

# Plateletpheresis effect study: a single center study in a rural based model

## Abstract

**Introduction:** The collection of platelets by aphaeresis is considered as a very great progress in transfusion medicine. A larger yield (total number of collected platelets) is obtained if the donor has a greater number of initial platelets and if the separation is done in a shorter time. In this we will briefly highlight the importance of platelet transfusion.

**Aim:** To identify patient clinical and associated infection that showed some influence of platelet efficacy of the procedure and post transfusion platelet count increments / decrement as the primary outcome variable rather than bleeding assessments.

**Donors and methods:** The process was carried out on FRESINIUS Kabi COM. TEC continuous flow centrifuge separator to examine risk factors for ineffective transfusion.

**Results:** In the 30 separations which satisfied the fixed criteria were men in 30 cases. There is a statically difference in the platelet value between the viral fever, dengue, malaria and others diseases patients. The average value of platelets before separation was 30k/ $\mu$ l-20k/ $\mu$ l. The range of minimal and maximal value is from 6k/ $\mu$ l to 4.8lakh/ $\mu$ l.

**Keywords:** donors, aphaeresis, platelets transfusion

Volume 2 Issue 6 - 2015

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**Received:** January 28, 2015 | **Published:** September 25, 2015

## Introduction

Platelet transfusion is most frequently used to correct unusually low platelet counts, either to prevent spontaneous bleeding (typically at counts below  $(10-15) \times 10^9/L$ ) or in anticipation of medical procedures that will necessarily involve some bleeding, bone marrow transplants, victims of traumatic injuries and patients undergoing open heart surgery, viral fever, malaria, dengue requires platelet transfusions to survive. Many life saving medical treatments require platelet transfusions. Platelet donation (Platelet Apheresis) is the procedure in which donor blood is passed through a machine (online blood cell separator) which separates the platelets from the blood and sends the remainder of the blood components (Red cells, plasma & leukocytes) to the donor.<sup>1</sup>

Platelets help to stop bleeding. Platelet count will be determined with each platelet donation, make to ensure that have enough platelets to be able to safely donate for another person. An anticoagulant containing citrate is used to keep the blood flowing while device collects the platelets from donor blood. The citrate binds calcium temporarily to keep the blood from clotting. To prevent clotting, donor blood is mixed in the machine with a liquid called an "anticoagulant" during the collection process. When the blood is returned to donor the anticoagulant can sometimes cause numbness and tingling of the fingertips or around the mouth. If donor feels numbness and tingling, donor should inform the operator running the machine immediately. These symptoms are easily treated with calcium, but if not treated can progress to muscle cramps. The citrate is an energy source for donor's body and will be metabolized. Studying the factors that affect the results of apheresis is one of the directions to satisfy the needs for platelets concentrates.<sup>2</sup>

For the process of selection of donors Directorate General of Health Services Ministry of Health & Family Welfare Government of India has adopted.<sup>3</sup> Collection of platelets by apheresis is considered one of the greatest advances in transfusion medicine. It provides an adequate response to rapidly growing demand for blood components. New technology has enabled more often donating platelets than whole blood, reducing the number of leukocytes without filtration.<sup>1</sup> Exact name of this procedure is Plateletpheresis, but is better known as single donor platelets apheresis. This procedure has a higher content of platelets (absolute number, yield and potency) that is present in a dose of platelets than the one obtained from the individual dose. Approximately, 5-11 individual doses, obtained from whole blood equal the dose obtained by apheresis.<sup>4</sup>

## Material and methods

The present study is a retrospective analysis of records of SDP procedures performed from August 2014 to December 2014 in M.P Birla Institute of Transfusional Science, Satna, and Madhya Pradesh. Apheresis donors must fulfill the following criteria:

- Be at least 18 years old.
- Be in good health.
- Weight at least 55 kilograms and donor's value of platelets before the procedure should be between 2lakh/ $\mu$ l-4lakh/ $\mu$ l.
- Not have taken aspirin or products containing aspirin 48 hours prior to donation.
- Plateletpheresis procedure: FRESINIUS Kabi COM.TEC-Aphaeresis machine separator with program selected PLT-5d-SN

was used. The collection protocol provided a maximum platelet rate collection (600ml), 80ml/min reinfusion, 1:7.2 ACD: Blood ratio, 2200rpm centrifuge speed and normal saline (0.9% NaCl). Separators enable the collection of leucocytes, platelet, plasma, peripheral blood stem cells concentrates through the system at the end of the collection. AS-104 uses continuous post collection filtration. The criteria for encompassment in the study were: estimated yield  $\geq 3 \times 10^{11}$ . The blood flow greater than 60ml/min and less than 75ml/min. The procedures were performed with the following appliances, equipment & reagents:

- S5L Singe needle Disposable kit
- Hand Sealer
- Acid-A-500ml or larger
- Automated Pressure Cuff
- Com.tec Operator's Manual
- Venipuncture and Sampling Supplies
- Hand gripper
- Venipuncture preparation supplies.
- Vacutainer needle and Vacutainer Tube holder
- Sample tubes
- 1:10 dilution of bleach solution OR other acceptable antimicrobial solution
- Biohazardous container
- Hand wash agent
- Soap and water

Principle of Platelet aphaeresis is centrifugation. The whole blood is passed through a centrifugation chamber with separation chamber disposable, at high RPM depending on the density (specific gravity) of the different components are sediment in the separation chamber. The Specific gravity of platelets is 1.040, platelets will be settled in between plasma (top Layer) and buffy coat (bottom layer). In apheresis donation, from donor arm blood is drawn and then pass into fully sterile kit machine cell separator, in which blood is spun and platelets are removed and remaining blood components are then returned through donor arm.<sup>5</sup>

## Results and discussion

At the FRESINIUS Kabi COM.TEC- machine made 30 separations that met the requirements for achieving into the study. There are total 30cases which are clinically diagnosed patients which are suffering from viral fever, malaria, dengue and some other diseases (like Myeloproliferative disease with bleeding disorders, encephalopathy, septicemia, hypoplastic bone marrow, nephropathy RPD) (Figure 1). In the 30cases of single donar platelets we our getting total 15cases of viral fever in which 13cases got response upto 2.5lakh/ $\mu$ l platelet counts and in rest 2cases we got no response and in some got decreased platelet counts due to patients suffering from hepatorenal syndrome ,encephalopathy, myeloproliferative disorders and hypoplastic bone marrow depression. 5cases of dengue in which 4patients getting response up to 1.6lakh/ $\mu$ l platelet counts and one patient got less platelet counts due to myeloproliferative disease with bleeding disorders. 4cases of malaria in which all got response raise upto 1.7lakh/ $\mu$ l platelets count and 6cases are from other diseases

associated like hepato-splenomegaly and septicemia raise upto 4.8lakh/ $\mu$ l (Figure 2).

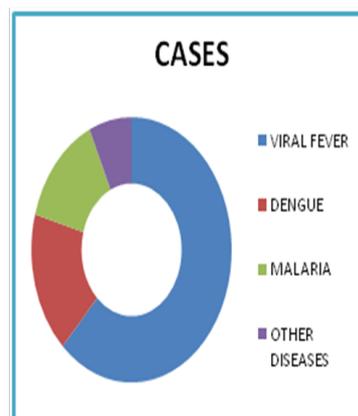


Figure 1 Classification of patients according to diseases.

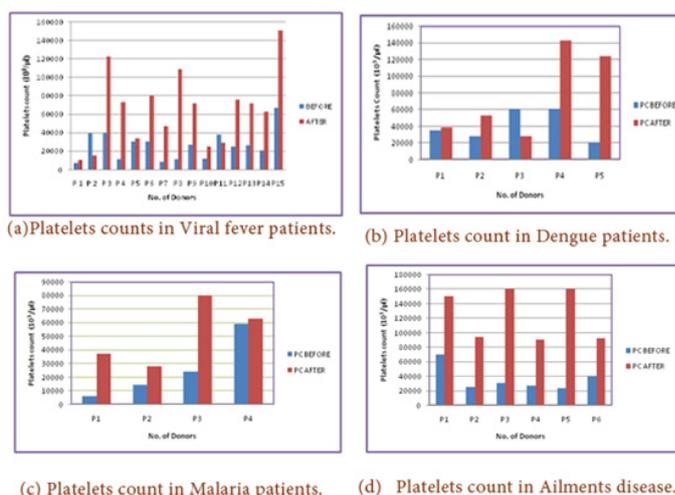


Figure 2 Shows patient platelet count before and after SDP procedure. (A) Platelets counts in Viral fever patients.

## Conclusion

Among critically ill patients with infectious diseases like dengue, malaria, viral fever platelets are administered by apheresis to prevent bleeding. But didn't respond to some who received failure to mount a platelet count increases after transfusion because they have the associated bone marrow ailments. Prospective studies are needed to determine the effects of platelet transfusion in these patient and predictors of ineffective transfusion.

## Acknowledgements

None.

## Conflict of interest

The author declares no conflict of interest.

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