Analysis of causes and frequency of donor deferral along with adverse donor reactions among plateletpheresis donors- A multicenter study

Authors:
Parvin F1, Naznin B2, Afroz T3, D A Biswas4, M Ali5, Dipta TF6, Afrose S7

1Assistant Professor, Transfusion Medicine and Clinical Hematology Department, BIRDEM General Hospital and Ibrahim Medical College, Dhaka, Bangladesh.
2Junior consultant, Transfusion Medicine Department, Asgar Ali Hospital, Dhaka, Bangladesh.
3Registrar, Transfusion Medicine Department, Apollo Hospitals, Dhaka, Bangladesh.
4Associate Professor, Department of Transfusion Medicine, Sir Salimullah Medical College & Mitford Hospital, Dhaka, Bangladesh.
5Assistant Professor, Department of Surgery, Shahid Syed Nazrul Islam Medical College, Kishoreganj, Bangladesh.
6Professor and Head, Transfusion Medicine and Clinical Hematology Department, BIRDEM General Hospital and Ibrahim Medical College, Dhaka, Bangladesh.
7Professor and Honorary Senior Consultant, Transfusion Medicine and Clinical Hematology Department, BIRDEM General Hospital and Ibrahim Medical College, Dhaka, Bangladesh.

*Corresponding Author:
*Parvin F,
* Assistant Professor, Transfusion Medicine and Clinical Hematology Department, BIRDEM General Hospital and Ibrahim Medical College, Dhaka, Bangladesh.
E-mail: dr.farida1984@gmail.com

Abstract:
Maintaining Background: Plateletpheresis is the process in which healthy donor blood is passed through an apparatus that separates out platelets and returns the remainders to the circulation. As the demand of platelet component is increasing day by day, Transfusion Medicine Department plays an important role to ensure the supply of safe blood when required.
Aim: To determine the causes and frequency of donor deferral along with adverse reactions during plateletpheresis.

Materials and Methods: This study was carried out in Transfusion Medicine Department of BIRDEM, Apollo Hospital (Dhaka) and Asgar Ali Hospitals at Dhaka during the period of January 2017 to December 2017. The Apheretic donor of either sex attending the mentioned department were selected and deferred by physician according to Standard Operating Procedure (SOP) of our hospital protocol. The data of deferred plateletpheresis donor were recorded in register book hand and analyzed retrospectively.

Results: Total 1191 plateletpheresis donor were screened during this study period from which 148 (12.42%) were deferred due to various reasons and the majority of donor (93.9%) were deferred temporarily. The major cause of donor deferral were poor venous access (27.7%, mostly in females), low platelet count (16.2%) and use of drug (most commonly analgesic) 11.4%. Out of 1043 performed plateletpheresis procedure, 23 (2.20%) had some types of adverse reaction which were mostly of mild intensity.

Conclusion: Continued efforts towards providing the superior training modules for technical personnel and superintendence of Transfusion Specialist reduce the donor deferral. Donor safety in addition with recruitment of new donor can be assured by decreasing the adverse reaction rates.

Keywords: Donor, adverse reaction, deferral, plateletpheresis.

Introduction:

The efficiency of blood transfusion therapy can be achieved by rational use of blood or blood products. For fulfilling the sufficient supply of blood components, proper donor selection is an essential step as donors are only source. Apheresis is an automated blood cell separation system in which draw of blood from donor or patient, separation and removal of cellular components or plasma and return of the remaining blood constituents. Plateletpheresis is the process of collecting platelets from a healthy donor by being passed through an apparatus. Routinely the number of aphaeretic platelet or Single Donor Platelet (SDP) is equivalent to 6-10 Random Donor Platelet (RDP) and contains at least 300x10^9/L platelet. Platelet can be used both therapeutically or prophylactically and patients with thrombocytopenia or platelet functional defects are mainly benefited by this component. Therapeutically platelet should be transfused when <50x10^9/L platelet count in presence of diffuse microvascular bleeding and prophylactically platelet is given both for prevention of bleeding and to stop active bleeding. The main aim of current study was to determine the causes and frequency of donor deferral along with adverse reactions during plateletpheresis.

Materials and Methods:
9. Donation interval (14 days between two plateletpheresis and 56 days from last whole blood donation)

10. No consumption of NSAIDs for last 48 hours, aspirin for 5 days and antibiotics for 14 days.

11. Negative test for Human Immunodeficiency Virus (HIV), Hepatitis B virus, Hepatitis C virus, Syphilis and Malaria

After preliminary selection of donor, their blood samples were tested for CBC (Complete blood count to see mainly Hb, Hct and platelet count) and TTI (HBsAg, Anti HCV, Human Immunodeficiency Virus (HIV 1 & 2), Syphilis and Malaria) by Rapid Immunochromatographic test. If any test report of CBC or TTI was unusual, donor was counseled properly and referred to respective department for further evaluation and management. Plateletpheresis procedure were performed by Hemonetics (MCS+), Spectra Optia, Trima Accel and Cobe Spectra with both continuous and intermittent flow. Calculations were done by using Ms Excel 2007.

Results:

In current study, Total 1191 plateletpheresis donor were screened during this study period from which 148 (12.42%) were deferred due to various reasons and among the deferred donors 100 (67.56%) were male and 48 (32.44%) were female as shown in Figure 1.

The deferred apheretic blood donor were classified into temporary and permanent and number of temporary and permanent deferral were 139 (93.9%) and 9 (6.1%) respectively as shown in Figure 2. In this study most of the deferred donors 79 (53.37%) were between 26-35 years of age as shown in Figure 3.

The major causes of temporary donor deferral were poor venous access (27.7%, mostly in females), low platelet count (16.2%) and use of drug (most commonly analgesic in 11.4% cases) and the least common cause was non matching blood group (2.1%) of donor with blood recipient as shown in Table 1. In our present study the most common cause of permanent deferral was seropositivity of Hepatitis B as shown in Table 2. Out of 1043 performed plateletpheresis procedure, 23 (2.20%) had some types of adverse reaction which were mostly of mild intensity as shown in Figure 4. Ten of them (0.95%) had nausea & vomiting i.e. vasovagal reaction of mild intensity, eight (0.78%) of them had tingling sensation in perioral area i.e. mild hypocalcemic feature and five (0.47%) of them had haematoma & swelling at venipuncture site i.e. local reaction.

Figure 1: Distribution of donor deferral according to sex (n=148)
**Figure 2: Types of donor deferral (n =148)**

**Figure 3: Distribution of deferred donor according to age group (n=148).**

**Table 1: Causes of temporary deferral of donor**

<table>
<thead>
<tr>
<th>Causes</th>
<th>Number</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor venous access</td>
<td>41</td>
<td>27.70%</td>
</tr>
<tr>
<td>Low platelet count</td>
<td>24</td>
<td>16.20%</td>
</tr>
<tr>
<td>Drugs (on NSAIDs, Antibiotics)</td>
<td>17</td>
<td>11.40%</td>
</tr>
<tr>
<td>Underweight (&lt;50kg)</td>
<td>15</td>
<td>10.10%</td>
</tr>
<tr>
<td>Abnormal blood pressure (Hyper/Hypotension)</td>
<td>13</td>
<td>8.70%</td>
</tr>
<tr>
<td>Causes</td>
<td>Number</td>
<td>Percentages (%)</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Low Hb ( &lt;12.5gm/dl)</td>
<td>11</td>
<td>7.40%</td>
</tr>
<tr>
<td>Skin allergy</td>
<td>6</td>
<td>4.30%</td>
</tr>
<tr>
<td>H/O Recent vaccination</td>
<td>5</td>
<td>3.30%</td>
</tr>
<tr>
<td>High Hb &amp; Hct</td>
<td>4</td>
<td>2.70%</td>
</tr>
<tr>
<td>Non matching blood group</td>
<td>3</td>
<td>2.10%</td>
</tr>
<tr>
<td>Total</td>
<td>139</td>
<td>93.90%</td>
</tr>
</tbody>
</table>

**Table 2:** Causes of permanent deferral of donor

<table>
<thead>
<tr>
<th>Causes</th>
<th>Number</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B Positive</td>
<td>7</td>
<td>4.7%</td>
</tr>
<tr>
<td>Syphilis Positive</td>
<td>2</td>
<td>1.4%</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

**Discussion:**

Donor deferral process before blood donation is an essential step to protect the blood recipient from transfusion associated complication and also to escape the following negative impact on donor motivation. Donor deferral may differ from region to region and one center to another. In our study, apheretic donor deferral rate was about 12.42% due to various reasons. The lowest deferral rate was observed by Pandey et al (10.6%) which is comparable with our study. The higher incidence of donor deferral was observed by some studies conducted by Vujhini et al., Seema et al., Pujani et al., and Tondon et al. which was between 18.02-28.03%. However the highest rate (44.2%) of donor deferral was reported in a study done by Syal et al.
Most of the deferred donors in present study were between the age of 18-35 years of age (81.74%) which was similar to the study done by Arora et al., Vujhini et al., Pujani et al. and Syal et al.

In this study we observed majority of the donors (93.9%) were deferred for temporary reasons which is comparable with the study conducted by Arora et al. (93.28%) and Seema et al. (89.65%). Mehmet et al. observed that the main reason of donor deferral was inappropriate venous access (25.7%) which is also comparable with our study (27.7%). As we know that donor should have suitable venous access (firm, large and palpable) on both hands to maintain return blood flow at least 70-80ml/min during plateletpheresis procedure. The second common deferral reason of apheresic donor in our study was low platelet count (16.2%) which was comparable with the study observed by Kusumgar et al. (21%), Vujhini, Seema and Pujani et al. reported that low platelet count was the first reason of donor deferral with higher percentage in their study which were 31.61%, 44.82% and 43.5% respectively. These findings are not similar with our study as because findings are varied country to country or region to region. In our study, we observed the third common cause of donor deferral was recent use of drugs (11.4%) like NSAIDs or antibiotics which was more comparable with the study done by Mehmet et al. (14.7%). The most common reason of permanent deferral of donor was Hepatitis B positivity and this finding is concurrent with other studies done by Arora, Seema and Pujani et al. 2.2% of apheresic donor had some mild type of adverse reactions in current study which was more similar with the study done by Philip et al (2.6%). This low incidence of our study is also concurrent with some studies done by Arora et al. (4.36%), Bonagiri Shanthi et al. (4.06%) and Khajuria et al. (6.06%) which indicates that plateletpheresis procedure is well tolerated by donor. The frequency of adverse reaction was lowest in the study conducted by Crocco et al. (0.68%) where the highest frequency was reported by Patidar et al. (18%).

Conclusion:

As the demand of apheretic platelet is increasing day by day in routine medical and surgical practice, selection criteria of plateletpheresis donor should be remodeled. In current study, temporary donor deferral was more and for this appropriate education, counseling and assurance of donor can play an integral role to retain new donor. Continued efforts towards providing the superior training modules for technical personnel and superintendence of Transfusion Specialist reduce the donor deferral. Donor safety in addition with recruitment of new donor can be assured by decreasing the adverse reaction rates.

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