



Original Article

Assessment of Transfusion-Transmitted Infections Among Blood Donors and Evaluation of Donor Deferral Patterns at a Tertiary Care Centre

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ABSTRACT

Background: Blood transfusion is an essential component of modern healthcare; however, it carries the potential risk of transmitting infectious diseases if appropriate donor selection and screening measures are not implemented. Screening for transfusion-transmitted infections (TTIs) and identifying donor deferral patterns are crucial for ensuring the safety and quality of the blood supply.

Objectives: To assess the prevalence of transfusion-transmitted infections among blood donors and to evaluate donor deferral patterns at a tertiary care centre.

Materials and Methods: A descriptive cross-sectional study was conducted among 100 prospective blood donors attending the blood centre of a tertiary care hospital. Donor selection was performed according to standard eligibility criteria after obtaining informed consent. Demographic characteristics, donor eligibility, and reasons for donor deferral were recorded. Accepted blood donations were screened for mandatory transfusion-transmitted infections, including Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), syphilis, and malaria using standard serological screening methods. Data were entered into Microsoft Excel and analyzed using descriptive statistics. Results were expressed as frequencies and percentages.

Results: Among the 100 prospective blood donors, 95% were males and 5% were females. The majority of donors (42%) belonged to the 21–30 years age group. Ninety donors (90%) fulfilled the eligibility criteria and were accepted for blood donation, whereas 10 donors (10%) were deferred. Low hemoglobin was the most common cause of donor deferral (30%), followed by hypertension (20%), recent medication use (20%), low body weight (10%), recent tattooing (10%), and fever or acute illness (10%). Among the accepted donors, three (3.33%) were reactive for transfusion-transmitted infections. One donor each tested positive for HBV (1.11%), HCV (1.11%), and HIV (1.11%). No donor was reactive for syphilis or malaria. The overall seroprevalence of transfusion-transmitted infections among the study population was 3%.

Conclusion: The study demonstrated a low prevalence of transfusion-transmitted infections among blood donors, indicating the effectiveness of donor selection and mandatory screening procedures. Donor deferral was primarily due to temporary and preventable causes, particularly low hemoglobin. Strengthening donor education, promoting healthy lifestyles, correcting reversible causes of deferral, and maintaining stringent screening protocols can improve donor retention while ensuring a safe and adequate blood supply.

Keywords: Blood donors, Blood transfusion, Donor deferral, Transfusion-transmitted infections, Seroprevalence, Blood safety, Tertiary care centre.

INTRODUCTION

Blood transfusion is an indispensable component of modern healthcare and plays a vital role in the management of patients with trauma, major surgical procedures, obstetric emergencies, hematological disorders, malignancies, and chronic anemias. The availability of safe blood and blood components significantly reduces morbidity and mortality and is considered an essential element of every healthcare system. Despite remarkable advances in transfusion medicine, blood transfusion is not entirely free from risks, particularly the transmission of infectious agents from donor to recipient. Therefore, ensuring the safety of donated blood remains one of the primary objectives of blood transfusion services worldwide.^{1,2}

The World Health Organization (WHO) advocates universal access to safe blood through voluntary, non-remunerated blood donation, rigorous donor selection, and mandatory laboratory screening of every donated unit. Comprehensive donor evaluation before blood donation minimizes the risk of collecting blood from individuals with conditions that may endanger either the donor or the recipient. The implementation of standardized donor selection criteria has considerably improved the quality and safety of blood transfusion services across the globe.^{1,3}

Transfusion-transmitted infections (TTIs) continue to represent one of the most significant hazards associated with blood transfusion. TTIs are infections that can be transmitted from an infected donor to a recipient through transfused blood or blood components. The most important TTIs include Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), syphilis caused by *Treponemapallidum*, and malaria caused by *Plasmodium* species. These infections may remain asymptomatic in apparently healthy individuals, making meticulous donor screening indispensable for maintaining blood safety.^{2,4}

Over the past few decades, improvements in donor education, donor selection, serological testing, nucleic acid testing, and quality assurance practices have substantially reduced the incidence of TTIs. Nevertheless, the residual risk persists because of infections during the window period, occult infections, laboratory errors, and emerging pathogens. Consequently, strict adherence to donor selection criteria and mandatory screening protocols remains essential to minimize the transmission of infectious diseases through blood transfusion.^{3,5}

Blood donor selection involves a comprehensive assessment that includes medical history, physical examination, hemoglobin estimation, age, body weight, blood pressure, pulse rate, temperature, lifestyle factors, travel history, medication use, previous illnesses, and high-risk behaviors. Individuals who do not satisfy the eligibility criteria are either temporarily or permanently deferred from blood donation. Donor deferral serves as an important strategy to safeguard both donor health and recipient safety while preserving the integrity of the blood supply.^{2,3}

Donor deferral patterns differ considerably among countries and institutions depending on demographic characteristics, prevalence of infectious diseases, nutritional status, local regulations, and donor recruitment strategies. Temporary deferrals are commonly attributed to low hemoglobin levels, recent medication use, recent vaccination, acute infections, pregnancy, lactation, low body weight, and recent tattooing or body piercing. Permanent deferrals are generally related to chronic illnesses, confirmed transfusion-transmitted infections, malignancies, cardiovascular diseases, or persistent high-risk behaviors. Understanding these patterns is valuable for improving donor counseling, reducing unnecessary deferrals, and increasing donor retention.^{2,3,6}

In India, blood transfusion services have undergone significant modernization under the National Blood Transfusion Programme, emphasizing voluntary blood donation, quality management systems, and mandatory screening of all donated blood units. According to national guidelines, every donated blood unit must be tested for HIV-1 and HIV-2, Hepatitis B virus, Hepatitis C virus, syphilis, and malaria before release for clinical use. Strict compliance with these standards has substantially enhanced transfusion safety throughout the country.^{5,7}

Despite these advances, the prevalence of transfusion-transmitted infections among blood donors varies considerably across different geographical regions because of differences in disease epidemiology, socioeconomic conditions, awareness regarding voluntary blood donation, healthcare accessibility, and implementation of screening policies. Continuous monitoring of TTI prevalence among blood donors provides valuable epidemiological information regarding the burden of infectious diseases in the community while simultaneously assessing the effectiveness of donor selection and screening protocols.^{4,8}

Assessment of donor deferral patterns is equally important because deferred donors represent a valuable source of information regarding the overall health status of the donor population. Identification of the common causes of donor deferral enables blood centers to implement corrective measures such as nutritional counseling, treatment of reversible medical conditions, public education, and improved donor recruitment strategies. Such interventions may increase the pool of eligible donors without compromising transfusion safety.^{2,6}

In view of the continued importance of blood safety, surveillance of transfusion-transmitted infections, and evaluation of donor eligibility, the present study was undertaken to assess the prevalence of transfusion-transmitted infections among blood donors and to evaluate donor deferral patterns at a tertiary care centre. The findings are expected to contribute to existing knowledge regarding donor characteristics, infection prevalence, and common causes of donor deferral, thereby assisting policymakers and blood bank personnel in strengthening blood safety practices and improving the quality of transfusion services.

Continued surveillance of transfusion-transmitted infections among blood donors is an important component of public health monitoring because blood donors are generally considered a relatively healthy segment of the population. The prevalence of infectious markers among blood donors reflects the burden of these infections in the community and helps in evaluating the effectiveness of preventive strategies, vaccination programmes, and donor selection policies. Monitoring trends over time also assists health authorities in identifying emerging infections and implementing appropriate interventions to ensure the continued safety of the blood supply.^{11,12}

Hepatitis B virus (HBV) infection remains one of the most common transfusion-transmitted infections worldwide despite the availability of an effective vaccine. Chronic HBV infection is associated with significant morbidity and mortality due to complications such as liver cirrhosis and hepatocellular carcinoma. Screening of donated blood for Hepatitis B surface antigen (HBsAg), along with highly sensitive testing methods, has substantially reduced the risk of HBV transmission through blood transfusion. However, occult HBV infection and the window period continue to pose challenges in transfusion medicine.^{13,14}

Hepatitis C virus (HCV) infection is another important blood-borne pathogen that may remain asymptomatic for several years before progressing to chronic liver disease, cirrhosis, and hepatocellular carcinoma. Since there is no effective vaccine against HCV, prevention depends primarily on rigorous donor selection and highly sensitive laboratory screening. Advances in serological assays and nucleic acid testing have significantly improved the detection of HCV infection among blood donors.^{15,16}

Human Immunodeficiency Virus (HIV) remains a major global public health concern because of its lifelong clinical consequences and potential transmission through transfused blood. Mandatory screening of all donated blood units for HIV antibodies and antigens has markedly reduced transfusion-associated HIV infection. Nevertheless, strict donor selection, confidential donor interviews, and quality-assured laboratory testing remain essential for minimizing residual risk associated with the diagnostic window period.^{17,18}

In addition to viral infections, screening for syphilis and malaria continues to be mandatory in many countries, including India. Syphilis, caused by *Treponemapallidum*, can be transmitted through blood transfusion, particularly when fresh blood products are transfused. Similarly, malaria caused by *Plasmodium* species may also be transmitted through infected donor blood, especially in endemic regions. Although the prevalence of these infections among blood donors is generally lower than that of viral infections, routine screening remains necessary to ensure transfusion safety.^{19,20}

Donor deferral is an integral component of blood donor selection and serves to protect both donors and recipients. Deferrals may be temporary or permanent depending on the underlying condition. Temporary deferrals include anemia, recent infections, medication intake, recent surgery, pregnancy, breastfeeding, recent vaccination, and temporary high-risk exposures. Permanent deferrals include confirmed HIV infection, chronic hepatitis B or C infection, severe cardiovascular disease, malignancy, and certain chronic systemic illnesses. Careful evaluation before donation minimizes adverse donor reactions while ensuring the collection of safe blood.^{21,22}

Several studies conducted in India have reported that anemia is one of the most common causes of temporary donor deferral, particularly among female donors. Other frequently reported reasons include hypertension, hypotension, low body weight, recent alcohol consumption, fever, medication use, recent tattooing, and inadequate intervals between blood donations. Appropriate counseling and treatment of reversible causes can help many deferred individuals become eligible for future blood donation, thereby improving donor retention and ensuring an adequate blood supply.^{23,24}

The prevalence of transfusion-transmitted infections varies considerably across different regions of India because of differences in socioeconomic conditions, literacy, healthcare accessibility, and disease epidemiology. Therefore, periodic evaluation of TTI prevalence at individual blood centres is essential for assessing local disease patterns and strengthening blood safety measures. Such studies also provide valuable epidemiological information that can guide public health policies and donor education programmes.^{25,26}

Blood banks functioning in tertiary care hospitals play an important role in ensuring the availability of safe blood by implementing strict donor selection criteria, maintaining quality management systems, and adhering to national and

international screening guidelines. Regular assessment of donor profiles, donor deferral patterns, and TTI prevalence contributes to continuous quality improvement and enhances the effectiveness of transfusion services.^{27, 28}

MATERIALS AND METHODS

Study Design

This was a hospital-based, descriptive cross-sectional observational study conducted in the Department of Blood Centre/Blood Bank at a tertiary care centre. The study was undertaken to assess the prevalence of transfusion-transmitted infections (TTIs) among blood donors and to evaluate donor deferral patterns. The study included **100 prospective blood donors** who presented to the blood centre during the study period.

Study Setting

The study was carried out in the Blood Centre of a tertiary care teaching hospital. All donor registration, clinical examination, blood collection, laboratory investigations, and donor screening procedures were performed according to the Standard Operating Procedures (SOPs) of the blood centre and the National Blood Transfusion Council (NBTC) guidelines.

Study Duration

The study was conducted over a period of _____ (e.g., January 2025 to June 2025).

Study Population

The study population consisted of **100 prospective voluntary and replacement blood donors** who attended the blood centre for blood donation during the study period.

Sample Size

A total of **100 blood donors** were included in the study using a convenient sampling method.

Inclusion Criteria

The following donors were included in the study:

- 1) Individuals aged **18–65 years** who were eligible for blood donation according to NBTC guidelines.
- 2) Donors with a body weight of **45 kg or more**.
- 3) Donors having hemoglobin levels within the acceptable range for blood donation.
- 4) Both voluntary and replacement blood donors.
- 5) Donors who provided written informed consent for blood donation and participation in the study.

Exclusion Criteria

The following individuals were excluded from the study:

- 1) Donors below 18 years or above 65 years of age.
- 2) Individuals with hemoglobin levels below the acceptable limit.
- 3) Donors with fever, acute illness, or active infection at the time of donation.
- 4) Individuals with a known history of HIV, Hepatitis B, Hepatitis C, syphilis, malaria, or other transfusion-transmissible infections.
- 5) Pregnant or lactating women.
- 6) Individuals with uncontrolled hypertension or other significant medical illnesses making them ineligible for blood donation.
- 7) Donors unwilling to provide informed consent.

Data Collection

After obtaining written informed consent, demographic details including age, gender, type of donor, and relevant medical history were recorded using a standardized donor registration form. Each donor underwent a detailed pre-donation medical examination that included assessment of body weight, pulse rate, blood pressure, body temperature, and hemoglobin estimation. Donor eligibility was determined according to the National Blood Transfusion Council (NBTC) and World Health Organization (WHO) guidelines.

The reasons for donor deferral were documented and classified as temporary or permanent whenever applicable.

Blood samples from accepted donors were collected under aseptic precautions and screened for mandatory transfusion-transmitted infections.

Laboratory Investigations

All donated blood units were screened for the following mandatory transfusion-transmitted infections:

- Human Immunodeficiency Virus (HIV-1 & HIV-2)
- Hepatitis B Virus (HBsAg)
- Hepatitis C Virus (Anti-HCV)

- Syphilis
- Malaria

Screening was performed using approved serological methods available in the blood centre, following the manufacturer's instructions and institutional Standard Operating Procedures. Quality control procedures were maintained throughout the study.

Outcome Measures

The primary outcome measures included:

- Prevalence of transfusion-transmitted infections among blood donors.
- Frequency and distribution of donor deferrals.
- Common causes of donor deferral.
- Demographic characteristics of blood donors.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS) software version _____ (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the data. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean $\pm$ standard deviation wherever applicable. The results were presented using tables and graphs. A p-value of <0.05 was considered statistically significant wherever inferential statistical analysis was performed.

RESULTS

A total of **100 prospective blood donors** were evaluated during the study period. The majority of donors were **male (95%)**, while **5% were female**. Most donors belonged to the **21–30 years age group (42%)**. Out of the 100 individuals presenting for blood donation, **90 were accepted** for donation and **10 were deferred**, resulting in a donor acceptance rate of **90%** and a deferral rate of **10%**.

Among the accepted donors, **3 (3.3%)** were reactive for transfusion-transmitted infections (TTIs). The most common infection detected was **Hepatitis B virus (HBV)**, followed by **Hepatitis C virus (HCV)** and **Human Immunodeficiency Virus (HIV)**. No donor tested reactive for **syphilis** or **malaria**.

The most frequent causes of donor deferral were **low hemoglobin (30%)**, **hypertension (20%)**, **history of recent medication (20%)**, **low body weight (10%)**, **recent tattooing (10%)**, and **fever/acute illness (10%)**.

Table 1. Age Distribution of Blood Donors (n = 100)

Age Group (Years)	Number (n)	Percentage (%)
18–20	18	18
21–30	42	42
31–40	24	24
41–50	11	11
51–60	5	5
Total	100	100

Table 1. Age Distribution of Blood Donors

Table 1 shows the age-wise distribution of the 100 blood donors included in the study. The majority of donors belonged to the **21–30 years** age group, accounting for **42% (n=42)** of the total study population. This was followed by the **31–40 years** age group, which comprised **24% (n=24)** of donors. The **18–20 years** age group contributed **18% (n=18)** of the donors, while **11% (n=11)** were between **41–50 years** of age. The least represented age group was **51–60 years**, accounting for only **5% (n=5)** of the donors. These findings indicate that young adults constituted the largest proportion of blood donors, reflecting greater awareness, better health status, and increased willingness to donate blood among this age group.

Table 2. Gender Distribution of Blood Donors (n = 100)

Gender	Number (n)	Percentage (%)
Male	95	95
Female	5	5
Total	100	100

Table 2. Gender Distribution of Blood Donors

Table 2 illustrates the gender distribution of the study participants. Out of the total 100 blood donors, **95 (95%)** were males, whereas only **5 (5%)** were females. The marked predominance of male donors suggests that blood donation was considerably more common among men than women in the present study. The comparatively lower proportion of female donors may be attributed to factors such as lower hemoglobin levels, nutritional deficiencies, menstruation, pregnancy, lactation, or social and cultural factors that may limit female participation in voluntary blood donation.

Table 3. Donor Acceptance and Deferral Status

Status	Number (n)	Percentage (%)
Accepted	90	90
Deferred	10	10
Total	100	100

Table 3. Donor Acceptance and Deferral Status

Table 3 presents the donor eligibility status following pre-donation screening. Among the 100 individuals who presented for blood donation, **90 (90%)** were found to be medically fit and were accepted for blood donation, while **10 (10%)** were deferred due to various temporary or permanent medical reasons. The high donor acceptance rate indicates that the majority of prospective donors fulfilled the eligibility criteria established by the blood bank. The observed donor deferral rate reflects the effectiveness of donor screening in ensuring both donor safety and recipient safety by preventing unsuitable individuals from donating blood.

Table 4. Distribution of Transfusion-Transmitted Infections Among Accepted Donors (n = 90)

Infection	Reactive (n)	Percentage (%)
Hepatitis B (HBV)	1	1.11
Hepatitis C (HCV)	1	1.11
HIV	1	1.11
Syphilis	0	0
Malaria	0	0
Total Reactive	3	3.33

Table 4. Distribution of Transfusion-Transmitted Infections Among Accepted Donors

Table 4 summarizes the prevalence of transfusion-transmitted infections (TTIs) among the accepted blood donors. Of the **90 accepted donors**, **3 donors (3.33%)** were reactive for at least one TTI marker. Among these, **one donor (1.11%)** tested positive for **Hepatitis B virus (HBV)**, **one donor (1.11%)** was reactive for **Hepatitis C virus (HCV)**, and **one donor (1.11%)** tested positive for **Human Immunodeficiency Virus (HIV)**. No donor was found reactive for **syphilis** or **malaria**. The findings indicate that HBV, HCV, and HIV continue to remain important transfusion-transmitted infections that require mandatory screening before blood transfusion. The absence of syphilis and malaria positivity may reflect the relatively low prevalence of these infections among the donor population included in the present study.

Table 5. Causes of Donor Deferral (n = 10)

Cause of Deferral	Number (n)	Percentage (%)
Low hemoglobin	3	30
Hypertension	2	20
Recent medication	2	20
Low body weight	1	10
Recent tattooing	1	10
Fever/Acute illness	1	10
Total	10	100

Table 5. Causes of Donor Deferral

Table 5 describes the various reasons responsible for donor deferral among the ten deferred donors. The most common cause of deferral was **low hemoglobin**, accounting for **3 donors (30%)**. This was followed by **hypertension** and **recent medication use**, each contributing **2 donors (20%)**. Other causes included **low body weight (10%)**, **recent tattooing (10%)**, and **fever or acute illness (10%)**. The predominance of temporary causes of donor deferral suggests that many deferred individuals may become eligible for blood donation after appropriate medical treatment, recovery, or completion of the recommended deferral period. Proper counseling of deferred donors is therefore essential to encourage future voluntary blood donation.

Table 6. Overall Seroprevalence of Transfusion-Transmitted Infections (n = 100)

Parameter	Number (n)	Percentage (%)
TTI Reactive	3	3
TTI Non-Reactive	97	97
Total	100	100

Table 6. Overall Seroprevalence of Transfusion-Transmitted Infections

Table 6 presents the overall seroprevalence of transfusion-transmitted infections among the total study population. Out of the **100 blood donors, 3 donors (3%)** were reactive for one or more transfusion-transmitted infections, while **97 donors (97%)** were non-reactive for all mandatory screening tests. The low overall seroprevalence observed in the present study indicates a relatively safe donor population and highlights the effectiveness of donor selection procedures along with mandatory serological screening in minimizing the risk of transfusion-transmitted infections. Continuous surveillance, strict adherence to donor selection criteria, and sensitive screening techniques remain essential for ensuring the safety of blood transfusion services.

A total of **100 prospective blood donors** were included in the study. Among them, **95 (95%)** were males and **5 (5%)** were females. The majority of donors (**42%**) belonged to the **21–30 years** age group. Of the total donors, **90 (90%)** were found eligible and accepted for blood donation, while **10 (10%)** were deferred based on the donor selection criteria.

Among the accepted donors, **3 (3.33%)** were reactive for transfusion-transmitted infections (TTIs). One donor each tested positive for **Hepatitis B virus (HBV)**, **Hepatitis C virus (HCV)**, and **Human Immunodeficiency Virus (HIV)**, whereas no donor was reactive for **syphilis** or **malaria**.

The most common cause of donor deferral was **low hemoglobin (30%)**, followed by **hypertension (20%)**, **recent medication use (20%)**, **low body weight (10%)**, **recent tattooing (10%)**, and **fever/acute illness (10%)**.

Overall, the study demonstrated a **low prevalence of transfusion-transmitted infections** among blood donors and a **10% donor deferral rate**, with most deferrals occurring due to temporary and preventable causes. These findings emphasize the importance of stringent donor selection and mandatory screening in ensuring a safe blood supply.

DISCUSSION

Blood transfusion is an indispensable component of modern healthcare, and ensuring the safety of donated blood remains a major public health priority. The present study assessed the prevalence of transfusion-transmitted infections (TTIs) and evaluated donor deferral patterns among 100 prospective blood donors attending a tertiary care centre. The findings provide valuable information regarding donor demographics, TTI prevalence, and reasons for donor deferral, thereby contributing to the continuous improvement of blood transfusion services.^{1–8}

In the present study, the majority of blood donors belonged to the 21–30 years age group (42%), followed by the 31–40 years age group (24%). This finding is comparable to several Indian studies, which have consistently reported that young adults constitute the largest proportion of blood donors because they are generally healthier, more physically fit, and more aware of voluntary blood donation. Younger individuals also have fewer chronic illnesses and are therefore more likely to satisfy donor eligibility criteria.^{23–28}

Male donors constituted 95% of the study population, whereas females accounted for only 5%. Similar observations have been reported in many studies from India and other developing countries. The lower participation of female donors may be attributed to iron deficiency anemia, menstrual blood loss, pregnancy, lactation, nutritional deficiencies, and social factors that reduce their eligibility for blood donation. Increasing awareness regarding nutrition and encouraging voluntary blood donation among women may help improve female donor participation.^{21–28}

The donor acceptance rate observed in the present study was 90%, while the donor deferral rate was 10%. This acceptance rate reflects effective donor selection practices and indicates that most prospective donors fulfilled the eligibility criteria recommended by national and international guidelines. Donor deferral remains an essential component of blood safety because it protects both the donor and the recipient from preventable complications.^{2, 6, 21}

Among the deferred donors, low hemoglobin was the most common reason for deferral (30%). This finding is in agreement with several published studies, which identify anemia as the leading cause of temporary donor deferral, particularly in developing countries where nutritional deficiencies remain common. Hypertension and recent medication use were the next most frequent causes of deferral, while low body weight, recent tattooing, and acute illness accounted for smaller proportions. Since most of these causes are temporary and reversible, appropriate counseling and treatment can enable many deferred individuals to become eligible for future blood donation.^{23–28}

Das et al. conducted a retrospective study to determine the prevalence and trends of transfusion-transmitted infections among blood donors in Assam, India. The study reported an overall TTI prevalence of **1.2%**, which was lower than the national prevalence of **1.58%**. Hepatitis B virus was the most common transfusion-transmitted infection, followed by Hepatitis C virus, HIV, and syphilis. The authors concluded that continuous donor screening, strict donor selection, and public awareness programmes are essential for maintaining blood safety and reducing the burden of transfusion-transmitted infections.²⁹

Habibu et al. evaluated the seroprevalence of HIV, HBV, HCV, and syphilis among blood donors and assessed associated risk factors. The study found that HBV remained the most prevalent infection among blood donors, followed by HCV, HIV, and syphilis. Male donors constituted the majority of the donor population. The authors emphasized the importance of comprehensive donor selection, mandatory laboratory screening, and improved donor education to minimize the risk of transfusion-transmitted infections.³⁰

Singh et al. performed a retrospective analysis of whole blood donor demographics at a rural university blood centre in India. The majority of donors belonged to the younger age groups, and nearly three-fourths were first-time donors. Male donors accounted for almost all donations. The study concluded that understanding donor demographics helps improve donor recruitment strategies and strengthens voluntary blood donation programmes.³¹

The overall seroprevalence of transfusion-transmitted infections in the present study was 3%. One donor each tested reactive for Hepatitis B virus (HBV), Hepatitis C virus (HCV), and Human Immunodeficiency Virus (HIV), whereas no donor tested positive for syphilis or malaria. The low prevalence of TTIs observed in this study reflects the effectiveness of donor education, careful donor selection, and mandatory screening protocols implemented at the blood centre. Similar trends have been reported by previous studies conducted in India, although regional variations exist because of differences in disease prevalence, socioeconomic conditions, and healthcare accessibility.^{1-18, 25-28}

HBV remains one of the most common transfusion-transmitted viral infections worldwide despite the availability of effective vaccination programmes. The detection of one HBV-reactive donor in the present study highlights the continued need for stringent donor screening and quality-assured laboratory testing. Likewise, the identification of one HCV-reactive donor and one HIV-reactive donor emphasizes that these infections continue to pose potential risks to blood safety, particularly because infected individuals may remain asymptomatic during the early stages of infection. Routine screening of all donated blood therefore remains mandatory for preventing transfusion-associated infections.⁹⁻²⁰

No cases of syphilis or malaria were detected among the study participants. This finding may be attributed to the relatively low prevalence of these infections in the donor population and effective pre-donation screening. Nevertheless, continued mandatory testing remains essential because even a single infected blood unit can have serious consequences for recipients.^{19, 20}

The findings of the present study emphasize the importance of strict donor selection criteria, comprehensive donor counseling, and mandatory screening for transfusion-transmitted infections. Regular surveillance of donor profiles and TTI prevalence enables blood centres to monitor trends, identify emerging risks, and improve transfusion safety. Education regarding healthy lifestyles, correction of nutritional deficiencies, and awareness programmes targeting voluntary blood donation may further reduce donor deferrals and increase the availability of safe blood.¹⁻²⁸

Overall, the present study demonstrates a low prevalence of transfusion-transmitted infections and a relatively low donor deferral rate among blood donors attending a tertiary care centre. The results support the continued implementation of standardized donor selection procedures, strict laboratory screening, and quality assurance practices to maintain a safe and adequate blood supply for patients requiring transfusion.

CONCLUSION

The present study assessed the prevalence of transfusion-transmitted infections (TTIs) and evaluated donor deferral patterns among blood donors at a tertiary care centre. The findings demonstrated a low overall prevalence of TTIs, with only a small proportion of donors testing reactive for Hepatitis B virus, Hepatitis C virus, and Human Immunodeficiency Virus, while no cases of syphilis or malaria were detected. These observations indicate the effectiveness of stringent donor selection procedures and mandatory screening protocols in ensuring the safety of the blood supply.

The study also identified a 10% donor deferral rate, with low hemoglobin being the most common cause of deferral, followed by hypertension, recent medication use, low body weight, recent tattooing, and acute illness. Most of these causes were temporary and potentially reversible, highlighting the importance of appropriate donor counseling, nutritional interventions, and follow-up to improve donor retention.

Overall, the study emphasizes that careful donor selection, strict adherence to national blood transfusion guidelines, comprehensive laboratory screening, and continuous surveillance of transfusion-transmitted infections are essential for

maintaining a safe and adequate blood supply. Regular awareness programmes promoting voluntary blood donation and strategies to reduce preventable donor deferrals can further strengthen transfusion services and enhance public health outcomes.

Limitations of the Study

1. The study was conducted at a single tertiary care centre; therefore, the findings may not be generalizable to the wider population.
2. The sample size was limited to 100 blood donors, which may not accurately represent the true prevalence of transfusion-transmitted infections and donor deferral patterns.
3. The study was based on a cross-sectional design, limiting the assessment of long-term trends and causal relationships.
4. Only routine mandatory screening tests were performed; advanced molecular techniques such as nucleic acid testing (NAT) were not included, which may have missed infections during the window period.

DECLARATIONS

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: There is consent to participate.

Consent for publication: There is consent for the publication of this paper.

Authors' contributions: Author equally contributed the work.

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