ORIGINAL ARTICLE

Indonesian Journal of Blood and Transfusion (*IDJBT*) 2024, Volume 2, Number 1 : 1-4
P-ISSN 3032-7520

Adverse events in donors at the blood donation unit of Indonesian Red Cross, Makassar

Published by
The Indonesian Society Blood Transfusion Physician

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Received: 2023-11-30
Accepted: 2024-02-01
Published: 2024-03-27

ABSTRACT

Introduction: Adverse events of blood donation are unexpected events that occur at any stage in the blood donation process. This study aimed to analyze the frequency, types, and risk factors associated with adverse events in donors at the Blood transfusion unit of the Indonesian Red Cross, Makassar.

Methods: This retrospective cross-sectional study was conducted from January 2019 to December 2021. Participants who suffered adverse events at the Indonesian Red Cross, Makassar blood transfusion unit were collected. The variables of this study include gender, age, donation status, blood type, weight, pre-donation blood pressure, and adverse events of the donor. Data were analyzed using the Kolmogorov-Smirnov, Gamma, Somers'd, and Spearman Rho test ($p<0.05$).

Results: 135 participants experienced adverse events. The incidence of adverse events in this study was 0.14%. Donors who experienced adverse events were primarily male (51.1%). The mean age was 28.81±8.68 years. Adverse events were primarily found in donors with blood type O rhesus D positive, first-time donors weighing 45 – 65 kg, and normal/prehypertensive blood pressure. The vasovagal reaction was the most common adverse event. In statistical analysis, there was no significant effect of risk factors on the incidence of adverse events ($p>0.05$). There was also no significant correlation between risk factors and the incidence of adverse events ($p>0.05$).

Conclusions: There was no significant effect or correlation between risk factors and the incidence of adverse events in donors.

Keywords: adverse events, blood transfusion unit, donors.
Cite This Article: Winarsi., Julyani, S., Samad, R., Muhiddin, R.A. 2024. Adverse events in donors at the blood donation unit of Indonesian Red Cross, Makassar. *Indonesian Journal of Blood and Transfusion* 2(1): 1-4

INTRODUCTION

Blood is a human body component that cannot be produced synthetically.[1] Thus, a procedure known as blood donation is required to meet the need for blood shortages.[2] In 2018, the Data and Information Center of the Ministry of Health of the Republic of Indonesia regarding the blood donor situation showed a shortage of blood needs. One of the obstacles faced in providing donor blood is adverse events.[3]

Adverse events are unexpected events that occur at any stage in the blood donation process. Adverse events in blood donation are generally divided into two types: acute and chronic. The most common acute reaction is vasovagal reaction (VVR) or vasovagal syncope (VVS). The prevalence of adverse events in blood donation is reported to be 1%, whereas the incidence of VVR reaches around 75%. VVR that often occurs are sweating, paleness, nausea, vomiting, palpitations, weakness, thirst, shortness of breath, cramps, bladder/bowel incontinence, tremors, and seizures. VVS is a syncopal syndrome characterized by temporary loss of consciousness, generally accompanied by hypotension and relative bradycardia. VVS can result in decreased consciousness, which can cause injury to the donor. Chronic adverse events such as iron deficiency can occur in regular blood donors.[4–7]

The incidence of donor adverse events varies between countries, ranging from 0.08%–13%. These differences even occur in research conducted in the same country and year. It may be related to donor characteristics.[5] Data regarding adverse events for blood donation in Southeast Asia is still not widely available; in Indonesia, the prevalence of adverse events has not been well documented. The Indonesian Red Cross of Makassar City reports that the daily blood demand in Makassar City has increased by up to 100 percent. Thus, more blood donors are needed every day.

This study aimed to provide an overview of the frequency, types, and various risk factors associated with adverse events in blood donation to provide ideal donor characteristics to fulfill the need for blood donors, primarily in Makassar City, Indonesia.

METHODS

Study Design and Data Collection

This research is a cross-sectional retrospective study by taking secondary data from donor medical records at the Blood Transfusion Unit Indonesian Red Cross Makassar City from January 2019 to December 2021. The research population was all donors' medical records at Blood Transfusion Unit Indonesian Red Cross Makassar City. The research sample was all medical record data from donors at Blood

Transfusion Unit Indonesian Red Cross Makassar City who experienced adverse events. Determining donors with adverse events is by looking at the form filled out by the Blood Transfusion Unit Indonesian Red Cross Makassar officer through an interview with the donor 30 minutes after the blood donation. The variables in this study include gender, age, donor status, blood type, body weight, pre-donation blood pressure, and adverse events that occur to the donor.

Data Analysis

Data analysis was performed using SPSS version 22 (Armonk, NY: IBM Corp.). The statistical methods used are frequency distribution and statistical tests. The statistical analysis carried out was descriptive statistical calculations as well as the Kolmogorov-Smirnov test (for adverse events data that is not normally distributed), the Gamma and Somers'd test, and the Spearman Rho test to analyze the influence and correlation of risk factors with the occurrence of adverse events. The test results are significant if the p-value is <0.05.

RESULTS

Characteristics of Subjects

Based on donor medical record data, the number of donors in this research period was 93,851, with the male being 70,389 people (75%). Donors who experienced adverse events were 135 people (0.14%) aged 17 – 51 years. The most common blood type is blood type O rhesus D positive. The number of first-time donors is also more significant than that of repeat donors. Donors with a body weight < 65 kg also experienced more adverse events than those with a body weight > 65 kg. Based on blood pressure classification, it was found that the number of donors with normal blood pressure/prehypertension was greater than that of donors with hypertension. The VVR was the most common adverse event, followed by hematoma (Table 1).

The Influence of Risk Factors on The Occurrence of Adverse Events

Based on Table 2, it was found that there was no significant influence of the risk

Table 1. Characteristics of subjects

Variables	n (%)	Mean ± SD
Sex		
Male	69 (51.1)	
Female	66 (48.9)	
Age (years)		
Young adult (17 – 39)	104 (77)	28.81 ± 8.68
Adults (40 – 60)	31 (23)	
Blood types		
A rhesus D positive	37 (27.4)	
B rhesus D positive	37 (27.4)	
AB rhesus D positive	9 (6.7)	
O rhesus D positive	52 (38.5)	
Donor status		
First-time donors	69 (51.1)	
Repeat donors	66 (48.9)	
Body weight (kg)		
45 – 65	82 (60.7)	63.79 ± 11.56
>65	53 (39.3)	
Blood pressure (mmHg)		
Normal (<120/<80)	37 (27)	
Prehypertension (120 – 139/80 – 89)	63 (47)	124.01±12.96/79.64 ±9.20
Hypertension *grade* 1 (140 – 159/90 – 99)	32 (24)	
Hypertension *grade* 2 (≥160/≥100)	3 (2)	
Adverse Event		
VVR	132 (97.8)	
Hematoma	2 (1.5)	
Rebleeding	1 (0.7)	

Note: SD, standard deviation; VVR, vasovagal reaction.

Table 2. Analysis of the influence of risk factors on the occurrence of adverse events

Variable	VVR	Hematoma	Rebleeding	p-value*
Sex				
Male	68	1	0	0.462
Female	64	1	1	
Age (years)				
Young adult (17 – 39)	112	2	1	0.085
Adults (40 – 60)	20	0	0	
Blood types				
A rhesus D positive	36	1	0	
B rhesus D positive	36	0	1	0.325
AB rhesus D positive	8	1	0	
O rhesus D positive	52	0	0	
Donor status				
First-time donors	68	1	0	0.530
Repeat donors	64	1	1	
Body weight (kg)				
45 – 65	80	1	1	0.799
>65	52	1	0	
Blood pressure				
Normal or Prehypertension	97	2	2	0.092
Hypertension (*Grade* 1 and 2)	35	0	0	

Note: *Gamma and Somers'd test; VVR, vasovagal reaction

Table 3. Correlation of risk factors with the occurrence of adverse events

Variable	Adverse events	
	r*	p-value*
Sex	0.066	0.448
Age	-0.082	0.343
Blood types	-0.068	0.435
Donor status	0.054	0.537
Body weight	-0.021	0.807
Blood pressure	-0.065	0.456

Note: *Spearman Rho test

factors of gender, age, blood type, donor status, body weight, and blood pressure on the incidence of adverse events with a p-value of 0.462; 0.085; 0.325; 0.530; 0.799 and 0.092, respectively.

Correlation of Risk Factors with The Occurrence of Adverse Events

In the Spearman Rho correlation test, it was found that there was no significant correlation between the risk factors of gender, age, blood type, donor status, body weight, and blood pressure with the incidence of adverse events with a p-value of 0.448; 0.343; 0.435, 0.537, 0.807 and 0.456, respectively (Table 3).

DISCUSSION

In this study, the ratio of male donors who experienced adverse events compared to women was 51.1%: 48.9%. It is associated with global statistics that the number of male donors is more significant than that of female donors.[7] Filshtinskaya et al. stated that women have a fear of experiencing more significant trauma during and after the donor process.[8] However, in line with that, women also strongly believe in the humanitarian aspect: the possibility of saving other people's lives.[7,9]

The number of first-time donors in this study was slightly more significant than that of repeat donors. One study showed that first-time donors had an adverse events rate of 1.84%, which fell to 0.79% when repeat donors. Although similar trends were seen in male and female donors, the differences were not statistically significant. First-time donors usually feel more anxious and afraid than repeat donors because they have no experience donating blood. It is this anxiety that has a direct emotional impact that can cause VVR.[7]

The average donor body weight was 63.79 kg, with a weight range of 46 – 105 kg. The weight criteria limit follows the provisions of the Regulation of the Minister of Health of the Republic of Indonesia (2015) for 350 mL volume of blood; the donor body weighs a minimum of 45 kg. Donor body weight, which is a less representative indicator compared to body mass index (BMI), is also a factor that plays an essential role in the incidence of serious adverse events. One study noted that increasing body weight from 45 kg to 80 kg decreased the incidence of adverse events. Another study also stated that the risk of adverse events doubled in donors weighing <54 kg. It is in line with this research that the incidence of adverse events was more common in donors with a body weight of 45 – 65 kg compared to donors with a body weight of > 65 kg.[10,11]

We also observed that most donors who experienced adverse events had normal blood pressure/prehypertension (74%). The study by Almutairi et al. also stated that normal blood pressure and prehypertension were found in 167 (80.3%) donors, while 41 donors (19.7%) were classified as hypertensive.[11,12]

The most common adverse events in all donors were VVR 97.8%, hematoma 1.5%, and rebleeding 0.7%. The VVR is an adverse event with the most frequency found globally. Savaliya et al. reported that the percentage of VVR was 53% among all adverse events.[13] Many factors cause VVR, but previous studies have revealed that psychosocial factors play a significant role. Psychosocial factors such as fear of needles, the sight of blood, state of mind, and quality and duration of sleep seem to harm donors, causing VVR reactions after or during blood donation.[14]

Based on our study, there was no influence of risk factors on adverse events. It differs from the findings of Almutairi et al., which stated that young blood donors, donors with a lower body weight, and donors who were giving blood for the first time had a higher risk of experiencing adverse events.[11] In our study, only four participants were 17 years old and were first-time donors; the other participants were young adults, and the majority were over 20 years old, and generally, all participants had sufficient body weight. Jerry et al. stated that the group most vulnerable to suffering adverse events is 16 and 17-year-olds. There were very few participants in this age group in our study, so it may not be able to provide an overview of the influence of the age group on the incidence of adverse events.[15]

The limitation of this study is that although our participants have passed vital signs testing and hemoglobin level testing using standard measurement equipment, are in good health, and meet the donation criteria, there are still many factors that have not been explored in more depth, such as investigating whether the participants are sufficient or lacking sleep, adequate food intake or not, which is likely very different for each individual. In the correlation test between risk factors and adverse events, it was found that there was a correlation, but it was not significant.

CONCLUSION

The incidence of adverse events in this study shows global agreement that this event occurs mainly in young adult donors, men, blood type O, slightly more common in men and first-time donors, weight <65 kg, and normal blood pressure or prehypertension. However, this study did not find a correlation between risk factors such as age, gender, blood type, donor status, body weight, and blood pressure and the incidence of adverse events. Further study is needed by involving a larger sample size, various centers, or over a more extended period to update the findings.

DISCLOSURES

Conflict of Interest

There is no conflict of interest in this work, according to all of the authors.

Ethical Consideration

All procedures were approved by the Health Research Ethics Commission, Faculty of Medicine, Hasanuddin University – Dr Wahidin Sudirohusodo Hospital – Hasanuddin University Hospital with Number: 438/UN4.6.4.5.31/PP36/2022 on August 18, 2022.

Funding

This work is not receiving any outside support.

Author Contributions

Each author participated to this study and made equal statements.

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