



PREVALENCE OF SEROPOSITIVITY IN BLOOD DONORS AT A TERTIARY CARE HOSPITAL

Public Health

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ABSTRACT

Objectives: Blood transfusion service is one of the key components of health care system. However, the life of transfusion recipients is at risk due to development of Transfusion-transmissible infections (TTI) such as HIV, HBV and HCV. This study was conducted to determine seroprevalence of TTIs among blood donors.

Methods: A retrospective cross-sectional study was conducted at the blood bank of tertiary care hospital. Data was collected from records of blood bank from January 2016 to December 2020. Blood units were screened by ELISA for HIV, HBV and HCV.

Results: A total of 7108 donors were screened out of which majority were males **6928** (97.48%). Total **1670** (23.49%) were voluntary donors and **5438** (76.50%) were replacement donors. Seroprevalence of HIV, HBV and HCV was 0.08%, 1.125%, and 1.80% respectively.

Conclusion: Proper selection and testing of donor's blood by using standard methods should be done to ensure safety of recipients.

KEYWORDS

Seroprevalence, Blood donors, HIV, HBV, HCV

INTRODUCTION

Blood transfusion service (BTS) is one of the key components of health care system. This life-saving intervention has been saving millions of lives globally. However, the life of transfusion recipients is at risk due to development of Transfusion-Transmissible Infections (TTI) such as HIV, HBV and HCV. In view of that screening of blood donors first started in 1947 to minimize the risk.^[1] Even after proper screening, with every unit of blood transfused, there is a 1% risk of transfusion associated problems including transfusion transmitted diseases.^[2]

India has third largest epidemic of HIV in the world. In 2017 the prevalence of HIV among adult (15-49 age group) was approximately 0.2%.^[3,4] Since last few years the rate of new infection declined by 27% and AIDS death falling by 56%.^[5]

Hepatitis B virus (HBV) not only causes chronic disease but life threatening liver disease also occurs. Approximately 257 million peoples are infected by HBV globally, of them 75% population from Asia. 50 million population of India is infected by HBV.^[5,6]

Worldwide the estimated 180 million individuals are infected by HCV.^[7] In India, approximately 13 million populations are infected by HCV.^[8] The prevalence of HCV in general population is 0.85% and among pregnant women it is 1.03 %.^[9] In India, it is mandatory to screen blood donors for HIV, hepatitis B, hepatitis C, syphilis and malaria.^[10,11] Screening of blood donors not only reduce the risk of TTI through infected blood products, but also gives an idea about the prevalence rates of the infections in the community.^[12] This further helps in assessment of the risk of TTIs, and hence in formulation of long term strategies to improve public health and to prevent spread of disease in local population.^[13] The aim of this study to determine the epidemiological profile of the blood donors and prevalence of seropositivity for HIV, HBV and HCV among blood donors.

MATERIALS AND METHODS

This retrospective cross sectional study was carried out at Blood Bank of Rajshree Medical Research Institute, Bareilly, U.P, after getting approval from Institutional Ethics Committee. The study was conducted on collected data of all voluntary and replacement donations which occurred over a period of five years from January 2016 to December 2020. A total of 7108 blood donation had occurred during this duration. Various data regarding demographic profile, voluntary or replacement donations, results of serological tests were analyzed. Data of both, donations at our blood bank as well as various blood donation camps organized by the blood bank were analyzed. In

the blood bank each donor's blood sample was screened for five infections - HIV, HBV, HCV, Syphilis and Malaria. Donor blood was screened by using 4th generation microlisa (J. Mitra & Co. Pvt Ltd) kit for HIV, Hepalisa (J. Mitra & Co. Pvt Ltd) kit for HBV and 3th generation microlisa (J. Mitra & Co. Pvt Ltd) kit for HCV and results were analyzed using Merilyzer EIAQUANT ELISA machine. Test for Syphilis was done by rapid card test (ASPEN) and malaria parasite by Advantage mal card (J. Mitra & Co. Pvt Ltd) and peripheral blood smear examination.

RESULTS

In the study, a total of **7108** donors were screened during the five-year period from January 2016 to December 2020 for TTIs. All donations were done either at blood bank of Rajshree Medical Research Institute, Bareilly or at blood camps organized by institutional blood bank at various places. Among all donors, **180** (2.53%) were females and **6928** (97.46%) were males. A total of **1670** (23.49%) were voluntary donors, out of which **96** (5.75%) were females and **1574** (94.25 %) were males. Remaining **5438** (76.50%) were replacement donors comprising of **84** (1.54%) females and **5354** (98.46%) males (**Table-1**). The commonest age group of donors was between 21-30 years, contributing to 3276 donations (46.09 %).

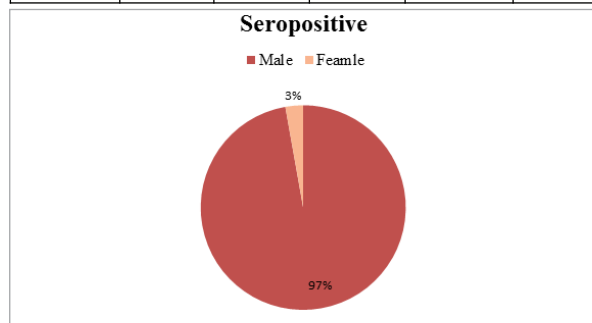
Table-1: List of yearly donation frequencies

Years	Donations				Total
	Voluntary donors		Replacement donors		
	Males	Females	Males	Females	
2016	259	21	653	18	951
2017	533	38	1101	19	1691
2018	359	13	1367	26	1765
2019	301	22	1508	20	1851
2020	122	2	725	1	850
Total	1574	96	5354	84	7108

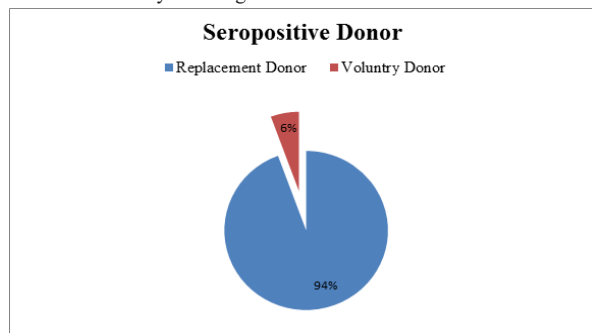
Out of 7108 donors **143** were seropositive with an overall seroprevalence of 2.01%. Among the seropositive donors **06** were HIV, **80** were HBV and **57** were HCV positive with a seroprevalence of 0.08%, 1.125%, and 0.80%, respectively (**Table-2**). The seroprevalence of HBV is highest, followed by HCV in the donors. Analysis of 143 seropositive cases depicted 4(2.79%) female donors and remaining 139 (97.2%) were male donors (**Figure-1**). All female seropositive donors were detected for HBV only. HCV and HIV serology tests were negative in these females. Fortunately all our donors were negative for Syphilis and Malaria.

Table-2: Frequency of TTIs in different years

Years	HIV	HBV	HCV	Syphilis	Malaria
2016	0	12	12	0	0
2017	4	16	10	0	0
2018	1	17	12	0	0
2019	1	20	14	0	0
2020	0	15	9	0	0
Total	6	80	57	0	0

**Figure-1: Gender wise distribution of seropositivity**

Among seropositive donors the fraction of replacement donors 136 (95.1%) were much higher than voluntary donor 7(4.89%) (**Figure-2**). Among 6 HIV seropositive donors 5 were replacement donors and only one(01) was voluntary donor. Among HBV and HCV seropositive donors the fraction of replacement donors were 76 and 55 respectively which was much higher than the voluntary donors. 4 voluntary donors were seropositive for HBV and 2 for HCV. Univariate analysis for delineating association of different variables with seropositivity revealed that seropositivity for HBV and HCV were significantly higher in replacement donors as compared to voluntary donors (p value HBV <0.0001, HCV<0.0001). While seropositivity for HIV infection failed to show any significant association with replacement and voluntary blood donors (p value 1). (**Table3**). Among seropositive donors more than half 74(51.74%) were in between 18-30 years of age.

**Figure-2: Distribution of seroprevalence in replacement and voluntary donors****Table-3: Univariate analysis of variables with seropositivity**

Category	Replacement donors	Voluntary donors	P value
HBV Seropositive	76	4	<0.0001
HBV Seronegative	5362	1666	
HCV Seropositive	55	2	<0.0001
HCV Seronegative	5383	1668	
HIV Seropositive	5	1	1.0
HIV Seronegative	5433	1669	

p value <0.05 considered significant, Test for significance: Fisher's exact test

DISCUSSION-

Worldwide more than 90 million units of blood are collected per year.^[14] To minimize the possibility of TTI and improve availability safe of blood for patients, WHO established guidelines for different domains of blood transfusion services, like selection and screening of

donors, rational use of blood and blood products, proper documentation, counseling and treatment of seropositive donors and implementation of effective quality control systems.^[15]

In this cross-sectional analysis total 7108 donations occurred over 5 years. Majority of the donors were males (97.46%) which are quite similar to other studies.^[16, 17, 18,19] In our study, 143 donors were seropositive with an overall seroprevalence of 2.01%. The distribution of seroprevalence in both sex varied largely; only 4 female donors (2.79%) were seropositive and 139 (97.2%) were male donors. Seroprevalence of HIV, HBV, and HCV were 0.08%, 1.125%, and 0.8%, respectively. There were no VDRL and malaria positive in donors. In our study the seroprevalence of HBV is more among blood donors as compared to HIV and HCV and this result showed concordance with other studies (**Table 4**).^[16,17,18,19]

Table-4: Comparison of seroprevalence with different studies

Overall seroprevalence	(%) HIV	(%) HBV	(%) HCV	(%) Reference
1.63	0.32	0.78	0.27	Adhikari et al. ^[16]
3.48	0.02	2.28	1.18	Kakepoto et al. ^[17]
18.7	8.5	10.6	0	Stokx et al. ^[18]
28.8	3.1	18.6	6.0	Buseri et al. ^[19]

According to the study done by Kakepoto *et al.*, higher rate of prevalence of HBsAg and HCV was observed in the younger age group of 21-30 years.^[17] Buseri *et al.*, noted that the highest prevalence of HIV was between 18 and 47 years and that for HBV was between 18 and 27 years of age.^[19] In this study also, most of the seropositive donors belonged to younger age group population between 18 and 30 years followed by 31-40 years.

Study conducted by Meena M *et al.*, found higher prevalence of seropositivity among replacement donors as compared to the voluntary donors.^[20] Similarly in our study seroprevalence in replacement donors 136 (95.1%) were much higher than the voluntary donor 7(4.89%). The seropositivity for HBV and HCV were found to be significantly associated with replacement donations. However seropositivity for HIV infection is not shown any significant correlation with replacement and voluntary blood donors.

CONCLUSION-

The seropositivity among blood donors is of huge concern in transfusion services. Proper selection and testing of donor's blood by using standard methods must be done to ensure safety of recipients. Introducing pre test and post test counseling in blood banks will identify patients at an earlier stage where treatment would be more effective. This will also prevent further transmission which has an impact on the family members and community. However prevalence of HIV in our study might be lower due to different sensitization and educational programs organized by government and NGOs. Also there is an obvious need to shift the burden to voluntary blood donations because voluntary donors are more aware and conscious about the high risk practices.

REFERENCES

- Available from: http://www.redcrossblood.org/learn-about-blood/history_blood-transfusion. [Last accessed on 2014 Mar 27].
- Sunderam S, KarirS, HaiderS, Singh S. B, Kiran A. Sero-Prevalence of Transfusion Transmitted Infections among Blood Donors at Blood Bank of Rajendra Institute of Medical Sciences, Ranchi. *Healthline Journal* 2015; 6 (1):36-40.
- UNAIDS 'Overview: India' 2019
- World bank, 'Data: India' 2019
- World Health Organization. Global hepatitis report,2017. Executive summary. World Health Organization; 2018
- Ray . G Current scenario of hepatitis B and its treatment in India. *J Clin Transl Hepatol* 2017;5:277-96.
- Messina JP, Humphreys I, Flaxman A, Brown A, Cooke GS, Pybus OG, et al. Global distribution and prevalence of hepatitis C virus genotype. *Hepatology* 2015;61:77-87
- Goel A, Seguy N, Aggarwal R. Burden of hepatitis C virus infection in india. A systemic review and meta-analysis. *J Gastroenterol Hepatol* 2019; 34:321-9
- Ministry of Health and Family Welfare. National hepatitis control programme: Operational Guidelines. Ministry of Health and family Welfare. Government of India, New Delhi:2018
- Blood bank. Central drugs standard control organization. Guidelines for blood banks(updated 2012 jul 26) . Available from: www.cdscoc.nic.in/forms/list
- An Action plan for blood safety 2003. National AIDS Control Organisation. Ministry of Health and Family Welfare Government of India. <http://www.naco.gov.in>
- Khan ZT, Asim S, Tariz Z, Ehsan IA, Malik RA, Ashfaq B et al. Prevalence of Transfusion transmitted infections in healthy blood donors in Rawalpindi District, Pakistan-a five year study. *Int J Pathol.* 2007; 5:21-25.
- 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.
- World Health Organization.Universal access to safe blood transfusion.World Health

- Organization, Geneva; 2008. Available from: <http://www.who.int/bloodsafety/publications/UniversalAccessToSafeBT>.
15. World Health Organization. Aide-memoire: Blood safety. World Health Organization. Geneva; 2002. Available from: <http://www.searo.who.int/entity/bloodsafety/BloodSafetyEng>.
 16. Adhikari L, Bhatta D, Tsering DC, Sharna DK, Pal R, Gupta A. Infectious disease markers in blood donors at Central Referral Hospital, Gangtok Sikkim. *Asian J Transfus Sci* 2010;4:41-2.
 17. Kakepoto GN, Bhally HS, Khaliq G, Kayani N, Burney IA, Siddiqui T, et al. Epidemiology of blood borne viruses: A study of healthy blood donors in Southern Pakistan. *Southeast Asian J Trop Med Public Health* 1996;27:703-6.
 18. Stokx J, Gillet P, De Weggheleire A, Casas EC, Maendaenda R, Beulane AJ, et al. Seroprevalence of transfusion-transmissible infections and evaluation of the pre-donation screening performance at the Provincial Hospital of Tete, Mozambique. *BMC Infect Dis* 2011;11:141.
 19. Buseri FI, Muhibi MA, Jeremiah ZA. Sero-epidemiology of transfusion-transmissible infectious diseases among blood donors in Osogbo, South-West Nigeria. *Blood Transfus* 2009;7:293-9.
 20. Meena M, Jindal T, Hazarika A. Prevalence of hepatitis B virus and hepatitis C virus among blood donors at a tertiary care hospital in India: A five year study. *Transfusion* 2011;51:198-202.