



Original Research Article

A 5 YEAR RETROSPECTIVE STUDY ON ASSESSING THE PREVALENCE OF TRANSFUSION TRANSMITTED INFECTIONS IN BLOOD DONORS

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ABSTRACT

Background: Blood transfusion is vital in trauma, surgery, and chronic care, but it poses a risk of transmitting infections like hepatitis B, hepatitis C, HIV, syphilis, and malaria. These infections often originate from asymptomatic donors and can spread through contaminated blood or improper handling during transfusion.

Materials and Methods: A retrospective study was conducted at the Model Blood Centre of SVRRGGH in Tirupati, aimed to ensure safe blood transfusion by rigorously screening all donations for transfusion-transmitted infections (TTIs) following national protocols.

Results: The five-year study at the Model Blood Bank, Tirupati, recorded 35,080 blood donations, with a significant gender disparity, as 97% of donors were male. The overall prevalence of infectious markers was 1.68%, with Hepatitis B (1.4%) being the most common infection, followed by HIV (0.14%), HCV (0.04%), syphilis (0.011%), and malaria (0.06%).

Conclusion: The study emphasizes the importance of rigorous screening protocols to ensure the safety of blood donations, especially considering the higher rate of infection in voluntary donors.

Keywords: Blood donation; HIV, HbsAg, HCV, transfusion transmitted infections.

INTRODUCTION

Blood transfusion is a crucial medical procedure, especially in trauma, surgery, and for patients with chronic conditions. However, it carries the risk of transfusion-transmitted infections (TTIs), where pathogens like hepatitis B (HBV), hepatitis C (HCV), HIV, syphilis, and malaria are transmitted through contaminated blood. These infections often come from asymptomatic donors and can be spread via contaminated blood products or improper handling during transfusion.^[1,2]

In India, several measures are in place to minimize TTIs. Mandatory screening protocols are enforced for all donated blood, with testing for HIV, HBV, HCV, syphilis, and malaria using advanced methods such as Chemiluminescence Immunoassays (CLIA) and

Enzyme Immunoassays (ELISA). Around 15% to 20% of blood units also undergo Nucleic Acid Amplification Testing (NAT), a method that reduces the window period for detecting infections, thus improving transfusion safety.^[3-5]

The Hemovigilance Programme of India (HvPI) monitors the transfusion process, ensuring adherence to safety protocols and addressing adverse reactions. Additionally, the National Blood Policy sets forth guidelines for blood collection, testing, storage, and distribution.^[6] These guidelines emphasize creating a detailed database of donor health histories and implementing exclusion criteria to lower infection risks. Continuous training for healthcare professionals is also a priority to maintain high safety standards.

While these efforts have significantly reduced TTI risks, challenges persist, including resource disparities and emerging infections. Although blood transfusions are essential to healthcare, ongoing vigilance and stringent infection control measures are vital to ensuring patient safety from potential infections linked to this procedure.

MATERIALS AND METHODS

The study was conducted at the Model Blood Centre of Sri Venkateswara Ramnarayan Ruia Government General Hospital (SVRRGGH) in Tirupati. The primary objective of the centre is to ensure the availability of safe blood for transfusion in accordance with the guidelines and recommendations set forth by the National Blood Transfusion Council (NBTC). To this end, all blood donations received at the Centre are rigorously screened for transfusion-transmitted infections (TTIs) using standardized screening methods. These include tests for infections such as hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), syphilis, and malaria, following national protocols to ensure the safety of blood products before transfusion.

This retrospective study was based on data collected from the Model Blood Centre over a span of five years, covering the period from March 2019 to February 2024. A total of 35,080 blood donations were recorded during this time. All data used in this study were anonymized and retrieved from the Centre's records. Information about donors was collected, including demographic details such as gender, age group, and the type of donor (voluntary or replacement). The study did not involve direct

patient interaction or new data collection, relying entirely on existing records.

For data analysis, the extracted information was entered into Microsoft Excel. Descriptive statistics, primarily percentages, were calculated to provide insights into the characteristics of blood donors. This included the distribution of donors by gender and age group, as well as a breakdown of the types of donations. These statistical measures were used to evaluate trends in donor demographics and to understand the prevalence of TTIs among the donor population over the study period.

RESULTS

A total of 35080 donations were done in Model blood bank, Tirupati over a period of 5 years. a total of 34,010 males and 1,070 females donated blood during the study period.

The highest number of donations came from individuals aged 21-30, representing 35% of the total, followed by the 31-40 age group at 25%. The majority of donations (95%) were voluntary, with only 5% given as replacement donations.

Infectious markers were identified in 1.68% of the total donations. Hepatitis B surface antigen (HbsAg) was the most common infection, found in 1.4% of donors, followed by HIV at 0.14%, and HCV at 0.04%. Syphilis and malaria were detected in a minimal number of cases, 0.011% and 0.06%, respectively. Interestingly, infections were more prevalent among voluntary donors compared to replacement donors. [Table 1]

Infections were more common in patients who donated blood voluntarily than those who donated blood for replacement. [Table 2]

Table 1: Patient Demographics

Parameters		2019	2020	2021	2022	2023	2024	total
Total no. of donations received		7702	7122	7284	6152	6262	558	35080
Gender	Females	251	107	200	138	278	96	34010
	Males	7451	7015	7084	6014	5984	462	1070
Age	≤20 years	1156	1069	1093	921	938	85	5262 (15%)
	21-30 years	2696	2493	2549	2153	2192	195	12,278 (35%)
	31-40 years	1926	1781	1821	1538	1565	139	8770 (25%)
	40-50 years	1541	1424	1457	1230	1252	112	7016 (20%)
	>50 years	385	356	364	308	313	28	1754 (5%)
Donation type	Voluntary	7317	6760	6920	5844	5949	530	33326 (95%)
	Replacement	385	356	364	308	313	28	1754 (5%)

Table 2: Prevalence of infectious markers in blood donors

Disease	2019	2020	2021	2022	2023	2024	Total
HIV	11	9	10	9	9	2	50 (0.14%)
HbsAg	110	101	103	87	89	10	500 (1.4%)
HCV	3	2	3	2	3	1	14 (0.04%)
Syphilis	1	1	0	1	1	0	4 (0.011%)
Malaria	6	4	5	3	4	1	23 (0.06%)
Total	7702	7122	7284	6152	6262	558	591 (1.68%)

DISCUSSION

The study conducted at the Model Blood Bank, Tirupati, over a five-year period provides valuable insight into the demographic distribution of blood donors and the prevalence of infectious markers. The results reveal significant trends regarding donor characteristics and infection rates that align with findings from previous research, contributing to the body of knowledge surrounding blood donation practices in India and globally.

In this study, male donors overwhelmingly outnumbered female donors, with 34,010 males (97%) compared to only 1,070 females (3%). This gender disparity is consistent with findings from other studies conducted across India. For instance, Sabu et al,^[7] and Agnihotri et al⁸ noted a similar male predominance in their studies, where female participation in blood donation was minimal due to various socio-cultural, physiological, and logistical factors. Social stigmas, fear of anemia, and a lack of awareness about the importance of blood donation among women are often cited as barriers to female participation.

Age-wise, the study indicates that the majority of donations came from younger individuals; particularly those aged 21-30 years (35%), followed by the 31-40 age groups (25%). These findings align with research by Nwogoh et al,^[9] who also reported that the majority of blood donors were young adults. This could be attributed to the fact that younger individuals are generally healthier and more likely to meet the eligibility criteria for blood donation. Moreover, educational initiatives targeting college students and young professionals may also explain the increased participation from this demographic.

A key finding in this study is that 95% of the donations were voluntary, while only 5% were replacement donations. This is an encouraging trend, as voluntary blood donations are considered safer than replacement donations due to the lower risk of transmissible infections. A study by Kakkar et al,^[10] similarly observed a high percentage of voluntary donations in urban blood banks, reflecting a growing awareness and willingness among the public to donate blood without coercion. This shift towards voluntary donations is critical for ensuring a stable and safe blood supply, as voluntary donors are generally more reliable and less likely to withhold information about their health status.

The study found that infectious markers were present in 1.68% of total donations. The most common infection was Hepatitis B surface antigen (HbsAg), detected in 1.4% of donors, followed by HIV (0.14%), HCV (0.04%), syphilis (0.011%), and malaria (0.06%). The prevalence of HbsAg is particularly concerning, as hepatitis B is a major global public health issue. A similar study by Arora et al,^[11] reported an HbsAg prevalence of 1.7%, which is comparable to the findings in present study. The high prevalence of hepatitis B among blood

donors underscores the importance of rigorous screening and vaccination programs.

Interestingly, the study also observed that infections were more prevalent among voluntary donors compared to replacement donors. This is a somewhat unexpected finding, as previous research typically associates higher infection rates with replacement donors. For example, Bhattacharya et al,^[12] reported that replacement donors had a higher risk of transmitting infectious diseases due to the urgent nature of the donation, which may lead to incomplete disclosure of health risks. The higher infection rates among voluntary donors in this study may be due to a lack of stringent pre-donation counselling and screening in certain cases, suggesting the need for improved donor education and screening procedures.

CONCLUSION

This study adds to the growing body of evidence highlighting the demographic trends and safety concerns in blood donation practices. The predominance of male and younger donors, along with the higher infection rates among voluntary donors, aligns with findings from similar research conducted in India and abroad. Addressing the gender disparity in donor participation and enhancing pre-donation screening, particularly for voluntary donors, could further improve the safety and sustainability of blood donation programs.

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