Original Article

Access this article online

Quick Response Code:

Website: www.ajts.org

DOI: 10.4103/ajts.ajts_90_21

Factors associated with vasovagal reactions in whole blood donors: A case–control study

Aaditya Shivhare, Abhishekh Basavarajegowda[1], K. T. Harichandrakumar[2], Pragya Silwal[1], Pruthvi Raj[3]

Abstract:

BACKGROUND: Vasovagal reactions to blood donation though generally mild and account for about 1% of donations, causes embarrassment/injury to the donors, lower likely return rates for future donations etc. The workforce hours devoted to attending to those who reacted can also affect the efficiency of the blood centre. There are various factors, both modifiable and nonmodifiable, involved in the causation of such reactions.

OBJECTIVES: This study sought to identify the factors associated with vasovagal donor reactions in a case–control study.

MATERIALS AND METHODS: This was a descriptive comparative study between donors who had VVRs (cases) and those who did not (controls) during or after blood donation from a single center in southern India. All the biophysical and demographic variables were collected from the donor records. In addition, a questionnaire was administered to the donors after donation within half an hour, addressing the psychosocial variables. All the data were captured in Microsoft Excel and analyzed using SPSS for Windows version 20.

RESULTS: A total of 178 donors who had donor reactions were included in the study with an equal number of controls who were age and sex-matched. Donors who had VVRs had an odds of 4.1 (95% confidence interval [CI]: 2.4–7.7) of admitted anxiety for blood donation. They also had an odds of 4.4 (95% CI: 2.8–6.9) of disturbed sleep the night before blood donation. Having an accompanying person to the blood center was detrimental, with an odds of 0.32 (95% CI: 0.2–0.6). Donors with local complications such as hematoma, double prick, or delayed collection had an odds of 21.2 (95% CI: 1.8–159.8) of developing VVR.

CONCLUSION: The psychosocial factors such as fear of the needle, the sight of the blood, state of mind, and quality and duration of sleep seem to have an association, adversely impacting the donors resulting in VVRs after/during blood donation.

Keywords:

Blood donor reactions, physical factors, psychosocial factors, vasovagal reactions

Department of Haematology, Tata Medical Center, Kolkata, [3]Department of Transfusion Medicine, The Mission Hospital, Durgapur, West Bengal, Departments of [1]Transfusion Medicine and [2]Medical Biometrics, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, India

Address for correspondence:
Dr. Abhishekh Basavarajegowda, Department of Transfusion Medicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, India.
E-mail: drabhigowda@gmail.com

Submitted: 05-07-2021
Accepted: 29-08-2021
Published: 26-05-2022

Introduction

Vasovagal reactions (VVRs) to donation are mild and account for roughly around 1% of donations. It causes embarrassment to the donors, results in lower likely return rates for future donations, wasteful workforce hours for attending those who reacted by the personnel of blood collection facility, etc.[1,2] There are various factors, both modifiable and nonmodifiable, involved in the causation of such reactions. The nonmodifiable factors include age, gender, ethnicity, and first-time donation status. The modifiable factors include the donor-related ones such as fear of needles, anxiety about blood donation or hospital environment, sleep duration and quality the night before, and other social stresses they are under and the contextual factors such as waiting time

How to cite this article: Shivhare A, Basavarajegowda A, Harichandrakumar KT, Silwal P, Raj P. Factors associated with vasovagal reactions in whole blood donors: A case–control study. Asian J Transfus Sci 2022;16:41-9.

and phlebotomists' experience.[3,4] Vasovagal syncope is argued to result from parasympathetic rebound related to a state of relief that follows a period of uncontrollable stress or an adaptive surrender to uncontrollable stress.[5]

Several studies have tried to identify factors associated with VVRs, but they are primarily on biophysical factors and donation factors.[6] In this study, we set out to determine the social and psychological factors that could be associated with VVRs in a case–control setting.

VVRs should always be brought to a minimum as far as possible. This necessitates the blood centers to look out for factors associated with them and strive to mitigate or modify them to make blood donation safe and comfortable for donors. If the study gives an insight into significant factors associated with blood donation reactions and is correctible, then the blood centers can work in the direction of addressing them.

Materials and Methods

Study design

This was a descriptive comparative study between donors who had VVRs and those who did not, during or after blood donation from a single center in southern India.

Study setting

The study was performed in the blood center of a tertiary care teaching hospital.

Participants

All the blood donors who had VVRs from January to December 2018 were included. Age- and sex-matched donors who did not have VVRs were chosen randomly on the same day as controls at a 1:1 ratio.

Exclusion

The participants whose pro forma or questionnaire was incomplete were excluded from the study.

Variables

The variables including biophysical profile such as weight, height, sociodemographic features, donation-related characters as to first time/repeat, previous donation experience, and outcomes were captured using the structured pro forma.

A questionnaire was designed in both English and local language for addressing the psychological issues that can be contributory to VVRs. The questionnaire was validated for its contents by getting opinions from three subject experts and incorporating those changes. The questionnaire consisted of ten items that asked the participants about their stress levels and perception, sleep quality, state of mind, etc. Each question had options in the form of a Likert scale and was self-administered in physical form only.

Measurements

All the direct variables such as height, weight, and blood pressure (BP) were recorded from the calibrated equipment routinely used in the department. The variables such as body mass index (BMI) and blood volume were calculated at the time of completing the pro forma. The blood volume was calculated using Nadler's formula for males and females.

Sampling and sample size

Sample size was estimated for assessing the difference in the proportion of outcome between cases and controls using OpenEpi software version 3.01, Open Source Epidemiologic Statistics for Public Health. With an expected difference of 15% in outcome between cases and controls at a confidence level of 95% and power at 80%, the sample size was estimated to be 170 in each group.

The sampling technique used was continuous sampling wherein all the donors who had VVRs were enrolled in the study after obtaining their consent. The controls were purposively chosen who were sex and age matched simultaneously around the same time and did not have any VVR.

Statistical analysis

All the variables and responses captured into pro forma and questionnaire were transferred into a Microsoft Excel sheet. The statistical analysis was carried out using Microsoft Excel and SPSS for Windows version 20 (SPSS IBM Corp. Ltd., Armonk, NY, USA). The distribution of data on categorical variables such as gender, number of donations, and admitted anxiety was expressed as frequencies and percentages. The continuous data such as age, blood volume, pulse BP, and duration after food were expressed as mean with SD. The association of categorical variables with donor reactions was carried out by the Chi-square test and the continuous variables by independent Student's *t*-test. All statistical analyses were carried out at a 95% confidence interval (CI), and $P < 0.05$ was considered statistically significant.

Ethical issues and consent

The study was reviewed by the Institutional Ethics Committee and approved on October 22, 2016 (IEC approval number: JIP/IEC/SC/2016/29/934). All the data were collected in an anonymized manner after obtaining written informed consent from all the participants.

Results

A total of 17,575 donations were made at our center during the study period. One hundred and seventy-eight

donors had VVRs, i.e., 1.01%. At a ratio of 1:1, 178 age-, gender-, site of donation-matched donors were chosen from the donors who did not have a VVR as controls among donors who donated similar time slots. The algorithm showing the participants and their inclusion in the study is shown in Figure 1. A majority (92%) of the VVRs were mild. The distribution of various severities of VVRs is summarized in Figure 2. Seventeen of the donors who had a VVR also had a local adverse event like a hematoma or a double puncture. Two of them had prolonged/incomplete collection.

The gender, education, donation site, and history/habit of smoking were similar in both the groups, with no statistically significant difference between them. Twelve cases were predominantly involved in a profession involving outdoor work with water requirements more avidly, whereas 58 (32.6%) were in the control group. This was significant χ^2 (1) = 37.33, $P \leq 0.01$. The odds ratio of 0.15 (95% CI: 0.08–0.29) was seen, suggesting the experience of working outdoors seeming to be protective. The comparison of these factors is shown in Table 1.

The biophysical factors are summarized in Table 2. The mean age of the controls was slightly higher, i.e., about 2 years. The mean weight and the derived values such as BMI and blood volume were higher in the control group and were statistically significant. The mean percentage of blood drawn as the proportion of blood volume of the donor was higher statistically significant in the donors who had a VVR. Before donation, the mean BP, both systolic and diastolic, and pulse rate were similar in both the groups.

The average number of previous donations was significantly lower, with a mean difference of 1.7 times (95% CI: 1.3–2.7) in the reaction group compared to the nonreactors (controls). There were 112 (62.9%) first-time donors, in the cases, whereas only 60 (33.7%) in the control group. The ones who reacted also had a higher average number of previous episodes of reaction (0.3 events vs. 0.1 events). The contextual factors such as mean duration of time since water intake, screen time, duration of sleep, and time spent on the journey

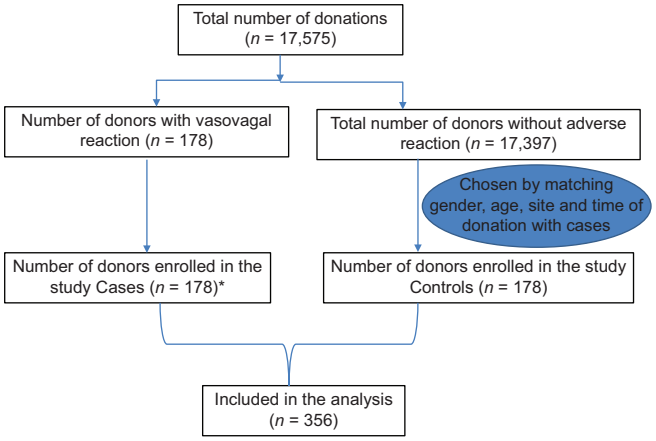

Figure 1: Flowchart summarizing the participants in the study. *One of the donors in the donor with reactions (cases) did not complete the questionnaire; however, his pro forma was completed. Hence, in the analysis of the questionnaire, there would be 177 cases

Table 1: Sociodemographic factors of the participants

Sociodemographic factors	Cases, *n* (%)	Controls, *n* (%)	Statistical inference
Gender			
Male	174	173	χ^2 (1)=0.1, 0.7
Female	4	5	
Education			
No formal education	19 (10.7)	14 (7.9)	χ^2 (2)=0.9, 0.6
Schooling (up to 10)	30 (16.9)	29 (16.3)	
College and beyond	129 (72.5)	135 (75.8)	
Donation site			
In-house	174	174	-
Outdoor camp	4	4	
Smoking			
Yes	31	30	χ^2 (1)=0.01, 0.9
No	147	148	
Profession (requiring water/outdoor work)			
Yes	12 (6.7)	58 (32.6)	χ^2 (1)=37.33, <0.01
No	165 (92.7)	120 (67.4)	

Table 2: Comparison of biophysical factors of the participants

Biophysical factors	Mean (SD)		Mean difference 95% CI, *P*
	Cases	Controls	
Mean age (years)	24.4 (5.3)	27.02 (6.93)	1.3-3.9, <0.01
Mean weight (kg)	65.6 (9.7)	71.4 (12.33)	3.4-8.1, <0.01
Mean height (cm)	170.4 (5.97)	170.5 (7.04)	-
Mean BMI (kg/m^2)	22.6 (3.07)	24.6 (4.04)	1.1-2.3, <0.01
Mean blood volume (L)	4.57 (0.54)	4.72 (0.53)	0.1-0.3, <0.01
Mean percentage/ proportion blood drawn (350 ml)	7.87 (0.83)	7.52 (0.84)	0.2-0.5, <0.01
Mean SBP (predonation)	123.7 (14.4)	124.3 (12.6)	-
Mean DBP (predonation)	78.1 (7.2)	78.5 (8.5)	-
Pulse rate	80.21 (6.2)	80 (8.9)	-

SD=Standard deviation, CI=Confidence interval, BMI=Body mass index, BP=Blood pressure, SBP=Systolic BP, DBP=Diastolic BP

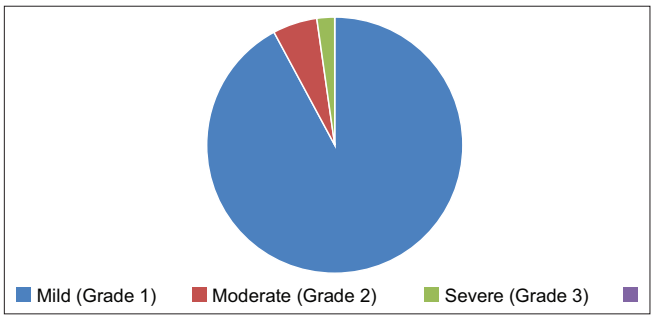

Figure 2: Distribution of grades of observed vasovagal reactions

in the last 24 h were all different in the groups and were statistically significant. There was no difference in the mean duration of time since the last meal between the groups. The groups did not differ in the regular duration of sleep, mean duration of meal to sleep gap, and weekly dedicated exercise duration. A comparison of all these factors is presented in Table 3.

The controls were matched to the timing of donation of the cases. Hence, this was comparable between the groups. The type of blood bag used was also similar and comparable for the same reason. However, a significant number of donor reactions happened during posttea (48.9%) and prelunch sessions (22.5%). Semi-solid and liquid food seems to be protective compared to solid food as a majority (87.6%) of donors in the case group had predominantly solid food before donation. Fatty food seems predisposed to reaction, whereas protein-rich food seems to be protective, as shown in Table 4. The temperature at the donation site was rated as unpleasant by a significantly higher number of cases (16%) compared to controls. A significant number of donors (>90%) who came to donate for someone they know had VVRs compared to the ones who were controls (75%). There was no significant difference in VVR in a donation being done on weekdays or weekends. A significantly high number of donors (42.7%) reported having passed high colored urine recently, indicating their hydration status [Table 4].

The odds ratio (OR) of various factors that can affect donor reactions is summarized in Table 5. The odds of admitting anxiety (4.1), history of head injury/trauma (2.5), being accompanied to the donation site (3.1), and most significantly having a local complication of phlebotomy (21.2) were higher in the cases as against the controls. The odds of being engaged in strenuous exercise or work (0.39), having an undisturbed continuous sleep (0.2), and one glass of water intake before donation (0.2) were shown to be protective against VVRs. The experience of the phlebotomist, more than or less than 2 years, did not seem to have much of an impact on the VVRs (OR: 1.05; 95% CI: 0.56–1.97).

Table 3: Comparison of contextual factors among controls and cases

	Mean (SD)		Mean difference 95% CI, *P*
	Cases	Controls	
Average number of previous donations	0.8 (1.6)	2.5 (4)	1.3-2.7, <0.01
Average previous events of reaction	0.3 (0.7)	0.1 (0.4)	0.04-0.26, <0.01
Mean duration since last meal	2.25 (0.79)	2.16 (0.92)	-
Mean duration (h) from last water intake (at least 500 ml)	9.6 (6.2)	3.2 (3.6)	5.3-7.4, <0.01
Average screen time in last 24 (h)	3.25 (2.3)	2.3 (2.1)	0.5-1.4, <0.01
Mean of average screen time (h)	3.5 (2.3)	3.0 (2.4)	0-1, <0.05
Weekly dedicated exercise time (h)	1.13 (0.4)	1.61 (0.8)	0.3-0.6, <0.01
Average duration spent on journey in the past 24 (h)	2.45 (4.1)	1.35 (2.9)	1-1.2,<0.01
Duration of sleep (last 24 h)	7 (1.69)	7.57 (1.47)	0.2-0.9, <0.01
General duration of sleep (h)	7.94 (1.06)	7.81 (1.08)	-
Mean meal to sleep gap (h)	1.65 (1)	1.66 (1)	-

SD=Standard deviation, CI=Confidence interval

The responses to the questionnaire with a Likert scale marking on various aspects of blood donation and general well-being are summarized in Table 6. The responses were different, and the difference was statistically significant for most of the questions except for questions as to whether they were compelled to donate due to any reason ($P = 0.3$) or person ($P = 0.06$). A slightly higher number of cases admitted to being afraid of seeing blood than controls (12.4% vs. 7.2%); however, this was not statistically significant. Quality of sleep was described as extremely refreshing by more controls (7.9%), whereas only 2.8% of cases reported so. However, this was not seen to be statistically significant and is summarized in Table 6.

Discussion

Vasovagal syncope results from a neurophysiological reflex which can be induced/seen in most healthy people reduction in blood volume either by venous pooling or by hemorrhage. The VVRs to blood donation are generally mild or moderate. Vasovagal adverse reactions are classified into three grades of severity: mild, for presyncope VVRs such as pallor, sweating, anxiety, light-headedness/dizziness; moderate for hypotension, vomiting, and transient loss of consciousness; and severe for loss of consciousness associated with other signs and symptoms such as recurrent vomiting, prolonged pulse and/or BP recovery times, incontinence, and convulsions. Previous studies have shown more than 85%, as high as 97%, of VVRs to be mild. Severe is usually about 2% only.[7]

The controls were similar to cases regarding various sociodemographic characters, which can have severe implications on the outcome such as gender, age, site of donation, and smoking. The mean age was slightly higher in the control group by a little above 2 years, but this is possible as it is difficult to exactly match the age as we recruited the controls simultaneously as the case from the available donors at that time. The age as a risk factor is generally attributed to very young donors, usually around 18–24 years, and is similar up to about 30 years.[8,9]

Table 4: Comparison of donation-related factors among the participants

Donation factors	Cases (%)	Controls (%)	Chi-square test (df), *P*
Timing of donation (general average %)			
8-10.00 am (20)	21 (11.8)	20 (11.2)	χ^2 (3)=1.1, 0.8
10.00-12.00 (30)	87 (48.9)	88 (49.4)	
12.00-lunch (15)	40 (22.5)	34 (19.1)	
Postlunch (35)	30 (16.8)	36 (20.2)	
Type of the bag			
Terumo	59 (33.1)	49 (27.5)	χ^2 (2)=2, 0.37
Polymed	104 (58.4)	108 (60.7)	
Donato	15 (8.5)	21 (11.8)	
Time since last meal (mean) (h)			
<1	16 (8.9)	28 (15.8)	χ^2 (4)=5.8, 0.22
1-2	109 (61.2)	104 (58.4)	
2-3	45 (25.3)	34 (19.1)	
3-4	5 (2.8)	7 (3.9)	
>4	3 (1.7)	5 (2.8)	
Type of last meal			
Solid	156 (87.6)	119 (66.9)	χ^2 (2)=22, <0.01
Semi-solid	21 (11.8)	53 (29.8)	
Liquid	1 (0.6)	6 (2.8)	
Type of meal			
Carbohydrate rich	152 (85.4)	151 (84.8)	χ^2 (2)=13, 0.01
Fat rich	25 (14)	14 (7.9)	
Protein rich	1 (0.6)	13 (7.3)	
Hunger before the previous meal			
Very hungry	5 (2.8)	5 (2.8)	χ^2 (2)=8.8, 0.01
Hungry	12 (6.7)	30 (16.9)	
Had as a routine	161 (90.5)	143 (80.3)	
Temperature at the site of donation			
Pleasant	129 (72.5)	157 (89.3)	χ^2 (2)=28.9, <0.01
Comfortable	20 (11.2)	20 (11.2)	
Unpleasant	29 (16.3)	1 (0.6)	
Donating for			
Blood relative/spouse	17 (9.6)	33 (18)	χ^2 (4)=39.8, <0.01
Other relatives	77 (43.3)	68 (38.2)	
Friend	69 (38.8)	33 (18.5)	
Voluntary (notified)	8 (4.5)	8 (4.5)	
Voluntary (walk-in)	6 (3.4)	36 (20.2)	
Time of donation			
Routine	157 (88.2)	163 (91.6)	χ^2 (2)=1.2, 0.56
Weekend	20 (11.2)	14 (7.9)	
Occasion color of most recently passed urine	1 (0.6)	1 (0.6)	
Colorless	24 (13.5)	74 (41.6)	χ^2 (2)=69.6, <0.01
Pale yellow	76 (42.7)	89 (50)	
High colored	76 (42.7)	14 (7.9)	
Not sure	2 (1.2)	1 (0.6)	

Bodyweight, which is a direct reflection of blood volume, has been directly associated with the incidence of VVRs. BMI, which corrects for the height factor and Estimated blood volume, which accounts for the height (by Nadler's formula), has been known to impact the VVR.[10,11]

Predonation BP, pulse rate is associated with VVRs. The reactions being more common in those with lower than 100 mmHg of systolic or pulse rate of more than 90/min.[12] No difference was noticed in our study between the groups with respect to them, probably due to the narrow window of selection for acceptability from 100 to 140 mmHg and matching of donors with respect to age.

Duration of sleep was reduced the day before donation from their regular hours by about an hour in the case group, whereas it was almost insignificant in the controls. There was also a statistically significant difference in the donor reaction group's sleep duration on the day before donation compared to the controls. The difference in sleep duration was also shown in Takanashi *et al*. Sufficient sleep is a significant health factor.[12,13] Fewer people who had reactions admitted to having good refreshing sleep the previous day than those who did not react. Avoiding meals or snacks for at least 2 h before sleeping is thought to be better for long-term health. Higher food intake closer to bedtime has also been known to have a negative effect on sleep quality.[14]

Observation in relation to screen time was something we attempted in the study, and it showed that this was significantly increased in donors with reaction. Screen time is also directly linked to sleep duration and physical inactivity, both of which can impact the sympathetic system.[15] Higher screen times have been linked with lower psychological well-being as well.[16] Whether this has any direct link to VVR needs to be explored.

The average dedicated exercise time was longer in the controls compared to the cases and was statistically significant. Exercises are known to benefit in many ways, including toning of muscles, improving functional capacity, improved arterial baroreceptor reflex sensitivity, and autonomic response. An effect on the autonomic nervous system is the augmentation of acetylcholine-stimulated nitric oxide release, which increases blood flow and may attenuate cerebral anoxia, being one of the mechanisms for VVR.[17]

On average, the donors who reacted on average had fewer previous donations than the controls (0.8% vs. 2.5%). In various previous studies, this has been shown that repeated exposure to blood donation reduces the risk of reaction.[18]

The experience and interpersonal skills of the phlebotomist have been shown to affect the reactions in blood donors. Our study did not find any difference among the groups based on whether the phlebotomists

Table 5: The odds ratio for various factors that can affect donor reaction

	Cases (*n*=178), *n* (%)	Controls (*n*=178), *n* (%)	OR (95% CI)
Admitted anxiety			
Yes	58	18	4.1 (2.41-7.67)
No	120	160	
History of head injury/trauma			
Yes	17	7	2.52 (1.02-6.24)
No	160	166	
Not sure	1	5	
Engaged in strenuous exercise/work			
Yes	13	30	0.39 (0.2-0.77)
No	165	148	
Breaks during/discontinuous sleep			
Yes	134	73	4.38 (2.78-6.89)
No	44	105	
Water intake before donation (1 glass)			
Yes	24	81	0.19 (0.11-0.31)
No	154	97	
Experience of the phlebotomist (years)			
>2	156 (87.6)	149 (83.7)	1.05 (0.56-1.97)
<2	22 (12.4)	29 (16.3)	
Accompanying the donor			
Nil	16	42	0.32 (0.17-0.59)
Yes (waiting outside)	162	136	
Local complications			
Yes	19	1	21.15 (2.8-159.8)
No	159	177	

OR=Odds ratio, CI=Confidence interval

are experienced more than 2 years or not. However, the number of donors who underwent phlebotomy by those who were experienced <2 years in our center was significantly less, about 15% only, and hence may be such results.

Negative affective expectancies are significantly correlated with vasovagal syncopal reactions.[19] People who had VVR more commonly reported being uncomfortable with the needle prick and afraid of the blood drawn from their arms.

A lesser number of people who reacted were willing to be registered as future voluntary donors. Previous studies have clearly shown that, however mild they are, VVRs significantly reduce the return rates of donors for future donation.[7]

A compulsion to donate or pressure from seniors/family members was not a significant factor (statistical) associated with the reaction. The voluntary and replacement donor behavior has been partially explained by the "opponent-affective theory" of Solomon.[18]

A lesser number of people who had reactions admitted to having been in good spirits that day since morning. The fear of injections, blood draws, or blood itself is well described in the literature. This invokes nervousness which increases negative reactions. An increase in BP triggered by the threat of possible harm and followed by a sudden decrease due to a sense of relief that occurs when the donor perceives that the threat has passed leads to VVR.[20] Predonation anxiety leading anxiogenic stimulus, represented by the intense emotion of giving blood or the donor's sight of his or her blood, evokes fear and anxiety and the expectation that the phenomenon could be repeated.[19,21]

Donors with VVRs also remembered an antecedent trauma/head injury with odds of 4 times against the donors. There is nothing suggesting that head injury/trauma can predispose to VVR, but it would be interesting to see if the propensity to have VVR leads to the fall/trauma itself because of orthostatic depletion of central blood volume.[22]

The needle prick was mentioned as moderately or very uncomfortable by more than 90% in the case group compared to 73% in the controls. A painful stimulus can lead to a VVR. Parasympathetic activation leading to reduced peripheral vascular resistance and decreased heart is the attributed cause for all VVRs.[23]

Our study showed that the donors who had VVR had taken predominantly solid food, whereas people who did not react had taken semi-solids or only liquids, which

Table 6: Comparison of responses to questionnaire survey regarding various factors

Question	Cases (*n*=177), *n* (%)	Controls (*n*=178), *n* (%)	*P*
How uncomfortable were you with the needle prick?			
0 (comfortable)	0	0	<0.01
1 (somewhat uncomfortable)	8 (4.5)	48 (27)	
2 (moderately uncomfortable)	126 (71.2)	96 (53.9)	
3 (very uncomfortable)	39 (22)	28 (15.8)	
4 (Extremely uncomfortable)	4 (2.3)	6 (3.3)	
How afraid were you of the blood being drawn from your arm?			
0 (not at all)	0	0	<0.01
1 (somewhat afraid)	16 (9)	66 (36.8)	
2 (moderately afraid)	156 (36.8)	107 (59.9)	
3 (very afraid)	5 (2.8)	5 (3.3)	
4 (extremely afraid)	0	0	
How do you feel about the blood donation experience as a whole?			
0 (comfortable)	8 (4.5)	26 (14.5)	<0.01
1	42 (23.7)	30 (16.4)	
2	113 (63.8)	112 (63.2)	
3	14 (7.9)	7 (3.9)	
4 (Extremely uncomfortable)	0	3 (2.0)	
Which smiley would you choose to describe your current state of mind?			
	0	36 (19.9)	<0.01
	2 (1.1)	13 (7.3)	
	34 (19.2)	24 (13.2)	
	128 (72.3)	83 (46.4)	
	13 (7.3)	22 (12.6)	
If you were given either donating today or donating after some days, what would you have chosen?			
Donate today and get registered as a future voluntary donor for the needy patients	47 (26.6)	77 (43.4)	<0.01
Just donate today	115 (65)	96 (53.9)	
Postpone it for today, donate it in future	13 (7.3)	5 (2.6)	
Postpone it for today, maybe donate in future	2 (1.1)	0	
Never donate	0	0	
When you got up in the morning, which of the following statements best describes your state of mind?			
In best of spirits, ready to make the moment filled with celebration	1 (0.6)	11 (5.9)	<0.01
In good spirits, just welcoming the day	8 (4.5)	32 (17.8)	
In OK spirits, I would push myself to achieve goals	82 (46.3)	49 (27.6)	
In manageable mood, hope it does not worsen	86 (48.6)	77 (43.4)	
Quite tensed, want a break desperately	0	9 (5.3)	
Regarding the sleep you had yesterday night, which statement best describes it?			
Extremely refreshing	5 (2.8)	14 (7.9)	0.02
Quite good sleep	38 (21.5)	38 (21.1)	
Less than usual but manageable	40 (22.6)	26 (14.5)	
Less than usual, I need to catch up after the work	94 (53.1)	96 (53.9)	
Less than usual, I need to catch up as early as possible	0	4 (2.6)	
Do you feel this blood donation was compelled?			

Contd...

Table 6: Contd...

Question	Cases (*n*=177), *n* (%)	Controls (*n*=178), *n* (%)	*P*
Yes	3 (1.7)	4 (2)	0.3
No	174 (98.3)	172 (96.7)	
Cannot say	0	2 (1.3)	
Were you asked by your senior person at work or your family or compelled to donate?			
Yes	9	18	0.06
No	168	160	
Are you afraid of seeing blood?			
Yes	22 (12.4)	14 (7.2)	0.1
No	154 (87)	164 (92.8)	
Cannot say	1 (0.6)	0	

was significantly different in the groups. Water intake before donation also had a protective effect (OR: 0.19) for reaction. Furthermore, protein-rich food was reported to be taken by the control groups, whereas cases reported fatty food. Liquid foods and water absorb faster into the blood, and hence, expansion of blood volume has been offered as an explanation for a similar effect in a study by Ando *et al*.[24] activation of the sympathetic system by various types of food by the altered osmolality or gastric expansion itself. It is to be noted that semi-solid or liquid food distends the stomach rapidly and further compared to solid food. Protein-rich food delays gastric emptying, thereby prolonging gastric distension, whereas high-fat content in food is related to early satiety, reducing food intake.[25,26]

A lesser number of people who reacted reported that they were comfortable with the donation experience as a whole and chose a smiling smiley at the end of the procedure. The donor satisfaction being established as a factor for donor return can here actually correlate their reluctance to come back or register themselves as regular voluntary donors.[27]

The strength of the study was that it was conducted on a reasonably large and adequate sample size. The questionnaire was self-administered, but assistance was available and provided when required, removing any doubts or confusion in the responders' minds.

Being a case–control study, this suffers from the usual recall bias. However, the interview was conducted immediately after the recovery and refreshments, and hence, it would have alleviated it to a reasonable extent.

Conclusion

The study reiterates the facts like the association of vasovagal reactions in donors with biophysical factors like weight, height, and their derived parameters like BMI, Blood volume, donation related factors like the number of previous donations, previous history of reactions, water intake and hydration status, physical comfort at the phlebotomy room, fear/comfort regarding needle prick, blood, donation experience as a whole, mental state on the day of donation.

Novel findings such as the association of reactions with screen time, weekly dedicated exercise duration, quality of sleep, type of food, antecedent journey before donation, and psychosocial features like whether accompanied by somebody came to the fore by the study.

Acknowledgment

We would like to acknowledge JIPMER for intramurally funding the project.

Financial support and sponsorship

This study was intramurally funded by JIPMER, Pondicherry.

Conflicts of interest

There are no conflicts of interest.

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