

## Prevalence and Determinants of Blood Donor Deferral in a Tertiary Care Apex Institute: A Cross-Sectional Study

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### Abstract

**Background:** Blood donor deferral is an essential component of ensuring the safety of both donors and recipients; however, it can adversely affect blood availability and donor retention. Understanding the prevalence and causes of donor deferral is crucial for improving blood transfusion services. This study aimed to determine the prevalence and determinants of blood donor deferral in a tertiary care apex institute and to analyze the pattern of temporary and permanent deferrals.

**Materials and Methods:** This cross-sectional observational study was conducted in the blood bank of a tertiary care apex institute over a period of one year (June 2023–June 2024). A total of 1220 prospective blood donors aged 18–65 years were evaluated according to standard eligibility criteria. Donors were categorized as accepted or deferred, and deferrals were further classified as temporary or permanent based on the underlying cause. Data were analyzed using SPSS version 20, and associations were assessed using the Chi-square test, with  $p < 0.05$  considered statistically significant.

**Results:** Out of 1220 prospective donors, 125 were deferred, resulting in a deferral rate of 10.2%. The deferral rate was significantly higher among females (18.2%) compared to males (8.5%) ( $p < 0.001$ ). Temporary deferrals constituted 80.0% of cases, while permanent deferrals accounted for 20.0%. Low hemoglobin was the most common cause of temporary deferral (45.0%), followed by recent illness (20.0%). Among permanent deferrals, hypertension (32.0%) was the leading cause, followed by diabetes mellitus and high-risk behavior (24.0% each). No significant association was observed between gender or age and the type of deferral.

**Conclusion:** Blood donor deferral in the studied population was primarily due to temporary and preventable causes, with anemia being the most significant factor. Targeted interventions such as nutritional improvement, donor education, and effective counseling, along with structured follow-up of deferred donors, can reduce deferral rates and enhance donor retention, thereby improving the availability of safe blood.

**Keywords:** Blood donor deferral, Anemia, Temporary deferral, Permanent deferral, Blood transfusion services.

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### Introduction

Blood transfusion services are a critical component of modern healthcare systems, playing an essential role in the management of medical and surgical conditions, trauma, obstetric emergencies, and hematological disorders. Ensuring an adequate and safe blood supply depends largely on the recruitment and retention of healthy voluntary blood donors. However, donor selection criteria are stringent, and a proportion of otherwise willing donors are deferred to safeguard both donor health and recipient safety [1].

Donor deferral refers to the rejection of a prospective blood donor based on established eligibility criteria, which may be temporary or permanent. Temporary deferrals commonly arise from conditions such as anemia, recent infections, medication use, or recent vaccinations, whereas permanent deferrals are usually due to high-risk behaviors or chronic medical conditions [2]. Donor deferral is an essential quality control measure but can negatively impact blood availability and donor

motivation, particularly if not managed appropriately [3].

Globally, the prevalence of donor deferral varies widely, ranging from 5% to 35%, depending on regional policies, population characteristics, and screening protocols [4]. In developing countries like India, higher deferral rates are often observed due to a greater burden of nutritional deficiencies, especially anemia, and a higher prevalence of transfusion-transmissible infections (TTIs) [5]. Among these, low hemoglobin levels remain the most common cause of temporary deferral, particularly among female donors [6].

Understanding the patterns and determinants of donor deferral is crucial for improving donor recruitment strategies, optimizing blood supply, and minimizing unnecessary deferrals. Identification of modifiable factors such as nutritional deficiencies, awareness gaps, and lifestyle-related risks can help design targeted interventions [7]. Additionally, proper counseling of deferred donors plays a vital role in ensuring their return once they become eligible, thereby maintaining a stable donor pool [8].

Despite its importance, data on donor deferral patterns from apex tertiary care institutions remain limited in many regions. Such institutions often cater to diverse populations and follow stringent screening protocols, making them ideal settings for studying donor deferral trends. Therefore, the present study aims to assess the prevalence and determinants of blood donor deferral in a tertiary care apex institute, with the objective of identifying common causes and suggesting measures to improve donor retention and blood safety.

## Materials and Methods

This cross-sectional observational study was conducted in the blood bank of a tertiary care apex institute in Indore, over a period of one year from June 2023 to June 2024. Ethical clearance for the study was obtained from the Institutional Ethics Committee, and the study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Confidentiality of donor information was strictly maintained throughout the study. All individuals presenting to the blood bank for whole blood donation during the study period were considered for inclusion, and both voluntary and replacement donors were screened according to standard eligibility criteria. A total of 1220 prospective blood donors were included in the study. Donors aged between 18 and 65 years who fulfilled preliminary registration requirements were included in the study, while those unwilling to

participate, having incomplete records, or presenting for apheresis donation were excluded. Donor selection was carried out in accordance with the guidelines laid down by the Drugs and Cosmetics Act of India and the National Blood Transfusion Council (NBTC). Each prospective donor underwent a detailed medical history assessment and physical examination, including measurement of weight, pulse, blood pressure, and temperature, along with hemoglobin estimation using a standard method. Based on the evaluation, donors were either accepted or deferred, and deferrals were categorized as temporary or permanent depending on the underlying cause. Temporary deferrals included conditions such as anemia, recent infections, medication use, recent vaccination, or alcohol intake, whereas permanent deferrals included high-risk behavior, chronic illnesses, and transfusion-transmissible infections. Data were collected from donor registration records and deferral registers using a structured proforma, and variables such as age, gender, type of donor (voluntary or replacement), donation status (accepted or deferred), reason for deferral, and type of deferral were recorded. The primary outcome measure was the prevalence of donor deferral, calculated as the number of deferred donors divided by the total number of registered donors during the study period, while secondary outcomes included the distribution of causes of deferral and their association with demographic variables. Data were entered into Microsoft Excel and analyzed using SPSS version 20, with categorical variables expressed as frequencies and percentages and continuous variables as mean  $\pm$  standard deviation. The association between variables was assessed using the Chi-square test, and a p-value of  $<0.05$  was considered statistically significant.

## Results

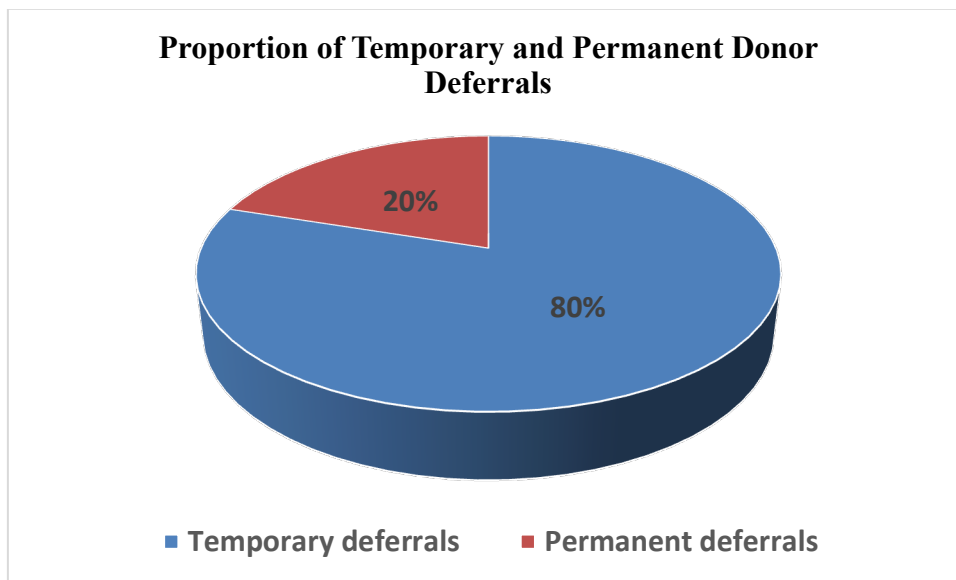
A total of 1220 prospective blood donors were screened during the study period, of whom 125 were deferred, yielding an overall deferral rate of 10.2%. The remaining 1095 donors (89.8%) were found eligible for blood donation. Among the deferred donors, the majority were males ( $n = 85$ , 68.0%), while females constituted 40 (32.0%).

As shown in Table 1, out of 1000 male donors, 915 (91.5%) were accepted and 85 (8.5%) were deferred. In comparison, among 220 female donors, 180 (81.8%) were accepted and 40 (18.2%) were deferred. Thus, the deferral rate was notably higher among female donors than males. Statistical analysis using the Chi-square test demonstrated a significant association between gender and donor deferral status ( $\chi^2 = 18.12$ ,  $p < 0.001$ ), indicating that gender plays an important role in determining donor eligibility in the studied population.

**Table 1: Association between Gender and Donor Deferral Status**

Gender	Accepted (n)	Deferred (n)	Total (n)	$\chi^2$ value	p-value
Male	915	85	1000	18.12	< 0.001
Female	180	40	220		
Total	1095	125	1220		

As illustrated in Figure 1, among the 125 deferred donors, temporary deferrals constituted the majority (n = 100, 80.0%), while permanent deferrals accounted for 25 (20.0%).



**Figure 1: Proportion of Temporary and Permanent Donor Deferrals**

As shown in Table 2, with respect to gender distribution, temporary deferrals were more frequent in both males (n = 65, 76.5%) and females (n = 35, 87.5%). Permanent deferrals were observed in 20 (23.5%) male and 5 (12.5%) female donors. However, the association between gender and type of deferral was not statistically significant ( $\chi^2 = 2.13$ , p = 0.144). The highest number of

deferrals was observed in the 18–25 years age group (n = 40), followed by 26–35 years (n = 35). Temporary deferrals predominated across all age groups. Although some variation was noted in the proportion of permanent deferrals across different age groups, the association between age and type of deferral was not statistically significant ( $\chi^2 = 3.21$ , p = 0.522).

**Table 2: Association between Gender and Age distribution with Type of Donor Deferral**

Variable	Category	Temporary (n)	Permanent (n)	Total (n)	$\chi^2$ value	p-value
Gender	Male	65	20	85	2.13	0.144
	Female	35	5	40		
Age Group (years)	18–25	35	5	40	3.21	0.522
	26–35	28	7	35		
	36–45	20	5	25		
	46–55	10	5	15		
	56–65	7	3	10		

Table 3 presents the distribution of causes of temporary donor deferral (n = 100) in the study population. Low hemoglobin (anemia) was the most common cause, accounting for 45 cases (45.0%). This was followed by recent illness (n = 20, 20.0%). Other contributing factors included alcohol intake (n = 12, 12.0%) and medication use

(n = 10, 10.0%). Less frequent causes of temporary deferral were recent vaccination (n = 8, 8.0%) and underweight status (n = 5, 4.0%), while no cases were categorized under ‘others’. Overall, the majority of temporary deferrals were due to reversible and potentially preventable conditions, with anemia emerging as the predominant factor.

**Table 3: Causes of Temporary Deferral (n=100)**

Cause	Number (n)	Percentage (%)
Low Hemoglobin	45	45.0%
Recent Illness	20	20.0%
Alcohol Intake	12	12.0%
Medication Use	10	10.0%
Recent Vaccination	8	8.0%
Underweight	5	4.0%
Others	0	0%
<b>Total</b>	<b>100</b>	<b>100%</b>

Table 4 illustrates the distribution of causes of permanent donor deferral (n = 25) in the study population. Hypertension was the leading cause, accounting for 8 cases (32.0%). This was followed by diabetes mellitus and high-risk behavior, each contributing 6 cases (24.0%). Transfusion-

transmissible infections were responsible for 5 cases (20.0%) of permanent deferral. Overall, permanent deferrals were predominantly attributed to chronic medical conditions and high-risk factors, which render individuals permanently unsuitable for blood donation.

**Table 4: Causes of Permanent Deferral (n=25)**

Cause	Number (n)	Percentage (%)
Hypertension	8	32.0%
Diabetes Mellitus	6	24.0%
High-risk Behavior	6	24.0%
Transfusion-Transmissible Infections	5	20.0%
<b>Total</b>	<b>25</b>	<b>100%</b>

## Discussion

The present study evaluated the prevalence and determinants of blood donor deferral in a tertiary care apex institute and observed an overall deferral rate of 10.2%. This finding is comparable to several studies conducted in similar settings, where deferral rates have been reported within a similar range, reflecting consistency in donor screening practices and population characteristics [9,10].

A significantly higher deferral rate was observed among female donors compared to males in the present study. Similar observations have been reported in multiple studies, which attribute higher deferral rates among females primarily to nutritional anemia and lower baseline hemoglobin levels [11–13]. This gender disparity highlights the need for targeted interventions such as nutritional supplementation, iron therapy, and awareness programs to improve donor eligibility among women.

Temporary deferrals constituted the majority (80.0%) of all deferrals, which is consistent with findings from other studies where temporary causes predominate over permanent ones [14,15]. This is an encouraging observation, as temporarily deferred donors represent a pool of potential future donors who can be recruited with appropriate counseling and follow-up.

Low hemoglobin (anemia) was identified as the most common cause of temporary deferral (45.0%), followed by recent illness and alcohol intake. This

finding is in agreement with previous studies, which consistently report anemia as the leading cause of donor deferral [11,16,17]. The high prevalence of anemia underscores the importance of strategies such as pre-donation screening, nutritional counseling, and iron supplementation programs to reduce avoidable deferrals and improve donor retention. Among permanent deferrals, hypertension was the most common cause, followed by diabetes mellitus and high-risk behavior. These findings are consistent with studies highlighting the increasing contribution of non-communicable diseases to donor ineligibility [18]. The rising burden of chronic conditions such as hypertension and diabetes in the general population may lead to a sustained reduction in the eligible donor pool.

The present study did not find a statistically significant association between gender and type of deferral or between age and type of deferral. Similar findings have been reported in other studies, suggesting that while demographic factors may influence overall deferral rates, they may not significantly affect the nature of deferral [15,19].

The findings of this study have important implications for blood transfusion services. Since a large proportion of deferrals are due to temporary and potentially reversible conditions, targeted interventions such as nutritional improvement, donor education, and effective counseling can significantly reduce deferral rates. Establishing structured follow-up mechanisms for temporarily

deferred donors can facilitate their return once they become eligible, thereby improving the overall availability of safe blood.

#### Conclusion:

The present study demonstrates that the prevalence of blood donor deferral in a tertiary care apex institute is 10.2%, with a significantly higher deferral rate observed among female donors. Temporary deferrals constituted the majority of cases, predominantly due to anemia, while permanent deferrals were mainly attributed to chronic conditions such as hypertension and diabetes mellitus, along with high-risk behaviors. These findings indicate that a substantial proportion of donor deferrals arise from preventable and reversible causes. Implementation of targeted strategies, including nutritional interventions, iron supplementation, donor awareness programs, and effective pre-donation counseling, can significantly reduce temporary deferrals.

Furthermore, establishing structured follow-up systems for temporarily deferred donors is essential to facilitate their return to the donor pool. Strengthening these measures can improve donor retention, enhance the availability of safe blood, and contribute to a more efficient and sustainable blood transfusion service.

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