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Original Research Article.

Blood Donation and Adverse Events: A Retrospective Study

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ABSTRACT

Introduction: Blood transfusion services are vital and aim to provide blood and blood products which are safe, readily available and adequate to meet the need of the patient. Aim of study is to estimate the frequency, type of adverse reactions and interventions that can be taken to reduce this frequency.

Materials and Methods: The present study was conducted over duration of 12 months (January 2017 to December 2017). This study comprises of 6500 blood donations in which 6250 were male and 250 were female donors. 4680 were voluntary donors and 1820 were replacement donors. Overall, 3473 whole blood donations, 2983 component donations, and 44 plateletpheresis donations were considered.

Results: Only 43 had some adverse events. Out of these, 15 had vasovagal reaction followed by nausea and vomiting comprising 11 donors. Some less common reactions were hematoma and nerve injury. As compared to whole blood donation there are less adverse events in cases of plateletpheresis.

Conclusion: Only few donors suffered any adverse event but methods should be employed to reduce risks with the help of maximum safety measures.

Keywords: Blood Donation, Blood Donors, Adverse Events.

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INTRODUCTION

Transfusion of blood has become an essential component of modern health care which helps in saving millions of lives every year. Blood transfusion services are vital and aim to provide blood and blood products which are safe, readily available and adequate to meet the need of the patient.[1] Transfusion of blood is a technology that blends science with philosophy and technique with philanthropy. The collection, processing and use have always been technical but its availability always depends on generosity of a donor. A proper donor selection is essential before any donation. According to WHO guidelines, proper donor selection is made as per screening protocol and an informed consent is taken from the donor. Generally, incidence of any untoward event encountered by the donor is less and donors undergo donation process well but untoward events of varying seriousness may occur during or towards the end of blood collection.[2]

Adverse reactions can be classified into local and systemic. Most common local reaction is hematoma formation at venepuncture site which usually resolves on its own but may sometimes need application of pressure.[2] Most common systemic reaction is vasovagal syncope which may be initiated by the sight of blood, venepuncture pain, etc which in most extreme cases may cause cardiac arrest if donor does not undergo proper care.[3,4] During apheresis, systemic reactions can occur as it uses anticoagulants such as acid-citrate-dextrose (ACD) which can cause varying degree of hypocalcaemia. Mild degree of hypocalcemia may cause paraesthesia of lips, oral cavity and limbs. Severe hypocalcemia symptoms may include tremors, muscle spasms, tachycardia, arrhythmia, convulsions and tetany.[5,6]

The aim of our study is to estimate the frequency and type of adverse reactions and time taken for recovery of donor to a healthy state. This can help to enhance interventional quality and also reduce the intensity and frequency of adverse reactions.

MATERIALS AND METHODS

The present study was conducted on blood donors who presented to the Blood Bank of Teerthanker Mahaveer Hospital & Research Centre, Moradabad over duration of 12 months (January 2017 to December 2017). Blood collection was done in blood donation camps and in-house donations. The donors' age ranges from 18 years to 58 years. The donors were selected in accordance with

established guidelines laid down by Drugs & Cosmetics Act by NABH, New Delhi, India.[7] These donors were observed during the entire course of blood donation for any adverse reactions. Donations were done using 16G needle and from antecubital vein. Apheresis was performed using Fresenius Kabi COM.TEC apheresis machine using double or single needle closed system kit (Fresenius Kabi AG, Bad Homburg, Germany). The study was undertaken to evaluate frequency of adverse events in blood donations.

Table 1: Patient's Data

Socio-Demographic Data	Reactions	No Reactions
Total	43	
Male	41	6209
Female	2	248
Age		
<30 Years	32	3528
>30 Years	11	2929
Weight		
<70 Kg	30	3520
>70 Kg	13	2937

Table 2: Reactions

	n	%
Whole Blood		
Vasovagal Reaction	15	34.88
Nausea, Vomitting	11	25.6
Minor Syncopal Reaction	8	18.6
Haematoma	4	9.3
Arterial Puncture	0	0
Nerve Injury	1	2.3
Apheresis		
Citrate Toxicity	3	6.97
Vasovagal Reaction	1	2.3
Needle Puncture	1	2.3

RESULTS

This study comprises of 6500 blood donations. Out of the total blood donations, 6250(96.2%) were male and 250(3.8%) were female donors. Of the total 6500 donations, 4680 (72%) were voluntary donors comprising of 4500 males and 180 females. Only 1820 (28%) were replacement donors comprising of 1750 males and 70 female donors.

The occurrence of various adverse donor reactions was 43/6500 (0.66%). These reactions were higher among donors <30 years which was 0.9% (p value <0.05) and donors with weight <70 kg had reactions 0.85% (p value <0.05) in comparison to donors ≥30 years (0.4%) & weighing ≥70 kg (0.44%) respectively.

This can further be characterised into 3473 (53.43%) whole blood donations, 2983 (45.89%) component donations, and 44(0.68%) plateletpheresis donations. The maximum reactions occurred during or after whole blood donations in comparison to blood component donations. Thus it can be postulated that both periodic donors and first-time donors were willing to give whole blood whereas plasma component donations were almost always done by periodic donors. Out of the total blood donations, 43 had some adverse events. Out of these, 15(34.88%) had vasovagal reaction. The second most commonly seen adverse event was found to be nausea and vomiting comprising 11 (25.6%) donors followed by minor syncope (18.6%).Some less common reactions were hematoma (9.3%) and nerve injury (2.3%). There was only one case in which donor had severe vasovagal reaction which responded quickly to the treatment. Arterial prick, seizures and cardiac arrest were not recorded. As compared to whole blood donation there are less adverse events in cases of plateletpheresis. In our set up the most common adverse event was citrate toxicity which was of mild intensity (6.97%). Some less common events were needle puncture and mild intensity vasovagal reaction.

DISCUSSION AND CONCLUSION

It is the responsibility of the blood bank to fulfil the blood requirement of the community as well as ensuring safety of the blood donors. The donor's return rate depends on the experience they had during blood donation.[8] Our study shows that 0.66% of all donations (whole blood, plateletpheresis and multicomponent donations) had adverse donor reaction. Our study shows lesser adverse events incidence (0.66%) in comparison to research by Agnihotri N. et al which showed an incidence of 2.5%.[9] A study conducted in Bangladesh showed higher adverse events rate which was 4.9%.[10] This difference may be due to the different age groups and the type of blood donors (voluntary v/s replacement donors) evaluated in these studies. Regular voluntary donors usually have less incidence and severity of these adverse events.

In our set up most of the donor reactions are vasovagal reactions (37%). Earlier some Indian studies reported vasovagal reactions to be 63.5% and 70.0%, which are higher when compared to our study.[9,11] This vasovagal reaction which is related to blood donors is multifactorial response mainly occurring to first-time donors, other related factors being younger age group, underweight& females.[12-14] Some studies have shown a lower incidence of vasovagal syncope in donors aged ≥ 30 years.[9] Our study shows the maximum cases of such events in <30 years age group. A study which was conducted in France postulated that young people who are vasovagal reactors exhibit decreased baroreceptor sensitivity under psychological or physical stress.[15] With advancing age, body tends to become more stable hemodynamically. The vasovagal reaction was managed by loosening the tight clothing's thus maintaining adequate airway and elevating both legs. In some of the cases cold compressions were also given. In only 1 case administration of corticosteroid was required and in most cases recovery occurred within 15-20 minutes of fluid supplementation.

The second most commonly seen adverse response was nausea and vomiting. Minor syncope reaction was the next common donor reaction in our set up which was common during or just immediately after donation. These were managed by putting the patient in trendelenburg position and maintaining proper airway. Infusion of colloids and crystalloids was rarely required.

Needle injuries can occur which might lead to skin contusions, hematoma formation, and arterial puncture or in severe cases, even pseudoaneurysm. Needle prick injuries were only 2%, which is considered to be in agreement with a prior study which has been conducted in Bangladesh.[10] However, Newman et al,[16] showed higher frequencies of skin contusions in 15.1% of donors whereas Agnihotri et al,[9] found hematoma formation as

the main unfortunate reaction (35%) of all adverse events. This can occur due to faulty techniques, untrained phlebotomists and improper selection of the vein from which blood donation is being considered.[9] Management of hematoma was done in our setup by cold compresses and reassuring the donors. It is a known fact that venepuncture associated nerve injuries can occur in 1 of every 6300 donations.[16] A single case of needle injury was reported in our study. There have not been any serious fatal adverse events in our study. In apheresis related donor reactions, most common reaction was citrate toxicity which was of mild intensity with slight tingling and numbness along with circumoral paraesthesia. The treatment to be given is slow re-infusion of citrate to allow for dilution, increasing the blood: citrate levels of the donor thus decreasing amount of citrate infused, giving supplements of oral calcium, and intravenous calcium if required. Bolan et al. examined oral calcium supplement administration& its consequence on citrate toxicity.[17] In our study, we gave 1gm of calcium tablets to the donor. The administration of intravenous calcium is usually not necessary and thus is not studied in our setting. In our study, we have not encountered any kind of adverse event related to severe citrate toxicity.

Hypovolemic and vasovagal reactions can also occur in cases of apheresis. For these events, the procedure has to be temporarily stopped and infusion of fluid should be resumed. Depending on why the reaction has occurred there will be change in blood pressure and pulse rate. In case of hypovolemia, there is rise in blood pressure and lowered pulse rate in response and this change is not seen in cases of vasovagal events. The treatment given is same as that given to whole blood donors.

In our setup female donors were more vulnerable to adverse donor events most common events being fainting and vasovagal attack. Incidence was also more common in cases of 1st time donors as compared to repeated donors. The weight of the donor was also found to be one of the significant factors leading to adverse reactions. One study found an inverse relationship between donor weight and adverse donor.[9]

Thus our study found that the incidence of adverse events related to blood donation wasn't very high. To reduce adverse reactions & encourage donors to voluntarily donate blood, we should try following these strategies. This includes reducing the donor-to-phlebotomist ratio, proper counselling prior to donation, encouraging fluid intake prior to phlebotomy and providing donors necessary information regarding blood donation.[18]

Although number of donors who suffered from any adverse event was found to be very less it is always necessary to seek methods to reduce risks with the help of maximum safety measures as well as competent medical assistance.

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