



INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by IJRPS Journal

Home Page: <https://ijrps.com/>

Seroprevalence of Transfusion Transmitted Infection (TTI) and demographic profile of seropositive blood donors in a tertiary care hospital

Sujata Banerjee, Yogesh R Yadav*

Department of Community Medicine, Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital, Kalwa, Thane, India

Article History

Received on: 04 Feb 2024
 Revised on: 11 Mar 2024
 Accepted on: 15 Mar 2024

Keywords

Blood Transfusion,
 Transfusion transmitted
 infections (TTI),
 HIV,
 Hepatitis B,
 Syphilis and HCV

Abstract

Transfusion departments have long been crucial in the screening, monitoring, and management of diseases spread by blood transfusions. Transfusions are a life-saving intervention that saves lives all over the world. Research has indicated that blood banks with component facilities have greater rates of positive for HIV, HCV, and HBV, whereas blood banks without component facilities have higher rates of syphilis and malaria. A retrospective study on blood donors done at the Blood Bank of a tertiary care hospital of western Maharashtra, India, from January 2015 to December 2020. The study analyzed a total of 15,400 donors, of which 412 donors came out to be seropositive. Majority of seropositive blood donors were in the age group of 18-30 years. The study showed a significant difference between seropositivity of voluntary and replacement donors of the year 2020. Educating, clearing the notions/myths regarding blood donation, telling the benefits and involvement of social media and NGO in promoting blood donation activities can play an important role in breaking the ice between people and blood donations. It will also create awareness regarding blood donation in the general public.



*Corresponding Author

Name: Dr. Yogesh R Yadav
 Phone: +91 9167336586
 Email: yogeshyadav2009@gmail.com

eISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v15i3.4682>

Production and hosted by

IJRPS | www.ijrps.com

© 2024 | All rights reserved

INTRODUCTION

Since 1930, blood transfusions have been performed for a variety of purposes [1]. Because of measures to improve health care standards, ageing populations, increased frequency of sophisticated surgical procedures, advancements in blood bank processes, and strict screening requirements that

have reduced donor availability, blood has become a scarce resource. Research has shown that a significant percentage of blood transfusions are misused, frequently in both affluent and developing nations [2]. Blood transfusions are a life-saving procedure that save millions of lives worldwide [3]. Blood transfusions can lower morbidity in a number of clinical illnesses and disorders, but they also carry a risk of Transfusion-Transmitted Infections (TTIs) [4]. Transfusion departments have long been crucial to the detection, tracking, and management of diseases brought on by blood transfusions. In addition to screening for TTIs, blood transfusion services can provide information on the prevalence of these infections in healthy people [5]. Blood safety is seriously threatened by infections such as malaria, syphilis, hepatitis B virus (HBV), hepatitis C virus

(HCV), and human immunodeficiency virus (HIV) [6].

Donors of blood can be classified as either replacement or voluntary. A steady foundation of regular, willing blood donors can provide a sufficient and consistent supply of safe blood. Due to the lowest rate of bloodborne infection among them, these donors are also the safest category of donors. The World Health Organization advises that all blood donations be checked for pathogens before being used. Testing for malaria, syphilis, hepatitis B, hepatitis C, and HIV need to be required. Blood screening ought to be carried out in compliance with quality system specifications.^[7] Blood products and donor management, blood collection, testing, processing, storage, distribution of safe blood when needed clinically, and staff training are all part of managing blood transfusion services. The Maharashtra government has established a great example for addressing the aforementioned administrative challenges in meeting the transfusion requirements compared to any fragmented system by establishing the State Blood Transfusion Council as an independent institution under the Department of Health.^[8] Higher rates of HIV (0.15%), HCV (0.37%), and HBV positive were seen in the blood banks with component facilities (0.91%). However, compared to blood banks with the component facility, blood banks without the facility had higher rates of malaria (0.17%) and syphilis (0.18%).^[9] Compared to replacement donors, voluntary donors have a reduced rate of TTIs. Blood drawn from low-risk individuals therefore has a lower risk of TTI. India has an estimated adult HIV incidence of 0.2-2.3%, and the country is home to up to 40 million of the 350 million chronic hepatitis B carriers globally. The prevalence of the hepatitis B surface antigen (HBsAg) ranges from 1% to 13%, with an average of 4.7 percent. In India, there are roughly 12-13 million HCV carriers [1]. An infectious disease can contribute to a pool of infection in society since it can spread even in its asymptomatic stage. Even though there are now more sensitive ways to identify TTI markers, the issue of false negative results still exists because of factors like the high genetic variability of viral strains, the prevalence of asymptomatic carriers in society, blood donation during the "Window Period," and technical errors. One of transfusion

medicine's biggest challenges is prevention of TTIs [10].

This study intends to determine the seroprevalence of TTI and evaluate the demographic profile of replacement and voluntary blood donors in a tertiary care hospital's blood bank, taking into account the prevalence of TTI in India.

Materials and Method

A retrospective cross-sectional study on donations that was performed from January 2015 to December 2020. The study was done at the Blood Bank of tertiary care hospital of western Maharashtra India. This study was approved by Institutional Clinical Ethics Committee before starting the study (Ref. No.-RGMC/CSMH/IEC/A/203 dated 16th April 2021). This study includes donors who donated blood from January 2015 to December 2020, either in blood bank or in various blood donation camps attended by the blood bank of this tertiary care hospital. All donors were selected as per the criteria of State Blood Transfusion Council, Maharashtra. Data entry and Statistical analysis was done by using MS excel 2019.

Results

Table 1 Occupational diversity in seropositive donors

Occupation	No.	HIV	HBsAg	HCV	VDRL
Service	321	57	189	60	15
Student	43	7	27	9	0
Business	13	1	9	2	1
Home maker	13	2	9	2	0
Farmer	11	0	9	1	1
Labourer	6	0	5	1	0
Government Job	3	0	3	0	0
Other	2	0	0	2	0

The study analyzed a total of 15,400 donors which included 6097 (39.6%) voluntary donors and 9303 (60.4%) replacement donors. Four hundred twelve donors (both voluntary and replacements) were tested positive for TTI with an overall seroprevalence of 2.68%. Among the total seropositive cases, 251(1.63%) were HBsAg, 67(0.44%) were HIV, 77(0.5%) were HCV and 17(0.11%) were VDRL positive. The majority of seropositive blood donors were in the age group of 18-30 years. When classified on the basis of

Table 2 Year-wise distribution of voluntary and replacement seropositive blood donors

Year	Voluntary Seropositive No. (%)	No. of Voluntary blood donors	Replacement Seropositive No. (%)	No. of Replacement blood donors	Z test	p value
2015	42 (4.33)	970	46 (4.47)	1028	0.16	0.88
2016	23 (2.92)	789	31 (2.71)	1145	0.27	0.79
2017	15 (2.12)	708	40 (2.57)	1557	0.67	0.50
2018	38 (3.62)	1050	58 (3.19)	1817	0.60	0.55
2019	21 (1.89)	1111	53 (2.30)	2306	0.79	0.43
2020	15 (1.02)	1469	30 (2.07)	1450	2.29	0.02*

Table 3 Seroprevalence of blood donors in various studies

Overall seroprevalence	HIV	HBsAg	HCV	VDRL	Reference
2.90%	0.27%	1.11%	1.53%		Koshy et al ³
1.63%	0.32%	0.78%	0.27%	0.27%	Adhikari et al ¹⁶
1.87%	0.11%	1.22%	0.14%	0.40%	Pachori et al ¹⁰
2.18%	0.07%	1.06%	0.12%	0.25%	Sahil sehgal et al ⁴
11.90%	0.24%	1.18%	0.43%	0.23%	Makroo et al ⁶
1.12%	0.13%	0.42%	0.56%	--	Sundaramurthy et al ¹⁷
1.34%	0.08%	0.98%	0.09%	0.16%	Dobariya et al ¹⁶
2.68%	0.44%	1.63%	0.5%	0.11%	This study

occupation, 321(2.08%) seropositive donors were found to be in service, 43 and 13 were students and businessmen respectively while 13 homemakers were seropositive among all donors **Table 1**.

The majority of blood donors belong to locality that are covered under blood bank of Tertiary care hospital. The overall prevalence of TTI was approximately equal in both replacement and voluntary blood donors. Overall seroprevalence show declining trend in both voluntary and replacement donors except in the year 2018. In 2018, Seropositivity was 3.62% in voluntary donors while it was 3.19% in replacement donors [Table 2]. No significant difference was found between voluntary seropositivity and replacement seropositivity prevailing from the year 2015 to 2019. While the difference between seropositivity of voluntary and replacement donors of the year 2020 was found to be significant ($p < 0.05$) **Table 2**.

Discussion

Each year, 118.5 million units of blood are collected worldwide. The World Health Organization recommends that all blood donations be checked for pathogens before use, including HIV, hepatitis B, hepatitis C, syphilis, and malaria. Blood screening should adhere to quality system norms[7].

The overall HIV prevalence trend in India has been dropping since the epidemic's peak in 2000, and it has stabilized in recent years. In 2019, this indicator's estimated value was 0.22% (0.17-0.29%)[11]. Similarly, the population prevalence of Hepatitis B (HBsAg) and chronic HCV infection is 3-4.2 percent (with more than 40 million HBV carriers) and 1%, respectively [12][13]. In India, the population prevalence of STIs such as syphilis, gonorrhoea, and chlamydia ranges between 0% and 3.9%[14]. Except for HBsAg, the prevalence of TTI in blood donors is similar to that of the general population, according to our findings. The prevalence of HBsAg in blood donors in our study (1.63%) was lower than in the general population (3-4.2%).

In this study, replacement donors accounted for 60.41% of all donations, while voluntary donors accounted for 39.59%. Other studies have found a comparable greater percentage of replacement donors. In Pachori et al ^[10], the prevalence of replacement and voluntary donors was 87.47% and 12.53%, respectively, whereas Pawan Singh et al ^[5] found 84.87% and 15.12%. The explanation for less voluntary donations could be a lack of desire and societal norms surrounding blood donation.

In compared to earlier studies, such as Adhikari et al.[15], Koshy et al.[3], and Makroo et al.[6], which had HIV prevalence rates of 0.32%, 0.27%, and 0.24%, respectively, this study had a high HIV seropositivity rate (0.44%) among blood donors.

The seropositivity rate of HBV (HBsAg) in the current study was reported to be 1.63%, which is greater than studies conducted in other parts of India. Pachori et al. [10], Sahil sehgal et al. [4], Koshy et al. [3], and Makroo et al.[6] found HBsAg prevalence of 1.22%, 1.06%, 1.11%, and 1.18%, respectively. Among 251 HBV seropositive blood donors 174 (1.13%) belong to 18-30 years age group, while only 61(0.40%) and 16(0.10%) were in the age group of 31-45 and 46-60 years of age group, respectively.

The seroprevalence of HCV in this study was 0.5%, which was greater than three separate investigations done by Arya DR [1], Dobariya et al [16], and Sahil Sehgal et al[4], which revealed HCV seropositivity of 0.18%, 0.09%, and 0.12%, respectively. In studies by Koshy et al[3] and Sundaramurthy et al[17], HCV seroprevalence was 1.53% and 0.56%, respectively. Koshy et al.[3] observed that HCV seroprevalence (1.53%) was substantially higher in Ludhiana, Punjab, than in the current study. The high incidence of injectable drug users (IDU) in Punjab is thought to be the most likely explanation of this. HCV prevalence varies dramatically across India. In the current study, the prevalence rate of syphilis (VDRL) was 0.11%. Most investigations, such as Arya DR,[1] Makroo et al.,[6] Adhikari et al[15], and Pachori et al[10], found prevalence rates higher than the current study, at 0.89%, 0.23%, 0.27%, and 0.40%, respectively. Very few studies had a lower prevalence rate than the current study. Pawan Singh et al.[5] found a prevalence of VDRL of 0.04%. H. Anjali et al.[18] discovered a low prevalence of 0.10%. The main drawback of H. Anjali et al.[18] was that they only considered willing blood donors. The spectrum of seroprevalence in numerous studies in comparison with the current study has been portrayed in **Table 3**.

Conclusion

There is an enormous discrepancy between the supply and demand for blood, thus raising awareness and encouraging blood donation is essential. This can be accomplished through spreading awareness, dispelling misconceptions,

outlining the advantages, and highlighting the role that NGOs and social media play in encouraging blood donation events.

The decreasing trend of TTI indicates that action plans are on the right track, yet many goals for lowering TTI remain unmet. Stricter donor selection criteria should be developed, error monitoring should be done, and advanced diagnostic procedures like NAT (Nucleic Acid Amplification) should be made available to all blood banks in order to further reduce seroprevalence.

Ethical Approval

This research was conducted in accordance with guidelines established by the Institutional Animal Ethic Committee (IAEC). Approval number: RGMC/CSMH/IEC/A/203 dated 16th April 2021 was obtained from the IAEC prior to the commencement of the study. All procedures involving animals were carried out with care and consideration for their welfare, in compliance with ethical standards and regulations.

Author Contribution

All authors made substantial contributions to the conception, design, acquisition, analysis, or interpretation of data for the work. They were involved in drafting the manuscript or revising it critically for important intellectual content. All authors gave final approval of the version to be published and agreed to be accountable for all aspects of the work, ensuring its accuracy and integrity.

Conflict of Interest

The authors declare no conflict of interest, financial or otherwise.

Funding Support

The authors declare that they have no funding for this study.

REFERENCES

- [1] Arya DR, Mahawar NL, Pachaury R, Bharti A, Sharma L, Kumar H, et al. Seroprevalence of transfusion transmitted infections among blood donors at a Tertiary Care Hospital Blood Bank in North India. Indian j health sci 2016; 9:77-81
- [2] Varsha T, Ashwini K, Maheswaran UE. Prevalence of transfusion transmissible

- infections in donors and utilization of blood and components in a tertiary care hospital. *J. Evolution Med. Dent. Sci.* 2019;8(42):3125-3129.
- [3] Koshy JM, Manoharan A, John M, Kaur R, Kaur P. Epidemiological profile of seropositive blood donors at a tertiary care hospital in North India. *CHRISMED J Health Res* 2014 [cited 2021 Oct 26];1:91-4. Available from: [Link](#)
- [4] Sehgal, S., Shaiji, P. S., & Brar, R. K. Seroprevalence and Trends of Transfusion Transmissible Infections in Blood Donors in Andaman and Nicobar Islands- An Institutional Retrospective Study. *Journal of clinical and diagnostic research : JCDR.* Cited 2017 April. 11(4), EC21–EC24.
- [5] Singh P, Daiya M, Tandon SK, Puja, Bairwa S, Kalhan S. Seroprevalence of Transfusion Transmitted Infections among Blood Donors in Delhi, India - A 3 Years Retrospective Study. *Ann. Int. Med. Den. Res.* 2017; 3(3):PT10-PT13.
- [6] R.N. Makroo, Vikas Hegde, Mohit Chowdhry, Aakanksha Bhatia, and N.L. Rosamma. Seroprevalence of infectious markers & their trends in blood donors in a hospital-based blood bank in north india. *Indian J Med Res.* 2015 Sep; 142(3): 317–322.
- [7] Blood safety and availability. World Health Organization. Updated 2020 June 10. Available from: [Link](#)
- [8] Ramani, K. V. & Mavalankar, Dileep & Govil, Dipti. Management of Blood Transfusion Services in India: An Illustrative Study of Maharashtra and Gujarat States. *IIMA Working Papers.* 2007 March 09. Available from: [Link](#)
- [9] Assessment of Blood Banks in India- 2016. National AIDS Control Organization. Available from: [Link](#)
- [10] Pachori S., Pachori P., Tiwari D., et al. Seropositivity of transfusion transmitted infections in blood donors in blood bank, tertiary care centre of pediatric institute spmch hospital, jaipur. *Int J Med Sci Educ.* 2020;7(5):28-34
- [11] HIV Facts & Figures. National AIDS Control Organization. Last updated 2021 January 28. Available from: [Link](#)
- [12] Viral Hepatitis- The Silent Disease Facts and Treatment Guidelines. Directorate General of Health Service, Ministry of Health & Family Welfare. Available from: [Link](#)
- [13] Know hepatitis act now- World hepatitis Day 2016. World Health Organisation. Available from: [Link](#)
- [14] Haldar P, Morineau G, Das A, Mehendale S. A surveillance model for sexually transmitted infections in India. *Indian J Public Health.* 2015;59:286-94.
- [15] Adhikari L, Bhatta D, Tsering DC, Sharma DK, Pal R, Gupta A. Infectious disease markers in blood donors at central referral hospital, Gangtok, Sikkim. *Asian J Transfus Sci.* 2010 [cited 2021 Feb 12];4:41-42
- [16] Dobariya GH, Raja KA, Unagar CA, Pandya AN, Patel JN, Jarag MA, et al. Prevalence and trends of transfusion transmitted infections among blood donors of blood bank attached to government hospital of South Gujarat. *India Int J Res Med Sci* 2016, 4: 4123–7.
- [17] Sundaramurthy R, Arunagiri R, Ganesan V, Perumal S, Tiruvanamalai R, Charles J. Seroprevalence of transfusion transmissible infections among blood donors by chemiluminescent assay in a tertiary care center. *J of Infect Dev Ctries.* 2018; 12 (01): 31.
- [18] Transfusion-transmissible infections among voluntary blood donors at Government Medical College Thiruvananthapuram, Kerala, India, H. Anjali, Ancy Issac, M. R. Anjali, and T. S. Anish, *Asian J Transfus Sci.* 2012 Jan-Jun; 6(1): 55–56.

Copyright: This is an open access article distributed under the terms of the Creative Commons Attribution-Noncommercial- Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

© 2024 IJRPS | www.ijrps.com