

Original Research Article

Study of blood donor complications after whole blood donation in our center

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ABSTRACT

Background: Despite the advent of many synthetic and semi-synthetic products, the importance of biological blood products cannot be undermined in the current era. The blood donors are the backbone of any health care delivery system that has a well-organized blood transfusion service.

Methods: A prospective study conducted for the period of 16 months aimed to find out various complications and their frequencies before, during or after the blood donations. The donors who developed any complications were followed up for at least three weeks to assess the late reactions if any. Blood donation was carried out with proper precautions and asepsis by experienced phlebotomists.

Results: Out of 10346 blood donations, 9887 were from replacement donors, while 459 were from voluntary donors. Total donation associated complications were 113, out of which the majority were VVRs (n=74), followed by venous hematomas (n=34) and arterial punctures (n=5). Of the 74 donors who had a VVR after blood donation, the incidence was higher in females (1.64% versus 0.69%). A higher incidence of VVRs was seen among the donors who had a history of previous blood donation.

Conclusions: This study strengthened the fact that though blood donation is relatively safe, it still has a complication rate of nearly 1%. To encourage for blood donation at a regular interval, all the possible steps should be taken to minimize the rate of complications. More medical attention should be given to the “at-risk” donors.

Keywords: Blood donors, VVRs, Hematoma, Arterial puncture

INTRODUCTION

Blood, being a special connective tissue, has a variety of functions and plays a vital role in managing the patient within healthcare systems.¹ Real progress of blood transfusion was made after 1616 when William Harvey described blood circulation throughout the body, and medical practitioners tried numerous substances such as beer, milk, urine, ship blood, and plant resin afterward. Despite the advent of synthetic and semi-synthetic products in the current era, the importance of biological

blood products cannot be undermined.² Blood products have a potential role in resuscitation in trauma patients and have been a cornerstone in treating massive hemorrhagic shock.³

Blood donors are the backbone of any healthcare delivery system with a well-organized blood transfusion service. According to World Health Organization (WHO), based on the samples of 1000 people, the blood donation rate in high-income, upper-middle, lower-middle, low-income countries are 31.5, 15.9, 6.8, 5.0, respectively.⁴

Though blood donation is relatively safe, studies have shown the increasing occurrence of adverse reactions to whole blood donation, and these complications are an important reason for decreasing likelihood of becoming a repeat donor.^{2,5,6,7,8} This emphasizes the need to look for the factors influencing them and the frequency of the complications to be minimized.²

The majority of the complications associated with blood donations are constituted by the Vasovagal reactions (VVR), which refers to the development of any of the following symptoms, such as dizziness, weakness, apprehension, diaphoresis, pallor, bradycardia, and hypotension during or shortly after blood donation. Other complications include arterial puncture, local nerve injury (irritation), fatigue, sore arm, bruise, or hematoma. Many factors are associated with these complications, such as age, sex, weight, the height of the donor, type of blood donation, history of blood donation, etc.^{9,10}

The present study was conducted to find various complications, frequency, and possible association with the above-mentioned factors associated with blood donation in our institutional blood bank.

METHODS

A prospective study approved by Institutional Ethics Committee was conducted at Dr R.N Cooper hospital for 16 months, from September 2017 to December 2018. The study aimed to determine various complications and their frequencies before, during, or after the blood donations. The recorded details were as follows: age, sex, body mass index (BMI), history of previous donation and complications, blood groups, type of donations (voluntary, replacement), amount of blood donated, and consent for the study. The donors who developed any complications were followed up for at least three weeks to assess the late reactions if any.

The donors having age ranges from 18 to 60 years, weight more than 45 kg, no history of any infectious diseases, chronic illness, drug usage, had taken food in the last 4 hours, pulse rate in the range of 60-100, systolic blood pressure in the range of 90-140 mm Hg and diastolic blood pressure in the range of 60-100 mm Hg, normal body

temperature, and willing to give the consent were included in the study.

The donors who experienced VVR in previous blood donation, not willing to give consent, history of any infectious diseases, chronic illness, drug usage, not meeting the inclusion criteria were excluded from the study.

Blood donation was carried out with proper precautions and asepsis by experienced phlebotomists.

Statistical analysis was performed by IMB statistical package for social sciences (SPSS) version 20 software. Cross tabulation and frequency distribution was performed to prepare the tables. Quantitative data were expressed as mean and standard deviation whereas categorical data was expressed as number and percentage. Means and standard deviation were compared using paired t test whereas chi square test was used to compare the percentage. Level of significance was assessed at 5%.

RESULTS

Out of 10346 blood donations, 9887 were from replacement donors, while 459 were from voluntary donors. Total donation associated complications were 113, out of which the majority were VVRs (n=74), followed by venous hematomas (n=34) and arterial punctures (n=5). Of the 74 donors who had a VVR after blood donation, the incidence was higher in females (1.64% versus 0.69%). However, this gender predilection was not statistically significant (p=0.665).

Sixty-nine of the total VVRs occurred in replacement donors, and five in a voluntary donor. Though the incidence was higher in the replacement donors, this was not statistically significant (p= 0.162). A higher incidence of VVRs was seen among the donors who had a history of previous blood donation. The majority of the cases of VVRs were mild. In replacement donors, the cases of mild and moderate VVRs were 69 and 1, respectively. Mild VVRs were also noted in 4 voluntary donors. None of the donors developed severe VVRs. Table 2 shows the signs and symptoms of the VVRs experienced by the donor.

Table 1: Characteristics of the donors and frequency of VVRs and Hematomas.

Characteristics of donors		Frequency of Vasovagal reflexes	Frequency of Venous Hematomas	Total Donors
Sex distribution	Males	70	31	10103
	Females	4	3	243
Type of donor	Voluntary	5	5	459
	Replacement	69	29	9887
History of previous donation	Yes	18	26	2213
	No	56	8	8133

Table 3 shows the mean systolic and diastolic blood pressure of the donors before and after VVRs. We observed a fall in systolic and diastolic blood pressure of the donors. The heart rate was also decreased, shown in Figure 2.

Table 2: Frequency of signs and symptoms of VVRs experienced by the donors.

Signs/symptoms of vasovagal reflexes	Frequency (n)
Weakness	129
Dizziness	90
Sweating	75
Headache	52
Nausea	40
Vomiting	9
Loss of consciousness	6
Tingling	4
Convulsions	0

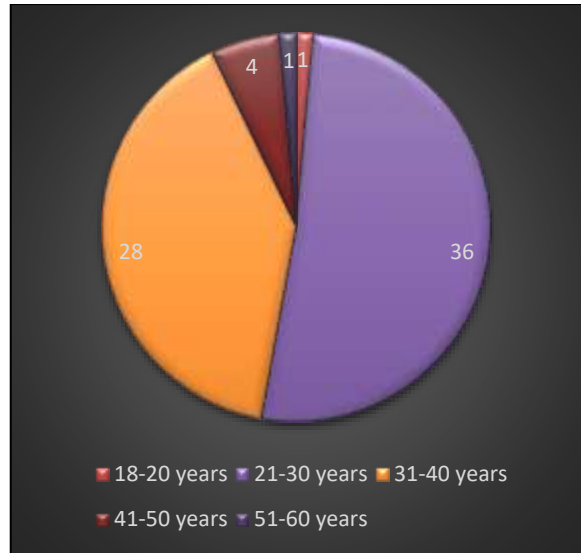


Figure 1: Frequency of vasovagal reflexes.

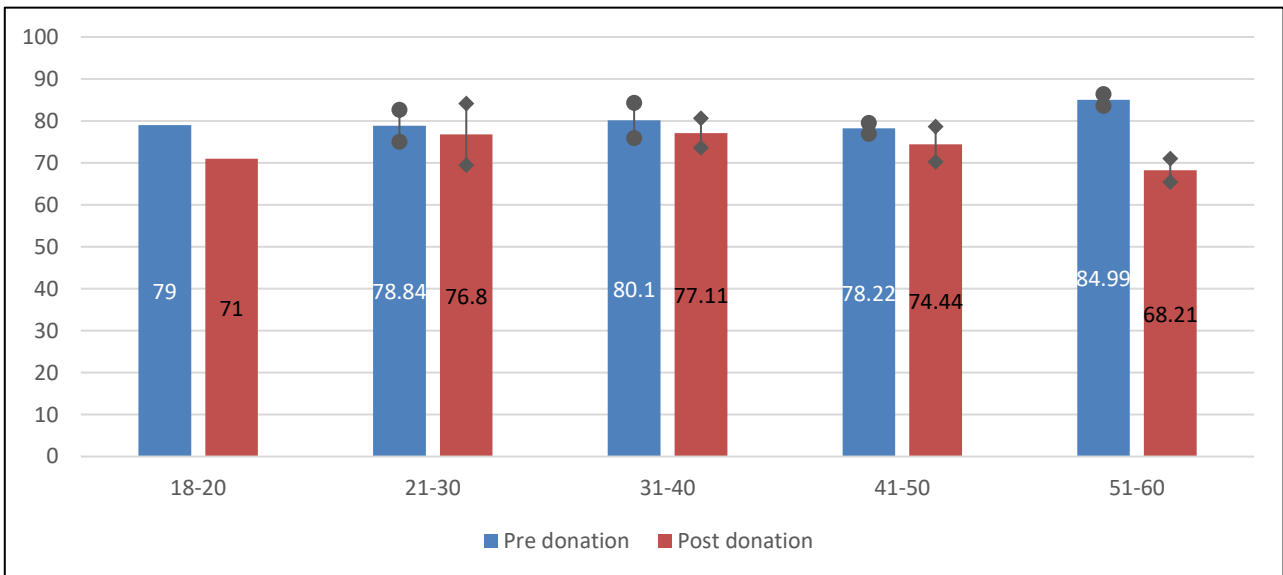


Figure 2: Mean±SD heart rate observed in pre donation and post donation.

Table 3: Mean SBP and DBP of the donors before and after VVRs.

Age (years)	Mean SBP (mm of Hg)			Mean DBP (mm of Hg)		
	Pre-donation	Post-donation	P-value	Pre-donation	Post-donation	P-value
18-20	122	118	0.552	80	78	0.446
21-30	123.50 (SD=5.25)	118.74 (SD=7.67)	0.0021	80.6 (SD=6.15)	76.6 (SD=6.50)	0.034
31-40	125.03 (SD=10.50)	116.79 (SD=8.38)	0.003	79.20 (SD=6.40)	72.75 (SD=5.40)	0.022
41-50	134.44 (SD=13.40)	118.90 (SD=15.90)	0.002	83.98 (SD=14.88)	77.1 (SD=9.21)	0.001
51-60	134.70 (SD=4.20)	120.89 (SD=7.77)	0.001	86.99 (SD=1.51)	70.11 (SD=2.77)	0.012

A total of 34 donors developed hematoma during/after blood donation, of which 10 donors had to undergo repeat phlebotomy. Table 1 shows the frequency and distribution of donors based on their various characteristics, which developed hematomas. The incidence of hematoma was higher in female donors compared to male donors. A higher incidence of hematoma was also seen in voluntary donors as compared to replacement donors.

Neurological deficits were not seen in any of the donors due to inadvertent neural damage, and no deaths were reported in the study related to blood donation. All the donors were followed up for 3 weeks, who developed any of the above-mentioned complications.

DISCUSSION

Our tertiary care hospital has over one hundred twenty thousand admissions per year. This high patient load, in turn, has increased the demand for blood products. In our well-equipped facility for blood donation, the average number of blood donations range from 30-80 donations per day. The donor should be respected as he donates his blood to someone else. The donor's well-being and safety are of utmost importance, and efforts should be directed towards minimizing complications due to blood donations.

Though blood donations are safe, they still carry the risk of a few complications. In our study, donation related complications were found to be 1.09%. The most frequently encountered complication was VVRs (65.48%), followed by hematomas (30.08%) and arterial puncture (4.42%), respectively. A study conducted in 2 transfusion centers in Italy demonstrated 0.28% adverse reactions of all donations, and VVRs were the most commonly observed adverse events constituted 70.99% of all complications.¹¹

A study done in an Indian tertiary care hospital showed that donation related complications were 0.99% of all donations and complications like VVRs, venous hematoma, arterial puncture encountered were 64.9%, 32.4%, and 2.7%, respectively.² A study done in Tehran studied only the vasovagal complications, and overall complication rates were 13.4%.¹²

The incidence of VVRs and its association with age, sex, weight, and history of the previous donation is well known.⁹ Tondon et al. found VVRs in the majority of the age group of 31-40 years and VVRs rate in the first time donors was 89%. The incidence of VVRs was 2.5 times higher in females than males.¹⁰ Zervou et al. also emphasized a higher incidence of VVRs in first-time donors and was attributed to the high-stress levels.¹³

The second important complication is a hematoma. In Denmark, the study demonstrated a 33% incidence of venous hematoma of all the complications, which is comparable to this study, which showed 30.08% of all adverse reactions.¹⁴ Out of 34 patients who developed

hematomas in this study, the higher incidence was seen in the 41-50 year age group. The donors were prescribed serratiopeptidase for 3 days and advised for cold compression. Nine of them came back after 2 weeks complaining of skin pigmentation in the phlebotomy area and counseled for that.

Arterial punctures are cumbersome, rare, and often occur due to faulty technique, blind phlebotomies, or inexperienced phlebotomists. Newman et al. showed 0.0029% incidence rate of this event among all donations.¹⁵ In this study, arterial punctures occurred in five (0.048%) donors. Donors were advised to press the bleeding site for at least 15 min, followed by a tight pressure band-aid application, and were asked to follow up if required.

The other few blood donation complications seen in various studies are as follows: Arm injuries, thrombophlebitis, iron deficiency, nerve damage, and its sequel. However, none of these were seen in this study.^{14,16}

CONCLUSION

This study strengthened the fact that though blood donation is relatively safe, it still has a nearly 1% complication rate. To encourage blood donation at a regular interval, all the possible steps should be taken to minimize the rate of complications. Donors should be familiar with the process and discussed that to alleviate the anxiety so that complications can be reduced. Adequate night sleep and a proper meal before donation should be advised and implemented. The general health of the donors should be checked by strict screening. More medical attention should be given to the "at-risk" donors. To increase repeat donations, phlebotomists should build a good rapport with the donors, alleviate their apprehension and anxiety by engaging them in conversation and ensure their health and safety.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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