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Frequent plateletpheresis donations & its effect on haematological parameters: An observational study

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***Background & objectives*: The well-being of donors undergoing frequent plateletpheresis has been a matter of concern. The aim of this study was to analyze the effect of frequent plateletpheresis on the haematological parameters (HP) of repeat donors.**

***Methods*: The study was conducted during February 2016 to March 2017 on all the repeat plateletpheresis donors undergoing the 2nd plateletpheresis within a month of the first in a tertiary care centre. Donors repeating plateletpheresis 3rd and 4th times were also studied. The values of the HP observed on follow up after plateletpheresis done on three different separators were compared.**

***Results*: HPs of the 98 donors were similar at follow up except mean platelet volume (P<0.05). Of the 98 donors, 35 were followed up within a week and 63 were followed up within 8-30 days. No significant alteration was found in the HPs except a significant difference in the variation of platelet counts of the two groups (P=0.025). In 34 donors who presented 3rd time for plateletpheresis (mean gap between 1st and 3rd plateletpheresis=31 days), no significant differences in the HPs were found except the platelet distribution width (P<0.05). Minimal difference in the HP was found in the baseline and the follow up of 3rd plateletpheresis *i.e.*, at 4th plateletpheresis donation. Plateletpheresis through all the three cell separators used had similar effects on the follow up HPs.**

***Interpretation & conclusions*: Repeated plateletpheresis can be done without any detrimental effects on the cell counts of the plateletpheresis donors. The three cell separators yielded similar post-donation follow up haematological parameters.**

Key words Cell separators - frequent plateletpheresis - haematological parameters - plateletpheresis - single donor platelet

Single donor platelet concentrate donation by apheresis, also known as plateletpheresis donation, leads to a brief fall in platelet counts in donors. To ensure donor safety, the U.S. Food and Drug Administration (FDA) laid down guidelines to allow 12 donations per year with no more than two donations per week and a minimum interval of 48 h between two donations which was revised to 24 donations per year in 1988[1,2]. In 2005, guidelines were revised with donations limited to 24 components per year with not more than three components per procedure being allowed[1,2]. Concerns were raised regarding prolonged decrease in the platelet counts of the donors undergoing frequent plateletpheresis. Katz *et al*[1] reported that the

restrictions on the frequent plateletpheresis donors were not binding and could adversely affect the availability of the apheresis components. Studies have shown that there is a drop in the haemoglobin (HB), haematocrit (HCT), platelet count and the white cell count post plateletpheresis when samples drawn up to 30 min from completion of the procedure are tested[3,4]. However, this decrease in all the relevant parameters may not sustain for long time periods, as already observed[1]. Katz *et al*[1] speculated that difference between their study and the other studies such as that conducted by Lazarus *et al*[3] was the difference in the instruments and the materials used for apheresis.

This aspect of frequent plateletpheresis has been studied to a lesser extent in this part of the world. Plateletpheresis is a directed donation in our setup and is done on demand. The attendants and relatives often undergo repeat plateletpheresis to support the patients, and this provides us an opportunity to observe and analyze the haematological parameters (HP) and find answers to this aspect of donor safety. The aim of this study was thus to find the impact of multiple plateletpheresis procedures on the platelet count and all other relevant HP on follow up in the donors. The effect of the use of different cell separators on the HP was also studied.

Material & Methods

The study was conducted in the department of Transfusion Medicine of All India Institute of Medical Sciences, New Delhi, India. All HP of the single donor platelet (SDP) donors who repeated their donation within the time frame of 13 months *i.e.*, from February 2016 to March 2017 were considered for the study. All consecutive plateletpheresis donors who underwent repeated plateletpheresis donations within the study period and met the inclusion criteria were enrolled for analysis. The study was approved by the Institutional Ethics Committee. The donor was requested to fill the routine questionnaire. Written informed consent from each donor was taken after explaining the plateletpheresis procedure to the donor. The pre-donation screening and counselling was done; samples were tested for HP, blood grouping and transfusion transmissible infections (chemiluminescence immunoassay). The calibrated haematology analyser, Nikon Kohden MEK-8222 (Japan) was used for the blood counts and the parameters noted were HB, red blood cells (RBC), HCT, mean corpuscular volume (MPV), mean corpuscular HB (MCH), mean corpuscular HB concentration (MCHC), white blood cells (WBC), total platelet count (TPC), plateletcrit (PCT), mean platelet volume (MPV) and platelet distribution width (PDW).

The cell separators used for doing plateletpheresis were MCS+ separator (Hemonetics Corporation, Braintree, Massachusetts, USA), COM. TEC, DN (Fresenius HemoCare GmbH, Bad Homburg v.d.H, Germany) and Trima Accel (Terumo BCT, Lakewood, CO, USA). For all the apheresis procedures, departmental standard operating procedure was followed which was based on the Director General of Health Services guidelines[5]. The anticoagulant used was ACD-A (anticoagulant citrate dextrose solution-A) (Terumo BCT, Lakewood, CO, USA) which was used in ratio of 1:12 to 1:7 of ACD-A to whole blood. The target collection of each procedure was a dose of 3×10^{11} platelets in 200-250 ml plasma as only a single unit of SDP was collected per procedure. Since the plasma content of the platelet products were not beyond 250 ml, routine protein analysis of the donors was not done. However, in donors who donated apheresis platelets more than four times, plasma protein estimation was done.

All the donors who donated at least twice a month in the study duration were included. Plateletpheresis donors who repeated their 2nd donation of platelets after 30 days were excluded. To assess the effect of repeated platelet donation, the 12 different HP sampled before each SDP procedure, denoted as pre-plateletpheresis values, were analyzed. The parameters of the donors at the 2nd visit acted as the follow up data to study the effect of first plateletpheresis apart from guiding the eligibility for the 2nd donation.

The donors were divided into two groups. Group I consisted of all those donors who repeated the 2nd SDP donation within a week of the first donation. All the other donors who repeated the 2nd donation at a gap of 8-30 days were considered group II. Donors with platelet counts between 150,000 and 200,000/µl were categorized as subgroups IA and IIA in groups I and II, respectively. Similarly, donors with platelet counts 200,000-300,000/µl were categorized as subgroups IB and IIB and those with count beyond 300,000/µl were categorized as subgroups IC and IIC in groups I and II, respectively. To evaluate the effect of different cell separators on the HP, the parameters assessed before repeat donation (1st to 2nd or 2nd to 3rd or 3rd to 4th) done within a week were considered as the outcome measures of the cell separator used for the first procedure.

Statistical analysis: Data were analyzed by Stata 14 version 11.1 (StataCorp, College Station, Texas, USA) and presented in mean (standard deviation) or median (range), mean difference, 95 per cent confidence interval, percentage change and frequency percentage as appropriate. Percentage change was calculated as (mean difference/pre-values)×100. Within group in the continuous variables were assessed by paired *t* test and between two groups comparison was done by independent *t* test (following normal distribution) or Wilcoxon rank-sum test. The comparison among the cell separators was done by Kruskal-Wallis test or one way ANOVA as appropriate.

Results

A total of 1880 plateletpheresis were performed during the study period. There were 131 SDP donors who donated at least two times in one calendar year which included one female donor and 130 male donors. The age groups of the donors was 18-54 (mean=29.13±7.69) years. Forty nine donors underwent plateletpheresis three times and eight donors donated apheresis platelets four times in the calendar year.

To assess the effect of plateletpheresis on the HP, all the donors (n=98) who donated a 2nd time within a month (mean gap=12.22 days) of the first donation were considered for analysis. The average values of the 12 different HPs at the time of first donation (baseline parameter) and at the time of the second donation, which acted as a follow up for the first plateletpheresis donation, are summarized in Table I. There was no significant difference at the two time points for all the HPs. However, the MPV was significantly (P<0.05) higher at the time of 2nd plateletpheresis, and the percentage change was found to be substantial (Table I).

Of the 98 donors, 35 belonged to group I (mean gap between donations=5.17 days, range=3-7 days) and the rest 63 donors belonged to group II (mean gap between donation=16.14 days, range=8-30 days). The average values of the 12 different HPs at the time of first SDP donation and at the time of second donation and the difference are depicted in Table II. The changes in the platelet counts at the time of 2nd donation in all the 98 donors of groups I and II are described in Table III. Of the 98 donors, majority *i.e.*, 54.1 per cent had counts beyond their baselines. Majority (80%) of group I donors of subgroup IA and those (60%) of subgroup IC had increased platelet count at the time of 2nd donation. However, 85 per cent of donors of subgroup IB had a

Table I. Average values, mean difference, 95 per cent confidence interval (CI) and percentage change of the haematological parameters of plateletpheresis donors who donated 2nd time within one month of the first donation

Variables	Mean±SD (n=98)		Mean difference (95% CI)	Per cent change
	Pre-1st plateletpheresis	Pre-2nd plateletpheresis		
Hb (g/dl)	15.08±1.11	15.00±1.05	0.08 (−0.09*-0.24)	0.5
RBC (/µl)	5.03±0.43	5.02±0.43	0.01 (−0.05*-0.07)	0.2
HCT (%)	44.51±3.23	44.17±5.11	0.34 (−0.54*-1.22)	0.8
MCV (fl)	88.79±6.56	88.65±6.36	0.14 (−0.44*-0.72)	0.2
MCH (pg)	30.00±3.04	29.76±2.96	0.24 (−0.01*-0.49)	0.8
MCHC (g/dl)	33.99±1.46	33.79±1.59	0.21 (−0.20*-0.62)	0.6
RDW (fl)	14.11±1.36	13.96±1.37	0.14 (−0.04*-0.32)	0.9
TLC (/µl)	7.44±1.54	7.44±1.51	0.001 (−0.26*-0.26)	0.01
TPC (/µl)	242.58±56.66	242.74±57.69	−0.16 (−9.82*-9.50)	−0.1
PCT (%)	0.22±0.05	0.21±0.05	0.002 (−0.23*-0.75)	0.9
MPV (fl)	9.80±1.96	15.8±2.05	−5.99 (−6.61*-−5.38)	−61.1
PDW (fl)	15.52±2.01	15.81±2.04	−0.28 (−0.74*-0.17)	−1.8

Interpretation: <2.5 per cent of the donors will have the respective haematological parameter reduced below the (*) marked values at the repeat plateletpheresis donation done within one month of the first plateletpheresis donation. The per cent change is given by the formula: (mean difference/pre-value)×100. Hb, haemoglobin; RBC, red blood cells; HCT, haematocrit; MPV, mean corpuscular volume; MCH, mean corpuscular haemoglobin; MCHC, mean corpuscular haemoglobin concentration; WBC, white blood cells; TPC, total platelet count; PCT, plateletcrit; MPV, mean platelet volume; PDW, platelet distribution width; CI, confidence interval; SD, standard deviation

Table II. Average values of the haematological parameters of the donors in groups I and II and the difference at two time points

Variable	Group (n=35 in I, n=63 in II)	Mean±SD		Difference median (minimum, maximum)	$P^{\$}$
		Pre-1st donation	Pre-2nd donation		
Hb (g/dl)	I	14.92±1.14	14.93±1.00	0 (−1.70, 2)	0.960
	II	15.18±1.09	15.05±1.09	0.19 (−2.79, 2.50)	0.275
	$P^{\#}$	0.287	0.600	0.142	
RBC (/µl)	I	4.91±0.36	4.89±0.39	−0.01 (−0.62, 0.36)	0.910
	II	5.11±0.46	5.09±0.44	0.06 (−1, 0.92)	0.713
	$P^{\#}$	0.023	0.027	0.625	
HCT (%)	I	44.18±2.58	44.05±3.04	−0.09 (−5.79, 4.69)	0.895
	II	44.73±3.53	44.24±5.97	−0.19 (−9.59, 32.98)	0.450
	$P^{\#}$	0.418	0.865	0.847	
MCV (fl)	I	90.34±5.95	90.16±5.70	0 (−4.70, 8.59)	0.727
	II	87.83±6.74	87.95±6.60	0 (−7.40, 7.90)	0.737
	$P^{\#}$	0.075	0.100	0.824	
MCH (pg)	I	30.55±2.46	30.59±2.29	0 (−3.1, 2)	0.810
	II	29.73±3.29	29.35±3.15	0.19 (−1.59, 3.90)	0.008
	$P^{\#}$	0.207	0.045	0.261	
MCHC (g/dl)	I	33.81±1.52	33.95±1.92	−0.20 (−6.29, 3.39)	0.604
	II	34.19±1.48	33.68±1.34	0.5 (−4.20, 5.69)	0.080
	$P^{\#}$	0.234	0.432	0.151	
RDW (fl)	I	14.20±1.52	14.15±1.38	0 (−1.79, 2.70)	0.346
	II	14±1.25	13.86±1.34	0.09 (−1.5, 2)	0.226
	$P^{\#}$	0.489	0.331	0.976	
TLC (/µl)	I	7.63±1.57	7.64±1.42	0.05 (−2.6, 4.62)	0.948
	II	7.34±1.53	7.38±1.61	0.15 (−4.76, 3.02)	0.957
	$P^{\#}$	0.374	0.436	0.528	
TPC (/µl)	I	234.2±53.66	220.66±54.35	18 (−81, 119)	0.094
	II	247.24±58.16	255.02±56.20	−10 (−150, 138)	0.201
	$P^{\#}$	0.277	0.004	0.025	
PCT (%)	I	0.22±0.05	0.20±0.04	0.02 (−0.06, 0.14)	0.034
	II	0.23±0.05	0.22±0.06	0 (−0.12, 0.11)	0.810
	$P^{\#}$	0.457	0.086	0.150	
MPV (fl)	I	10.06±1.49	9.46±2.05	0.50 (−3.59, 5.2)	0.079
	II	9.64±9.64	9.07±1.92	0.39 (−4.59, 4.5)	0.156
	$P^{\#}$	0.888	0.366	0.707	
PDW (fl)	I	15.14±2.37	15.80±1.80	−0.39 (−6, 4.09)	0.202
	II	15.68±1.77	15.86±2.09	−0.04 (−4.4, 6.5)	0.617
	$P^{\#}$	0.229	0.884	0.463	

$^{\#}P$ denotes the comparison between two groups calculated by independent *t* test; $^{\$}P$ denotes the comparison within the groups assessed by paired *t* test

decreased platelet count at the 2nd donation. In group II, increased platelet counts were seen with 84.6, 60.5 and 100 per cent in donors of subgroups IIA, IIB and IIC, respectively. The difference between the alteration in the platelet counts in the two groups of donors was found to be significant (P=0.025) which is shown in

Table III. Distribution of baseline platelet values and effect of plateletpheresis on subsequent platelet counts

Group	Subgroup (range of TPC per µl)	Total number of donors	Number of donors with increased count above baseline (%)	Mean of the rise above baseline (per µl)	Number of donors with decreased count below baseline (%)	Mean of the drop below baseline (per µl)
I	A (150,000-200,000)	10	8 (80)	35,750	2 (20)	30,500
	B (200,000-300,000)	20	3 (15)	36,000	17 (85)	44,170
	C (>300,000)	5	3 (60)	18,330	2 (40)	56,500
II	A (150,000-200,000)	13	11 (84.6)	26,360	2 (15.4)	24,920
	B (200,000-300,000)	38	23 (60.5)	43,910	15 (39.5)	30,600
	C (>300,000)	5	5 (100)	17,600	0	0

Table II. The three different cell separators used had no impact on the HP on follow up as shown in Table IV.

Thirty four donors repeated the 3rd donation within one month of the 2nd plateletpheresis donation. The mean gap between the 1st and the 3rd donation was 31 days, and mean gap between 2nd and 3rd donation was 11 days. The detail of the comparison between the HPs of the pre-donation blood sample at the 1st (baseline) and 3rd donations, which was follow up data for the 2nd plateletpheresis, is shown in Table V. As evident from the minimal percentage changes in the HPs, none of the differences was found to be significant except the PDW with $P<0.05$. Similarly, Table VI shows the analysis of the eight donors who repeated their 4th donation within one month of the 3rd plateletpheresis donation. The mean gap between the 1st and the 4th donation was nearly 33 days, and between the 3rd and the 4th donation was 10 days. No significant change was found in the HPs tested at the 1st and 4th plateletpheresis donation. There were six donors who donated four times within a time span of one month; four of them had a protein analysis done. The donors were tested after the 4th donation. The total protein, albumin and globulin were within the normal range after four donations in all the donors with the mean of the total protein content being 7.025 g/dl, serum albumin 4.77 g/dl and serum globulin 2.25 g/dl.

Discussion

The study revealed that there was barely any difference in the HPs of the frequent plateletpheresis donors at follow up. Recoveries of platelet counts were found beyond baseline levels in the majority of the donors who were found eligible and successfully completed their second plateletpheresis donation within a month of the first. According to this study, the HPs seen at the follow up were comparable irrespective of the type of cell separator used.

Various studies have found significant reduction in the post-donation platelet counts when sampled immediately after the completion of the apheresis[4,6,7]. However, follow up results assessed in this study were different. Several factors help in the platelet count recovery. Firstly, the thrombopoietin (TPO) levels increase post-plateletpheresis donation, and may remain elevated for 1-7 days[8-10]. This leads to bone marrow stimulation and not only increases the progenitor cells number but also maintains their survival[11,12]. Secondly, there is recruitment of the sequestered platelets from the spleen which is a reservoir of nearly one-third of the total platelets formed[13,14]. The platelets released from the spleen are younger and larger than the circulating platelets and therefore have larger MPV[13]. Thirdly, bone marrow stimulated due to platelet donation produces and releases platelets early into circulation[15,16]. These facts support the observation of the present study regarding the increased MPV seen on donor follow up. The presence of younger platelets in the donors' circulation after a plateletpheresis donation could have led to higher MPV.

As per Das *et al*[4] a drop in HB, RBC count and HCT is found immediately after plateletpheresis possibly due to haemodilution due to infusion of saline and/or anticoagulants during the procedure. A study conducted by de Aguilar-Nascimento *et al*[17] to see changes of the HP due to infusion of normal saline has shown a significant decrease of HB and HCT on haemodilution in the immediate post-infusion phase of one hour of infusion of two liters of saline. Thus, some amount of red cell loss occurring during the plateletpheresis and the haemodilution could also be a factor causing the decrease in HB in the plateletpheresis donors[4].

Table IV. Comparison of the cell separators on the basis of effect of plateletpheresis on haematological parameters

Parameter	Machine	Mean±SD		*P**	Difference median (minimum, maximum)
		Pre-1st donation	Pre-2nd donation		
Hb (g/dl)	Comtec	14.94±1.09	15.08±0.94	0.473	−0.30 (−0.79, 1.3)
	Hemonetics	14.95±1.04	14.98±1.06	0.800	0 (−1.7, 1)
	Trima	14.54±1.04	14.64±0.75	0.632	−0.19 (−1, 2)
	P@	0.461	0.442		0.267
RBC (/µl)	Comtec	4.88±0.36	5.00±0.47	0.241	−0.02 (−0.79, 0.17)
	Hemonetics	4.81±0.34	4.84±0.39	0.487	0 (−0.63, 0.36)
	Trima	4.88±0.49	4.85±0.44	0.550	−0.03 (−0.25, 0.35)
	P@	0.684	0.619		0.620
HCT (%)	Comtec	43.41±2.77	44.52±3.29	0.357	−0.09 (−9.6, 2.3)
	Hemonetics	43.90±3.01	44.16±3.36	0.618	−0.14 (−6, 4.6)
	Trima	43.8±2.34	43.36±2.09	0.505	0.5 (−2.59, 5)
	P@	0.984	0.604		0.768
MCV (fl)	Comtec	88.85±5.74	88.95±4.01	0.900	0.1 (−5.8, 3.3)
	Hemonetics	91.5±4.16	91.55±3.77	0.928	−0.09 (−5.2, 8.5)
	Trima	90.34±8.18	89.92±8.36	0.591	−0.19 (−4.7, 5.8)
	P@	0.538	0.435		0.840
MCH (pg)	Comtec	30.24±1.70	30.17±2.12	0.899	0 (−2.5, 3.2)
	Hemonetics	31.28±1.70	31.16±1.93	0.567	−0.19 (−2.2, 2)
	Trima	29.98±3.25	30.35±2.99	0.326	0 (−3.1, 1.7)
	P@	0.229	0.441		0.658
MCHC (g/dl)	Comtec	33.97±2.17	33.81±1.45	0.857	−0.20 (−3.7, 6.4)
	Hemonetics	34.2±1.28	34.08±1.87	0.744	−0.34 (−3.79, 3.1)
	Trima	33.17±1.53	33.82±2.13	0.344	−0.09 (−6.2, 3.39)
	P@	0.119	0.883		0.946
RDW (fl)	Comtec	14.32±1.90	14.2±1.72	0.738	0 (−1.7, 1.8)
	Hemonetics	14.37±1.52	14.24±1.56	0.517	−0.19 (−1.2, 2.5)
	Trima	14.26±1.45	14.13±1.02	0.660	0.09 (−1.7, 2.7)
	P@	0.984	0.950		0.907
TLC (/µl)	Comtec	7.93±1.82	7.84±1.63	0.824	0.009 (−1.9, 3.3)
	Hemonetics	7.65±1.29	7.79±1.49	0.460	−0.02 (−2.6, 1.3)
	Trima	7.67±1.52	7.19±1.06	0.326	0.22 (−1.8, 4.62)
	P@	0.868	0.377		0.790
TPC (/µl)	Comtec	201.1±22.43	192.230.46	0.529	21 (−70, 71)
	Hemonetics	239.80±51.88	223.84±53.25	0.098	16.5 (−90, 119)
	Trima	238.46±46.92	241.26±46.66	0.796	−6 (−81, 59)
	P@	0.074	0.051		0.451
PCT (%)	Comtec	0.21±0.01	0.21±0.03	0.781	−0.02 (−0.05, 0.06)
	Hemonetics	0.23±0.05	0.20±0.04	0.045	0.03 (−0.11,0.14)
	Trima	0.21±0.03	0.20±0.05	0.619	0.005 (−0.09, 0.12)
	P@	0.354	0.927		0.241

Contd...

Parameter	Machine	Mean±SD		P^*	Difference median (minimum, maximum)
		Pre-1st donation	Pre-2nd donation		
MPV (f)	Comtec	10.52±0.75	10.98±1.25	0.376	−0.29 (−3.3, 2.1)
	Hemonetics	10.01±1.75	9.34±1.77	0.073	0.5 (−2.6, 6.1)
	Trima	9.54±1.76	8.77±2.05	0.414	0.75 (−3.7, 5.2)
	$P^@$	0.338	0.019		0.246
PDW (fl)	Comtec	16.01±1.95	16.67±0.84	0.769	−0.29 (−2.6, 3.1)
	Hemonetics	15.16±2.33	15.54±1.87	0.361	−0.19 (−6, 4.09)
	Trima	15.47±2.42	15.60±1.93	0.943	0.44 (−5.5, 3.1)
	$P^@$	0.641	0.642		0.651

$^@P$ denotes the comparison among the cell separators calculated by Kruskal-Wallis test/one-way ANOVA; $^*P$ denotes the comparison within the cell separators at 1st and 2nd plateletpheresis assessed by paired *t* test

Contrary to the findings on repeat plateletpheresis donors[18,19], this study did not find any significant drop in HB, RBC or HCT in any group of our donors, possibly because maximum number of plateletpheresis donations studied here was limited to three to four whereas the earlier groups[18,19] mentioned their observations on more number of frequent plateletpheresis donations. No sustained decrease in the WBC count was found in this study population although studies conducted on samples collected immediately post plateletpheresis show a decrease in counts[4,7].

Das *et al*[4] have mentioned the differential effect of the cell separators used on the post donation cell counts. They found more platelet and WBC loss with the Fresenius cell separator as compared to Hemonetics and Amicus cell separators. Beyan *et al*[20] have also noted significant difference in the fall in HB and HCT during plateletpheresis among cell separators they compared. Analysis on the three cell separators used in this study did not find any significant decrease of the various parameters as analyzed on donors repeating plateletpheresis within a week.

Our study was limited by a few shortcomings. First, the immediate post-plateletpheresis sample was not analyzed; second, the isolated lymphocyte counts which showed sustained decreases in other studies were not followed up[21]. Third, the serum ferritin levels were not done which has been found as a significant factor in some studies[18,19]. Comprehensive studies are required

Table V. Haematological parameters of donors who underwent plateletpheresis three times during the study period with a gap of within 30 days between 2nd and 3rd plateletpheresis

Parameters	Mean±SD		Mean difference (95% CI)	Per cent change (%)
	Pre-1st plateletpheresis (n=34)	Pre-3rd plateletpheresis (n=34)		
Hb (g/dl)	14.70±1.13	14.65±1.07	0.05 (−0.22-0.32)	0.3
RBC (/µl)	4.98±0.59	4.96±0.63	0.01 (−0.10-0.12)	0.2
HCT (%)	44.14±3.35	43.79±3.18	0.35 (−0.73-1.44)	0.8
MCV (fl)	89.52±8.45	89.25±9.25	0.26 (−0.82-1.34)	0.3
MCH (pg)	29.92±3.82	30.16±4.44	−0.24 (−0.76-0.27)	−0.8
MCHC (g/dl)	33.33±1.55	33.53±2.30	−0.19 (−0.95-0.56)	−0.6
RDW (fl)	14.66±1.86	15.12±3.62	−0.45 (−1.77-0.86)	−3.1
TLC (/µl)	7.61±1.62	7.38±1.66	0.23 (−0.19-0.66)	3.0
TPC (/µl)	234.09±42.27	225.66±61.33	8.43 (−12.75-29.60)	3.6
PCT (%)	0.22±0.05	0.22±0.05	0.001 (−0.02-0.02)	0.4
MPV (fl)	9.49±1.19	9.37±1.92	0.11 (−0.62-0.84)	1.2
PDW (fl)	15.89±1.77	14.76±2.38	1.13 (0.21-2.06)	7.1

The per cent change is given by the formula: (mean difference/pre-value)×100

Table VI. Haematological parameters of donors who underwent plateletpheresis three times in the study period and with a gap of 30 days between 3rd and 4th plateletpheresis

Parameters	Mean±SD		Mean difference (95% CI)	Per cent change (%)
	Pre-1st plateletpheresis (n=8)	Pre-4rd plateletpheresis (n=8)		
Hb (g/dl)	14.69±1.47	14.26±0.90	0.43 (−0.23-1.07)	2.9
RBC (/µl)	4.89±0.54	4.80±0.33	0.09 (−0.22-0.39)	1.8
HCT (%)	44.14±14	43.16±2.67	0.98 (−2.10-4.05)	2.2
MCV (fl)	90.59±5.81	90.06±5.17	0.52 (−1.48-2.53)	5.7
MCH (pg)	30.24±3.41	29.84±2.94	0.40 (−0.56-1.36)	1.3
MCHC (g/dl)	33.25±1.95	33.09±2.05	0.16 (−1.02-1.34)	0.4
RDW (fl)	15.3±2.06	15.01±1.77	0.29 (0.93-1.50)	1.9
TLC (/µl)	7.55±1.47	7.36±1.36	0.19 (−1.65-2.03)	2.5
TPC (/µl)	227.63±43.10	246.75±54.46	−19.12 (−61.40-23.152)	8.4
PCT (%)	0.21±0.03	0.21±0.04	−0.001 (−0.05-0.05)	−0.5
MPV (fl)	9.79±1.67	8.82±2.25	0.96 (−0.93-2.85)	9.8
PDW (fl)	16.01±2.27	16.14±0.92	−0.13 (−2.28-2.02)	0.8

The per cent change is given by the formula: (mean difference/pre-value)×100

to look into these finer aspects of plateletpheresis donor safety.

In conclusion, our study shows that repeated plateletpheresis can be done without any significant detrimental effects on the cell counts of the plateletpheresis donors. The three cell separators used in this study had similar post-plateletpheresis HPs follow up.

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