

Analysis of Reasons for Blood Donor Deferral: A Retrospective Study at a Tertiary Care Centre in North India

Dr. Aashish Kumar Laduna¹, Dr. Amit Sharma², Dr. S P Bhardwaj³

¹Junior Resident, Department of Immunohaematology and Transfusion Medicine, SMS Medical College and Attached Hospital, Jaipur, Rajasthan, India

Email: aashishladuna7[at]gmail.com

²Department of Immunohaematology and Transfusion Medicine, SMS Medical College and Attached Hospital, Jaipur, Rajasthan, India

Email: amitbloodbank[at]gmail.com

³Assistant Professor, Dept of IHTM, SMS Medical College, Jaipur, Rajasthan, India

Email: bhardwaj.shantanu[at]gmail.com

Abstract: ***Background:** Blood donor deferral is an inevitable component of donor selection that safeguards both donors and recipients but can adversely affect donor retention and blood availability. Understanding the pattern and causes of deferral is essential for optimizing donor eligibility criteria and sustaining transfusion services, particularly in high-volume tertiary care settings [1, 2]. **Aim:** This retrospective, observational study was conducted in the Department of Transfusion Medicine, SMS Medical College and Attached Hospital, Jaipur, over a one-year period (September 2024 to August 2025), to analyze the frequency and reasons for blood donor deferral. **Materials and methods:** A total of 40,128 prospective voluntary and replacement donors were screened following Drugs and Cosmetic Rules, and DGHS guidelines; each donor underwent a standardized pre-donation evaluation comprising demographic assessment, medical/surgical history, physical examination, and hemoglobin estimation using a HemoCue Hb 301+ analyzer. **Results:** Of the 40,128 donors screened, 4,332 (10.79%) were deferred; males constituted 83.1% and females 16.9% of deferred donors. Anemia was the single most common cause of deferral (23.55%) and was significantly more frequent among female donors ($p < 0.001$), followed by medical/surgical conditions (17.45%), underweight/underage status (11.91%), and recent tattooing (5.26%); other temporary causes- including inadequate sleep, allergy, recent vaccination, menstruation, animal bite, alcohol intake, and recent donation- together accounted for 41.84% of deferrals. **Conclusion:** The overwhelming majority of deferrals were temporary and potentially avoidable. Targeted donor education addressing anemia, particularly iron deficiency among female donors, together with structured pre-donation counseling, could substantially reduce avoidable deferrals, expand the eligible donor pool, and improve donor retention, thereby helping to ensure a stable and safe blood supply.*

Keywords: blood donor deferral; anemia; hemoglobin; voluntary blood donation; transfusion medicine; donor retention

1. Introduction

Safe and adequate blood transfusion services depend fundamentally on the recruitment and retention of healthy, low-risk voluntary blood donors [1]. Donor selection criteria, which combine a structured questionnaire, physical examination, and hemoglobin screening, exist to protect the donor from adverse effects of donation and to protect the recipient from transfusion-transmissible infections and other harms [2]. When a prospective donor fails to meet these criteria, the donor is temporarily or permanently deferred. While necessary for blood safety, deferral represents a lost donation opportunity, can discourage a donor from returning, and- if the underlying cause is not addressed- may perpetuate a cycle of repeated deferral [3].

The magnitude and pattern of donor deferral vary widely across countries and even across regions within the same country, reflecting differences in donor demographics, prevailing disease epidemiology, nutritional status, and local donor selection guidelines [2,3]. Indian studies have reported total deferral rates ranging from approximately 5% to over 30%, with

low hemoglobin consistently identified as the leading temporary cause, particularly among female donors [2,3].

Anemia, most commonly due to iron deficiency, remains the single largest contributor to donor deferral worldwide, accounting for roughly one-third to three-quarters of all temporary deferrals in various series, with a strong female preponderance driven by menstrual blood loss and reduced iron reserves relative to men [4,5,6]. Whole-blood donation itself removes a substantial quantity of iron with each unit, and repeated donation without adequate iron replenishment can further compound pre-existing deficiency, particularly in premenopausal women [7,8,9].

Recent tattooing or body piercing is another frequently encountered, though increasingly debated, cause of temporary deferral, historically instituted because of the theoretical risk of transfusion-transmissible infections such as hepatitis B, hepatitis C, and HIV associated with needle-related procedures [10]. More recent donor cohort studies from regulated settings, however, have found no measurable increase in transfusion-transmissible infection risk among donors with recent tattoos or

piercings, prompting several blood services to shorten or reconsider this deferral period [11,12].

Beyond blood safety, donor deferral has important implications for donor retention: deferred donors, especially first-time donors, are less likely to return for subsequent donation attempts unless supported by appropriate counseling, iron supplementation where indicated, and motivational engagement [13,14,15]. Identifying and addressing the modifiable causes of deferral is therefore central to expanding and sustaining the voluntary donor pool. The present study was undertaken to analyze the frequency and reasons for blood donor deferral at a high-volume tertiary care blood centre in North India, with the aim of informing targeted donor education and retention strategies.

2. Aims and Objectives

To analyze the frequency and causes of blood donor deferral at SMS Medical College and Attached Hospital, Jaipur, over a period of one year (September 2024 to August 2025), and to compare the pattern of deferral between male and female donors.

3. Materials and Methods

This was a retrospective, observational study conducted in the Department of Transfusion Medicine, SMS Medical College and Attached Hospital, Jaipur, Rajasthan, over a period of one year (September 2024 to August 2025), after obtaining Institutional Ethics Committee clearance. A total of 40,128 prospective voluntary and replacement blood donors, aged 18-65 years, who presented for whole blood donation during the study period were screened in accordance with the Drugs and Cosmetics Rules and the guidelines of the Directorate General of Health Services (DGHS) and the National AIDS Control Organisation (NACO).

Each prospective donor underwent a standardized pre-donation evaluation comprising recording of demographic data, a structured medical and surgical history, physical examination (including blood pressure, pulse, weight, and general well-being), and hemoglobin estimation using a HemoCue Hb 301+ point-of-care analyzer. Donors not meeting the eligibility criteria specified in the donor selection guidelines were categorized as temporarily or permanently deferred. Temporary causes of deferral recorded included anemia (hemoglobin below the cut-off of 12.5 g/dL for females and males), underweight (less than 45 kg) or underage (less than 18 years old) status, recent illness or vaccination, menstruation, inadequate sleep, recent tattooing or piercing, recent alcohol intake, and recent blood donation within the mandatory inter-donation interval. Permanent causes of deferral included chronic diseases such as diabetes mellitus on insulin therapy, cardiovascular disease, and malignancy.

Data on age, sex, type of donor (voluntary/replacement), and reason for deferral were extracted from donor registration records and deferral registers maintained in the blood centre and

entered into a structured proforma. Data were analyzed using descriptive statistics (frequencies and percentages); the Chi-square test was used to compare the distribution of deferral causes between male and female donors, with a p-value of less than 0.05 considered statistically significant.

4. Results

Of the 40,128 prospective donors screened during the one-year study period, 4,332 (10.79%) were deferred from donation. Among the deferred donors, males accounted for 3,600 (83.1%) and females for 732 (16.9%), reflecting the predominantly male composition of the overall donor pool at the centre (Table 1, Figure 1).

Gender	Number of Donors (n)	Percentage (%)
Male	3600	83.1
Female	732	16.9
Total deferred donors	4332	100

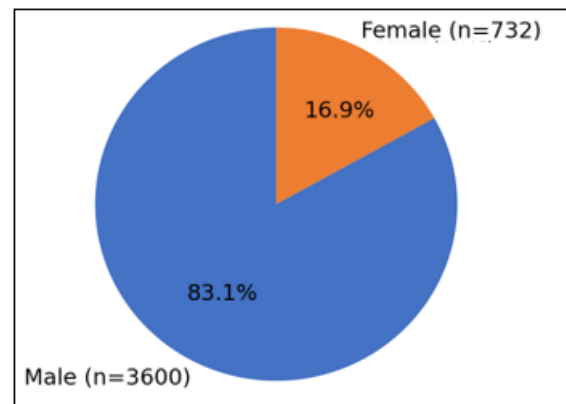


Figure 1: Gender distribution of deferred donors (n = 4,332)

Anemia was the most common single cause of deferral, accounting for 1,020 donors (23.55%), and was significantly more frequent among female donors than male donors ($p < 0.001$). Medical or surgical conditions, including past surgeries, diabetes mellitus, uncontrolled hypertension and other chronic illnesses, accounted for 756 donors (17.45%). Underweight or underage status was responsible for 516 deferrals (11.91%), while recent tattooing accounted for 228 deferrals (5.26%). The remaining 1,813 deferrals (41.84%) were attributed to a heterogeneous group of other temporary causes, including inadequate sleep, allergy, recent vaccination, menstruation, animal bite, recent alcohol intake, and recent donation within the mandatory inter-donation interval (Table 2, Figure 2).

Cause of Deferral	Number of Donors (n)	Percentage (%)
Anemia	1020	23.55
Medical / surgical conditions	756	17.45
Underweight / underage	516	11.91
Recent tattoos	228	5.26
Other temporary causes*	1813	41.84
Total deferred donors	4332	100

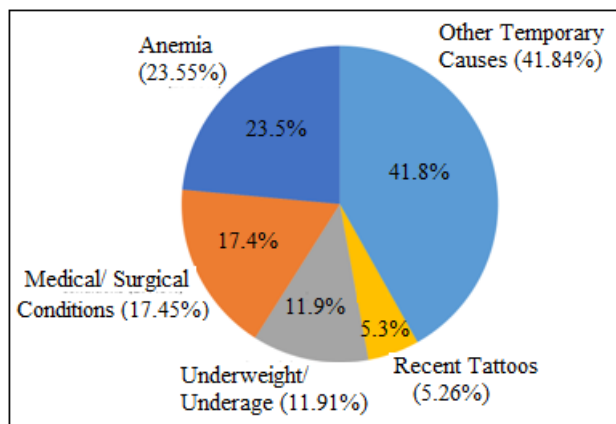


Figure 2: Distribution of causes of blood donor deferral (n = 4,332).

*Other temporary causes comprised inadequate sleep, allergy, recent vaccination, menstruation, animal bite, alcohol intake, and recent donation within the mandatory inter-donation interval, none of which individually exceeded the frequency of the four named categories above.

5. Discussion

The overall deferral rate of 10.79% observed in this study is comparable to figures reported from other Indian tertiary care centres, which have ranged from approximately 5% to over 30% depending on donor population, screening cut-offs, and regional disease burden [2,3]. As in most published series, temporary causes vastly outnumbered permanent ones, underscoring that the majority of deferred donors could potentially be recruited again after the underlying, reversible cause is corrected [2,3].

Consistent with the wider literature, anemia was the single largest contributor to deferral in the present cohort and disproportionately affected female donors. Iron deficiency, driven by menstrual losses and by the cumulative iron cost of repeated donation, is well documented as the principal mechanism underlying low-hemoglobin deferral in premenopausal women [4,5,6,7]. Several groups have shown that structured iron supplementation and serum ferritin-guided donor management can reduce the rate of repeat low-hemoglobin deferral among regular female donors, and such strategies, along with pre-donation dietary counseling, may be of particular value in the present setting given the high proportion of anemia-related deferral [7, 8, 9].

Recent tattooing accounted for a modest but notable proportion of deferrals in this study. While tattoo- and piercing-related deferral has traditionally been justified by the theoretical risk of transfusion-transmissible infection, several recent large donor-cohort studies from regulated settings have found no measurable increase in blood-borne virus incidence among donors with recent tattoos performed under hygienic conditions, and some blood services have consequently shortened the associated deferral interval [10, 11, 12]. These findings suggest that periodic reassessment of the tattoo/piercing deferral criterion, taking into account local

regulation of tattoo parlours and infection prevalence, may help recover otherwise eligible donors without compromising blood safety.

Beyond the specific causes identified, this analysis reinforces those of similar studies in highlighting that deferral, even when medically appropriate, represents an opportunity to engage rather than lose a prospective donor. Structured post-deferral counseling, motivational interviewing, and clear communication about when and how a deferred donor may safely return have each been shown to improve subsequent donor return rates in controlled studies [13,14,15]. Incorporating such donor-retention strategies into routine blood centre practice, alongside targeted anemia screening and management, could meaningfully expand the eligible and willing donor pool at this and similar tertiary care institutes.

Limitations of this study include its retrospective, single-centre design, reliance on point-of-care hemoglobin estimation without confirmatory laboratory testing or ferritin assessment, and the absence of follow-up data on whether deferred donors subsequently returned to donate. Prospective, multicentric studies incorporating iron-status assessment and donor follow-up would help to further refine donor education and retention strategies.

6. Conclusion

In this one-year analysis of 40,128 prospective donors at a tertiary care institute in North India, 10.79% were deferred, and the great majority of deferrals were temporary and potentially preventable. Anemia, particularly among female donors, was the leading cause, followed by medical/surgical conditions, underweight/underage status, and recent tattooing. Targeted donor education—especially regarding anemia and iron status in female donors and lifestyle-related deferrable conditions—together with structured pre-donation counseling and post-deferral donor engagement, can help minimize avoidable deferrals and expand the eligible donor pool. Strengthening these measures is likely to improve donor satisfaction and retention and to help ensure a stable and safe blood supply for the institute.

References

- [1] V S, R A, Haran A H, I S K, and James S. (2024), "Analysis of Blood Donor Deferral Pattern at a Tertiary Care Hospital in Chennai: A Cross-Sectional Retrospective Study." *Cureus*, 16(8), e67541.
- [2] Kumar R, Bhardwaj S, and Sood T. (2023), "Analysis of reasons of blood donor deferral at a tertiary care institute in India and its reflections on community health status." *Global Journal of Transfusion Medicine* (PMC10180785).
- [3] Mangwana S. (2013), "Analysis of blood donor deferral pattern: scenario at tertiary care hospital in India." *Asian Journal of Transfusion Science*, 7, 160-161.

- [4] Kasraian L, and Negarestani N. (2012), "Anemia and the blood donor." *Revista Brasileira de Hematologia e Hemoterapia*, 34(5), 337-338.
- [5] Silva MA, de Souza RA, Carlos AM, Soares S, and Moraes-Souza H. (2012), "Etiology of anemia of blood donor candidates deferred by hematologic screening." *Revista Brasileira de Hematologia e Hemoterapia*, 34(5), 356-360.
- [6] Cable RG. (2013), "Low hemoglobin deferral in blood donors." *Current Opinion in Hematology*, 21(6), 546-551.
- [7] Maghsudlu M, and Nasizadeh S. (2011), "Clinical evaluation of iron treatment efficiency among non-anemic but iron-deficient female blood donors: a randomized controlled trial." *Vox Sanguinis*, 101(2), 145-151.
- [8] Karp JK, and King KE. (2022), "Iron Deficiency and Blood Donation: Links, Risks and Management." *Annals of Blood*, 7, 1-9.
- [9] Spencer BR, Kleinman S, Wright DJ, Glynn SA, Rye DB, et al. (2013), "Iron Replacement Therapy in the Routine Management of Blood Donors." *Transfusion*, 53(8), 1670-1679.
- [10] Goldman M, Xi G, Yi QL, Fan W, and O'Brien SF. (2009), "Reassessment of deferrals for tattooing and piercing." *Transfusion*, 49(4), 648-654.
- [11] van de Laar TJW, Marijt-van der Kreek T, Molenaar-de Backer MWA, and Hogema BM. (2019), "No increased risk of transfusion-transmissible infections after tattooing, body piercing, or acupuncture among blood donors in the Netherlands." *Transfusion*, 59(9), 2841-2848.
- [12] Ramakrishnan S, and Vijayakumar S. (2024), "Is tattooing associated with increased seroprevalence of transfusion-transmitted infections among blood donors: A single-center study from Southeastern India." *Global Journal of Transfusion Medicine* (PMC11259337).
- [13] France CR, France JL, Carlson BW, Kessler DA, Rebosa M, et al. (2010), "An adapted postdonation motivational interview enhances blood donor retention." *Transfusion*, 50(8), 1778-1786.
- [14] Alharbi MA, and Alsulami RM. (2024), "Motivational Factors and Barriers to Voluntary Blood Donation Among First-Time and Repeat Donors." *Cureus* (PMC12899317).
- [15] Custer B, and Chinnock B. (2024), "Voluntary Blood Donation in Modern Healthcare: Trends, Challenges, and Opportunities." *Journal of Blood Medicine* (PMC11675880).