

## Analysis of Donor Deferral Characteristics for Plateletpheresis in a Tertiary Care Hospital – A Retrospective Study.

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### Abstract

#### Background:

The demand of platelets is increasing rapidly in various cases like cancer dengue fever, and other platelet-related disorders. Single donor platelet (SDP) unit is a useful platelet product over the traditional Random Donor Platelet (RDP) unit in many diseases for raising the platelet count. For better yield, a healthy and young donor is required which is a great challenge for the blood bank staff.

**Material and Method:** The present study was conducted from June 2015 to December 2018 (retrospectively) in the Department of Blood Bank, L.N. Medical College and J.K Hospital, Bhopal. Data were collected from the records maintained by the Department of Blood Bank and Transfusion Medicine.

**Results:** Out of 165, a total of 110 Plateletpheresis donors were selected for SDP donation, and the remaining 55 (33.3 %) donors were deferred for various reasons. The predominant age range of the deferred donors was 25–34 years (50.9 %). Among the deferred donors, males were 81.8 % and females were 18.18 %. Temporarily deferred donors account for 98.19 % and permanently deferred donors were 1.81 %. Most common causes for deferral were Poor venous access (29.09 %), low platelet count (21.81 %), and low Hb count (16.36 %), and the least common cause was dermatitis at the venipuncture site (3.63 %). The most common reason for permanent deferral was seropositivity for HBsAg

**Conclusion:** Selection of proper plateletpheresis donor will give good yield of platelets. Temporary deferred donor should be counseled properly so as to encourage them for the future donations when they become eligible, and this bridges the gap between the demand and supply of apheresis platelets.

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### I. Introduction

Transfusion medicine has come up as an integral part of the health care System. The main aim of Blood banks is to provide adequate and safe supply of blood or its component along with the safety of donor. Strict donor guidelines have been made and are revised time to time to ensure proper strict donor selection criteria for the safety of donor.[1] Appropriate donor selection ensures safety of donor as well as recipients. With the increasing advent of technologies Donor can now donate either whole blood or a particular component like platelets during apheresis procedure which is termed plateletpheresis. Apheresis is the process by which a desired blood component is extracted from the donors circulation and the other components are returned to the circulation in real time. [2]

Platelet concentrates, prepared from whole blood are termed as RDP - Random Donor Platelets and the platelet product prepared by apheresis is termed as SDP – Single Donor Platelet. The number of platelets in SDP is equivalent to 5-8 RDPs and contains at least  $3.0 \times 10^{11}$  platelets [3].

The product of newer technology – SDP has multiple advantages RDP which includes decreased risk of transfusion transmitted infections (TTIs), bacterial contamination & alloimmunization. [4,5] In addition, it also prevents the chances of refractoriness to a larger extent. [3]

Recently the demand of SDP has increased consistently. However, the process of Apheresis requires more technical skills and donor cooperation than whole blood donation because of prolonged duration of the procedure. For adequate platelet yield ( more than or equal to  $3 \times 10^{11}$ ) and donor safety, the donor selection criteria should be clearly defined. Determination of reasons & rates of donor deferral for the procedure can help in planning more efficient recruitment strategies & donor selection criteria. Donors are generally deferred temporarily or permanently for some or the other reasons, which may create a negative impact on voluntary blood/component donation, especially in countries like ours where voluntary donation is already very less. Hence, motivation, education, and treatment of these temporarily deferred donors are very important to retain them in donor pool so that they can be considered for donation in future.

## II. Materials and Methods

The present study was conducted from June 2015 to December 2018 (retrospectively) in the Department of Blood Bank, L.N. Medical College and J.K Hospital, Bhopal. Data were collected from the records maintained by the Blood Bank. A total of 110 plateletpheresis procedure were performed during the period of three and half years.

The following donor selection criteria were followed in our institution according to the NBTC (State Blood Transfusion Committee) guidelines 2017

- (a) Age 18-60 years
- (b) Weight > 50 kg
- (c) Hemoglobin > 12.5gm/dL
- (d) Platelet count > 1.5 lacs/ cumm
- (e) At least three days from last plateletpheresis / a gap of three months from the last whole blood donation
- (f) No consumption of aspirin in the last three days
- (g) Absence of any illness
- (h) ABO identical donor for the patient
- (I) Negative tests for HBs Ag, HCV, HIV, Malaria & syphilis
- (j) Adequate venous status

Besides these, all other criteria for the whole blood donations were followed.

Blood samples were collected for checking the blood group which should be identical to the patient's blood group, complete blood count (CBC) & serological tests. CBC was done by Mindray BC 3000 hematology analyzer. The serological tests were done using fourth generation ELISA kits for HIV(J - mitra), HBsAg (ELISA J- mitra), HCV (ELISA J mitra). Tests for syphilis & malaria were done by rapid card test (Alere SD). The donors who full-filled the above criteria were called & apheresis procedure was performed using Trima® Accel™ cell separator.

## III. Results

Out of 165, a total of 110 SDP donors were selected for SDP donation, and the remaining 55 (33.3 %) donors were deferred for various reasons. The predominant age range of the deferred donors was 25–34 years (50.9 %) [Table 1]. Among the deferred donors, males were 81.8 % and females were 18.18 % [Table 2]. Temporarily deferred donors account for 98.19 % and permanently deferred donors were 1.81 %. Most common causes for deferral were Poor venous access (29.09 %), low platelet count (21.81 %), and low Hb count (16.36 %), and the least common cause was dermatitis at the venipuncture site (3.63 %). The most common reason for permanent deferral was seropositivity for HBsAg [Table 3].

**Table 1: Age distribution of the deferred donors**

Age range of deferred donors	Number of donors deferred (%)
18-24 years	17 (30.9)
25-34 years	28 (50.9)
35-44 years	6 (10.9)
> 45 years	4 (7.2)
Total	55 (100)

**Table 2: Gender distribution of the deferred donors**

Sex of donors deferred	Number of donors deferred (%)
Male	45 (81.8)
Female	10 (18.18)
Total	55 (100)

**Table 3: Causes for donor deferral**

Cause for deferral	Number of deferrals (%)
<b>Temporary</b>	
Poor venous access	16 (29.09)
Low platelet count	12 (21.81)
Low Hemoglobin	9 (16.36)
Alcohol consumption in the last 24 h	6 (10.90)
Under weight	5 (9.09)
On antibiotics	4 (7.27)
Dermatitis	2 (3.63)
<b>Permanent</b>	

Seropositive for HBsAg	1 (1.81)
Total	55 (100)

#### IV. Discussion

Platelet transfusions are traditionally given to those undergoing chemotherapy for leukemia and multiple myeloma; aplastic anemia, hypersplenism, idiopathic thrombocytopenic purpura, sepsis, and septic shock; bone marrow transplantation; patients on radiotherapy; planned organ transplant cases; or those undergoing surgeries such as cardiopulmonary bypass. Platelet transfusions should be avoided in those with thrombotic thrombocytopenic purpura as the condition can worsen and lead to neurological symptoms, acute renal complications, and failure, and this is presumably due to creation of new thrombi as the platelets are consumed. It should also be avoided in those with heparin-induced thrombocytopenia or disseminated intravascular coagulation.[6] In adults, platelet transfusions are recommended in those who have levels <10,000/ul, <20,000/ul if a central venous catheter is being placed, or <50,000/ul if a lumbar puncture or major surgery is required.[7-9]. SDP is the best component in such cases as they have better yield as it is a controlled process where the equipment extracts platelets according to the donor height, weight, hematocrit, platelet count, and blood volume. SDP also allows prolongation of intervals between transfusions;[10] however, the most significant problem for increasing the use of apheresis platelets is poor availability of SDP donors, and it is due to increased procedure time, causing noncooperation by donors and partly due to lack of safety awareness. Besides these, ineligibility of donors due to low platelet count, low hemoglobin, or low weight further aggravates the problem. Side effects of the plateletpheresis generally fall into three categories: blood pressure changes, problems with vein access, and effects of the anticoagulant on the donor's calcium level. Changes in blood pressure can sometimes cause nausea, fatigue, and dizziness. Venous access problems can cause bruising and sometimes hematoma. While donating, a supply of calcium antacid tablets is usually kept close by to replenish the calcium lost. Because the anticoagulant works by binding to the calcium in the

blood, a donor's levels of calcium – and especially of active calcium ions – drop during the donation process. The lips may begin to tingle or there may be a metallic taste; since calcium enables the function of the nervous system, nerve-ending-dense areas (such as the lips) are susceptible, at least during the donation process. Unusually low calcium can cause more serious problems such as fainting, nerve irritation, and short-duration tetany. Such acute hypocalcemia is usually due to low calcium levels before donation, aggravated by the anticoagulant. Hypocalcemia can be curtailed by modestly increasing dietary calcium intake in the days before donation. Serious problems are extremely rare; however, apheresis donors are typically not allowed to sleep during the long donation process so that they can be monitored.[11] The risk of these conditions happening can be reduced or prevented by predonation education of the donors and change of apheresis machine configuration.[12] Repeated platelet donations at short intervals will cause the venipuncture site to scar. While cosmetically it is virtually invisible, the scarring also occurs on the vein itself, making it harder to insert a needle on future

occasions. In this study, the donor deferral rate was 33.3 %. Arora *et al.*,[13] Tondon *et al.*,[14] and Pujani *et al.*[15] have reported 28.03%, 27.5%, and 25.4% of donor deferral rate, respectively, which was much higher than our study. Pandey *et al.* have reported just 10.6% – a very low deferral rate.[16] A very high donor deferral rate of 44.2% was found in a study by Syal *et al.*[17] Like in any other studies, the donors deferred were young under 35 years of age (81.93%). This is because the majority of donors who come for donation also fall in this age range only. In a study by Arora *et al.*, 82.9% of the deferred donors were <35 years. Similar findings were also observed in the study conducted by Pujani *et al.* and Syal *et al.* In the present study, all the females (10 in number) were deferred either for low hemoglobin or for underweight. This could be because of the iron deficiency anemia which is common in females. The studies in literature also show a very less number of females as plateletpheresis donors. Temporary deferral accounts for 98.19% and 1.81% were permanently deferred in our study. Donors with low platelet count can be asked to come again later for retesting the platelet count so that they can donate in the next attempts. Donors with low hemoglobin levels should be counseled, treated, and educated on how to increase the hemoglobin levels. Kusumgar *et al.*[20]

observed no effect on platelet yield or adverse donor reactions while performing plateletpheresis on 49 donors with 11.5%–12.4% g hemoglobin levels and stated that one-fifth of the donors can be reconsidered if criteria for hemoglobin can be relaxed. Fraser *et al.* observed no deleterious effects when the cutoff for hemoglobin was 11.5% g among the donors.[21] In the present study, 22.05% of donors could re-enter the donor pool if the cutoff for hemoglobin was 11.5% g which is highest compared to the studies in literature

## V. Conclusion

The demand for platelets taken from apheresis procedure is increasing day by day in the routine medical and surgical practice. Selection of plateletpheresis donor with utmost stringency will give good yield of platelets. In this study, temporary donor deferral was more, and these donors were counseled and encouraged for future donations with proper information regarding the procedure, so proper counseling of the deferral donors bridges the gap between demand and supply of SDPs. Most of the temporary deferred donors turned up for plateletpheresis after few weeks and months. Lower adverse reaction associated with the plateletpheresis makes it a better and safe procedure.

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