable HBsAg levels.^[1]

Table 3: Seroprevalence of different TTI in present study.

TTI	Voluntary donors (n=4208)		Replacement donors (n=10852)		Total (n= 15060)	
	Number of seropositive cases	% of seropositive cases	Number of seropositive cases	% of seropositive cases	Number of seropositive cases	% of seropositive cases
HBV	30	0.712	291	2.681	321	2.131
HCV	5	0.118	89	0.820	94	0.624
HIV	3	0.071	18	0.166	21	0.139
Syphilis	28	0.665	168	1.548	196	1.301
Malaria	0	0	0	0	0	0

Table 4: TTI Prevalence in India.

Comparison of TTI prevalence rate in different parts of India					
Place	HIV%	HBsAg %	HCV%	Syphilis%	References (12-19)
Bangalore, Karnataka	0.44	1.86	1.02	1.6	Srikrishna A et al ^[12]
Ludhiana	0.084	0.66	1.09	0.85	Gupta N. et al ^[13]
Delhi	0.56	2.23	0.66	-----	Pahuja S et al ^[14]
West Bengal	0.28	1.46	0.31	0.72	Bhattacharya P et al ^[15]
Southern Haryana	0.3	1.7	1.0	0.9	Arora D et al ^[16]
Lucknow (UP)	0.23	1.96	0.85	0.01	Chandra T et al ^[17]
Jhalawar, Rajasthan	0.02	2.56	Nil	0.20	Diwan R et al ^[18]
Ahmedabad, Gujrat	0.16	0.98	0.11	0.23	Shah N et al ^[19]
Present study (2014)	0.139	2.131	0.624	1.301	

Various studies in India about the seroprevalence of HCV have shown data ranging from the lowest (nil) in the study by Diwan R et al in 2012 to the higher up to 1.09% by Gupta et al, 2004. A significantly lower prevalence for HCV of 0.624% (94/15060) has been noted in our study.

Sexually transmitted infections are widespread in developing countries and constitute a major public health problem. The antibodies detected for syphilis show reactivity of 1.301% (196/15060) in our study, which is lower as compared to Srikrishna A et al but higher than other studies in India as shown in [Table 4].

HIV prevalence was found to be lower in our study as compared to others except Diwan R et al^[18] and Gupta N et al^[13]. HBV prevalence was found to be lower than Pahuja S et al^[14] and Diwan R et al.^[18]

As is apparent from the results of present study, voluntary blood donors have significantly lower rates of prevalence for markers of TTIs as compared to replacement blood donors. This is consistent with findings of Fernandes et al.^[20] The current practice of selection of voluntary donors over replacement donors to meet with the need for blood in a hospital coupled with more numbers of voluntary donor drives in the community as well as availability of better testing reagents (particularly for HIV and HCV infections) is sure to lower down the threats of

transmitting TTIs to patients via transfusion of blood and blood products. Awareness of general population about voluntary regular blood donation should be created to minimize the chances of spreading transfusion-transmitted infections. Replacement donors carry a relatively higher risk of transfusion-transmitted infections due to increased chances of donations by professional donors, which may escape detection during donor screening procedures. Hence, blood from replacement donors should be accepted only in cases of dire emergencies when transfusion of blood or blood products would be life saving.

CONCLUSION

The major concern in transfusion services today is increased seropositivity among Replacement Donors for HCV, HIV, HBsAg and syphilis. A noticeable number of replacement donors harbour HIV, HBV, HCV, Malaria and Syphilis infections. So strict selection of donors and proper testing of donor's blood by using standard method is highly recommended to ensure safety for recipient. With the advent of nucleic acid amplification techniques (NAT), western countries have decreased the risk of TTI to a major extent. But the cost-effectiveness of

NAT is poor. The NAT has added benefits but its high financial cost is of concern, especially in underdeveloped countries like India. Apart from NAT for donor screening, other factors such as public awareness, vigilance of errors, educational and motivational programs is sure to help in decreasing the infections. Efforts should be made to increase the number of voluntary donors and reduce replacement donations to a minimum. Motivation of potential local blood donor population would help in effective implementing of voluntary blood donation program in the community.

REFERENCES

1. Florian B, Damiano C, Francesco M, Roger YD, Christian B. Transfusion transmitted infections. *J Transl Med.* 2007;5:25.
2. Pallavi P, Ganesh C K, Jayashree K, Manjunath G V. Seroprevalence and trends in transfusion-transmitted infections among blood donors in a university hospital blood bank: A 5 year study. *Indian J Hematol Blood trans.* 2011 March; 27(1): 1-6.
3. Screening Donated Bloods for Transfusion-Transmissible-Infections, World Health Organization. 2010; 3-4
4. NACO. Standards for Blood Banks and Blood Transfusion Services. 2007; 33-4.
5. Tiwari BR, Ghimmire P, Karki S, Raj Kumar M. Seroprevalence of human immunodeficiency virus in Nepalese blood donors: A study from three regional blood transfusion services. *Asian Journal of Transfusion Science.* 2008; 2: 66-68.
6. "Manual on quality standards for HIV testing laboratories" product & published by NACO (National AIDS Control Organization), Ministry of Health and family Welfare, Government of India, New Delhi published in March 2007.
7. Khan Z T, Asim S, Tariz Z, Ehsan I A Malik R A, Ashfaq B et al. Prevalence of Transfusion transmitted infections in healthy blood donors in Rawalpindi District, Pakistan-a five years study. *Int J Pathol ;* 2007(5) :21-5.
8. Bhawani Y, Rao PR, Sudhakar V. Seroprevalence of transfusion transmissible infections among blood donors in a tertiary care hospital of Andhra Pradesh. *Biol. Med.,* 2010; 2(4): 45-8.
9. Drugs and cosmetics rules, 1945 (amended till 30th june2005) from Government of India available from <http://www.cdsc.nic/html/Drugs&cosmeticsAct.pdf>.
10. "Standard for blood banks and blood transfusion services" produced & published by NACO (National AIDS Control Organization), Ministry of Health and family Welfare, Government of India, New Delhi Published In. 2007:19-24.
11. The gazette of india, Extraordinary, part II, Section 3, Sub section (i). Published by authority, Ministry of health and family welfare (Dept. of health). Notification: New Delhi: 1999; 5:28-56.
12. Srikrishna A, Sitalakshmi S, Damodar P. How safe are our donors? *Indian J Pathol Microbiol.* 1999; 42: 411-6.
13. Gupta N, Kumar V, Kaur A. Seroprevalence of HIV, HBV, HCV and syphilis in voluntary blood donors. *Indian J Med Sci.* 2004; 58:255-257.
14. Pahuja S, Sharma M, Baiitha B, Jain M. Prevalence and trends of markers of hepatitis C virus, hepatitis B virus and human immunodeficiency virus in Delhi blood donors. A hospital based study. *Jpn J Inf. Dis.* 2007. 60:389-391.
15. Bhattacharya P, Chakraborty S, Basu SK. Significant increase in HBV, HCV, HIV and syphilis infections among blood donors in West Bengal, Eastern India 2004-2005. Exploratory screening reveals high frequency of occult HBV infection. *World J. Gastroenterol.* 2007;13:3730-3733.

16. Arora D, Arora B, Khetarpal A. Seroprevalence of HIV, HBV, HCV and syphilis in blood donors in Southern Haryana. *Indian J. Pathol. Microbiol.* 2010; 53:308-309.
17. Chandra T, Kumar A, Gupta A. Prevalence of transfusion transmitted infections in blood donors: an Indian experience. *Trop. Doct.* 2009 ;39:152-154 .
18. Diwan R, Mathur M. Incidence and pattern of transfusion transmitted infection in voluntary donors in a teaching hospital "A four year retrospective study. *Journal of Pharmaceutical and Biomedical Sciences.* 2012; 22(22): 1-4.
19. Shah N, Shah J M, Jhaveri P. Sero prevalence of HBV, HCV, HIV and syphilis among blood donors at a tertiary Care Teaching Hospital in Western India. *Gujarat Medical Journal ,* 2013; 68(02):35-39.
20. Hilda Fernandes, Prema Fancy D'souza, Pushpa Maria D'souza. Prevalence of Transfusion Transmitted Infections in Voluntary and Replacement Donors. *Indian J Hematol Blood Transfus.* 2010 Sep; 26(3): 89-91.

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