

Original Research Article

An Audit of Single Donor Platelet Apheresis: A Three Years' Experience at a Tertiary Care Hospital

Sudhir Kumar Vujhini¹, Shanthi Bonagiri², Mahesh Kumar Kandukuri³, Murali Krishna Bogi³

¹Associate Professor, ²Professor and Head, ³Assistant Professor

Department of Transfusion Medicine and Immunohematology, Nizam's Institute of Medical Sciences, Hyderabad, Telangana State, India

***Corresponding author**

Dr. Sudhir Kumar Vujhini

Email: vujhini14@gmail.com

Abstract: Single Donor Platelet Apheresis (SDP) involves collection of whole blood in anticoagulant solution, separation of whole blood into components, collection of platelets in a separate bag and transfusing the remaining constituents back to the donor. One SDP unit is equal to 4-6 Random Donor Platelet (RDP) units. Audit of single donor platelet pheresis (SDP) was done to assess the utilisation of SDP, demographic profile of the donors, discarding details of the SDP units. This study of SDP audit was conducted retrospectively for periods of three years in the Department of Transfusion Medicine and Immunohematology in a Tertiary care Hospital, Hyderabad, India. Data was obtained from the records maintained in the department and was analyzed. Total blood units collected during January 2014 to December 2016 was 52,702. Total number of SDP procedures performed was 325. All the SDP donors were males and replacement donors only. About 88.31 % of donors fall in the age range of 18-35 years. Platelet count of the donors ranged from 1.9 to 4.3 lakhs/uL and about 97.55 % of the donors were having platelet count between 2.0 -4.0 lakhs/uL. Maximum SDP units were utilized by Medical Oncology Department (75.69 %) followed by the Department of General Medicine. Six SDP units were discarded due to expiry. Voluntary donors need to be encouraged in view of increasing demand for SDP. In view of early (5 days) expiry of SDP units and high cost, correct assessment of its transfusion requirement will prevent the wastage of the unit.

Keywords: An audit, Single Donor Platelet Apheresis, Donors.

INTRODUCTION:

Severely thrombocytopenic patients are at risk of developing life threatening spontaneous bleeding. Platelet transfusion becomes an essential vital role in preventing such complications [1]. Platelets are currently obtained either by fractionation of whole blood or single donor platelet apheresis (SDP). In SDP, blood is drawn from a donor in anticoagulant solution and separated into components. Platelets suspended in plasma are retained as end product and the remaining components i.e. red blood cells and plasma are returned to the individual [2, 3]. Nowadays, the use of SDP concentrates has increased as it has higher concentration of platelets (about 4-6 times) than that produced from a unit of whole blood and also there is reduction in donor exposures and risk of allo immunization [4-10]. SDP also has decreased risk of bacterial contamination [11-13]. This study was carried out retrospectively in our

Department of Transfusion medicine and Immunohematology to know the SDP donor details, utilization of SDP units by the different Departments etc.

MATERIALS AND METHODS:

This present study was conducted retrospectively for periods of three years (January 2014 to December 2016) in the Department of Transfusion Medicine and Immunohematology in a Tertiary care Hospital, Hyderabad, India. Data was obtained from the records maintained in the Department and was analyzed. Platelet Apheresis procedures were performed using Fresenius Kabi COM.TEC apheresis machine. Our selection criteria followed for SDP donation include all the parameters similar to routine Blood donation and also include:

- Adequate venous access
- Donor weight 60 kg or above.
- Platelet count >1.50 lakhs/ul.
- A gap of 3 months from the last whole blood donation or three days from the last platelet pheresis
- Negative serology for HIV, HBsAG, HCV, Syphilis, Malaria.

RESULTS:

Total blood units collected during January 2014 to December 2016 was 52,702. Total number of SDP procedures performed was (0.61%) 325 [Table 1].

Total Platelet Rich Plasma (PRP) units prepared were 34,240 and SDP units account for 0.94% of total platelet units prepared (Table 2). All the SDP donors were males and replacement donors only. About 88.31 % of donors fall in the age range of 18-35 years (Table 3). Platelet count of the donors ranged from 1.9 to 4.3 lakhs/uL and about 97.55 % of the donors were having platelet count between 2.0 -4.0 lakhs/uL (Bar diagram). Maximum SDP units were utilized by Medical Oncology Department (75.69 %) followed by the Department of General Medicine (13.84 %), (Pie diagram). Six SDP units (1.84 %) were discarded due to expiry.

Table 1: Total Blood And SDP Units Collected

YEAR	2014	2015	2016	TOTAL	PERCENTAGE %
UNITS					
BLOOD UNITS COLLECTED	18,181	16,194	18,327	52,702	99.39
SDP UNITS COLLECTED	78	86	161	325	0.61
TOTAL	18,259	16,280	18,488	53,027	100

Table 2: Preparation of RDP and SDP – year-wise

Units/year	2014	2015	2016	Total	Percentage %
Random Donor Platelets	10861	11092	12287	34240	99.06
SDP	78	86	161	325	0.94

Table 3: Age distribution of SDP Donors

Age (years)-category	Number of SDP donors	Percentage %	Predominant age range
18-25	95	29.23	88.31 %
26-30	160	49.23	
31-35	32	9.85	
36-40	20	6.15	
41-45	13	4.00	
46-50	4	1.23	
51-55	1	0.30	
Total	325	100	

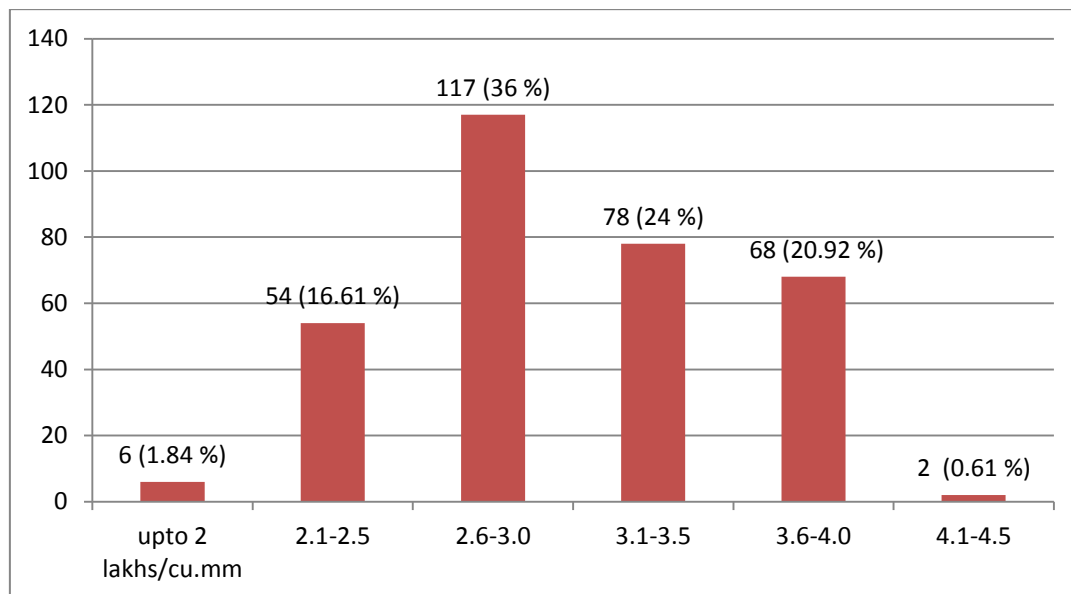


Fig-1: Bar diagram- Platelet Count Range of SDP Donors

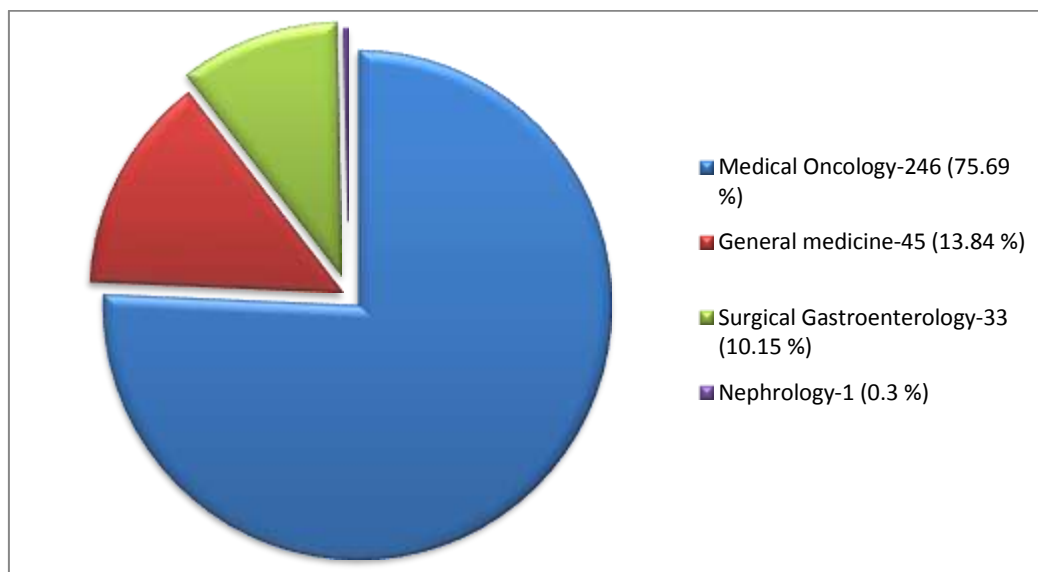


Fig-2: Pie Diagram-Utilization of SDP units Department-wise.

Table 4: Comparison of age-wise distribution of *Present study* among different studies in literature

Age in years	Present study		Suresh <i>et al.</i> ; [18]		Arun <i>et al.</i> ; [1]	
	Total cases	%	Total cases	%	Total cases	%
18-30	255	78.46	63	70	84	64.7
31- 40	52	16.0	19	21.9	37	28.5
41-50	17	5.23	08	8.9	09	6.9
51-60	01	0.30	00	00	00	00
Total	325	100	100	100	130	100

DISCUSSION:

Platelets play a very important role in hemostasis. They are needed for transfusion either prophylactically or therapeutically in cases of severe thrombocytopenia. Generally in such cases either 4-6 units of random donor platelet or 1 unit of SDP is transfused [14, 15]. One unit of SDP should contain a minimum of 3×10^{11} platelets as per American Association of Blood Bank (AABB) guidelines [1, 15], while European guidelines advocate that one SDP should contain 2×10^{11} platelets [1, 16]. This will give an increment of 30,000 to 60,000/ μL [12, 18]. Nowadays, SDP units are the main source of platelets in many countries [6].

In the present study, total of 325 SDP procedures were done over a period of three years. In a study by Mukta Pujani *et al.* [17] total of 256 SDP procedures were done over a 2 years period whereas in a study by Arun *et al.* [1], the total SDP procedures were 130 over a period of 4 years. In our study and in study by Mukta Pujani *et al.* [17] the weight criteria for donor selection was 60 kg or above. In a study by Suresh *et al.* [18], the weight criteria was 65 kg or above whereas in a study by Swarup *et al.* [19], it was 55 kg or above. Majority of the donors in the present study were in the age group of 18-30 years (78.46 %). This finding was in agreement with studies in literature (table 4) [1, 18]. This could be because of the fact that the predominant blood donors also fall in this age group.

In our study, there were no female SDP donors (0.0 %) whereas in a study by Arun *et al.* [1] there was one female SDP donor accounting for 1.3 %. This is because predominant blood donors were also males and also females being frequently rejected for their low hemoglobin levels. But 22.8 % females SDP donors were present in a study by Maria Helena Barbosa *et al.* [20] Platelet count of the donors ranged from 1.9 to 4.3 lakhs/uL and about 76.61 % of the donors were having platelet count between 2.0 -3.5 lakhs/uL when compared to 77.8 % donors in a study by Arun *et al.* [1]. Majority of the SDP units (75.69 %) were utilized by Medical Oncology Department. Indications for SDP units differ from hospital to hospital. In hospitals with oncology department, the major demand for SDP units is for cancer patients with thrombocytopenia. In hospitals without oncology department, General Medicine department has major demand for SDP units for treating many of the medical conditions associated with thrombocytopenia especially in Dengue fever.

Platelet units being stored at 20-240 C with agitation have increased chances of bacterial

contamination. Mehrdad Jafari *et al* reported cases of post platelet transfusion sepsis [21]. In our study, there was no such case observed. In our study six units (1.84 %) of SDP were discarded due to expiry. Samina Tufail Amanat *et al.* [13] also reported in their study that 1.5 % of the SDP units were not utilized. The role of clinician in assessing the requirement of SDP units for transfusion in patients is very important in preventing the wastage of SDP units. Prior discussion with the blood bank medical officer may also help.

CONCLUSION:

Single Donor Platelets have an advantage over the Random Donor Platelets. Currently, there is an increased demand for SDP in cases of thrombocytopenia secondary to chemotherapy in growing cancer patients. Careful selection of donors for SDP is very important for donor and patient safety. In our study, predominant donors for SDP are of 18 to 35 years of age. All are males and replacement donors only. Voluntary donors need to be encouraged in view of increasing demand for SDP. In view of early (5 days) expiry of SDP units and high cost, correct assessment of its transfusion requirement will prevent the wastage of the unit.

REFERENCES:

1. Arun R, Yashovardhan A, Deepthi K, Suresh B, Babu KS, Jothibai DS. Donor demographic and laboratory predictors of single donor platelet yield. J Clin Sci Res. 2013; 2:211-5.
2. Francis RR. Apheresis. In: Harmening DM, editor. Modern Blood Banking and Transfusion Practices. 4th ed. Ch 17. Philadelphia: F A Davis Company; 1999: 363.
3. Roy AD, Bagchi IR, Choudhury N. Need for motivation of platelet pheresis donors: A tertiary care cancer center experience from Eastern India. Annals of medical and health sciences research. 2014 Mar 1; 4(7):63.
4. Mangwana S. Influence of donor demographics on the platelet yield during plateletpheresis-experience of 1100 procedures at a tertiary-care hospital. Journal of Pathology of Nepal. 2014 Apr 25; 4(7):525-9.
5. Chambers LA, Kruskall MS, Pacini DG, Donovan LM. Febrile reactions after platelet transfusion: the effect of single versus multiple donors. Transfusion. 1990 Mar 4; 30(3):219-21.
6. Rock G. Apheresis: four decades of practice. Vox sanguinis. 2002 Aug 1; 83(s1):45-7.
7. Hagberg IA, Akkøk CA, Lyberg T, Kjeldsen-Kragh J. Apheresis-induced platelet activation:

- comparison of three types of cell separators. *Transfusion*. 2000 Feb 1; 40(2):182-92.
8. Murphy MF, Waters AH. Clinical aspects of platelet transfusions. *Blood Coagul Fibrinolysis*. 1991;2:389-96.
 9. Patel AP, Kaur A, Patel V, Patel N, Shah D, Kanvinde S, Prajapati S, Patel H, Rathod D, Adesara R, Rani S. Comparative study of plateletpheresis using Baxter CS 3000 plus and Haemonetics MCS 3P. *Journal of clinical apheresis*. 2004 Jan 1; 19(3):137-41.
 10. Wallace EL, Churchill WH, Surgenor DM, Cho GS, McGurk S. Collection and transfusion of blood and blood components in the United States. 1994. *Transfusion* 1998; 38:625-36.
 11. Makroo RN, Raina V, Kumar P, Kanth RK. Role of platelet transfusion in the management of dengue patients in a tertiary care hospital. *Asian journal of transfusion science*. 2007 Jan 1; 1(1):4.
 12. Dua S, Manocha H, Agarwal D, Sharma S. An Analysis of Deferral Pattern in Plateletpheresis Donors. *Journal of Contemporary Medicine and Dentistry*. 2015; 3(3):24-7.
 13. Amanat ST, Shakoora HA, Raza M, Khan N, Rauf A. Clinical Indications and Adverse Reactions of Platelet Apheresis. *Journal of the College of Physicians and Surgeons--Pakistan: JCPSP*. 2015 Jun 1; 25(6):403-6.
 14. Goodnough LT, Ali S, Despotis G, Dynis M, DiPersio JF. Economic impact of donor platelet count and platelet yield in apheresis products: relevance for emerging issues in platelet transfusion therapy. *Vox sanguinis*. 1999; 76(1):43-9.
 15. Prince TH, editor. Standards for blood banks and transfusion services. 25th edition. Bethesda: MD: AABB, 2008: 36.
 16. Council of Europe. Guide to the preparation, use and quality assurance of blood components. 12th edition. Strasbourg: Council of Europe Publishing; 2006.
 17. Pujani M, Jyotsna PL, Bahadur S, Pahuja S, Pathak C, Jain M. Donor deferral characteristics for plateletpheresis at a tertiary care center in India-a retrospective analysis. *Journal of clinical and diagnostic research: JCDR*. 2014 Jul; 8(7):FC01.
 18. Suresh B, Arun R, Yashovardhan A, Deepthi K, Sreedhar Babu KV, Jothibai DS. Changes in pre- and post-donation haematological parameters in plateletpheresis donors. *Clin Sci Res*. 2014; 3:85-9.
 19. Swarup D, Dhot PS, Arora S. Study of single donor platelet (SDP) preparation by Baxter CS 3000 plus and Haemonetics MCS plus. *Medical Journal Armed Forces India*. 2009 Apr 30; 65(2):137-40.
 20. Barbosa MH, Silva KF, Coelho DQ, Tavares JL, Cruz LF, Kanda MH. Risk factors associated with the occurrence of adverse events in plateletpheresis donation. *Revista brasileira de hematologia e hemoterapia*. 2014 Jun; 36(3):191-5.
 21. Jafari M, Forsberg J, Gilcher RO, Smith JW, Crutcher JM, McDermott M, Brown BR, George JN. Salmonella sepsis caused by a platelet transfusion from a donor with a pet snake. *New England Journal of Medicine*. 2002 Oct 3; 347(14):1075-8.