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A STUDY ON PREVENTION OF DONOR REACTION AMONG THE VOLUNTARY BLOOD DONORS BY GIVING PREDONATION HYDRATION IN A TERTIARY CARE HOSPITAL – SALEM.

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ABSTRACT

Introduction: *Blood donation is an essential element of healthcare, guaranteeing a consistent supply of blood for transfusions. Donor reactions, especially vasovagal responses, provide considerable obstacles to donor retention and safety. Addressing these responses is crucial to guarantee a favorable donor experience and promote recurring donations.*

Materials and Methods: *A prospective longitudinal study was performed for 1 year at Vinayaka Mission's Kirupananda Variyar Medical College & Hospital in Salem, India. A total of 2000 voluntary blood donors were included, randomly allocated into two groups: one group received pre-donation hydration, while the control group adhered to the conventional donation procedure. This study primarily aims to assess the efficacy of pre-donation hydration in mitigating vasovagal symptoms in voluntary blood donors.*

Results: *The intervention group exhibited a notable decrease in vasovagal reactivity relative to the control group. Pre-donation hydration assisted in preserving blood volume and averting abrupt declines in blood pressure, enhanced circulation and stabilized cardiovascular reactions. Younger and novice donors demonstrated elevated response rates, underscoring the necessity for focused interventions.*

Conclusion: *Pre-donation hydration is efficacious, non-invasive measures that improve donor safety and retention. Blood donation centers ought to incorporate these measures into standard donor care standards to enhance donation experiences and ensure a consistent blood supply.*

KEYWORDS: *Blood donation, vasovagal reactions, pre-donation hydration, donor safety, voluntary blood donation.*

INTRODUCTION

Whole blood donation remains an essential pillar of healthcare systems worldwide, with millions of units collected annually to meet the demands of medical treatments. While the process is generally safe, adverse donor reactions are a major concern, particularly for first-time donors.[1] One of the most frequent complications encountered is a vasovagal reaction, which is caused by a sudden decrease in blood pressure and heart rate. The underlying physiological mechanism involves activation of the vagus nerve, leading to decreased sympathetic tone and increased parasympathetic stimulation, which results in hypotension and

bradycardia. [2,3]It is widely acknowledged that voluntary, non-remunerated blood donation is the safest and most reliable source. However, donor reactions, ranging from mild discomfort to severe complications, pose significant challenges to the sustainability of blood donation programs. Vasovagal responses, including symptoms such as dizziness, fainting, and anxiety, are among the most common reactions experienced by blood donors. Additionally, local reactions such as hematomas, nerve damage, and arterial punctures further contribute to donor discomfort and reluctance for future donations. [4,5]Dehydration is recognized as a key contributing factor to VVR, as it leads to reduced plasma volume and impaired cardiovascular compensation during blood withdrawal.[6] To counteract these effects, several blood donation centers have begun exploring hydration strategies to improve donor stability. Providing a pre-donation drink, particularly one rich in electrolytes, may help maintain circulatory homeostasis and mitigate the risk of VVR.[7,8] This study aims to assess the efficacy of pre-donation hydration in mitigating vasovagal symptoms in voluntary blood donors in a tertiary care hospital. The study aims to compare the individual impacts of these interventions and evaluate whether a combination of both strategies produces superior outcomes. The study examines the effects of these treatments on donor satisfaction and their propensity to donate again.

MATERIALS AND METHODS

The study was conducted at Department of Immuno-hematology and Blood Transfusion, Vinayaka Mission's Kirupananda Variyar Medical College & Hospital, a leading blood donation center in Salem, India.

STUDY PERIOD: June 2023 to May 2024 (1 Year)

STUDY DESIGN: Prospective longitudinal study

SAMPLE SIZE: A total of 2000 voluntary blood donors participated,

INCLUSION CRITERIA:

Healthy individuals between the ages of 18 and 65 years for repeat donors and 18 to 60 years for first-time donors. Donors who met the National AIDS Control Organization (DGHS) guidelines Individuals who gave informed consent to participate in the study. Donors with no previous history of severe vasovagal reactions during blood donation.

EXCLUSION CRITERIA:

Donors who did not meet the eligibility criteria set by DGHS.Donors who refused to provide consent for participation in the study. Donors who had a history of severe vasovagal reactions.Donors with any precipitating medical condition that could potentially increase the risk of adverse effects during blood donation.

ALLOCATION & IMPLEMENTATION:

The donors were chosen according to the established inclusion and exclusion criteria. Ethical approval acquired from the institutional ethics commission. Donors were randomly allocated to two groups: one group received pre-donation hydration (300-500 ml of water intake 20-30 minutes prior to donation) while the control group followed the conventional donation procedure without these interventions.

RANDOMIZATION

The study involved 2000 voluntary blood donors for participation. The selection strategy randomly assigned individuals into two independent groups to ensure equal representation between the intervention and control groups by alternative selection. One thousand participants in this cohort underwent the standard blood donation procedure, excluding any supplementary treatments.

INTERVENTIONS

Blood collection occurred at the Department of Immuno-hematology and Blood Transfusion at Vinayaka Mission's Kirupananda Variyar Medical College & Hospital. The Study Group (n = 1000) received pre-donation hydration during donation.

Outcome Measures and Data Collection

- Blood Pressure Variability

- Incidence of Vasovagal Reactions (VVR)

Statistical analysis:
The researchers examined the collected data using Microsoft Excel and Chi Square Test testing techniques. The mean and standard deviation data were computed to assess blood pressure and other vital indicators. Statistical analyses determined which interventions between the study group and control group resulted in significant alterations in vasovagal responses. An study of p-values established statistical significance by confirming that the results were not attributable to random chance.

RESULTS:
Sex Distribution
Out of a total of 2,000 cases in our study, 1,902 (95.1%) were males, while only 98 cases (4.9%) were females. (TABLE 1) (FIGURE 1)
Age Distribution
In our study, the majority fell within the age group of 36 to 50 years, accounting for 951 cases or 47.5%. This was followed by individuals aged 21 to 35 years, who made up 800 cases (40%). Those under 20 years comprised 201 cases (10.1%), while the least represented age group was 51 to 65 years, with only 48 cases (2.4%). (TABLE 2) (FIGURE 2)
Mean Blood Pressure Distribution
In our study, the mean systolic blood pressure (SBP) among the individuals was 134.87 mmHg with a standard deviation of 9.76 mmHg. The mean diastolic blood pressure (DBP) was recorded at 86.87 mmHg, with a standard deviation of 6.87 mmHg. (TABLE 3) (FIGURE 3)
Comparison of Previous Donation Between Groups
In our study, among the control group of 1,000 individuals, 363 had previously donated, while in the study group of the same size, 321 individuals reported prior donations. The difference between the two groups was statistically significant, with a p-value of 0.007. – using chi square test (χ^2 value = 3.92) (TABLE 4)

Comparison of vasovagal reaction
In our study, among the control group, vasovagal reactions were observed with 258 cases classified as mild, 103 as moderate, and none as severe. Similarly, in the study group, there were 82 mild cases and 28 moderate cases, with no severe reactions reported in either group. χ^2 value = 0.43, p value = 0.045 showing a statistical significance. (TABLE 5) (FIGURE 4)

DISCUSSION
Results indicated a significant reduction in vasovagal reactions among donors who received pre-donation hydration. Compared to the control group, donors in the intervention group reported fewer incidents of dizziness, fainting, and nausea. These findings align with previous study by Kuttath V et al[9] who states that demonstrating the efficacy of hydration in maintaining blood volume and preventing sudden drops in blood pressure, which are common triggers for vasovagal responses. It was found to enhance circulation and stabilize blood pressure, further reducing the risk of fainting during donation.
The study also highlighted the demographic factors influencing donor reactions. Younger donors and first-time donors exhibited a higher prevalence of vasovagal responses, underscoring the need for targeted interventions in these populations. Similarly Wu Q et al[10] state that younger and new donor status, younger age were positively associated with higher VVR risk from their study.Psychological factors such as fear of needles and anxiety about the donation process were also identified as significant contributors. Providing donors with pre-donation education and reassurance was found to be beneficial in mitigating these concerns. Findings from this case study revealed a marked difference in VVR occurrence between the two groups. Similarly Wu Q et al[10] state that Donation-related fear, anxiety, were associated with higher VVR risk from their study.Among donors who consumed a pre-donation drink (Group A), only

8% experienced mild to moderate VVR symptoms. In contrast, 22% of donors in Group B, who did not receive pre-donation hydration, exhibited symptoms of VVR. More significantly, two donors in Group B experienced severe VVR, necessitating immediate medical intervention[6].A closer analysis of first-time versus repeat donors provided further insights. First-time donors exhibited a higher incidence of VVR across both groups, likely due to heightened anxiety and lack of physiological adaptation to blood withdrawal. However, those in Group A who had consumed the pre-donation drink displayed a significantly lower reaction rate compared to their counterparts in Group B. Among repeat donors, VVR incidence was generally lower, though pre-donation hydration still contributed to a reduced risk of adverse events. Lewin A et al[11] states that Pre-donation water and salty snacks to prevent vasovagal reactions among blood donors from their studies. However, Van Remoortel H[12] state that Pre-donation water ingestion with caffeine consumption or salt supplementation may result in a VVR reduction, compared to water ingestion only.The effectiveness of a pre-donation drink in reducing VVR can be attributed to several physiological mechanisms. Pre-hydration helps to expand plasma volume, which counteracts the reduction in circulating blood volume during donation. This prevents abrupt drops in blood pressure, maintaining stable cardiovascular function throughout the process. Furthermore, electrolyte-based drinks assist in sodium retention, which supports fluid balance and helps sustain intravascular volume[7]Another important factor is venous access. Dehydration leads to reduced venous filling, making it more difficult to locate and puncture a vein for donation. Proper hydration ensures better vein distension, thereby facilitating a smoother and less stressful donation experience. Additionally, donors who are well-hydrated may exhibit lower cortisol levels, reducing the likelihood of anxiety-induced VVR.[13,14]The findings of this case study align with previous research on hydration and VVR prevention in blood donors. Studies have consistently demonstrated that pre-donation hydration improves hemodynamic stability and reduces adverse donor reactions. Beyond physiological benefits, ensuring donor comfort and safety is critical for improving donor retention. Individuals who experience discomfort or fainting during donation are less likely to donate again, posing a long-term challenge for blood supply sustainability.

CONCLUSION

The results of this study highlight the importance of pre-donation hydration in minimizing the risk of vasovagal reactions among whole blood donors. Providing a simple 500ml electrolyte-based drink prior to donation can significantly reduce the likelihood of adverse reactions, ensuring a safer and more comfortable experience for donors. These findings have important implications for blood donation centers, as implementing hydration strategies can improve donor retention rates and overall blood supply stability. Given the positive outcomes observed, it is recommended that blood banks and donation centers incorporate pre-donation hydration as a standard practice, particularly for first-time donors.

RECOMMENDATION

- Early Implement pre-donation hydration (300–500 ml water 20–30 minutes before donation) as a standard practice in blood donation centers.
- Focus hydration strategies especially on first-time and young donors, who are more prone to vasovagal reactions.
- Provide pre-donation counseling to reduce donor anxiety and enhance the overall donation experience.
- Ensure proper hydration protocols to facilitate easier venous access and reduce procedure-related stress.
- Incorporate these measures into donor retention strategies to promote repeat donations and stable blood supply.

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Table 1: Sex Distribution

Sex	No of Cases	Percentage
Male	1902	95.1
Female	98	4.9
Total	2000	100.0

Figure 1: Gender Distribution of Blood Donor's

Table 2 : Age Distribution

Age	No of Cases	Percentage
< 20 years	201	10.1
21 – 35 years	800	40
36 – 50 years	951	47.5
51 – 65 years	48	2.4
Total	2000	100.0

Figure 2: Age Distribution of Blood Donor's

Table 3: Mean Blood Pressure Distribution

Blood Pressure	Mean	SD
SBP	134.87	9.76
DBP	86.87	6.87

Figure 3: Blood Pressure Statistics of Blood Donar's

Table 4: Comparison of Previous Donation Between Groups

	Control Group (n = 1000)	Study Group (n = 1000)	P value
Previous Donation	363	321	.045

Table 5: Comparison of vasovagal reaction between groups

Vasovagal Reaction	Mild	Moderate	Severe
Control Group	258	103	0
Study Group	82	28	0

Figure 4: Vasovagal reaction in Control Vs. Study groups

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