

Factors Leading to Pre-Donation Deferral in Blood Donors at a Tertiary Care Facility: A Retrospective Analysis

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Received: 09-10-2024 / Revised: 11-11-2024 / Accepted: 14-11-2024

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Conflict of interest: Nil

Abstract:

Background: Blood donation is a crucial component of healthcare systems globally. Identifying the reasons for deferring individuals willing to donate blood is essential for improving donation practices. This study aimed to analyze deferral cases to support the practice of voluntary blood donation within the healthcare framework for fostering voluntary donation, ensuring safe blood and blood products for recipients, safeguarding donor health, and developing strategies to retain deferred but motivated donors.

Materials and Methods: Conducted as a retrospective study from January 2022 to December 2022, all whole blood donors underwent comprehensive history and physical examination. Donors were either accepted or deferred following standard blood donor guidelines. Data from 345 deferred individuals were subsequently analyzed.

Results: The deferral ratio between males and females was 3.93:1, with 275 (79.71%) males and 70 (20.21%) females deferred. The highest percentage of temporary deferrals was noted in the 21–30 years age group (37.10%), while the highest rate of permanent deferrals was observed in the 41–50 years age group (6.09%). Of the total deferrals, 302 (87.54%) were temporary, while 43 (12.46%) were permanent. Low hemoglobin was the most common cause (43.13% of deferrals).

Conclusion: Low hemoglobin was the primary reason for deferrals. Most deferrals were temporary and could be managed or reversed. Encouraging these deferred individuals to return to the donor pool can enhance the availability of this life-saving resource. Additionally, analyzing deferral data provides insights that can expand blood donation efforts, save lives, and increase public awareness.

Keywords: Blood donation, Deferral, Anemia, Whole blood.

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Introduction

Blood donation is an essential component of the global healthcare system, playing a pivotal role not only in the treatment of various conditions but also in saving lives. It is well-established that complications resulting from mismatched blood transfusions can range from mild symptoms, such as fever and chills, to severe, life-threatening conditions. These complications may lead to immunomodulation in recipients and other significant adverse reactions [1]. Therefore, it is crucial to conduct a thorough screening of potential blood donors, including detailed medical history and physical examinations, to ensure that only eligible donors proceed with blood donation.

Such rigorous screening processes are mandatory to promote effective blood transfusion practices, reducing the risks of transfusion-transmitted infections and adverse reactions, while ensuring that only safe and compatible blood units are transfused. Donors must meet specific criteria to avoid being deferred, which not only ensures the safety of the recipients but also protects the health

and well-being of the donors. In developing countries like India, a significant challenge is the shortage of blood and blood products. According to the World Health Organization, the minimum requirement to meet a country's blood needs is approximately 1% of its population. In India, the annual blood collection in 2016–17 was 11.1 million units, falling short of the target of 13 million [2]. A knowledge gap exists regarding blood donation practices, fuelled by prevalent misconceptions and societal myths.

The objective of this study is to examine the causes, patterns, and rates of whole blood donor deferrals at a tertiary care hospital, which will help identify the underlying reasons for deferral. By addressing these causes, efforts can be made to encourage blood donation and bridge the shortfall in blood supplies. The study aims not only to promote voluntary blood donation but also to ensure the safety of blood recipients and donors, while developing strategies to retain deferred donors in the future. Given the critical nature of

blood donation, the National Blood Transfusion Council (NBTC) has established guidelines that all blood centers in the country must follow. The NBTC, formed in 1996, provides the regulatory framework for these centers. This study seeks to identify and analyze the causes of whole blood donor deferrals, address the reasons for deferrals, and guide further management, all while enhancing the overall safety of both the donor and the recipient. In accordance with the "Drugs and Cosmetics Rules, 1945" (second amendment), published in *The Gazette of India* on March 11, 2020, which replaced the term "blood bank" with "blood centers," this study applies the latest blood donation criteria to assess and defer whole blood donors [3,4].

Material and Methods

A retrospective study was conducted for one year at the blood bank of an Indian tertiary care teaching hospital. The study included all voluntary and replacement whole blood donors, who were non-remunerated, attending the blood bank at the hospital. Apheresis donors were excluded from the study. All individuals expressing interest in whole blood donation underwent a thorough history review and general physical examination. Based on standard blood donor guidelines, individuals were either accepted or deferred. Hemoglobin levels were measured using the copper sulfate (CuSO₄) method, which is based on specific gravity principles. If donors were deemed ineligible at any stage according to the blood donation guidelines, they were either temporarily or permanently deferred. After deferral, donors were counseled about the reasons for their deferral.

Data was collected and analyzed from 345 deferred patients to identify deferral patterns, major causes, and deferral frequency using appropriate statistical methods.

Results

The study sample consisted of 345 individuals with diverse age and gender distributions (Table 1). The majority of participants (39.42%) were between 21–30 years, followed by those aged 31–40 years (28.12%). The gender distribution showed a predominance of males (79.71%) compared to females (20.29%).

Analysis of deferral rates (Table 2), both temporary and permanent, indicated that younger age groups had higher deferral rates, especially in the 21–30 and 31–40-year categories. Among individuals aged ≤ 20 years, all deferrals were temporary, with no permanent deferrals recorded. The highest percentage of temporary deferrals was noted in the 21–30 years age group (37.10%), while the highest rate of permanent deferrals was observed in the 41–50 years age group (6.09%). Gender-wise, males exhibited higher temporary (69.57%) and permanent (8.70%) deferral rates than females.

Among the causes for pre-donation deferral, low hemoglobin was the most prevalent (Table 3), accounting for 43.19% of cases. Other notable causes included the recent use of antibiotics (11.30%), recent COVID-19 vaccination (6.38%), and skin diseases (4.64%). Causes with lower deferral rates encompassed conditions such as thyroid disease (1.16%), dengue (1.16%), typhoid (0.87%), and jaundice (0.87%).

Table 1: Basic demographic data of study population

| Age Groups | n | % |
|-----------------|-----|-------|
| ≤ 20 years | 43 | 12.46 |
| 21–30 years | 136 | 39.42 |
| 31–40 years | 97 | 28.12 |
| 41–50 years | 52 | 15.07 |
| >50 years | 17 | 4.93 |
| Gender | | |
| Male | 275 | 79.71 |
| Female | 70 | 20.29 |

Table 2: Age and gender wise deferral rates

| Variables | Temporary Deferral | | Permanent Deferral | |
|-----------------|--------------------|-------|--------------------|------|
| | n | % | n | % |
| Age | | | | |
| ≤ 20 years | 43 | 12.46 | 0 | 0.00 |
| 21–30 years | 128 | 37.10 | 8 | 2.32 |
| 31–40 years | 88 | 25.51 | 9 | 2.61 |
| 41–50 years | 31 | 8.99 | 21 | 6.09 |
| >50 years | 12 | 3.48 | 5 | 1.45 |
| Gender | | | | |
| Male | 240 | 69.57 | 30 | 8.70 |
| Female | 62 | 17.97 | 13 | 3.77 |

Table 3: Causes of Pre-Donation deferral in Blood Donors

| Cause of Deferral | n | % |
|-------------------------|-----|--------|
| Low Haemoglobin | 149 | 43.19 |
| On antibiotics | 39 | 11.30 |
| COVID-19 vaccine | 22 | 6.38 |
| Skin disease | 16 | 4.64 |
| Low body weight | 14 | 4.06 |
| Hepatitis B | 12 | 3.48 |
| Dental causes | 12 | 3.48 |
| Diabetes | 10 | 2.90 |
| Hypertension | 9 | 2.61 |
| Tattoo | 9 | 2.61 |
| Others | 9 | 2.61 |
| Lack of sleep | 8 | 2.32 |
| History of surgery | 7 | 2.03 |
| Previous blood donation | 6 | 1.74 |
| No meal taken | 6 | 1.74 |
| Thyroid disease | 4 | 1.16 |
| Dengue | 4 | 1.16 |
| Typhoid | 3 | 0.87 |
| Jaundice | 3 | 0.87 |
| Menstruation | 2 | 0.58 |
| Tetanus | 1 | 0.29 |
| Total | 345 | 100.00 |

Discussion

In this study, the leading reason for deferral was identified as low hemoglobin levels. The highest number of deferrals occurred within the age group of 21–30 years. Of all the reported blood donors, there was a higher rate of deferral in males compared to females. Among the total deferrals, the majority were temporary. The most frequent cause of permanent deferrals was Hepatitis B infection.

The study by Kandasamy D et al. recorded 99,680 pre-donation screenings, with 10.6% deferred, primarily due to low hemoglobin levels (52.45%) [2]. Hamid Iqbal et al. reported 3,348 donors, with 12.9% deferred; anemia was the most common cause, followed by Hepatitis C virus infection [5]. In the study by Henshaw Uchechi Okoroju et al., 1,886 donors were reported, with 8.69% deferred, primarily due to Hepatitis B virus infection (31.71%), followed by anemia (21.95%) [6]. Donath Mkenda Valerian et al. recorded 14,377 participants, with a deferral rate of 12.7%, where infections accounted for 62% of all deferrals. Low hemoglobin led to temporary deferrals (21.1%), while Hepatitis B virus was the leading cause of permanent deferrals (29.6%) [7]. Jamal et al. reported 63,582 donors with a deferral rate of 24%, with therapeutic injections and low hemoglobin being the primary causes for deferral [8].

Vidhi Jain et al. documented 13,042 donors, with 7.71% deferred; 67.29% of deferrals were temporary, while 32.7% were permanent, with low hemoglobin being the leading cause of deferral

[10]. In a study by Vujhini et al., 75,167 donors were recorded, with 6.64% deferred, and anemia again led the causes of deferral, contributing to 49.09% [14]. Sarat Das reported 14,078 donors, with 9.69% deferred, and low hemoglobin was the most common reason for deferral, accounting for 54.58% [9]. Al Shaer et al. reported 142,431 donors, with 19.4% deferred, primarily due to low hemoglobin, which accounted for 929 deferrals per 10,000 donors [13]. Agrawal et al. reported 1,835 donors with a deferral rate of 4.79%, and the most common reason for deferral was low hemoglobin, accounting for 56.92% [15]. Kanika Taneja et al. reported 24,062 donors, of whom 17.1% were deferred, with anemia being the predominant cause, responsible for 51% of deferrals [11]. Similarly, Mangwana et al. documented 22,404 donors, with a deferral rate of 17.88%, and anemia was the leading cause of deferral, accounting for 25.68%, followed by a history of medication use [12].

In a study conducted by Sonal Kumar et al., a total of 11,665 donors presented, out of which 1,522 (13.1%) were deferred. Among the deferred donors, 41.9% were male and 58.1% were female, with a female-to-male ratio of 1.4:1. The leading cause of temporary deferral was low hemoglobin, which accounted for 54.6%, while hypertension was the most common reason for permanent deferrals, representing 17.29% of all deferrals and 25.7% of temporary deferrals. Hypertension was also the second most common cause of deferrals, contributing to 16.6% of all deferrals and 50.76% of permanent deferrals [16]. These studies collectively highlight that low hemoglobin or

anemia (<12.5 gm/dl) is the predominant reason for both temporary and overall deferral of whole blood donors. Differences in the rates observed across studies may be attributed to factors such as ethnicity, geographical region, socioeconomic status, and the level of awareness about blood donation in the population.

This study confirms that low hemoglobin is the primary cause of deferrals among whole blood donors. In countries like India, further research is necessary to explore the underlying causes of anemia, which is often linked to iron deficiency anemia among deferred blood donors. Iron deficiency anemia is treatable, and providing nutritional or iron supplements on a prophylactic basis to at-risk populations could help address this issue. The study, however, excluded apheresis donors.

Conclusion

The demand for blood and its products is rising, making it crucial to raise awareness and dispel myths about blood donation. This can be done through educational initiatives like lectures, posters, and blood donation camps. Our research, along with previous studies, shows that anemia (low hemoglobin) is the primary cause for temporary donor deferrals. Addressing this through preventive measures and monitoring, especially in vulnerable populations, is vital. Additionally, these studies offer insights into the relationships between factors like age, gender, blood group, and deferral patterns, which can inform future research and health policies to promote blood donation.

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