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Profile Analysis of Apheresis Platelet Donors and Receivers: An Observational Study in a Tertiary Care Cancer Hospital in Dhaka Bangladesh

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Abstract

Background: Apheresis is a blood transfusion process that allows a donor to give specific blood components like platelets, RBCs, or plasma to the receivers. During this procedure, the rest blood components are returned to the donors. For safe and effective apheresis platelet transfusion, profiling of donors and receivers or primary information of them is very important. In Bangladesh, we have not enough research-based information regarding these issues. ***Aim of the study*:** The aim of this study was to analyze the profile of apheresis platelet donors and receivers who were cancer patients. ***Methods*:** This was a retrospective observational study which was conducted in the Department of Transfusion Medicine, National Institute of Cancer Research and Hospital (NICRH), Mohakhali, Dhaka, Bangladesh during the period from January 2018 to December 2019. In total 210 platelet donors and 210 platelet receivers through apheresis procedure were enrolled as the study population. The ethical committee of the mentioned hospital had approved this study. Before starting data collection, properly written consent was taken from all the participants. All data were processed, analyzed, and disseminated by MS Office and SPSS version 20 as per need. ***Result*:** In this study, the mean age of the donor was 26.62 ± 5.86 years. Only one donor was female (0.5%) whereas 95.5% of donors were male. As platelet count, below 2 lacs, above 2 lacs, above 3 lacs, and above 4 lacs were in 10%, 72.4%, 16.7%, and 1% donors respectively. For 100% donors, it was a single donation. On the other hand, the mean age of the receivers was 26.94 ± 15.55 years. We observed, 69% of receivers were male whereas 31% were female. In this study, as platelet count of receivers, we found <10,000/lac, 10,000-30,000/lac and 30,001-50,000/lac platelets among 15.7%, 61.9% and 22.4% receivers respectively. The majority of the receivers were with AML (*Acute Myeloid Leukemia)* which was found among 68%. As a total number of apheresis, a single number was found in 13% and multiple numbers were found in 36% of receivers. In 82% of receivers, history of chemotherapy and in 18% receiver's history of chemotherapy as well as radiotherapy were found. ***Conclusion*:** In Bangladesh basically males are the prominent part of platelet donation through apheresis procedure. Although young males play a vital role in apheresis platelet donation, younger children and adolescents are the basic receivers here, a large number of healthy young women as potential blood donors are still out of platelet donation procedure in Bangladesh. Necessary motivational education could make them interested as platelet donors in the mainstream blood transmission system in near future.

Keywords: Profiling, apheresis, platelet donors, blood transmission.

I. INTRODUCTION

Apheresis is a blood transfusion process that allows a donor to give specific blood components like platelets, RBCs or plasma to the receivers. During this procedure, the rest blood components are returned to the donors. For safe and effective apheresis platelet transfusion, profiling of donors and receivers or primary information of them is very important. In Bangladesh, we have not enough research-based information regarding these issues. Apheresis comes from a Greek word, aparejos which mean to take away. For many years, platelets were obtained from whole blood donations by Buffy Coat and Platelet Rich Plasma (PRP) methods. Apheresis platelets became available by the year 1970 [1]. Platelets obtained from the apheresis technique are termed as Single Donor

Platelets (SDP). SDP have advantages over Random Donor Platelets (RDP) in various aspects [2]. Apheresis has an adverse effect on donor haematopoiesis with short term and long-term effects like anaemia, thrombocytopenia, lymphocytopenia [3]. Platelet donors can help more patients by donating more units during each donation. Apheresis collections are optimized based on donor/receiver blood types. Through apheresis blood transfusion it reduced infectious complications, transfusion reactions, reduced transfusion frequency, ease of leukodepletion, prevention of all immunization, enhancement of platelet quality and elimination of the need to pool WBDP (Whole blood derived platelets) in transfusion services. The first FDA (Food and Drug Administration guideline on Plateletpheresis, in 1983 limited the number of procedures to 12 in a year with no more than two times in a week and minimum interval between two procedures must be 48 hours. But, in 1988, the FDA revised the upper limit to 24 procedures in a year. With blood centers collecting double dose and a triple dose of platelets to meet the demand, FDA issued draft guidance to limit the number of platelet components to be collected in a year to 24 rather than 24 procedures [4]. The effects of apheresis donation on donor haematological parameters have been studied more in the west through many studies. There remains a conflicting picture on the effect of platelet apheresis on the donor with some studies concluding even repeated platelet apheresis is safe with no significant adverse effects [5] and some reporting significant effect on haematopoiesis [6]. In Bangladesh, very few studies had been conducted regarding the profiling of apheresis platelet donors and receivers. For this reason, the main objective of this study was settled to analyze the profile of apheresis platelet donors and receivers.

II. OBJECTIVES

The general objective of this study was to analyze the profile of apheresis platelet donors and receivers.

III. METHODOLOGY & MATERIALS

This was a prospective observational study which was conducted in the Department of Transfusion Medicine, National Institute of Cancer Research Institute and Hospital (NICRH), Mohakhali, Dhaka, Bangladesh during the period from January 2018 to December 2019. In total 210 platelet donors and 210 platelet receivers through apheresis procedure were enrolled as the study population. The ethical committee of the mentioned hospital approved the study. Properly written consent was taken from all the participants before starting data collection. Donors, as well as receivers, were subjected to clinical examination. Hemoglobin was measured by Haemocue. The blood pressure and pulse rate of both the donors and receivers were recorded. A blood sample from the donor was sent for platelet count estimation by cell counter to haematology laboratory of the mentioned hospital. Blood grouping and Rh (Rhesus) typing was done. Screening for Transfusion Transmissible Infections on the donors and on the product was done using Chemiluminescence Immunoassay. According to the exclusion criteria of this study, severely ill patients and pregnant women were excluded. For data collection, a pre-designed questionnaire was used. All data were processed, analyzed, and disseminated by MS Office and SPSS version 20 as per need.

IV. RESULT

In this study, the majority of the donors were from the 18-30 years' age group which was 81% (n=170). Besides this, 18% (n=37) donors were from the 31-40 years' age group, and the rest 1% (n=3) donors were from 41-50 years. No one donor was from >50 years' age group. The mean age of the donor was 26.62 ± 5.86 years. In analyzing the gender of the donors, we observed only one donor was female (0.5%) whereas near about 100 percent (95.5%) donors were male which was 209 in number. In this study, platelet count below 2 lacs, above 2 lacs, above 3 lacs, and above 4 lacs in 10%, 72.4%, 16.7%, and 1% donors respectively. In the platelet apheresis procedure, 14% of donors faced tingling sensation was found as a side effect. For 100% donors, it was a single donation. On the other hand, in this study, the majority of the receivers were from the 0-20 years' age group which was 54% (n=112). Besides this, 25%, 18%, and 3% donors were from 21-40, 41-60, and 61-80 years' age groups respectively. The mean age of the receivers was 26.94 ± 15.55 years. In analyzing the gender of the receivers, we observed, 69% of receivers were male whereas the rest 31% were female. In this study, as platelet count of receivers, we found <10,000/lac, 10,000-30,000/lac and 30,001-50,000/lac platelets among 15.7%, 61.9% and 22.4% receivers respectively. The majority of the receivers were with AML which was found among 68%. Besides this, ALL and Ca lung were found among 9.5% and 11.9% receivers which were noticeable. As a total number of apheresis single number was found in 13% and multiple numbers were found in 36% of receivers. In 82% of receivers, history of chemotherapy and in 18% of receiver's history of chemotherapy as well as radiotherapy were found.

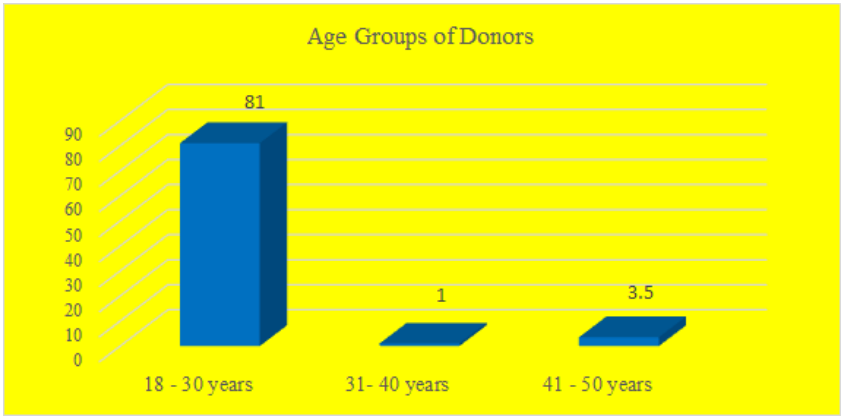

Figure AI: Age distribution of donors (N=210)

Table AI: Gender distribution of donors (N=210)

Gender	n	%
Male	209	99.5
Female	1	0.5
Total	210	100.0

Table AII: General features of donors (N=210)

Variables	n	%
Platelet count		
Bellow 2 lacs	21	10.0
Above 2 lacs	152	72.4
Above 3 lacs	35	16.6
Above 4 lacs	2	1.0
Side effects		
Tingling sensation	30	14.3
Nausea-vomiting	1	0.5
Hypotension	1	0.5
Numbers of donation		
Single Donation	210	100.0
Multiple Donation	0	0.0

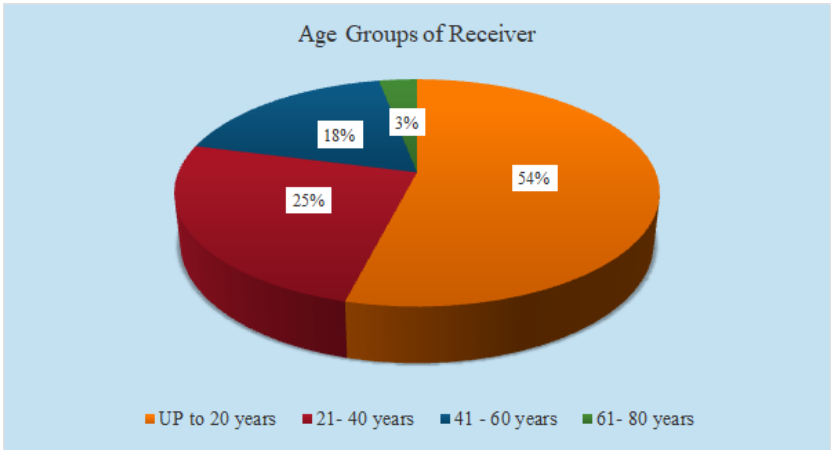

Figure BI: Age distribution of receivers (N=210)

Table BI: Gender distribution of receivers (N=210)

Variables	n	%
Male	144	68.6
Female	66	31.4
Total	210	100.0

Table BII: General features of receivers (N=210)

Variables	n	%
Platelet count		
<10,000/lac	33	15.7
10,000-30,000/lac	130	61.9
30,001-50,000/lac	47	22.4
Patient diagnosis		
AML	143	68.1
ALL	20	9.5
Myeloproliferative syndrome	2	1.0
Ca lung	25	11.9
Ca Breast	7	3.3
Ca Stomach	3	1.4
Ca Colon	5	2.4
Other Cancer	5	2.4
Total number of apheresis		
Single number	28	13.3
Multiple numbers	75	35.7
History of radiotherapy & Chemotherapy		
Chemotherapy	172	81.9
Chemotherapy & Radiotherapy	38	18.1

V. DISCUSSION

The aim of this study was to analyze the profile of apheresis platelet donors and receivers. In our study, the majority of the donors were from the 18-30 years' age group which was 81% (n=170). No one donor was from >50 years' age group. So as per these findings, we can claim that younger people play a vital role in blood donation in Bangladesh. Donors in the 26-34 years of age constituted most of the donations (46.8%), with individuals in the 18-34 years of age contributing 69.6%, as compared to 45.2% for the 18-39 years' age-group in the USA for example [7]. Moreover, older people over 44 years of age contributed only 7.9% as compared to 54.8% for over 40 years of age in the USA.7 This directs that in the western world age affects blood donor and donation rates also. In analyzing the gender of the donors of this current study, we observed only one donor was female (0.5%) whereas near about 100 percent (95.5%) donors were male which was 209 in number. These findings were similar to that of many other studies conducted in several regions of the globe. Women are usually underrepresented and donate blood less than men [8, 9], this difference is particularly marked in this study with women contributing only 1.8% of the total donations. May be attributed to the lack of accommodation facilities at the donation suites, in addition to other social factors and beliefs, such as the fear of becoming anemic, the poor rate of female donation in this study [10]. In this study, as platelet count below 2 lacs, above 2 lacs, above 3 lacs, and above 4 lacs in 10%, 72.4%, 16.7%, and 1% donors respectively. So, in the majority of our donors, the platelet count was found >2 lacs. In the platelet apheresis procedure 14% of donors faced tingling sensation was found as a side effect. In several studies, nausea-vomiting and headache were found as common complications. In this study, the majority of the receivers were from the 0-20 years' age group which was 54% (n=112). The mean age of the receivers was 26.94 ± 15.55 years. In analyzing the gender of the receivers, we observed, 69% of receivers were male whereas the rest 31% were female. In this study, as platelet count of receivers, we found <10,000/lac, 10,000-30,000/lac and 30,001-50,000/lac platelets among 15.7%, 61.9% and 22.4% receivers respectively. As a total number of apheresis single number was found in 13% and multiple numbers was found in 36% of receivers. In 82% receivers, history of chemotherapy and in 18% receivers, history of chemotherapy as well as radiotherapy were found. All these findings may be helpful in further similar studies.

VI. LIMITATIONS OF THE STUDY

This was a single centered study with limited sample. Due to limited sample size, the findings of this study may not reflect the exact scenario of the whole country.

VII. CONCLUSION AND RECOMMENDATIONS

In Bangladesh basically, males are the prominent part of platelet donation through apheresis procedure. Although young males play a vital role in apheresis platelet donation, younger children and adolescents are the basic receivers here. But a large number of healthy young women as a potential blood donor is still out of platelet donation procedure in Bangladesh. Necessary motivational education could make them interested as platelet donors in the mainstream blood transmission system in near future. These types of study findings of profile analyzing of platelet donors and receivers could indicate the present scenario as well as the future pathway of platelet apheresis blood donation in Bangladesh. For getting

more reliable information we would like to recommend conducting more studies in several places with larger-sized samples.

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