A Multicenter Study of Donor Deferral Rates and Reasons in Plateletpheresis

F Parvin[1], T Afroz[2], B Naznin[3], M A Aleem[4], T M Tarin[5], M Ali[6], T F Dipta[7]

Abstract

Background: Demand for platelets has increased in recent years due to rising oncology cases, dengue fever, and other conditions associated with low platelet counts. The Transfusion Medicine Department plays a vital role in supplying apheresis platelet units with higher yields and fewer complications. Single donor platelet (SDP) units are particularly effective in raising platelet levels for patients and are processed through a device that separates platelets while returning the remaining components to circulation.

Aim: To determine the donor deferral rates and reasons of deferred donors during plateletpheresis.

Materials and Methods: This study was conducted in the Transfusion Medicine Department of BIRDEM, Apollo Hospital (Dhaka), and Asgar Ali Hospital in Dhaka from January 2021 to December 2021. Apheresis donors of either sex attending the mentioned departments were selected and deferred by physicians according to the Standard Operating Procedures (SOP) protocol followed by previously mentioned hospitals. The data of deferred plateletpheresis donors were recorded in a register and analyzed retrospectively.

Results: Out of 1,191 plateletpheresis donors, 1,043 were chosen for single donor platelet (SDP) donation, while 148 (12.4%) were deferred for various reasons. The most frequent age group among the deferred donors was 26–35 years (53.3%). Among the deferred individuals, 67.5% were male and 32.4% were female. Most donors were temporarily deferred, making up 93.9%, while permanently deferred donors were 6.1%. The main reasons for temporary deferral included poor venous access (27.7%, primarily among females), low platelet count (16.2%), and drug use (most commonly analgesics) at 11.4%, with the least common cause being a non-matching blood group (2.1%). The most common reason for permanent deferral was seropositivity for HBsAg.

Conclusion: Based on the findings of our study most of the deferred donors were between 26-35 years of age and male. The major causes of temporary donor deferral were poor venous access, low platelet count, drug use specially analgesics and underweight and the most common cause of permanent deferral was seropositivity for Hepatitis B.

Keywords: Deferral, donor, plateletpheresis.

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[1]Dr. Farida Parvin
Associate Professor
Dept. of Transfusion Medicine and Clinical Haematology
BIRDEM General Hospital and Ibrahim Medical College, Dhaka, Bangladesh.

[2]Dr. Tamanna Afroz
Senior Specialist
Dept. of Transfusion Medicine
Apollo Hospitals, Dhaka, Bangladesh.

[3]Dr.Bepasha Naznin
Associate Consultant
Dept. of Transfusion Medicine
Asgar Ali Hospital, Dhaka, Bangladesh.

[4]Dr. Mohammad Abdul Aleem
Resident Medical Officer
Matrichaya Hospital, Raipur, Lakshmipur, Bangladesh.

[5]Dr. Tamanna Mahfuza Tarin
District Sexual and Reproductive Health and Rights Officer, DGHS, Bangladesh.

[6]Dr. Mohammad Ali
Assistant Professor
Dept. of Colorectal Surgery
Shaheed Suhrawardy Medical College Dhaka, Bangladesh.

[7]Prof. Tashmim Farhana Dipta
Professor and Head
Dept. of Transfusion Medicine and Clinical Haematology
BIRDEM General Hospital and Ibrahim Medical College, Dhaka, Bangladesh.

Correspondence
Dr. Farida Parvin,
Associate Professor
Department of Transfusion Medicine & Clinical Haematology,
BIRDEM General Hospital, Dhaka, Bangladesh.
E-mail: dr.farida1984@gmail.com.

Introduction

The Transfusion Medicine department is crucial in the healthcare system, primarily focused on providing safe and adequate blood and its components. Proper donor selection is essential, requiring specific criteria to ensure the safety of both donors and recipients. Recruiting plateletpheresis donors is particularly challenging, as additional parameters must be considered beyond those for routine blood donation. However, some donors may be temporarily or permanently deferred for various reasons, which can negatively affect voluntary blood donation efforts.[1] Apheresis is an automated system for separating blood cells, which involves drawing blood from a donor or patient, separating and removing specific cellular components or plasma, and returning the remaining blood constituents. Plateletpheresis specifically refers to the process of collecting platelets from a healthy donor using this apparatus.[2] Standard plateletpheresis procedure usually takes about 1 to 1.5 hours. The collection occurs in a closed automated system, and the product can be stored for up to 5 days. Typically, the number of apheresis platelets, also known as Single Donor Platelets (SDP), is equivalent to 6-10 units of Random Donor Platelets (RDP) and contains a minimum of 300 x 10^9/L platelets.[3] In recent years, apheresis platelets have become increasingly preferred over the last decade, primarily because of their benefits compared to random donor platelets (RDPs).

These benefits include significantly reduced risks of transfusion-transmitted infections, bacterial contamination, and alloimmunization due to less donor exposure.[4,5,6] The primary aim of the current study is to determine the donor deferral rates, the characteristics of deferred donors, and the reasons for donor deferral during plateletpheresis.

Materials and Methods

This multicenter retrospective record-based study was conducted on 1,191 apheretic donors attending the Transfusion Medicine departments of BIRDEM General Hospital, Apollo Hospitals, and Asgar Ali Hospital in Dhaka from January 2021 to December 2021. Donors of either sex in the mentioned departments were selected purposively and classified into four groups according to their age. They were selected and/or deferred after taking a full medical history using a preformed questionnaire, followed by a complete physical examination and assessment of all vital parameters, in accordance with the following criteria for Single Donor Platelet (SDP) preparation and pre-donation screening, adhering to common standard hospital protocols for all three hospitals:

1. Absence of any illness
2. Age between18 to 60 years
3. Body weight of donor not less than 55kg
4. Haemoglobin≥12.5 gm/dl
5. Platelet count > 150 x 109 /L
6. Adequate venous access (firm, large and palpable vein) on both the hands
7. ABO identical donor of the recipient
8. Have donated whole blood at least once before
9. Donation interval (14 days between two plateletpheresis and 56 days from last whole blood

Donation)

10. No consumption of NSAIDs for last 48 hours, aspirin for 5 days and antibiotics for 14days.
11. Negative test for Human Immunodeficiency Virus (HIV), Hepatitis B virus, Hepatitis C virus, Syphilisand Malaria.

After the preliminary selection of donors, their blood samples were tested for a complete blood count (CBC) to assess hemoglobin (Hb), hematocrit (Hct), and platelet count, as well as for transfusion-transmitted infections (TTIs), including HBsAg, anti-HCV, Human Immunodeficiency Virus (HIV 1 and 2), syphilis, and malaria, using a rapid immunochromatographic test. If any CBC or TTI test results were abnormal, the donor was counseled and referred to the appropriate department for further evaluation and management. Plateletpheresis procedures were performed using Hemonetics (MCS+), Spectra Optia, TrimaAccel, and Cobe Spectra, utilizing both continuous and intermittent flow. Calculations were conducted using Microsoft Excel 2007.

Results

In the current study, a total of 1,191 plateletpheresis donors were screened during this period, of which 148 (12.4%) were deferred for various reasons. Among the deferred donors, 100 (67.56%) were male and 48 (32.44%) were female, as shown in Table I. The deferred apheresis blood donors were classified into temporary and permanent deferrals, with 139 (93.9%) classified as temporary and 9 (6.1%) as permanent. Most of the deferred donors, 79 (53.3%), were between 26-35 years of age, as illustrated in Table II.The major causes of temporary donor deferral included poor venous access (27.7%, mostly in females), low platelet count (16.2%), and drug use (most commonly analgesics in 11.4% of cases), while the least common cause was a non-matching blood group (2.1%) between the donor and recipient, as shown in Table III. In our study, the most common cause of permanent deferral was seropositivity for Hepatitis B, as indicated in Table IV.

Table I : Distribution of donor deferral according to gender (n=148)

Sex of deferred donors	Number of deferred donors	Percentage
Male	100	67.5%
Female	48	32.4%

Table II : Distribution of deferred donor according to age group (n=148)

Age range of deferred donors	Number of deferred donors	Percentage
18-25 years	38	25.6%
26-35 years	79	53.3%
36-45 years	19	12.8%
>45 years	12	8.1%

Table III : Causes of temporary donor deferral

Causes	Number	Percentages (%)
Poor venous access	41	27.7%
Low platelet count	24	16.2%
Drugs (on NSAIDs, Antibiotic)	17	11.4%
Underweight (<50kg)	15	10.1%
Abnormal blood pressure (Hyper/Hypotension)	13	8.7%
Low Haemoglobin(<12.5gm/dl)	11	7.4%
Skin allergy	6	4.3%
H/O recent vaccination	5	3.3%
High Haemoglobin and Hct	4	2.7%
Non matching blood group	3	2.1%
Total	**139**	**93.9%**

Table IV : Cause of permanent donor deferral

Causes	Number	Percentages (%)
Hepatitis B pos	7	4.7%
Syphilis positive	2	1.4%
Total	**9**	**6.1%**

Discussion

Platelet concentrates are usually indicated for patients undergoing chemotherapy for leukemia and multiple myeloma, as well as those with aplastic anemia, acquired immunodeficiency syndrome, hypersplenism, idiopathic thrombocytopenic purpura (severe), sepsis, and septic shock. They are also transfused to bone marrow transplant recipients, patients receiving radiotherapy, individuals preparing for organ transplants, and those undergoing surgeries such as cardiopulmonary bypass.Platelet transfusions should be avoided in individuals with heparin- induced thrombocytopenia or disseminated intravascular coagulation.[7] In adults, platelet transfusions are recommended for those with platelet counts below 10,000/µL, below 20,000/µL when placing a central venous catheter, or below 50,000/µL when a lumbar puncture or major surgeries.[8-11] Platelets should be transfused therapeutically when the platelet count falls below 50 x 10^9/L accompanied by diffuse microvascular bleeding, while platelets are administered to prevent bleeding or to manage active bleeding.[12] The main challenge in increasing the use of apheretic platelets is the limited availability of single donor platelet (SDP) donors, along with lengthy procedure times that can lead to donor noncooperation and a lack of safety awareness. Additionally, donor ineligibility due to low platelet counts, low hemoglobin, or low weight exacerbates the problem. The side effects of plateletpheresis typically fall into three categories: changes in blood pressure, difficulties with vein access, and the impact of anticoagulants on calcium levels, potentially leading to hypocalcemia. While serious complications are rare, apheresis donors are usually not permitted to sleep during the extended donation process to ensure proper monitoring.[13] The risk of these conditions during platetpheresis can be reduced or prevented through proper donor education before the procedure and adjustments to the apheresis machine configuration.[14] In our present study, the donor deferral rate was 12.42%. Pujani et al.[15] reported deferral rates of 25.4%, Tondon et al.[16] reported 27.5%, and Arora et al.[17] reported 28.3%, all of which are significantly higher than our findings. However, the highest rate of donor deferral was reported in a study done by Yadev et al.[18] (43.2%) and Syal et al[19] (44.2%) during plateletpheresis . The lowest deferral rate was observed by Pandey et al (10.6%),[20] which is more comparable with our study. As in other studies, a significant percentage of deferred donors are young individuals under 35 years of age, accounting for 81.74%. This may be due to the fact that the majority of plateletpheresis donors belong to this age group. In a study conducted by Arora et al.,[17] 82.9% of deferred donors were also under 35, which is also comparable to the findings reported by Vujhiniet al.,[1] Pujani et al.,[15] and Syal et al.[19] In our study, temporary deferrals accounted for 93.9%, while 6.1% were permanently deferred. The observed percentage of temporary deferral in our study is more similar to the findings of Arora et al.[17](93.28%). Mehmet et al.[21] reported that the primary reason for temporary donor deferral was inappropriate venous access (25.7%), which is comparable to our study's finding of 27.7%. Suitable venous access (firm, large, and palpable) is essential for maintaining a return blood flow of at least 70-80 ml/min during the plateletpheresis procedure. The second most common reason for deferral among apheretic donors in our study is low platelet count (16.2%), which corresponds with findings from Kusumgar et al.[22] (21%). In contrast, Vujhini et al.[1], Pujani et al.[15] and Seema et al.[23] and identified low platelet count as the primary reason for donor deferral, reporting percentages of 31.61%, 43.5% and 44.82% respectively. These differences may be attributed to variations across countries and regions.In our study, the third most common reason for donor deferral was recent drug use (11.4%), including NSAIDs and antibiotics. Similar findings were observed by Mehmet et al.[21] The leading cause of permanent deferral among donors was Hepatitis B positivity, consistent with findings from Pujani et al.,[15],Arora et al.,[17] and Seema et al.[23]

Conclusion

The findings of this study indicate that the temporary donor deferral rate is significantly higher than the permanent donor deferral rate, highlighting the critical role of donor education, counseling, and reassurance in retaining new donors.

Recomendation

As the demand for apheresis platelets continues to rise in routine medical and surgical practices, the selection criteria for plateletpheresis donors should be re-evaluated to enhance donor participation and reduce deferral rates. Moreover, awareness of general people should be increased by mass media publicity about plateletpheresis which could increase number of donors and further contribute to reducing deferral rates.

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