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IMPORTANCE OF DONOR VARIABLES ON PLATELET YIELD AMONG PLATELETPHERESIS DONORS IN BLOOD CENTRE, GMCH

Pathology

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ABSTRACT

Introduction: Collection of platelets by apheresis is considered as one of the greatest advances in transfusion medicine. It has been shown that transfusion of high yield platelet products could reduce the number of transfusions in thrombocytopenic patients. Single Donor Plateletpheresis provides a better platelet product due to reduce transfusion reactions, lower allo-immunization rate and decrease transmission of infectious diseases. **Aims & Objectives:** To assess the various donor related variables on platelet yield in post plateletpheresis unit. **Materials & Methods:** A hospital based retrospective cross sectional study on 81 SDP donors at blood centre in Gauhati Medical College & Hospital over 12 months. Inclusion criteria for the selection of donors were in accordance with rules laid down in Drugs and Cosmetics Act Ministry of Health and Family Welfare, Government of India. Intake of NSAIDs, drugs in last 36 hours, presence of any illness, ABO non-identical donor, seropositive for HIV, Hbs Ag, HCV antibody, syphilis and malaria were excluded. Donor variables such as pre donation platelet, age, gender, weight, height, hematocrit were documented before each procedure. Informed consent were obtained from donors.The plateletpheresis procedures were performed on Fresnius Kabi COM.TEC apheresis machine. **Results:** Post apheresis unit platelet yield is correlated with height, weight and donor's pre donation platelet. Donor's haemoglobin, hematocrit and age did not show correlation with platelet yield. **Conclusion:** Platelet yield optimization is a developing issue in blood transfusion facilities. Identifying such factors may help in proper selection of donors to get higher platelet yields in lesser time and as a consequence betterclinical outcome for patients.

KEYWORDS

Single Donor Platelet, Apheresis, Donor Variables, Platelet Yield.

INTRODUCTION

Collection of platelets by apheresis is considered one of the greatest advances in transfusion medicine. It is an emerging and effective response to rapidly growing demand for blood components. Plateletpheresis is the collection of platelets using an automated blood cell separator device. Platelets can be prepared either by :

(1) A pool of 4 to 6 units of random donor platelets (RDP), or
(2) 1 unit of single donor platelets (SDP).

In the present scenario the trend is seen to be shifted towards using SDP over pooled random donor platelet (RDP).[1] It has been shown that transfusion of high yield platelet products could reduce the number of transfusion of platelets in thrombocytopenic patients.[2] Single donor platelets are a better platelet product due to reduce transfusion reactions, lower allo-immunization and decrease transmission of infectious diseases.[3,4]

MATERIALS AND METHODS

Study Design: A hospital based retrospective cross sectional study.
Study Setting: Blood centre in Gauhati Medical College & Hospital.
Duration Of Study: September 2023 to August 2024
Sample Size: 81
Sampling Method: Convenient sampling method was followed.

Inclusion Criteria: Criteria for the selection of donors were in accordance with rules laid down in Drugs and Cosmetics Act Ministry of Health and Family Welfare, Government of India

Selection Criteria:

1) Weight>50 kg
2) Haemoglobin> 12.5g/dl
3) Age-18-65years
4) Platelet count>1.5 lakhs /microlitre

A gap of 8 weeks from the last whole blood donation or 3 days from last plateletpheresis.

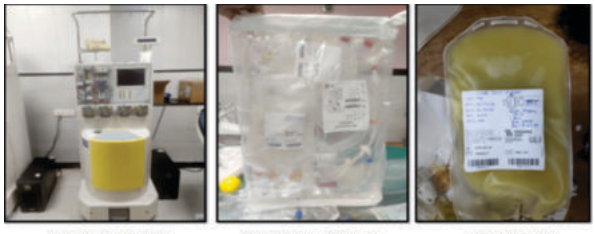
Exclusion Criteria

- Intake of NSAIDs in last 36 hours
- Presence of any illness
- ABO non-identical donor for the patient
- Positive serology for HIV, HbsAg, HCV antibody, syphilis and malaria.

Donor variables such as age, gender, weight, height, hematocrit were documented before each procedure. Informed consent was obtained from donors.

METHODOLOGY

The plateletpheresis procedures were performed on Fresnius Kabi COM.TEC apheresis machine (continuous flow cell separator) using closed system apheresis kits, single needle procedure with program selected 5d-SN following standard operating procedure.



Apheresis machine | S5L kit for apheresis | SDP product

RESULTS:

Table 1: Age-wise Distribution Of Plateletpheresis Donor. (N=81)

Age (in years)	No. of donors	Percentage
18-20	7	8.64%
21-30	39	48.15%
31-40	25	30.86%
41-50	8	9.88%
51-60	2	2.47%
Total	81	100

Maximum participants were in the age group 21-30years (48.15%). Least participants (2.47%) were in the age group 51-60years.

Table 2: Pre-donation Platelet Count Distribution Among Plateletpheresis Donors (N=81)

Platelet count (105/µl)	No. of donors	Percentage

1.6-2.0	10	12.35%
2.01-2.5	26	32.10%
2.51-3.0	30	37.04%
3.01-3.5	10	12.35%
3.51-4.0	3	3.70%
>4.0	2	2.47%
Total	81	100

The above table depicted that among the plateletpheresis donors majority (37.04%) of them had pre donation platelet count of 2.51 $x10^5/\mu l$ -3.0$x10^5/\mu l$. Only 2 of them had >4.0 $x10^5/\mu l$.

Table 3: Platelet Yield Distribution Among Plateletpheresis Donors (N=81)

Platelet yield (1011/unit)	No. of donors	Percentage
<3	14	17.28%
3.1-3.5	33	40.74%
3.6-4.0	13	16.05%
4.1-4.5	14	17.28%
4.6-5	6	7.41%
>5	1	1.23%
Total	81	100

Table 4: Hemoglobin Distribution Of Donors (N=81)

Hemoglobin level (g/dl)	No. of donors	Percentage
<14 g/dl	32	39.51%
≥14 g/dl	49	60.49%
Total	81	100

Majority of the plateletphereis donors had haemoglobin ≥14g/dl.

Table 5: Background Information Of Donor. (N=81)

Parameter	Range	Mean ± S.D.
Age (in years)	18-57	30.39 ± 8.21
Weight (in kgs)	55-100	72.81 ± 11.09
Height (in cms)	154-184	167.81 ± 7.42
Platelet Yield (1011/unit)	2.8 – 5.2	3.64 ± 0.61
HCT	38 - 51	43.69 ± 3.30
Hemoglobin (g/dl)	12.5 – 17.4	14.24 ± 1.09
Pre-donation Platelet (103/µl)	160-435	262.86 ± 55.74

Table 6: Pearson Values For Correlation Of Donor With Platelet Yield (N=81)

Parameter	Correlation
Age (in years) of donor	r = 0.135, p= 0.228
Weight (in kgs) of donor	r = 0.474 p = 0.000*
Height (in cms) of donor	r = 0.321 p = 0.003*
HCT	r = 0.036 p = 0.752
Haemoglobin (in g/dl)	r = -0.050 p = 0.656
Pre-donation platelet (103/µl)	r = 0.288 p = 0.009*

Weight (p = 0.000), height (p = 0.003) and pre-donation platelet count (p = 0.009) of the donor showed linear correlation with the platelet yield in our study whereas no correlation was found between platelet yield and pre donation haemoglobin values(p = 0.656) and hematocrit (p = 0.752).

DISCUSSION

Various studies done previously shows that platelet yield is predominantly dependent on the donor platelet count.[5,6,7,8,9] Goodnough et al studied 708 plateletpheresis procedures and found a direct correlation between platelet yield and pre-donation platelet count. In 12% of the procedures in this study, the mean yield was < 3 x 10^{11}/unit when the pre-donation platelet count was < 200 x 10^3 /µl.[5] Chaudhary et al studied 94 plateletpheresis procedures and found a mean yield of 2.8 ± 0.73 x 10^{11}/unit . In their study, when the predonation platelet count was greater than 300 x 10^3 /µl, the yield was also greater than 3 x 10^{11} platelets/unit in 80% of the products. They have also reported that the mean yield was 2.5 ± 0.59 x 10^{11}/unit when the pre-donation platelet count was < 200 x 10^3 / µl.[9] Our results were also in accordance with these observations and the platelet yield correlated linearly with the pre-donation platelet count of the donor.

Study	Predonation platelet	Platelet yield
Goodnough et al	mean= 237	mean=4.24
Choudhary et al	mean=94	mean=2.8
My study	Mean=81	Mean=3.64

Pre-donation haemoglobin concentration is another donor factor that can affect the yield. Negative correlation with donor pre-aphaeresis haemoglobin levels and yield was observed by Guerrero-Rivera et al and Enein AA et al (r = - 0.306).[6,10] Our results were in accordance with these observations between haemoglobin level and the platelet yield.

In our study no correlation was found between platelet yield and haemoglobin concentration values.No correlation of pre-donation hemoglobin concentration of the donor with platelet yield was observed as well by Das S S et al (r = - 0.05, P>0.005), Chaudhary R et al r=-0.1,p>0.005),Mangwana S et al (r=0.0 22, p>0.05), Patel J et al, (r = -0.001, P > 0.005) & Arun et al.[8,9,11,12,13] Our study showed a negative correlation with age(r=0.135, p>0.05) which is in accordance with negative correlation as observed by Arun et al.[13] But our study showed a strong positive correlation with weight(r=0.474, p<0.05). Similar findings were also observed by Mangwana S et al and Arun et al.[11,13] Chaudhary R et al and Patel J et al did not show any correlation between donor's weight & platelet yield (r = 0.18, p> 0.005 and r = 0.023,p>0.005) respectively.[9,12] Greater the body weight, greater is the blood volume available for processing and greater is the platelet yield. The present study showed positive correlation of height & weight with platelet yield (r=0.321 , p <0.05 and r= 0.474 , p <0.05 respectively) which is in accordance with that of Mangwana et al.[11] Arun et al did not show any correlation with between platelet yield and haematocrit (r = –0.011) which is in accordance with our study (r=0.036).

CONCLUSION

Platelet yield correlated positively with height, weight and donor's pre donation platelet count. Donor's haemoglobin, hematocrit and age did not show correlation with platelet yield. Donor's gender was not taken into consideration because all cases were male. Platelet yield optimization is a developing issue in blood transfusion facilities. Identifying such factors may aid in donor selection to obtain higher platelet yields in lesser time and as a consequence better clinical outcome.

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