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SEROPREVALENCE OF TRANSFUSION TRANSMISSIBLE INFECTIONS AMONG BLOOD DONORS IN A TERTIARY CARE CENTRE: EIGHT YEARS STUDY

Pathology

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ABSTRACT

Background: Transfusion transmissible infections (TTIs) are one of the major adverse effects of blood transfusion. Serological testing can reduce, but not eliminate the occurrences of TTIs. Study of TTIs amongst blood donors could help to find safe blood for the patients.

Aims: This study was conducted to evaluate the prevalence of markers of Hepatitis B virus (HBV), Hepatitis C virus (HCV), Human Immunodeficiency Virus (HIV), Syphilis and Malaria among Voluntary Blood Donors and Replacement Blood Donors in a tertiary care centre.

Materials and Methods: A retrospective study was conducted at The State of the art Model blood bank, Pt. Jawaharlal Nehru Memorial Medical College (JNMMC) and Dr. B. R. Ambedkar Memorial Hospital, Raipur, Chhattisgarh. This study included all the blood donors both from in-hospital donations and outdoor camps donations (including Voluntary and Replacement donors) from January 2011 to December 2018. Enzyme-linked immunosorbent assay (ELISA) test was done for screening of HBV, HCV and HIV; Rapid Plasma Reagin (RPR) test was done for syphilis and Card Test for Malaria Antigen.

Results: A total of 1,08,577 donors were screened over a period of eight years. The seroprevalence of HIV, HBV, HCV, syphilis and malaria was found to be 0.12%, 0.77%, 0.04%, 0.22% and 0.03% respectively. Overall seroprevalence of reactive TTIs was 1.19%, which was maximum in the year 2013 (2.28%) after that there was a gradual decrease in the prevalence rate of TTIs in blood donors over the years. Infections were more common among Replacement Donors as compared to Voluntary Donors.

Conclusion: The increase in public awareness regarding Voluntary blood donation, meticulous donor screening, counselling and use of highly sensitive tests can help in reducing the risk of TTIs. Prevalence of HIV infection is decreasing in the blood donors. The HBV infection still remains a menace to be tackled. HCV, Syphilis and malaria maintain a low rate of positivity. Methods to ensure a safe blood supply should be encouraged.

KEYWORDS

Hepatitis B virus; Human immunodeficiency virus; Hepatitis C virus; Syphilis; seroprevalence, transfusion transmitted infections

INTRODUCTION:

Blood transfusion is an integral part of medical management. Adequate, safe and timely given transfusion save millions of life; however, unsafe transfusion leads to many life-threatening complications and increases the possibility of transfusion-transmitted infections (TTIs).[1] Unsafe transfusions are costly from both human and economic points of view and lead to high morbidity and mortality.[2,3] Most common TTIs are Human Immunodeficiency Virus (HIV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Syphilis and Malaria. An effective donor screening protocol for donor selection, proper counselling of donors, sensitive screening tests and effective discarding techniques for reactive units can ensure a reduction in the risk of acquiring TTIs.[4] There is always chance of false-negative result due to limitation of kits used and "window period" of the infection. Every transfusion is a potential risk factor. Minimizing its use and taking donation from low risk population for TTIs are some of the modalities used for reduction of adverse events associated with blood transfusions. The present study was conducted to estimate and compare the seroprevalence of TTIs amongst VDs and RDs during 8-years period (2011-2018).

MATERIALS AND METHODS:

This retrospective study was carried out over a period of 8-years from January 2011 to December 2018. These included in-hospital donations as well as outdoor camps donations, including Voluntary as well as Replacement Donors. In this 8-year period, 1,08,577 donations were tested. Donor selection was based on detailed past and present history; examination was done according to the criteria from National Blood Transfusion Council (NBTC). A donor consent form including history of previous hospitalization, surgery, jaundice, fever, vaccination, dog bite, blood transfusion, occupation, high risk behaviour, tattoo marks, etc were obtained to eliminate risky donors. All blood donors' samples were screened for HIV, hepatitis B surface antigen (HBsAg), HCV, Syphilis and Malaria. HIV, HBsAg, HCV tests were done by third generation ELISA kits. Syphilis was diagnosed by performing the Rapid Plasma Reagin (RPR) test. Malaria testing was done by Malaria Antigen Card test.

RESULTS:

1,08,577 healthy blood donors were tested over a period of 8 years from 2011 to 2018 for HIV, HBsAg, HCV, Syphilis and Malaria. Majority of the blood donors 1,02,505 (94.4%) were males and the remaining 6,072 (5.6%) were females. Out of which 63,525 (58.5%) were Replacement Donors and 45052 (49.5%) were Voluntary Donors. Their ages ranged from 18 to 60 years. Out of 1,08,577 donors, 1,297 (Prevalence: 1.19%) donors were found to be positive for one of the TTIs.

Table 1: Year wise distribution of blood donors; seropositive cases and prevalence of TTIs

Year	Total number of blood donors	HIV		HCV		HBsAg		VDRL		MP		Total reactive cases and prevalence	
		No. of Positive	Prevalence	No. of Positive	Prevalence	No. of Positive	Prevalence	No. of Positive	Prevalence	No. of Positive	Prevalence	No. of Positive	Prevalence
2011	10468	31	0.29%	8	0.07%	98	0.93%	4	0.03%	11	0.10%	152	1.45%

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2012	10469	16	0.15%	4	0.03%	116	1.10%	7	0.06%	2	0.01%	145	1.38%
2013	11150	18	0.16%	3	0.02%	113	1.03%	118	1.05%	3	0.02%	255	2.28%
2014	11661	9	0.07%	9	0.07%	120	1.03%	33	0.03%	1	0.01%	172	1.47%
2015	13478	18	0.13%	6	0.04%	95	0.70%	7	0.05%	6	0.04%	132	0.98%
2016	16127	14	0.08%	7	0.04%	107	0.66%	44	0.03%	1	0.01%	173	1.07%
2017	17286	20	0.11%	5	0.02%	102	0.59%	20	0.11%	5	0.02%	152	0.88%
2018	17938	8	0.04%	6	0.03%	90	0.50%	10	0.05%	2	0.01%	116	0.65%
Total	108577	134	0.12%	48	0.04%	841	0.77%	243	0.22%	31	0.03%	1297	1.19%

Table-1 shows donors and their seroprevalence of TTIs in different years. The overall seroprevalence for HIV, HBsAg, HCV, Syphilis and Malaria was 0.12%, 0.77%, 0.04%, 0.22% and 0.03% respectively.

Maximum Number of Positive cases (n=1282; 98.8%) were from male donors and remaining only 15 (1.2%) positive cases were from female donors (Table 2).

Table 2: Gender wise distribution of blood donors; seropositive cases and prevalence of TTIs

Year	Total number of blood donors	HIV		HCV		HBsAg		VDRL		MP		Total No. of Positive cases	Prevalence
		No. of Positive cases	Prevalence	No. of Positive cases	Prevalence	No. of Positive cases	Prevalence	No. of Positive cases	Prevalence	No. of Positive cases	Prevalence		
Total Male	102505	131	0.13%	48	0.05%	837	0.82%	235	0.23%	31	0.03%	1282 (98.84%)	1.25%
Total Female	6072	3	0.05%	0	0	4	0.07%	8	0.13%	0	0.00%	15 (1.16%)	0.25%
Total	108577	134	0.12%	48	0.04%	841	0.77%	243	0.22%	31	0.03%	1297	1.19%

Further subdivision amongst Voluntary Donors and Replacement Donors were shown in Table 3 and 4.

Table 3: Distribution of TTIs among blood donors according to their type of donation.

Year	Total number of blood donors	HIV		HCV		HBsAg		VDRL		MP		Total No. of Positive cases	Prevalence
		No. of Positive cases	Prevalence	No. of Positive cases	Prevalence	No. of Positive cases	Prevalence	No. of Positive cases	Prevalence	No. of Positive cases	Prevalence		
Total RD	63525	93	0.15%	39	0.06%	598	0.94%	180	0.28%	22	0.30%	932 (71.86%)	1.46%
Total VD	45052	41	0.09%	9	0.02%	243	0.54%	63	0.14%	9	0.02%	365 (28.14%)	0.81%
Total	108577	134	0.12%	48	0.04%	841	0.77%	243	0.22%	31	0.03%	1297	1.19%

Table 4: Year wise distribution of TTIs among blood donor according to their type of donation.

Year	Total number of blood donors	Replacement Donor	Voluntary Donor	Reactive RD	Reactive VD	Total Reactive cases
2011	10468	4526	5942	101 (66.45%)	51 (33.55%)	152
2012	10469	5850	4619	83 (57.24%)	62 (42.76%)	145
2013	11150	6419	4731	185 (72.55%)	70 (27.45%)	255
2014	11661	7137	4524	123 (71.51%)	49 (28.49%)	172
2015	13478	9157	4321	106 (80.3%)	26 (19.7%)	132
2016	16127	8597	7530	112 (64.74%)	61 (35.26%)	173
2017	17286	10297	6989	117 (79.97%)	35 (23.03%)	152
2018	17938	11542	6396	105 (90.52%)	11 (9.48%)	116
Total	108577	63525	45052	932 (71.86%)	365 (28.14%)	1297

Positive cases were more common among Replacement Donors (n=932; prevalence - 1.46%) compared to Voluntary Donors (n=365; prevalence – 0.81%). Amongst donors, HBV (n=841; prevalence-0.77%) turned out to be the most prevalent TTI. The seropositivity for HIV has decreased overall in both Voluntary Donors and Replacement Donors over the study period. The seroprevalence of HBV, HCV and syphilis were maximum in the year 2013 (2.28%) after that there was a gradual decrease of TTIs in blood donors over the years. Malaria was found to be the least prevalent TTI during the study period.

DISCUSSION:

Blood transfusion is a life-saving integral remedy in current medical practices along with it also carries contemporary risk of transmitting dreadful TTIs like HIV, Hepatitis B and C.[5] Donor selection is the most important steps in improving the safety of blood and blood products. Knowledge and awareness regarding the reasons of donor deferral is important to avoid the loss of the potential donor.

In our study, total number of donation in last eight years (January 2011 to December 2018) was 1,08,577, out of which were 1,02,505 (94.4%) were male and 6,078 (5.6%) were females. Majority of the donors belonged to the age group of 18-60 yrs. The result of female donors were comparable with other studies of Giri PA et al. (4.72%), Petal PJ (7%), Pallavi et al. (2%), Jain and Gupta (2%), Fernandes et al. (3%), Pahuja et al. (3%) and Arora et al. (4%).[5-11] In our study (Table 2), only 15 cases (1.16%) of female donors were positive for various TTIs while there were 1,282 (98.84%) positive cases among male. Participation of female blood donors should be encouraged to carry forward this trend and help to ensure safe blood for patients.

Replacement Donations were 63,525 (58.5%) while Voluntary Donations were only 45,052 (28.14%) in the present study. Replacement Donors are more likely to be one time donors and various study documented high prevalence of TTIs in this group[7-9,12] same as in our study where 932 (71.86%) cases of replacement donors were positive for various TTIs while only 365 cases (28.14%) of voluntary donors were positive for TTIs (Table 3 and 4).

The seroprevalence of the HIV, HBV, HCV, syphilis and malaria were 0.12%, 0.77%, 0.04%, 0.22% and 0.03%, respectively which is comparable with other studies such as Bharti et al.,[13] Patel et al[6], Sushama et al.,[14] Mandal et al.,[15] Bhawani et al.,[12] Rawat et al.[16] as shown in Table 5.

Table 5: Comparison of transfusion transmitted infections prevalence rate with other studies

Author	Year	Place	Group	Total Donation	HIV	HBsAg	HCV	Syphilis	Malaria	Total Prevelance
Bharti et al	2005 - 2017	Yavatmal	RD and VD	111462	0.46%	1.27%	0.06%	0.12%	0.00%	1.90%
Patel et al	2007-2013	Gandhinagar, Gujarat	RD and VD	15368	0.14%	0.38%	0.06%	0.14%	0.00%	0.72%
Sushama et al	2007-2011	Mumbai	RD and VD	76653	0.26%	1.30%	0.25%	0.28%	NA	2.10%
Mandal et al	2010-2012	Darjeeling	RD and VD	28,364	0.42%	1.24%	0.62%	0.65%	<0.01%	2.93%
Bhawani et al	2004-2009	Amalapuram, AP,	RD and VD	8067	0.39%	1.41%	0.84%	0.08%	NA	2.74%
Rawat et al	2008-2014	Delhi	RD and VD	220482	0.32%	1.61%	0.73%	1.62%	0.06%	4.36%
Matee et al	2004-2005	Tanzania	RD and VD	1559	3.80%	8.80%	1.50%	4.70%	NA	15.90%
Tarufi et al	2008	Italy	Refugee	529	1.50%	8.30%	4.50%	1.50%	NA	12.29%
Tessema et al	2003-2007	Ethiopia	RD and VD	6361	3.80%	4.70%	0.70%	1.30%	NA	9.50%
Kapse et al	2011-2018	Our Study	RD and VD	108577	0.12%	0.77%	0.04%	0.22%	0.03%	1.19%

However, this seroprevalence rate is lower than studies done by Matee et al.,[17] Tafuri et al.,[18] Tessema et al.[19] as shown in Table 5.

CONCLUSION:

As the present study has been done for longer duration i.e 8 years, this will help to better understand the trend as compared to other studies which are done for shorter durations. This study also highlights that blood transfusion is one of the major modes to contract HIV, HBV, HCV and syphilis. HBV is the most and malaria the least common TTI found among blood donors. Though Replacement Donors overwhelmingly predominate the donor subpopulation in the modern world. Blood donations from Voluntary Donors are safer than Replacement Donors. The Voluntary Donor strength intimately correlates with the number of blood camps. Due to multidimensional approach by blood bank, nongovernment organizations and government support through NACO, Voluntary Donations are increasing year by year. Decreased reliance on Replacement Donors helps to show reducing trend for prevalence of TTIs. Steps should be taken to encourage more Voluntary Donors to provide safe blood to the patients.

REFERENCES:

1. Bihl F, Castelli D, Marincola F, Dodd RY, Brander C. Transfusion-transmitted infections. J Transl Med 2007; 5 : 25.
2. World Health Organization. Blood Safety Strategy for the African Region. Brazzaville: WHO Regional Office for Africa; 2002.
3. World Health Organization. Status of Blood Safety in the WHO African Region: Report of the 2004 Survey. Brazzaville: WHO Regional Office for Africa; 2007. p. 1-25.
4. Tiwari BR, Ghimire P, Karki S, Rajkarnikar M. Seroprevalence of human immunodeficiency virus in Nepalese blood donors: A study from three regional blood transfusion services. Asian J Transfus Sci 2008; 2 : 66-8
5. Giri PA, Deshpande JD, Phalke DB, Karle LB. Seroprevalence of transfusion transmissible infections among voluntary blood donors at a tertiary care teaching hospital in rural area of India. J Family Med Prim Care. 2012;1:48-51.
6. Patel PJ. Transfusion transmissible infections in blood donors: A 7-year study in central Gujarat. Med J DY Patil Univ 2014;7:620-4.
7. Pallavi P, Ganesh CK, Jayashree K, Manjunath GV. Seroprevalence and trends in transfusion transmitted infections among blood donors in a university hospital blood bank: A 5 year study. Indian J Hematol Blood Transfus 2011;27:1-6.
8. Jain R, Gupta G. Family/friend donors are not true voluntary donors. Asian J Transfus Sci 2012;6:29-31.
9. Fernandes H, D'souza PF, D'souza PM. Prevalence of transfusion transmitted infections in voluntary and replacement donors. Indian J Hematol Blood Transfus 2010;26:89-91.
10. Pahuja S, Sharma M, Baitha 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 Infect Dis 2007;60:389-91.
11. Arora D, Arora B, Khetarpal A. Seroprevalence of HIV, HBV, HCV and syphilis in blood donors in Southern Haryana. Indian J Pathol Microbiol 2010;53:308-9.
12. Bhawani Y, Rao PR, Sudhakar V. Seroprevalence of transfusion transmissible infections among blood donors in a tertiary care hospital of Andhra Pradesh. Biology and Medicine, 2010; 2 (4): 45-48. 2010.
13. Bharti KS, Lodha ND. Changing Trends of Transfusion Transmissible Infections in Blood Donors in Vidharbha Region: A Retrospective Study of Thirteen Years. International Journal of Contemporary Medical Research. September 2018;9(5):15-19
14. Sushama A. Chandekar, Gaythri P. Amonkar, Heena M. Desai, Nitin Valvi, and Gururaj V. Puranik. Seroprevalence of transfusion transmitted infections in healthy blood donors: A 5-year Tertiary Care Hospital experience. J Lab Physicians. 2017 Oct-Dec;9(4):283–287.
15. R. Mandal, K. Mondal. Transfusion transmissible infections among blood donors from a sub-Himalayan rural tertiary care centre in Darjeeling, India. Journal of Traditional and Complementary Medicine 2016;6:224-229
16. Rawat A, Diwaker P, Gogoi P & Singh B. Seroprevalence & changing trends of transfusion-transmitted infections amongst blood donors in a Regional Blood Transfusion Centre in north India. Indian J Med Res. November 2017;146:642-645
17. Matee MI, 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 Salaam, Tanzania. BMC Public Health. 2006;6:21.
18. Tafuri S, Prato R, Martinelli D, Melpignano L, De Palma M, Quarto M, et al. Prevalence of hepatitis B, C, HIV and syphilis markers among refugees in Bari, Italy. BMC Infect Dis. 2010;10:213.
19. Tessema B, Yismaw G, Kassu A, Amsalu A, Mulu A, Emmrich F, et al. Seroprevalence of HIV, HBV, HCV and syphilis infections among blood donors at Gondar University Teaching Hospital, Northwest Ethiopia: Declining trends over a period of five years. BMC Infect Dis. 2010;10:111.