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Blood Donation Behaviours and Challenges: Insights from University Students in Saudi Arabia

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Abstract **Background and Aims:** Blood transfusion is vital in treating conditions such as sickle cell anemia and thalassemia. However, many students hesitate to donate due to limited awareness of its importance and related guidelines. This study assessed knowledge, attitudes and practices regarding blood donation among university students in Saudi Arabia, while identifying major challenges. **Methods:** A descriptive cross-sectional study was performed on 385 university students by administering a self-structured pre-validated questionnaire. Descriptive statistics was performed using frequencies and percentages for categorical variables. The chi-square test was utilized to assess the association between categorical variables. **Results:** About 6.5% of participants demonstrated good knowledge of blood donation, 53.2% showed moderate knowledge and 40.3% poor knowledge, with no significant associations found between knowledge levels and the assessed variables. A positive attitude was observed in 95.1% of students, with marital status being the only variable significantly linked to attitude. While just 31.9% had previously donated blood, approximately 83.6% expressed willingness to donate in the future. The main barriers to donation were chronic illness (78.4%), fear of infection (67.8%) and fear of fainting (63.9%). **Conclusion:** Despite strong willingness, students showed limited understanding of eligibility and health aspects of blood donation. Focused educational interventions are needed to correct misconceptions and enhance participation.

Key Words Blood Donation, Knowledge, Obstacles, Practices, University Students, Saudi Arabia

INTRODUCTION

There are currently no substitutes for the components of human blood that are essential for life. To ensure the best therapeutic outcomes, appropriate and safe blood and blood products practices should be followed and blood and its products should be easily accessible for usage in specific medical situations [1,2]. Blood transfusions are most frequently required for surgery, trauma, haematology disorders and problems associated to pregnancy, thus necessitating voluntary and regular donations for ensuring an adequate supply of blood for all blood types [3,4]. Thus, blood banks look for donors, screen for infectious diseases, process blood and keep it refrigerated for medical requirements [5,6].

Worldwide, more than 100 million units of blood are donated annually [7,8]. However, Saudi Arabia's average blood donation rate (13.8 per 1000) is lower than that of high-income nations (32.6 per 1000) mainly due to limited awareness and misconceptions about blood donation [9,10]. Previous studies revealed that a substantial number of the populace views blood donation and its social value negatively [2,11]. Among the Middle Eastern countries, Saudi Arabia is most affected by sickle cell anaemia and beta-thalassemia [3], with high prevalence in Al-Qunfudah (135.7% per 1000 Saudis) compared with Makkah (30.3%) and the Western region (28.5%) respectively [4]. Limited public awareness of the prevalence of these conditions and their frequent need for blood transfusions remains a

significant issue. Blood unviability is common in many healthcare settings due to an imbalance between the growing need for safe blood and blood products and the inability to arrange a regular supply of blood because of misunderstandings, perceived dangers and harms and low donor motivation [6]. This study aimed to assess the knowledge, attitudes and practices related to blood donation among university students in Saudi Arabia. The findings are intended to shed light on the challenges faced by students in this context, potentially guiding the development of effective solutions. Additionally, the results may contribute to raising awareness and promoting healthy blood donation practices within the university student population.

Study Objectives

This study aimed to:

- Assess the knowledge level about blood donation among university students in Saudi Arabia
- Evaluate attitudes towards blood donation among the study population
- Investigate current blood donation practices among university students
- Identify major barriers and challenges to blood donation
- Provide evidence-based recommendations for promoting blood donation awareness and participation

METHODS

A descriptive cross-sectional study was performed on 385 university students using questionnaire (developed using Google Forms, Google, Mountain View, CA, USA) as a tool for data collection that was distributed through electronic social media. The research data was collected over a period of two months, from February 2025 to March 2025. Students of both genders were included in the study. The minimum required sample size of 385 was determined using an online calculator (Qualtrics), with a 5% margin of error and a 95% confidence level. All participant information remained confidential, with no names or identification details collected. Participation was entirely voluntary, allowing participants to withdraw from the survey at any time. The study employed convenience sampling, which is acknowledged as a limitation that may affect the generalizability of findings to the broader student population. A self-structured pre-validated questionnaire was designed for collection of the data based on earlier studies [10,11]. After designing the questionnaire, it was rechecked by a panel of 3 specialists for the approval of its validity. Following pilot validation with 30 participants, the questionnaire's internal consistency was assessed using Cronbach's alpha. The alpha values for knowledge ($\alpha = 0.78$) and attitude ($\alpha = 0.82$) sections demonstrated good reliability.

The survey was divided into 5 parts.

- **Part 1:** Included 6 questions about the sociodemographic data of the participants as well as general information regarding blood transfusion
- **Part 2:** Consisted of 16 questions related to the participant's knowledge about blood donation knowledge. A three-point Likert scale (Yes, No and Don't Know) was used for evaluation. Each correct response was awarded one point, while incorrect and "Don't Know" responses received zero points. The total score and percentage were calculated for each participant. Knowledge levels were categorized as follows:
  - **Good knowledge:** 13-16 correct answers
  - **Moderate knowledge:** 9-12 correct answers
  - **Poor knowledge:** Less than 9 correct answers
- **Part 3:** Contained 7 items to assess participant's attitude towards blood donation. Participants were categorized as having either a positive or negative attitude based on their responses. Each statement assessed a specific attitude, with response options of "Agree," "Disagree," and "Neutral." A positive attitude was indicated by a specific response, while the remaining two responses were classified as representing a negative attitude
- **Part 4:** Included 4 statements regarding the practices of the participants related to blood donation
- **Part 5:** Included the barriers related to blood donation among the students

Ethical Approval and Informed Consent

The study was approved by the Local Committee of Bioethics (decision no. 6/25/H dated 27/01/2025) at Northern Border University, Arar, Saudi Arabia. Completing the survey was considered as providing informed consent. Participants who did not complete the survey were excluded from the study.

Ethical Compliance with Human Study

This study was conducted in compliance with the ethical standards of the University on human subjects as well as with the Helsinki Declaration. This study was conducted and reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross-sectional studies.

Data Analysis

For Data analysis, SPSS 26.0 (IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY, USA: IBM Corp) was used. Descriptive statistics was performed using frequencies and percentages for categorical variables. Chi square test was used to assess the relationship between sociodemographic factors and knowledge and attitude of the students towards blood donation. A p-value of <0.05 was considered statistically significant All assumptions for chi-square testing were verified prior to analysis, ensuring that expected cell frequencies were ≥ 5 in at least 80% of cells and no expected frequency was <1. Fisher's exact test was used when chi-square assumptions were not met.

RESULTS

Characteristics of the study population are outlined in Table 1. The survey included 385 individuals, predominantly

Table 1: Demographic Details and General Information

Characteristics		Count	Percentage
Overall		385	100
Age	18-20	125	32.5
	21-24	125	32.5
	25-30	29	7.5
	More than 30 years	106	27.5
Gender	Male	174	45.2
	Female	211	54.8
Educational level	Other courses student	217	56.4
	Health professional student	168	43.6
Marital Status	Not married	264	68.6
	Married	121	31.4
I am aware of the right to voluntary blood donation?	No	59	15.3
	Yes	326	84.7
Describe the attitude of your family towards blood donation	Encouraging	318	82.6
	Discouraging	25	6.5
	Don't Know	42	10.9

Table 2: Items for Assessing Knowledge About Blood Donation

	Yes		No		Don't Know	
Knowledge items	Count	Percentage	Count	Percentage	Count	Percentage
1. I can donate blood to a person with the same blood group as me	343	89.1	5	1.3	37	9.6
2. I think that someone having Hepatitis C can't donate blood	256	66.5	28	7.3	101	26.2
3. A person with anaemia can't donate blood	315	81.8	31	8.1	39	10.1
4. I believe that it is necessary to do laboratory tests before undergoing blood donation	340	88.3	16	4.2	29	7.5
5. To stay healthy, blood donation should be every three months	216	56.1	46	11.9	123	31.9
6. A person can have anaemia caused by excessive blood donation	155	40.3	117	30.4	113	29.4
7. I think that on doing blood donation body's blood circulation is improved.	344	89.4	2	0.5	39	10.1
8. I understand that on doing the Blood donation, the bone marrow will be simulated to produce new red blood cells	313	81.3	3	0.8	69	17.9
9. Donor must be between 18 and 65 years	295	76.6	18	4.7	72	18.7
10. Blood donation lowers the risk of cardiovascular diseases	254	66.0	15	3.9	116	30.1
11. Smokers can donate blood	182	47.3	109	28.3	94	24.4
12. I think that the amount of blood withdrawn is 200 ml during the single blood donation process	156	40.5	46	11.9	183	47.5
13. The minimum weight limit for blood donation is 30kg	144	37.4	87	22.6	154	40.0
14. I understand that if someone has a fever on the day of blood donation can donate the blood.	64	16.6	211	54.8	110	28.6
15. A person with diabetes can donate blood	116	30.1	145	37.7	124	32.2
16. A person with hypertension can donate blood	126	32.7	119	30.9	140	36.4

aged 18-24 years. Gender distribution was fairly balanced. In terms of education, more than half of the participants were enrolled in non-health-related courses, while remaining were health professional students. Most participants were unmarried. High level of awareness regarding voluntary blood donation was identified, although a minority remained unaware. Moreover, familial attitudes on blood donation were mostly positive, with majority of the participants expressing encouragement from their families.

The data in Table 2 provides insights into participants' knowledge about blood donation. A total of 16 items were included in the assessment. Most participants correctly believed they can donate blood to someone with the same blood group and recognized the necessity of laboratory tests before donation. A significant awareness was observed among the participants about health-related limitations towards blood donation, particularly regarding anemia and Hepatitis C as contraindications. Nevertheless, some misconceptions were also identified regarding appropriate donation frequency and eligibility criteria. Awareness of the risks and benefits of blood donation varied among the participants, with some recognizing that excessive donation may contribute to anemia and that donation can stimulate bone marrow activity, while others remained unaware. The findings indicate uncertainty among the participants regarding eligibility of blood donation, including smoking status, minimum weight requirements, standard donation volume and temporary deferral due to fever. Additionally, there was notable confusion about the eligibility of individuals with chronic conditions such as diabetes and hypertension. The data indicates good knowledge in certain domains, yet it also uncovers notable deficiencies that could be addressed through targeted educational programs.

Table 3 illustrates the distribution of participants' knowledge levels concerning blood donation and was classified as good, moderate or poor. Furthermore, it analyses the correlation between knowledge levels and various factors, such as gender, age, educational attainment and the marital status of the participants. Overall, a substantial proportion of participants exhibited poor knowledge, while merely a small fraction demonstrated good knowledge. Age was not significantly associated with knowledge levels, though older participants showed slightly better awareness than younger ones. Similarly, gender

Table 3: Association Between Knowledge and Explanatory Variables

Knowledge items		Poor		Moderate		Good		Chi square statistic	p-value
		Count	Percentage	Count	Percentage	Count	Percentage		
Overall		155	40.3	205	53.2	25	6.5		
Age	18-20	56	44.8	62	49.6	7	5.6	6.264	0.395
	21-24	50	40.0	65	52.0	10	8.0		
	25-30	14	48.3	15	51.7	0	0.0		
	More than 30 years	35	33.0	63	59.4	8	7.5		
Gender	Male	77	44.3	89	51.1	8	4.6	3.277	0.193
	Female	78	37.0	116	55.0	17	8.1		
Educational level	Other courses student	93	42.9	115	53.0	9	4.1	5.054	0.079
	Health professional student	62	36.9	90	53.6	16	9.5		
Marital Status	Not married	114	43.2	134	50.8	16	6.1	3.001	0.222
	Married	41	33.9	71	58.7	9	7.4		

Table 4: Items for Assessing Attitude Towards Blood Donation

Attitude items	Agree		Neutral		Disagree	
	Count	Percentage	Count	Percentage	Count	Percentage
1. It is better to motivate others to donate blood	372	96.6	6	1.6	7	1.8
2. I think that most donars do blood donation out of religious beliefs only	103	26.8	47	12.2	235	61.0
3. I strongly belive that most donars responsibility to do blood donation is to save human lives	350	90.9	14	3.6	21	5.5
4. I think that blood donation should only be made for relatives and family members to avoid chances of mismatch transfusion and infections	54	14.0	13	3.4	318	82.6
5. I wish to receive training on blood donation practices and the related guidelines	289	75.1	48	12.5	48	12.5
6. I assure that I would like to do blood donation whenever there will be shortage in blood banks	310	80.5	26	6.8	49	12.7
7. I wish to participate in blood donation campains organised by my university and am willing to do bloood donation.	313	81.3	52	13.5	20	5.2

Table 5: Association between attitude and explanatory variables

Attitude items		Negative		Positive		Chi Square Statistic	p-value
		Count	Percentage	Count	Percentage		
Overall		19	4.9	366	95.1		
Age	18-20	9	7.2	116	92.8	3.721	0.285
	21-24	7	5.6	118	94.4		
	25-30	1	3.4	28	96.6		
	More than 30 years	2	1.9	104	98.1		
Gender	Male	9	5.2	165	94.8	0.038	1
	Female	10	4.7	201	95.3		
Educational level	Other courses student	12	5.5	205	94.5	0.375	0.639
	Health professional student	7	4.2	161	95.8		
Marital Status	Not married	18	6.8	246	93.2	6.349	0.02
	Married	1	0.8	120	99.2		

differences were not statistically significant, however, a slightly higher proportion of females demonstrated good knowledge as compared to males. The educational background had an impact on knowledge levels, as evidenced by health professional students exhibiting better understanding than those in other fields. Marital status showed no significant correlation with knowledge levels. In short, none of the examined explanatory variables demonstrated a statistically significant correlation with knowledge regarding blood donation, indicating that knowledge levels may be affected by other unassessed factors.

To assess students' attitudes toward blood donation, seven statements were provided and students indicated their responses by choosing "agree," "disagree," or "neutral." The results presented in Table 4 indicate that majority of the students exhibited a favorable attitude towards promoting donations among others. Furthermore, more than half were against religious discrimination in blood donation. Most students expressed a favorable view of blood donation as a responsebility and opposed the idea that blood donation should be limited to relatives. A large proportion expressed a willingness to undergo training on blood donation and indicated a readiness to donate in instances of blood shortages and to engage in blood donation campaigns organized by the university. The findings of our study gives an insight about accentuating motivation, responsibility and readiness to engage in donation activities among students.

Table 5 shows students attitude towards blood donation. Furthermore, it examines the correlation between sociodemographic variables and individuals' attitude regarding blood donation. The analysis indicated that the vast majority of participants had a positive attitude toward blood donation. Age, gender and educational background did not have a statistically significant effect on attitude, although older and health professional students tended to be slightly more positive. Marital status was identified as a significant variable, with married individuals exhibiting a more

Table 6: Practices Adopted Regarding Blood Donation

Practices		Count	Percentage
Have you ever donated blood	Yes	123	31.9
	No	244	63.4
	Can't remember	18	4.7
If yes, how many times have you donated	Once	66	53.7
	Twice	24	19.5
	Three or more	32	26.0
	Missing	1	0.8
Have you ever attended a lecture regard the importance of blood donation?	Yes	162	42.1
	No	187	48.6
	Can't remember	36	9.4
If the blood donation is needed anytime in the future, will you intend to donate the blood	Yes	322	83.6
	No	7	1.8
	Don't Know	56	14.5

Table 7: Obstacles to Blood Donation

	Yes		No		Don't Know	
Obstacles	Count	Percentage	Count	Percentage	Count	Percentage
Fear of Infection is the biggest obstacle to donate blood	261	67.8	63	16.4	61	15.8
Fear of Fainting is the biggest obstacle to donate blood	246	63.9	101	26.2	38	9.9
Fear of weakness is the biggest obstacle to donate blood	213	55.3	121	31.4	51	13.2
Fear of seeing blood is the biggest obstacle to donate blood	198	51.4	149	38.7	38	9.9
Unawareness of donation process is the biggest obstacle to donate blood	236	61.3	110	28.6	39	10.1
Having chronic disease is the biggest obstacle to donate blood	302	78.4	36	9.4	47	12.2

favorable attitude compared to unmarried participants. In summary, although positive attitude towards blood donation was prevalent, marital status emerged as the sole variable significantly associated with attitude levels.

Table 6 provides a summary of the blood donation practices among participants. Only a minority of participants reported having donated blood, whereas the majority had not done so or were unable to recall their donation status. Of the individuals who donated, contributions ranged from a single donation to multiple donations Furthermore, less than half of the participants reported having attended a lecture on the significance of blood donation, while most of them had not attended such a lecture or were unable to recall. Despite the low rate of past donation, participants' intentions to donate in the future were generally favorable, with most expressing willingness to contribute. The findings indicate a discrepancy between knowledge and practice, underscoring the necessity for enhanced awareness campaigns to convert willingness into action.

Table 7 displays several obstacles to blood donation faced by students. The presence of a chronic disease was identified as the main reason followed by the fear of infection and the fear of fainting. Additional barriers consisted of a lack of awareness regarding the donation process and apprehension about appearing weak. Although these barriers indicated concerns that hinder blood donation, a significant portion of participants either did not express these fears or remain uncertain about the donation process.

DISCUSSION

Blood transfusions save millions of lives worldwide each year and enable a variety of complex procedures that extend the lifespan of patients with severe acute and chronic disorders [2,5,7,12]. The shortage of blood and blood products can be somewhat lessened by students' availability in the teaching universities as source of voluntary blood donors. Despite having a positive attitude and comparatively excellent understanding about voluntary blood donation, some studies have revealed that students do not follow the guidelines regarding the blood donation well [6,8,10]. Our study findings suggested that while there were variations in knowledge levels about blood donation across different demographic groups, none of these differences reached statistical significance. This indicates that sociodemographic factors may not be strong predictors of knowledge about blood donation practices in health profession student's population. Further research may be needed to explore other potential factors influencing knowledge levels, such as socio-economic status or exposure to blood donation campaigns.

Our survey included 385 individuals, predominantly aged 18-24 years. This demographic knowledge gives an insight that like earlier studies younger populations were more interested and had been willing to participate in voluntary blood donation programs. The high level of awareness about voluntary blood donation among health profession students in our study is encouraging. This highlights an opportunity for targeted educational campaigns about blood donation within non-health academic settings to enhance awareness and participation among the students who are taking other non-health related courses.

The majority of our participants in the present study were unmarried, which was in agreement with earlier study highlighting that single individuals may have different motivations or find easy to overcome the barriers regarding blood donation compared to married individuals [1].

Previous studies on blood donation practices among health professional students have provided valuable insights into their understanding of key concepts and common misconceptions [13-15]. Our study revealed mixed

knowledge levels regarding donor eligibility and safety. While the majority of participants recognized that individuals with anemia should not donate and understood the importance of laboratory tests prior to donation, reflecting awareness of donor safety but still some gaps persisted. For instance, only a portion correctly understood that a person infected with Hepatitis C cannot donate, highlighting the need for increased awareness of infectious disease transmission risks. Similarly, fewer participants appreciated that excessive blood donation can lead to anemia, indicating limited understanding of the potential health impacts of frequent donations. Most participants demonstrated good knowledge of blood compatibility, correctly identifying that they could donate to someone with the same blood group. However, misconceptions remained regarding donation frequency and minimum hemoglobin levels, with a notable number believing that donations should occur every three months or holding incorrect assumptions about hemoglobin requirements.

Our study findings regarding perception, practices and myths related to blood donation were similar to the findings seen in few other studies [13-16]. A vast majority of participants in our study believed that blood donation improves blood circulation and stimulates bone marrow to produce new blood cells which were found to be similar to early study results [14,15]. However, there was confusion among few participants regarding other eligibility criteria for blood donation, such as minimum weight limit for donation and whether individuals with fever or diabetes can donate blood. There were also notable misconceptions, particularly regarding smokers' eligibility for donating blood and the amount of blood taken during donation. This indicates a need for better education on these topics. A minority of participants in our study believed that people donate blood solely out of religious purposes. This indicates that the majority do not view religious beliefs as the primary motive for blood donation. These findings align with the findings of other studies [14-16].

In the present study it was found that only a minority of participants have donated blood, whereas the majority had not done so or were unable to recall their donation status. This is in line with previous studies where majority of students have never donated blood in their lives [15,16]. In order to encourage voluntary blood donation and foster a positive attitude toward voluntary blood donation campaign, students should be given opportunities through frequent blood donation awareness programs and helping to encourage them to participate in blood donation camps. Furthermore, only less than half of the participants in the present study reported having attended a lecture on the significance of blood donation, while most of them had not attended such a lecture or were unable to recall. Earlier studies have shown that not many students have attended lectures on the importance of blood donation [13-15,17,18]. This indicates a gap in educational outreach, as nearly half of the participants in our study also have not received formal information on the blood donation topic, suggesting a need for more engaging and memorable experiences about participating in blood donation campaign after getting adequate knowledge and awareness by educational interventions.

The analysis of obstacles to blood donation among health professional students revealed several key concerns. The presence of a chronic disease was identified as the main reason followed by the fear of infection and the fear of fainting. Additional barriers consisted of a lack of awareness regarding the donation process and apprehension about appearing weak, reflecting misconceptions about blood donation practices. These beliefs may stem from a lack of accurate information or misunderstandings about donation guidelines. Understanding the barriers among student population may also help in developing effective strategies to encourage more blood donations. Educational campaigns by providing information about the safety of the procedure and tips for ensuring a comfortable donation experience could also help alleviate these fears among students.

Our study results give an insight that by providing clear, accessible information about the safety and benefits of blood donation, as well as addressing specific fears, organizations can work to overcome these barriers and encourage to contribute to voluntary blood donation among students.

CONCLUSIONS

The present study indicates a generally high level of interest for blood donations among health profession education students. However, there were significant gaps in knowledge about specific eligibility criteria for blood donation and the health implications of blood donation. Addressing these misconceptions through targeted educational initiatives can enhance overall understanding and encourage more students to participate in blood donation programs.

Recommendations

Based on the study findings, a multifaceted, evidence-based approach is recommended to enhance blood donation awareness and participation among university students in Saudi Arabia. Comprehensive, student-focused educational programs should be implemented to address misconceptions about eligibility, donation frequency, procedures and health effects, using interactive workshops, seminars and digital platforms. Universities should strengthen institutional support by organizing regular on-campus blood donation drives in collaboration with blood banks and health authorities, ensuring convenient access, mobile units during peak periods and adequate pre- and post-donation medical support. Targeted strategies are needed to reduce key barriers such as fear of infection, fainting and chronic illness, through reassurance about safety protocols, enhanced support for first-time donors and testimonial campaigns featuring student donors. Blood donation education should be integrated into orientation programs, curricula and wellness initiatives, supported by institutional policies that recognize donor contributions and facilitate participation.

Conflicts of Interest

The authors declare no conflicts of interest.

Ethical Approval and Informed Consent

The study was approved by the Local Committee of Bioethics (decision No. 6/25/H dated 27/01/2025) at Northern Border University, Arar, Saudi Arabia. Completing the survey was considered as providing informed consent. Participants who did not complete the survey were excluded from the study.

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