TAJ June 2007; Volume 20 Number 1

ISSN 1019-8555
The Journal of
Teachers Association
RMC, Rajshahi

Original Article

Adverse Donor Reaction During and Immediately After Venesection

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Abstract

There are no reports in the transfusion medicine literature that describe adverse donor reactions after whole-blood donation based on solicited information. A descriptive study was done in the Transfusion Medicine Department, Dhaka Medical College Hospital during the period of July'2000 to December'2001. The present study solicited adverse donor reaction and donor reaction information from 14,413 randomly selected whole-blood donors approximately immediately or within 30 minutes after the whole-blood donation. From this study, percentage of adverse donor reaction was 4.98%.

The number of prior donations was inversely proportional to the risk of reaction; It was found that, first-time donors have a higher frequency of reactions (5.04%) than do repeat donors (4.96%).The value for first-time or repeated donor were significant (p<0.0001).Female donors are more vulnerable to adverse donor reaction than male donors (5.97%) (4.94%) (p<0.001). In this study it was also found that, fainting or vasovagal attack was more common in female donors (0.77 %) than male donors (0.35 %). It was also found incidence were more in first time donor (1.08%) than repeated donor (0.0%) in case of female donor. Adverse donor reaction after donation and complaints may be more common than previously thought. The post donation follow-up and interview is a good tool for defining the blood donor's experience. It can also be used to evaluate and potentially improve blood donor safety and comfort.

TAJ 2007; 20(1): 39-47

Introduction

Blood is the most precious and unique gift that one human being can give to another. The life saving fluid can not be created artificially. Blood donors are the precious recourses. Donor retention is directly linked with the donor services and donor care. It is important to provide total satisfaction to donor as customer, because only then they would become regular donor and remains loyal to the system. Donors are the brick of which the main structure of blood transfusion service is built. Most donors tolerate giving blood very well but occasionally adverse reaction may occur. Blood donation has potential medico-legal consequences. If a donor becomes ill shortly after giving blood, the illness may be attributed to the blood donation and should be encouraged to get in touch with the transfusion service. There is little information in the Transfusion Medicine literature that describes the adverse donor reaction during and immediately after whole blood donation based on solicited information. Total blood donors were 14,423.

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Among them 13,969 were male and 454 were female of age group 18-60 years during a period of 01/07/2000 to 31/12/2000. Some of the patients were first time and some are repeated blood donor in the department of Transfusion Medicine, Dhaka Medical College Hospital. They are all fulfilling the selection criteria of as per Preforma of the said National Blood transfusion Service of Bangladesh.

Steps are:
A. Donor Selection
B. Preparation Counseling
C. During Donation
D. Post donation
E. Follow up

Donor Selection

Only people of good health are accepted as blood donors for therapeutic use. Govt. of the Peoples Republic of Bangladesh, Ministry of Health and Family Welfare has fixed the donor criteria an questionnaire to be used in connection with the donation and collection blood by the blood transfusion Centre attached with to different hospital in Bangladesh in 1976.

Preparation Counseling

Before collection of blood we make a preliminary assessment of the donor's state of health.

Provide information about risk factors, offer the donor an opportunity to self exclude or self defer.

Explain the procedure involved in blood donation and the reasons why they are under taken including the Medical History, The Basic health check, the venepuncture it self, post donation care and the laboratory test that are performed on all donors blood.

Answer the donors question and provide reassurance in case of anxiety.

Obtain the donors informed consent to donation

Medical History

Donor's medical history at the time of donation is recorded. This provides information needed to decide whether to accept the donor, defer the donor temporarily, or exclude the donor permanently.

Health Checkup

We have collected information from donors themselves about any health condition or other factors that might either endanger their own health if they give blood as per WHO and BTS of Bangladesh govt. proforma e.g. blood pressure, Pulse rate, Height, Weight, Haemoglobin estimation, times of donor's last meal, not having had a meal in the last 12-24 hours may lead to a fainting attack.

Venepuncture
Preparation of Venepuncture site

Blood is drawn from a large firm vein in an area that is free from skin lesion evidence of infection. Inspect both of the donor's arms to select the best choice. Remove any tight fitting sleeved clothing if possible or to roll up loose sleeves.

Gently apply the deflated sphygmomanometer cuff around the donor's upper arm approximately 6 cm above the elbow. The aneroid gauge should register 0' prior to inflation. A vein in the anti-cubital fossa was used. Sphygmomanometer cuff was inflated to 80-100 mm of Hg and the donor was asked to clench and release his hand several times and then to make and maintain a clenched fist. The turgid veins in the anti-cubital fossa was examined and palpated and vein was selected commencing at the intended site of venepuncture site. The anti-cubital fossa was cleaned, using an enlarging concentric circular pattern. The area should be 10cm X 10cm. Prepared swabs containing 70% isopropyl alcohol are commonly used. Allow this to dry on the prepared arm.

Sphygmomanometer pressure is still out 80 mm of Hg or above and that the cubital vein is engorged clamp the donors tubing just by the needle guard using by the pair of plastic forceps. A local anesthetic spray is given at the intended site of skin puncture. Needle guard was removed.

Free hand was placed well below the prepared area in order to pull the skin taut over the puncture site. Holding the needle at a 45^0angle aim it care fully through the anesthetic 'bump' and puncture the skin with quick thrust. Lower the angle of the needle 10-15^0 and with a steady thrust advance the

needle to pierce the vessel well. Remove the occluding forceps and depending on the local anatomical layout of the venous system advance the needle 1-2 cm inside the lumen of the vein. When blood flow freely in to the back reduce the Sphygmomanometer pressure to 40-50 mm of Hg. Secure the needle with two piece of tap. Cover the venepuncture site with a sterile gauze swabs Ask the donor not to twist or turn the arm and to make a fist and release it every ten seconds in order to encourage a better flow Talk to the donor or entertain by audio visual aids.

Blood collection is done within 7 minutes from Venepuncture to withdraw the needle from the site.450 ml blood is collected with anticoagulant 18-16 gauge phlebotomy needle. Cap, Mask, Gloves and Draw sheet are used by the phlebotomist.

Care of the donor after phlebotomy

Check arm and apply bandage after bleeding stops. Donor remains reclaiming on bed or indoor chair for a few minutes under closed observation by stuff.

Allow donor to sit up when his/her condition appears satisfactory b and walls to an observation area.

The period of observation is about 30-45 minutes.

Refreshment by eat and drink something before leave.

Advice drinks more fluid than usual in next four hours

Do not smoke for 30 minutes

Better not any have any alcohol until you have catered.

Thank the donor for an important contribution encourage repeat donation after proper interval (90-120 days for male and 120-150 days for female)

Common Adverse Donor Reactions that occurred
Fainting or the vaso-vagal attack

Fainting vaso-vagal attack may occur at any time – during the donor selection processes, during donation, in the resting or refreshment area or even hours following a donation. Vasovagal attack appears to be a hypo-thalamic response. Its features are mainly produced by the action of the autonomic nervous system. Subject starts to sweat and turns pale, the skin feels cold, the pulse slows strikingly, heart rate may fall to 30 per min, the blood pressure may become unrecordable, there may be vomiting and involuntary defecation.

When taking blood warning of oncoming fainting is often given by a fall in flow.[6]Fainting was defined as the manifestation of any of a series of sign or symptoms such as pallor, sweating, dizziness or nausea.[4] In this sense of the ward some 5-6% of donors fainted. Donors who lost consciousness or could not stand or sit without doing so only 2.8% of donor fainted.[3]

Vasovagal reaction is commoner on the first occasion of giving blood. Fainting was found to be more common in female donor. In 40437 donation studied, 4.9% of the female donors and 3.8% of the male donors of first time was experienced with vaso-vagal attack. But in regular donors of both sexes 1.9% in female donors and 1.1% in male donors are affected.[5]

In one study there was a relation between the incidence of fainting and the amount of blood donated. The incidence was 3.8% in those giving 440ml, but 8.5% in those giving 540ml.[3]

Mild donor reaction

Vasovagal symptoms without loss of consciousness can occur.

The signs of mild donor reaction include:

- Anxiety
- Increased respiration
- Rapid pulse.
- Pallor and mild sweating
- Dizziness/continuous yawning
- Nausea/vomiting.

Moderate donor reaction

A progression of symptoms associated with a mild donor reaction, resulting in unconsciousness.

- loss of consciousness (fainting)
- repeated periods of unconsciousness

- a slow pulse which may be difficult to feel because of poor volume
- Shallow respiration.

Severe donor reaction

A faint or vasovagal attack may be accompanied by convulsions. Convulsions may be preceded by all the signs and symptoms of a vasovagal attack or they may occur without warning.[7]

Bruising

It is one of the commonest complications of blood donation.

Diffused extravasations of blood in the subcutaneous tissue due to rupture or injury of the small blood vessel without any breach of continuity of the skin externally.

Haematoma

It is restricted to a small area in the antecubital fossa.

This is a localized collection of effused blood from the rupture of the large blood vessels forming a fluctuating palpable mass under the surface of the unbroken skin.

Tetany

It is characteristically observed in nervous subject, thought to be due to hyperventilation. Incidence is 1 in 1000 blood donors. Hyperventilation is a rapid over breathing which lowers the carbon dioxide content of blood. In turn, this leads to muscle spasm.

Convulsion

It is rare. In 'vaso-vagal attack' loss of consciousness may follow convulsion.

May characterized by unease, irritability, olfactory hallucination, epigastric discomfort, jerking of one limb, tonic contraction of muscle, arms flexed and adducted, legs extended, respiratory muscle spasm, causes 'cry' as air expelled cyanosis, loss of consciousness, tongue biting, incontinence.

Accidental puncture of an artery

Puncture of an artery leads to an unusually rapid flow of bright red blood. When the needle is withdrawn there may be severe leakage of blood, followed by extensive bruising. This is an uncommon complication of blood donation.

Arterio-venous fistula

A donor**,** presented with an arterio-venous fistula causing an aneurysm in the antecubital fossa three months after an unusually rapid but uneventful donation.[1]

Air embolism

When blood is taken in a glass bottles (as is still the practice in some countries) air embolism is occasionally encountered. Plastic bag which contain no air there is no possibility of air embolism.

Fatalities attributed to blood donation

In 1975 the food and drug administration (FDA) of the USA published regulation requiring the reporting of deaths associated with blood collection plasma pheresis and transfusion.

In the 10 years from 1976 to 1985 three deaths attributed to the blood donation

Two deaths were due to myocardial infarction and one was in a patient with phaeochromocytoma.[2]

Problems with the blood flow

Occasionally, Venepuncture is unsuccessful or the vein may develop spasm after venepuncture so that the blood flow is not maintained. Slowing of the flow rate may be due to:

- Reduced cuff pressure.
- Occlusion of the lumen of the needle by the vein wall.
- Positioning of the lumen of the needle on a valve within the vein.

Accidents

There may be risk of injury to the head or body if a donor faints and falls.

Results

In our observation, among the 14,413 Blood Donor, 13,894 were male and 519 were female. Percentage of Adverse Donor Reaction 4.98%,

among them in male 4.94% and in female 5.97%. In case of male 12,732 were first time donor and 1,162 were repeated donor. The percentages of adverse donor reaction were found 4.99% and 4.38% respectively. In case of female 471 were first time donor and 48 were repeated donor. The percentages of adverse donor reaction were found 6.47% and 4.82% respectively. (Table-I). Age distribution among the blood donors both in male and female was pyramidal shape. Base is made by age 18-25 years and top is made by 60 years. (Table-II) Percentage of adverse donor reactions, fainting or vasovagal attack- 0.37%, bruising- 1.05%, haematoma- 0.36%, hyperventilation and tetany- 1.78%, accidental puncture of an artery- 0%, air embolism- 0%, problems with blood flow- 1.41% and accidents- 0.01%.

First time adverse donor reaction was more than the repeated donor both in male and female blood donor. (Table-III, Figure-01, Figure-03, Figure-04.) Female donors are more vulnerable to adverse donor reaction than male donor. Specially fainting or vasovagal attack is more common in female donor than male donor and also more common in first time donor than repeated donor (Figure-02).

Table- I: Adverse Donor Reaction

	Total	ADR	% ADR
Male	13,894	687	4.94 %
1. First time	12,732	636	4.99 %
2. Repeated	1,162	51	4.38 %
Female	519	31	5.97 %
1. First time	471	24	6.47 %
2. Repeated	48	07	4.82 %
Total	14,413		

Table- II: Age distribution among the blood donors.

	Male	Male %	Female	Female %	Total
18^{+} -25 years	4643	33.42	201	38.73	4844
25^{+} -30 years	4074	29.32	174	33.53	4248
30^{+} -35 years	2076	14.94	75	14.45	2151
35^{+} -40 years	1587	11.42	39	7.51	1626
40^{+} -45 years	865	6.23	21	4.05	886
45^{+} -50 years	476	3.43	9	1.73	485
50^{+} -55 years	83	0.60	×	×	83
55^{+} -60 years	59	0.42	×	×	59
60^{+} years	31	0.22	×	×	31
Total	13,894		519		14,413

Table- III: Adverse Donor Reaction in male and female blood donor.

	Grand		Male				Female			
	Total	%	Total	%	1^{ST} time	Repeated	Total	%	1^{ST} time	Repeated
Fainting, Vasovagal attack	53	0.37 %	49	0.35 %	45	4	4	0.77 %	4	0
Bruising.	152	1.05 %	147	1.06 %	136	11	7	1.35 %	5	2
Haematoma.	52	0.36 %	49	0.35 %	44	5	3	0.58 %	2	1
Hyperventilation and tetany.	256	1.78 %	246	1.77 %	229	17	11	2.12 %	8	3
Accidental puncture of an artery	0	0 %	0	0 %	0	0	0	0 %	0	0
Air embolism	0	0 %	0	0 %	0	0	0	0 %	0	0
Problems with blood flow	203	1.41 %	196	1.41 %	182	14	5	0.96 %	4	1
Accidents	1	0.01 %	0	0 %	0	0	1	0.19 %	1	0
ADR	718	4.98 %	687	4.94 %	636	51	31	5.97 %	24	7
Percentage (%)					4.99%	4.38%			6.47 %	4.82 %
Total Donor Number		14,413		13,894	12,732	1,162		519	371	148

Fig. 1: Percentage of Adverse Donor Reaction.

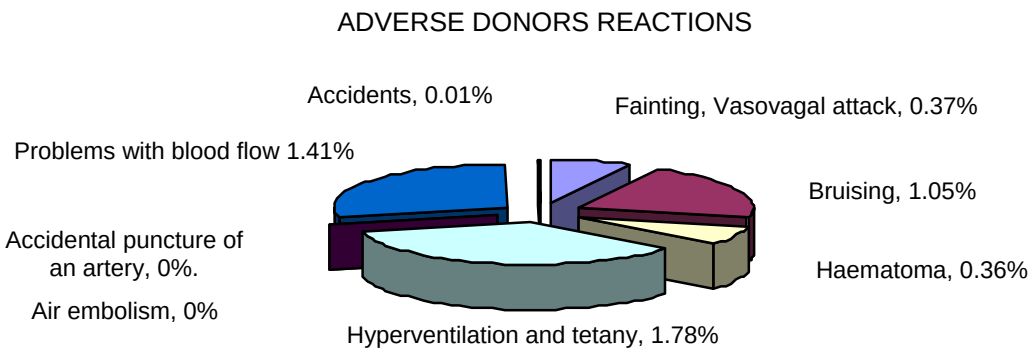


Fig. 2: Comparative study of male and female donors Adverse Reaction

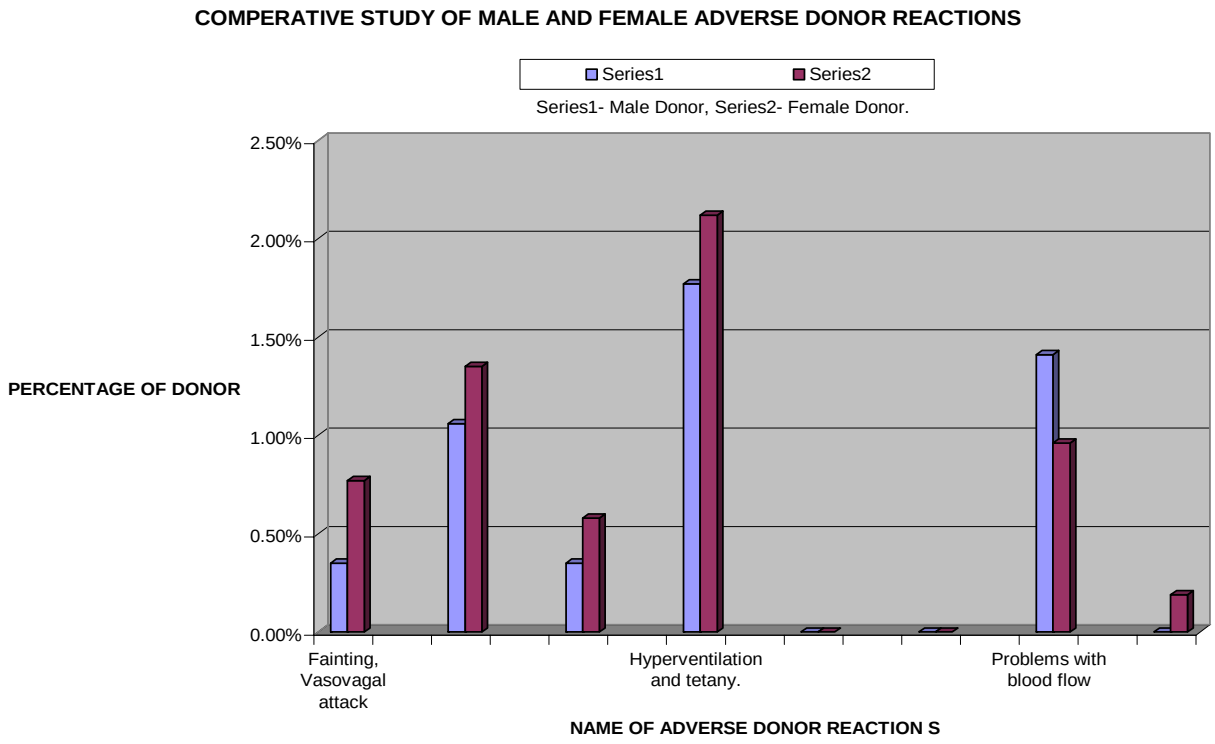


Fig. 3: Adverse Donor Reaction [Male in first time and repeated donor]

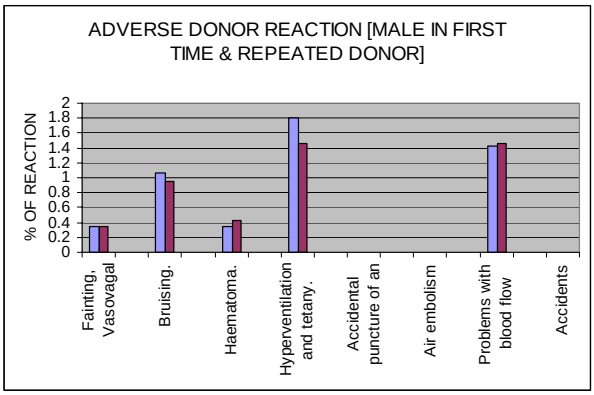
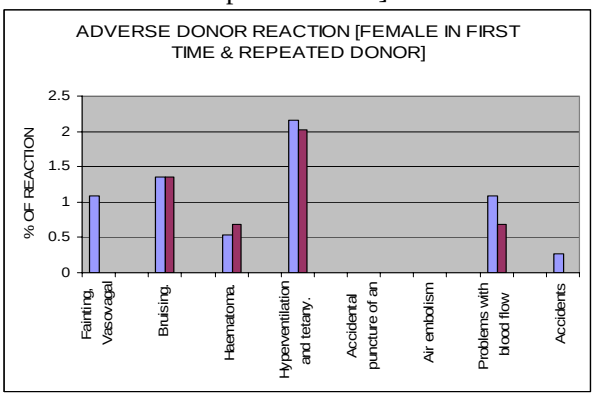


Fig. 4: Adverse Donor Reaction [Female in first time and repeated donor]



Discussion

From this study, percentage of adverse donor reaction was 4.98%, among them in male 4.94% and in female 5.97%. Fainting or vasovagal attack- 0.37%, bruising- 1.05%, haematoma- 0.36%, hyperventilation and tetany- 1.78%, accidental puncture of an artery- 0%, air embolism- 0%, problems with blood flow- 1.41% and accidents- 0.01%. In comparison with the study of B.H. Newman, S. Pichette , D. Pichette and E. Dzaka .Thirty-six percent of the donors had one or more adverse donor reaction. The most common systemic adverse effects (AE) were fatigue- 7.8%, vasovagal symptoms- 5.3%, and nausea and vomiting (1.1%). The most common arm findings were bruise- 22.7% and haematoma- 1.7%. Men were half as likely as women to have an AE (23% AE vs. 48% AE, $p < 0.0001$). Repeat blood donors had fewer AEs than first-time blood donors (36% AE vs. 47% AE, $p < 0.007$).[13]

The number of prior donations was inversely proportional to the risk of reaction.It was found that, first-time donors have a higher frequency of reactions- 5.04% than do repeat donors- 4.96%. First-time or repeat donor were significant ($p<0.0001$).In comparison with the study of D.O. Kasprisin, S.H. Glynn, F. Taylor, K.A. Miller.first-time donors have a higher frequency of reactions- 1.7% than do repeat donors- 0.19%.[14] Youth was a predictor of reactions and lower body weight mean- 59.3.4 kg than those who are mean- 67.4kg and Female donors are more vulnerable to adverse donor reaction than male donor. Male 4.94% and in female 5.97% ($p<0.001$). A group with systolic blood pressure ranging from 90 to 110 mm of Hg and a group with systolic blood pressure ranging from 120 to 140 mm of Hg. Comparison with the study of J.J. Trouern-Trend, R.G. Cable, S.J. Badon, B.H. Newman, M.A. Popovsky. Female donors, young donors, first-time donors, low-weight donors, and donors with low predonation blood pressure had higher absolute donation reaction rates than other donors.[15]

In this study it was found that, fainting or vasovagal attack was more common in female donors- 0.77 % than male donors- 0.35 %. It was also found incidence were more in first time donor-1.08% than repeated donor-0.0%. In case of female donor but not in case of male donor (first time donor-0.35% than repeated donor- 0.34%). Several studies indicate that, low incidence of vasovagal reactions: 119 in 10,547 donations (1.13%). Donors of younger age and of lower diastolic blood pressure were more prone to reaction. There was no significant sex difference. Higher reaction rates were also associated with first-time donation.[16] Societal or emotional factors, such as ingestion of caffeinated beverages was associated with a reduced risk of reactions. The experience of vasovagal reactions during blood

donation (e.g., faintness, dizziness, lightheadedness) can be a deterrent to repeat donation. Because these reactions are associated with decreases in blood pressure, caffeine was examined as a potential modulator of vasovagal reactions by virtue of its pressor effects.[17] There was no history of accidental puncture of an artery in this study.

Twelve cases of arterial punctures were identified from 410,000 blood donations (0.0029%; 1/34,000). Eleven cases had a fast blood-flow rate of <4 minutes; 9 units (75%) were bright red; and in 4 cases (33%), the needle was pulsating.[18] The effects of blood transfusion and blood donation on the immune system are still unclear. In a prospective study we investigated the effect of blood and blood component donation on several immunologic parameters. Lymphocyte subsets and cytokine levels were determined in 25 repeat whole-blood donors (RD), 25 plateletpheresis donors (PD), and 20 autologous blood donors (AD). First-time donors (FTD, n = 20) served as controls. Lymphocyte subsets and cytokines were determined using standard methods. Leukocytes, T-suppressor cells and natural killer (NK) cells were decreased in RD and PD when compared to FTD. Additionally, NK cells decreased with repeat donations in AD. No significant differences of cytokines in the different groups or during repeat autologous donations were observed.[19] Blood donation per se is not a stressful event and that moderate stress, as suggested by the increased cortisol levels and heart rate at the first donation, is secondary to emotional rather than to physical factors and occurs during a never-experienced-before event.[20]

Acknowledgement

I would like to express my deepest sense of gratitude, great appreciation and heartiest thanks to my respected teachers Professor Md. Mujibur Rahman and Professor Md. Mosherrof Hossain for their constructive criticism and valuable suggestion in successful completing this work.

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