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Original Research Article

ANALYSIS OF DEMOGRAPHICS OF PLATELETPHERESIS DONORS IN A TERTIARY CARE TEACHING INSTITUTE IN DELHI: A 5 YEAR STUDY

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Abstract

Background: The escalating demand for platelet transfusions has led to the widespread adoption of plateletpheresis, a process enhanced by advanced cell separation technologies. This prospective, observational study conducted in a tertiary care teaching institute. The objectives are to investigate the demographic and clinical characteristics of plateletpheresis donors over a five-year period (2018-2022). The study focuses on gender distribution, age demographics, occupational backgrounds, and variations in platelet counts, providing valuable insights for blood banks and healthcare organizations. **Materials and Methods:** Plateletpheresis donors were enrolled prospectively after obtaining informed consent. The study utilized the Amicus cell separation platform (Fresenius Kabi) and Haemonetics Multi-Component Collection System(MCS+), and data on gender, age, occupation, and platelet count were collected and compiled in a Microsoft Excel spreadsheet. Statistical analysis was conducted using SPSS version 21. Ethical standards were strictly adhered to, ensuring participant confidentiality and privacy. **Result:** Gender distribution analysis revealed a consistent predominance of male donors over the study years. The age group of 21-30 consistently contributed significantly to the donor pool. Servicemen emerged as the dominant occupational group. Platelet count variations demonstrated fluctuations, with specific categories showing notable changes across the years. **Conclusion:** The study provides a comprehensive overview of plateletpheresis donor characteristics, emphasizing the importance of targeted recruitment strategies, continuous donor education, and flexibility in donor criteria. The findings underscore the dynamic nature of plateletpheresis donations and offer valuable insights for blood banks aiming to optimize platelet yield while ensuring donor safety.

INTRODUCTION

Over the past decades, the escalating demand for platelet transfusions in India has driven the widespread adoption of technologically advanced plateletpheresis for the preparation of platelet concentrates (PC).[1] This surge in demand has particularly seen an upswing in the utilization of single-donor platelets obtained through automated cell separators, reflecting a broader trend in the evolution of blood component collection methodologies. The appeal of this approach lies in its cost-effectiveness and the ability to harvest multiple blood components concurrently, thereby optimizing resource utilization and enabling more extensive collection from a limited donor pool.[2,3] Plateletpheresis, as a critical component of modern blood banking practices, has witnessed continuous refinement with progressive improvements in cell separator technologies.[4]One of the notable advancements in this domain is the Amicus cell separation platform (Fresenius Kabi) and Haemonetics Multi-Component Collection System(MCS+), played a pivotal role in

streamlining the plateletpheresis process, enhancing efficiency, and minimizing donor discomfort.

This prospective, observational, and open-label study was conducted in a tertiary care teaching institute in India, with a focus on plateletpheresis donors. The study aimed to comprehensively investigate the characteristics of plateletpheresis donors, shedding light on the Indian scenario. The use of a 16-gauge needle inserted into the antecubital fossa vein with aseptic precautions ensured standardized and safe plateletpheresis procedures.

As plateletpheresis gains prominence in the landscape of transfusion medicine in India, understanding the intricacies of donor demographics, procedural nuances, and technological implications becomes paramount. This study contributes valuable insights into the dynamics of plateletpheresis donations in the Indian context, paving the way for further research and advancements in the optimization of platelet concentrate preparation.[5,6]

MATERIALS AND METHODS

This study employed a prospective, observational, and open-label design to investigate plateletpheresis donors in a tertiary care teaching institute setting. Plateletpheresis donors were enrolled in the study after obtaining informed and written consent. The inclusion criteria encompassed individuals eligible for plateletpheresis donation based on health and donor eligibility guidelines. Plateletpheresis procedures were conducted using Amicus cell separation platform (Fresenius Kabi) and Haemonetics Multi-Component Collection System(MCS+). These systems are known for its efficiency in collecting platelets and contributing to a streamlined and donor-friendly process. All plateletpheresis donations were performed with a 16-gauge needle, which was aseptically inserted into a vein in the antecubital fossa. Standardized aseptic precautions were implemented throughout the procedure to ensure donor safety and hygiene.

Data from the study were meticulously recorded and compiled in a Microsoft Excel spreadsheet. The variables included donor demographics (age, sex, occupation), and platelet count. The use of a spreadsheet facilitated organized data management for subsequent analysis.Statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 21. Descriptive statistics for continuous variables and percentages for categorical variables, were employed to summarize the data. Inferential statistics were applied where appropriate to assess the significance of observed differences.

The study adhered to ethical standards and guidelines for research involving human subjects. Informed and written consent was obtained from all participants, and their confidentiality and privacy were strictly maintained throughout the study.

RESULTS

[Table 1] presents a comprehensive overview of the gender distribution among plateletpheresis donors over the consecutive years from 2018 to 2022. The data reveal a consistent predominance of male donors across all years. In 2018, 99.1% of plateletpheresis donors were male, with a slight increase to 99.4% in 2019. The trend continued in 2020 and 2021, where 99.2% and 99.5% of donors, respectively, were male. Notably, the year 2022 maintained a high male donor percentage at 99.7%.

Conversely, female plateletpheresis donors constituted a minority across all years. In 2018, females accounted for 0.9% of donors, and this percentage decreased slightly to 0.6% in 2019. The subsequent year, 2020 demonstrated a marginal increase in female representation, with percentages of 0.8%. The year 2021 and 2022 maintained the lower percentage of female donors at 0.5% and 0.3% respectively.

[Table 2] illustrates the age distribution of plateletpheresis donors over the five-year span from 2018 to 2022, providing valuable insights into the demographic composition of the donor pool.

In 2018, the majority of donors fell within the age group of 21-30, constituting 47.6% of the total donors. This trend continued in 2019, with 45.9% falling into the same age bracket. The subsequent years, 2020 and 2021, saw a consistent representation of this age group, comprising 43.7% and 47.8% of donors, respectively. In 2022, the proportion remained high at 49.7%, emphasizing the sustained contribution of individuals aged 21-30 to the plateletpheresis donor pool.

The second-largest age group across all years was 31-40, with 36.1% in 2018, 39.0% in 2019, and 37.3% in 2020. In 2021, the percentage slightly decreased to 32.8%, with a further decline to 31.9% in 2022. This suggests a consistent presence of donors in their thirties, although with a modest decrease in later years. Additionally, the age group of 18-20 exhibited fluctuations, ranging from 4.1% in 2018 to 5.2% in 2019, and then declining to 3.9% in 2021. However, it experienced a slight increase in 2022, reaching 5.2%.

The representation of donors in the age categories of 41-50, 51-60, and 61-65 varied, showcasing distinctive patterns in each year but collectively contributing to the overall age diversity within the plateletpheresis donor cohort.

[Table 3] provides a detailed breakdown of the occupational distribution among plateletpheresis donors over the course of five years (2018-2022), shedding light on the diverse backgrounds of individuals contributing to platelet donations.

The data reveals a notable presence of student donors throughout the study period. In 2018,

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students constituted 11.5% of plateletpheresis donors, and this percentage increased to 15.1% in 2019. Although there was a slight dip in 2020 (12.7%), the contribution from students remained significant, accounting for 10.3% in 2021 and showing a notable increase to 15.3% in 2022. Servicemen consistently formed the largest occupational group among plateletpheresis donors. Representing 52.8% in 2018, this group remained substantial over the years, contributing 47.7%, 48.4%, 45.1%, and 47.5% in 2019, 2020, 2021, and 2022, respectively. Farmers, businessmen, and individuals falling into the "Others" category also contributed to the donor pool, albeit with varying percentages. Farmers, constituting 0.2% in 2018, showed minimal representation, while businessmen consistently contributed significantly, ranging from 28.8% in 2021 to 35.7% in 2020. The "Others" category, which included diverse occupations, exhibited noticeable variability, contributing 12.1% in 2021 and decreasing to 4.0% in 2022. The representation of drivers and labourers remained relatively low, with drivers contributing between 0.8 % and 2.2% over the years and labourers showing minimal presence, ranging from 0.8% to 5.2%.

[Table 4] elucidates the distribution of platelet counts among plateletpheresis donors across five successive years (2018-2022), providing crucial insights into the variability and trends in platelet count categories.

Table 1: Gender Distribution of Plateletpheresis Donors Over Five Consecutive Years (2018-2022)

Year	2018		2019		2020		2021		2022	
Gender	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Male	438	99.1 %	171	99.4 %	125	99.2 %	404	99.5 %	325	99.7 %
Female	4	0.9 %	1	0.6 %	1	0.8 %	2	0.5 %	1	0.3 %

Table 2: Age Distribution of Plateletpheresis Donors Across Five Consecutive Years (2018-2022)

Age Group	2018		2019		2020		2021		2022	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
18-20	18	4.1 %	9	5.2 %	6	4.8 %	16	3.9 %	17	5.2 %
21-30	211	47.6 %	79	45.9 %	55	43.7 %	194	47.8 %	162	49.7 %
31-40	160	36.1 %	67	39.0 %	47	37.3 %	133	32.8 %	104	31.9 %
41-50	47	10.6 %	12	7.0 %	13	10.3 %	50	12.3 %	35	10.7 %
51-60	7	1.6 %	4	2.3 %	5	4.0 %	13	3.2 %	8	2.5 %
61-65	0	0	1	0.6 %	0	0.0 %	0	0.0 %	0	0.0 %

Table 3: Occupation Distribution of Plateletpheresis Donors Over Five Consecutive Years (2018-2022)

	2018		2019		2020		2021		2022	
Occupation	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Student	51	11.5 %	26	15.1 %	16	12.7 %	42	10.3 %	50	15.3 %
Serviceman	234	52.8 %	82	47.7 %	61	48.4 %	183	45.1 %	155	47.5 %
Farmer	1	0.2 %	2	1.2 %	1	0.8 %	2	0.5 %	1	0.3 %
Buisnessman	145	32.7 %	51	29.7 %	45	35.7 %	117	28.8 %	103	31.6 %
Driver	5	1.1 %	2	1.2 %	1	0.8 %	9	2.2 %	3	0.9 %
Labourer	7	1.6 %	9	5.2 %	1	0.8 %	4	1.0 %	1	0.3 %
Others	0	0.0 %	0	0.0 %	1	0.8 %	49	12.1 %	13	4.0 %

Table 4: Pre Donation Platelet Count Distribution Among Plateletpheresis Donors: A Five-Year Overview (2018-2022)

Pre Donation	2018		2019		2020		2021		2022	
Platelet Count (million/microliter of blood)	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
1.5-2	1	0.2 %	48	27.9 %	1	0.8 %	112	27.6 %	2	0.6 %
2-2.5	95	21.4 %	59	34.3 %	39	31.0 %	128	31.5 %	74	22.7 %
2.5-3	152	34.3 %	40	23.3 %	43	34.1 %	92	22.7 %	111	34.0 %
3-3.5	117	26.4 %	18	10.5 %	28	22.2 %	48	11.8 %	79	24.2 %
3.5-4	66	14.9 %	6	3.5 %	12	9.5 %	19	4.7 %	40	12.3 %
4-4.5	8	1.8 %	1	0.6 %	3	2.4 %	7	1.7 %	17	5.2 %
4.5-5	4	0.9 %	0	0.0 %	0	0.0 %	0	0.0 %	2	0.6 %
>5	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %	1	0.3 %

1.5-2 x 10^5/µL:In 2018, only 0.2% of donors fell within this platelet count category, and this percentage increased substantially to 27.9% in 2019 before returning to a minimal 0.8% in 2020. In 2021, 27.6% of donors belonged to this category, and the percentage decreased to 0.6% in 2022. 2-2.5 x 10^5/µL:A notable proportion of donors, 21.4% in 2018, increased to 34.3% in 2019, representing the highest percentage in this category over the years. Subsequent years, 2020, 2021, and 2022, maintained substantial percentages of 31.0%, 31.5%, and 22.7%, respectively. 2.5-3 x 10^5/µL:With 34.3% in 2018, this category experienced fluctuations, reaching the lowest percentage of 22.7% in 2021. However, it consistently formed a significant proportion in each year. 3-3.5 x 10^5/µL:Starting at 26.4% in 2018, this category demonstrated a decreasing trend over the years, reaching 11.8% in 2021. 3.5-4 x 10^5/µL:Constituting 14.9% in 2018, this category experienced variations, with a decline to 3.5% in 2019 and subsequent increases in 2020, 2021, and 2022, reaching 12.3%. 4-4.5 x

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10^5/µL:The representation in this category fluctuated, ranging from 1.8% in 2018 to 5.2% in 2022. 4.5-5 x 10^5/µL:A minimal representation, varying from 0.9% in 2018 to 0.6% in 2022. >5 x 10^5/µL:Minimal or no representation in all years, with a single case accounting for 0.3% in 2022.

DISCUSSION

The observed patterns in the demographic and clinical characteristics of plateletpheresis donors in this study provide valuable insights into the dynamics of platelet donation practices over the five-year period from 2018 to 2022. Several key observations emerge from the data, encompassing gender distribution, age demographics, occupational backgrounds, and platelet count variations.

Gender Distribution: The consistently higher representation of male donors compared to female donors aligns with global trends in blood donation demographics.[7,8] The observed male predominance may be influenced by factors such as societal norms, eligibility criteria, and the lower prevalence of iron deficiency in males.[7,9] This finding is consistent with studies emphasizing the need for targeted recruitment strategies to increase female donor participation.[10]

Age Demographics: The predominant age group of 21-30 years emerged as a substantial contributor to the plateletpheresis donor pool across all years. This age range aligns with previous studies highlighting the prevalence of young donors in plateletpheresis programs.[11] The sustained involvement of individuals in their twenties underscores the importance of engaging and retaining this age group through targeted awareness campaigns and donor education programs.

Occupational Backgrounds: The diverse occupational backgrounds of plateletpheresis donors reflect the heterogeneous nature of the donor pool. Notably, servicemen consistently constituted the largest occupational group. This aligns with studies reporting a higher prevalence of donation among military personnel due to a sense of duty and organizational support.[12] Understanding the occupational distribution assists in tailoring recruitment efforts to engage specific sectors, fostering a consistent and diverse donor base.

Platelet Count Variations: The observed variations in platelet count categories highlight the dynamic nature of plateletpheresis donations. The increase in the 1.5-2 x 10^5/µL category in 2019 suggests potential adjustments in donor selection criteria or changes in patient needs. The consistent representation in the 2-2.5 x 10^5/µL category indicates a stable contribution from donors with moderate platelet counts, emphasizing the efficiency of the plateletpheresis process in this range.[13]

While the 3-3.5 x 10^5/µL category exhibited a decreasing trend, the 3.5-4 x 10^5/µL category demonstrated fluctuations, underscoring the importance of monitoring and adapting donor criteria to optimize platelet yield while ensuring donor safety.[14]

CONCLUSION

This study provides a comprehensive overview of plateletpheresis donor characteristics, offering valuable insights for blood banks and healthcare organizations. The observed trends underscore the importance of targeted recruitment strategies, continuous donor education, and flexibility in donor criteria to adapt to evolving healthcare needs.

REFERENCES

1. Current concepts in platelet transfusion - PMC [Internet]. [cited 2024 Jan 28]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2798780/
2. Swarup D, Dhot P, Arora S. Study of Single Donor Platelet (SDP) Preparation by Baxter CS 3000 plus and Haemonetics MCS plus. Med J Armed Forces India. 2009 Apr;65(2):137–40.
3. Overview of blood components and their preparation - PMC [Internet]. [cited 2024 Jan 28]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4260297/
4. Plateletpheresis in the Era of Automation: Optimizing Donor Safety and Product Quality Using Modern Apheresis Instruments - PMC [Internet]. [cited 2024 Jan 28]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7900306/
5. Prevalence and predictors of adverse reactions in plateletpheresis donors with the perspective of donor safety in a tertiary care hospital of Northern India - PubMed [Internet]. [cited 2024 Jan 28]. Available from: https://pubmed.ncbi.nlm.nih.gov/33162705/
6. (1) (PDF) Various aspects of plateletpheresis: Its impact on donor and patients [Internet]. [cited 2024 Jan 28]. Available from: https://www.researchgate.net/publication/319649312_Various_aspects_of_plateletpheresis_Its_impact_on_donor_and_patients
7. Madrona DP, Herrera MDF, Jiménez DP, Giraldo SG, Campos RR. Women as whole blood donors: offers, donations and deferrals in the province of Huelva, south-western Spain. Blood Transfus. 2014 Jan;12(Suppl 1):s11–20.
8. The Prevalence of Transfusion-Transmitted Diseases Among Blood Donors in the Central Blood Bank in Makkah, Saudi Arabia - PMC [Internet]. [cited 2024 Jan 28]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10724763/
9. Bani M, Giussani B. Gender differences in giving blood: a review of the literature. Blood Transfusion [Internet]. 2010 [cited 2024 Jan 28]; Available from: https://doi.org/10.2450/2010.0156-09
10. Blood donation motivators and barriers reported by young, first-time whole blood donors: Examining the association of reported motivators and barriers with subsequent donation behavior and potential sex, race, and ethnic group differences - France - 2022 - Transfusion - Wiley Online Library [Internet]. [cited 2024 Jan 28]. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/trf.17162
11. Young apheresis platelet donors show significant and sustained growth over the last decade in the US, 2010-2019: A favorable sign of the resiliency of the platelet supply - PubMed [Internet]. [cited 2024 Jan 28]. Available from: https://pubmed.ncbi.nlm.nih.gov/37191295/
12. Need for Motivation of Plateletpheresis Donors: A Tertiary Care Cancer Center Experience from Eastern India - PMC [Internet]. [cited 2024 Jan 28]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4083717/
13. Thokala RP, Radhakrishnan K, Anandan A, Panicker VK. Recovery of Platelet Count among Apheresis Platelet Donors. J ClinDiagn Res. 2016 Dec;10(12):EC01–4.
14. Analysis of Donor Safety in High Yield Plateletpheresis Procedures: An Experience from Tertiary Care Hospital in South India - PMC [Internet]. [cited 2024 Jan 28]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7326900/

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