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Single donor Plateletpheresis and its adverse donor reactions observed in central India

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Abstract
Background: Plateletpheresis is a sophisticated technology by which blood is processed by an apheresis machine that uses the principal of centrifugation to extract a desired component of the blood and returns the rest of the components to the donor in real time. Apheresis procedures are usually well tolerated, but adverse events in donor do occur in a few cases.
Aim and Objective: To study the Adversed donor reactions observed during single donor Plateletpheresis.
Material and Method: A retrospective, observational, study of 110 healthy voluntary donors after taking informed written consent.
Results: It was observed that out of 110 Single donor Plateletpheresis only five had adverse reactions (4.54 %).Two donors had tingling sensation in perioral area. Two had nausea and vomiting i.e. vasovagal reaction of mild intensity and only one with hematoma formation.
Conclusion: Apheresis performed on cell separator are safe and well tolerated having less adverse reactions however these reactions are relatively mild and easily treated.

Keywords: Plateletpheresis donor, adverse donor, observed

Introduction
Plateletpheresis is a sophisticated technology by which blood is processed by an apheresis machine that uses the principal of centrifugation to extract a desired component of the blood and returns the rest of the components to the donor in real time. Increasing demand of platelet transfusions for patients has led to a trend in the increased use of automated blood collections. The most common use of this technology is for collection of apheresis platelets. The minimum platelet count required to donate apheresis platelets is 150,000/μL. Apheresis platelet donors can donate more frequently than whole blood donors: AABB Standards limits apheresis platelet donations to no more than twice in a 7-day period and no more than 24 times per year.
The apheresis procedure is more rigorous than whole blood collection because the donor must remain connected to the apheresis machine for an extended period, often 1 to 2 hours. Another difficulty is the high incidence of hypocalcemic reactions, due to the calcium-binding anticoagulant used to keep blood from clotting in the machine. Platelets collected through apheresis technology have some advantages over random donor platelets (RDPs, collected by centrifugation from individual whole blood units) because 1 apheresis platelet unit is the equivalent of 6 to 10 RDPs. This decreases the risk of transfusion-transmitted disease and allergic transfusion reactions [1].
Apheresis procedures are usually well tolerated, but adverse events occur in a few cases. They may occur during or after the procedure. The overall rate of Adverse events with apheresis donation is approximately ten times less than that seen with pooled platelets obtained from whole blood donation, with mild events outnumbering the more severe ones, although the frequency of events requiring hospitalization may be higher in apheresis than with whole blood donation [2]. Hospitalization is still extremely rare [3].
Adverse Events that occur in donors can be divided into local reactions and systemic reactions [4, 5]. Local reactions are usually hematomas due to extravasation from the veins, caused by incorrect placement of the needle during the venipuncture. Pain, hyperaemia and swelling may develop at the site of the extravasation. Local phlebitis and thrombophlebitis are very rare [5, 6].

Systemic reactions are mainly vasovagal reactions that can be triggered by the pain of the venipuncture, or by the anxiety and state of tension of undergoing the donation, etc. These are characterized by pallor, sweating, dizziness, nausea, hypotension, bradycardia, and syncope. Citrate toxicity occurs because of the use of acidcitrate-dextrose (ACD) in apheresis [7].

Materials and Methods

This is a retrospective, observational, study conducted at L.N Medical College & Research Centre, Bhopal. A total of 110 healthy voluntary donors after taking informed written consent. Our study was performed on Trima® Accel™ cell separator. Trima® Accel™ is single needle intermittent flow type of cell separator. All donations were collected using 16 gauze needle inserted into a vein in the antecubital fossa, with all aseptic precautions. Donors were selected as per the set criteria for single donor platelet (SDP) preparation according to AABB guidelines:

1. Weight > 50 kg
2. Age - 18 to 60 years
3. At least three months from lastdonation/three days from last Plateletpheresis
4. Haemoglobin >12.5 gm/dl
5. Platelet count > 150 × 103/µl
6. Absence of any illness
7. No consumption of non-steroidal anti-inflammatory drugs for last seven days
8. Negative test for HIV, Hepatitis B, Hepatitis C, Syphilis and Malaria.

Results

Total 110 Plateletpheresis procedures were performed during our study period. Maximum number of donors were seen in age group between 19 – 30 years. (Table 1) Adverse events generally occurring during Plateletpheresis are

1. Vasovagal reactions: includes nausea, vomiting, syncope, sweating, pallor, dizziness, weakness, and hypotension.
2. Vascular injuries: like hematoma formation or bruising at venipuncture site.
3. Citrate reaction: Circumoral paresthesia, Tetany.

Table 1: Age distribution of donors

Age in years	No. of donors
19 – 30	54
31- 40	35
41 -55	21

Out of 110 Single donor Plateletpheresis only five adverse reactions were observed i.e. adverse event rate of 4.54% (Table-2). Two donors had tingling sensation in perioral area. Two had nausea and vomiting i.e. vasovagal reaction of mild intensity and only one with hematoma formation. All adverse events reported during the study period were of mild intensity and were managed conservatively and none of them needed hospitalization.

Table 2: Adverse reaction on donors.

Adverse Reaction	No. of Donors (4.54 %)
Citrate reactions	2 (1.8%)
Vasovagal reactions	2 (1.8%)
Vascular injury	1 (0.9%)

Discussion

The frequency of reactions to apheresis donation is less than that seen in whole blood donation [8]. Pain at the site of venipuncture was noted to be more common because the same vein in one arm is used for inflow and return, resulting in trauma and hematoma to the vein. Citrate is used as primary anticoagulant in donor apheresis procedures [9]. The anticoagulant effect of citrate results from its ability to chelate calcium ions resulting in the calcium ion being unavailable to participate in biological reactions such as the coagulation cascade. The non-availability of calcium ion hinders the coagulation cascade. The result of such a decrease in ionized calcium is that excitability of nerve membrane increase to the point where spontaneous depolarization can occur [10]. This produces signs and symptoms of citrate toxicity including perioral paresthesia, shivering, light headedness, twitching and tremors. In addition, some patients also experience nausea and vomiting. As the ionized calcium level falls, further, these symptoms may progress to carpopedal spasm, tetany and seizures [11]. In our study calcium supplement were given to the donors when they complained about tingling or numbness sensations. All these reactions were mild.

In this study, the adverse reaction on donors during plateletpheresis was 4.54 % which is similar to study done by Dogra *et al*, (4.59%) [12] And also on the similar line to study done by Dr Amrita Tripathi *et al*. (4.6 %) [13]. While the other studies conducted are Joseph *et al*. (2.67%) [14] and Garg *et al*. (2.0%) [15] Found out adverse reaction during plateletpheresis donation was quite lower from our present study and Kajal *et al*, concluded with (6%) [16] Comparatively higher from our present study. In our study the vasovagal reaction occurred in the form of sweating, syncope and faintness. This can be attributed to apprehension. Tomita *et al.* noted that hypocalcemia may be involved in the onset of vasovagal reactions in apheresis donors [17].

Conclusion

Apheresis donations performed on cell separator are safe and have less adverse events however these are relatively mild and easily treated. Experienced transfusion medicine specialists and trained superior technical personnel will make donors experience more pleasant and can further help in reducing the adverse reactions.

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