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ORIGINAL ARTICLE

Knowledge, Attitude, and Blood Donation Practices Among Medical Students in the Western Region of Saudi Arabia

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SUMMARY

Background: **Blood donation is a critical public health practice, yet many eligible individuals do not participate, even among healthcare students who are expected to lead by example. Understanding the knowledge, attitudes, and practices of medical students regarding blood donation is essential to improving future donation rates and addressing misconceptions.**
Methods: **A cross-sectional survey was conducted among 243 undergraduate medical students from various institutions in the western region of Saudi Arabia. Participants completed a structured questionnaire assessing their knowledge of blood donation eligibility, transfusion risks, benefits, attitudes toward donation, and past donation behavior. Statistical analysis was performed to identify associations between demographic variables and blood donation knowledge and practices.**
Results: **The majority of participants were female (83%) and Saudi nationals (86%), with most aged between 23 - 25 years. Knowledge about blood donation eligibility was moderate: 75.6% correctly identified the minimum age for donation, while only 29.6% were aware of the recommended donation interval. Most recognized transfusion-transmissible infections such as HIV (98.7%) and hepatitis B (95.1%). A high proportion (91.3%) correctly identified saving lives as the main benefit of donation, though misconceptions like boosting immunity were noted. Attitudes were overwhelmingly positive; 85.2% viewed donation as a moral responsibility and 85% were willing to donate voluntarily. However, only 26.8% had previously donated blood. Male students were significantly more likely to have donated than female students (44% vs. 20%; $p < 0.01$). Common barriers included health concerns, fear of needles, and personal reasons.**
Conclusions: **Despite strong awareness and positive attitudes, actual blood donation rates among medical students remain low. Gender differences and personal barriers significantly impact donation behavior. These findings underscore the need for targeted educational efforts, awareness campaigns, and institutional support to translate positive intentions into practice and improve donation rates among future healthcare providers.**
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INTRODUCTION

Blood donation plays a critical role in saving lives and supporting healthcare systems worldwide, especially in managing emergencies, surgical interventions, and chronic conditions such as anemia and cancer. Despite ongoing awareness campaigns and the proven safety of

blood donation, many regions still experience challenges in maintaining an adequate blood supply [1]. In Saudi Arabia, as in many countries, voluntary blood donation is vital for meeting the growing demand, yet participation rates often fall below national needs, with ongoing difficulties in recruiting regular donors [2].

Medical students represent a unique population that is expected to have a sound understanding of health-related behaviors, including the importance of blood donation. As future healthcare providers, their knowledge, attitudes, and personal practices can significantly influence public behavior and contribute to shaping national health outcomes [3]. Positive engagement of medical students in blood donation activities not only supports current healthcare demands but also helps in building a culture of donation among future professionals.

Previous research has shown that while many medical students are aware of the benefits of blood donation, gaps still exist in their detailed knowledge, such as eligibility criteria and donation frequency, notably, the vast majority (83.3%) had never donated blood before [4]. A study conducted between 2014 and 2015 reported that the majority of participants possessed adequate knowledge about blood donation. Among them, 99.2% recognized its importance to the community, while 30.1% had previously donated blood [5]. A study conducted in Makkah city among the medical science students revealed that medical students generally held a positive attitude toward blood donation, and those who had donated blood exhibited higher levels of awareness [6]. Moreover, a study assessing knowledge, attitude, and practice toward blood donation among medical students at Ibn Sina National College (ISNC) in Jeddah, Saudi Arabia, 47.9% (151) of participants demonstrated a positive attitude [7]. However, a positive attitude does not always translate into practice due to various personal, psychological, or logistical barriers [8]. Identifying these factors is crucial in designing targeted interventions to encourage regular, voluntary donations.

This study aims to evaluate the level of knowledge, attitude, and blood donation practices among medical students in the western region of Saudi Arabia. By understanding the current status and potential barriers among this group, the findings may help guide future educational initiatives and awareness campaigns to promote a sustainable culture of blood donation in the region.

MATERIALS AND METHODS

Study design

This cross-sectional survey was conducted in the western region of Saudi Arabia.

Participants

This study included medical students from various universities located in the western region of Saudi Arabia, including Jeddah, Makkah, and Taif. Eligible participants were male and female undergraduate medical students across all academic years who voluntarily agreed to participate in the study. Students who were not enrolled in a medical program or who declined to provide consent were excluded.

Data collection

Data were collected from February to April 2025, using a self-administered online questionnaire. The questionnaire was divided into three sections. The first section gathered information on the students' sociodemographic details. The second section contained items designed to evaluate their knowledge and attitudes regarding blood donation. The third section focused on assessing their blood donation practices and identifying potential barriers to donating. The questionnaire was distributed through social media platforms commonly used by students.

Study Variables

The study variables were divided into four main domains:

1) Demographic variables: age, gender, nationality, and university.

2) Knowledge: assessed by a series of factual questions about blood donation criteria, frequency, and benefits.

3) Attitude: measured by questions exploring students' beliefs and willingness to donate blood.

4) Practice: evaluated by asking about previous blood donation behavior, frequency, and reasons for donation or non-donation.

Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.0. (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies and percentages) were used to summarize the data. Chi-squared test was applied to assess associations between knowledge, attitude, and practice with demographic variable (gender). A p-value of < 0.05 was considered statistically significant.

RESULTS

A total of 243 undergraduate medical students participated in the study. The majority (54.3%) were aged between 23 - 25 years, followed by 22.2% over 25 years, and 23.5% aged 20 - 22 years. Most participants were female (83%, n = 202), and the remainder were male (17%, n = 41). Regarding nationality, 86% were Saudi nationals, while 14% were non-Saudi. In terms of educational affiliation, 59.3% (n = 96) were from Ibn Sina National College for Medical Studies. Other students were from Albatterjee Medical College (9%), Dr. Soliman Fakeeh College (6%), University of Jeddah (1.2%), and other institutions in western Saudi Arabia (24.7%) (Figure 1).

Table 1. Responses of medical students to knowledge questions about blood donation.

Knowledge of blood donation criteria		
Question	Responses	
	Correct answer n (%)	Wrong answer n (%)
What is the minimum age for blood donation in Saudi Arabia?	186 (75.6%)	57 (24.4%)
How often can a healthy adult male donate whole blood?	72 (29.6%)	171 (70.4%)
What is the minimum weight required to donate blood?	114 (46.9%)	129 (53.1%)
How long does a typical blood donation take?	96 (39.5%)	147 (60.5%)
Which of the following is *not* a requirement for blood donation?	219 (90%)	10% (24%)

Table 2. Responses of medical students to knowledge questions about transfusion risks and blood safety.

Knowledge of transfusion risks and blood safety		
Question		
Which diseases can be transmitted through unsafe blood transfusion?	Correct answer n (%)	Wrong answer n (%)
HIV	240 (98.7%)	3 (1.2%)
Hepatitis B	231 (95.1%)	12 (4.9)
Malaria	167 (68.7%)	76 (31.3%)
Diabetes	230 (95%)	13 (5%)

Table 3. Responses of medical students to Knowledge of the Benefits of Blood Donation.

Knowledge of benefits of blood donation	
Question	Responses n (%)
What are the benefits of blood donation?	
Helps save lives	222 (91.3%)
Boosts immunity	15 (6.2%)
Weight loss	0 (0%)
Enhances physical strength	6 (2.5%)
Female students	190 (94%)

Knowledge of blood donation criteria

To assess knowledge, participants were asked several questions. When asked about the minimum age for blood donation in Saudi Arabia, 75.6% correctly answered 18 years, indicating good awareness of legal eligibility. However, knowledge of donation frequency varied: while 29.6% correctly identified a three-month interval for whole blood donation, others believed donation could occur every 2 months (27.2%), every 4 weeks (25.9%), or once a year (17.3%) (Table 1).

Regarding the minimum weight required for blood donation, 46.9% of participants correctly selected 50 kg, while 49.4% chose 55 kg, indicating some confusion about eligibility criteria. However, there was no statistically significant association between gender and this knowledge among the medical students ($p > 0.05$). When asked how long the blood donation process takes, 39.5% selected 10 to 15 minutes, while 30.9% chose 5 to 10 minutes. Meanwhile, 21% thought it takes 30 - 45 minutes, and 8.6% believed it takes over an hour, indicating mixed understanding about the procedure duration (Table 1).

In identifying non-requirements for donation, 90% correctly chose "fasting before donation," while the remaining participants mistakenly selected essential requirements such as good health or age/weight eligibili-

Table 4. Answers of medical students to motivations and barriers of blood donation.

Motivations and barriers of blood donation	
Question	**Responses n (%)**
What motivated you to donate blood? (Select all that apply)	
To help others	**112 (46%)**
College campaign	**24 (10%)**
Personal/family medical emergency	**74 (30.5%)**
Religious reasons	**30 (12.3%)**
Other	**124 (51 %)**
What are your reasons for not donating blood? (Select all that apply)	
Fear of needles	**39 (16%)**
Lack of information/opportunity	**50 (20.5%)**
Health issues	**50 (20.5%)**
Not eligible	**20 (8.2%)**
I don't trust the safety of the process	**14 (5.7%)**
Other	**138 (56.7%)**

ty. Regarding the question, "Can a person donate blood while taking antibiotics?", 47% correctly answered "No" but 44% believed it was permissible after consulting a physician, and 8.6% incorrectly thought it was entirely acceptable. This points to some gaps in understanding medical disqualification criteria.

Knowledge of transfusion risks and blood safety

Participants were asked to identify diseases transmissible through blood transfusion. Most recognized HIV (98.7%), hepatitis B (95.1%), and malaria (68.7%) as transfusion-transmissible infections. However, 5% mistakenly identified diabetes, a non-transmissible condition, indicating some misunderstanding about disease transmission (Table 2).

Knowledge of benefits of blood donation

In this study students were asked about the primary benefit of blood donation, 91.3% correctly identified "helps save lives". Minor misconceptions were observed: 6.2% chose "boosts immunity" and 2.5% selected "enhances physical strength," while none selected "weight loss." This reflects a high awareness of the main purpose of blood donation, though some myths persist (Table 3).

In identifying blood recipients, most participants correctly selected accident victims (96.3%), surgical patients (97.5%), and cancer patients (76.5%). However, 7.4% incorrectly included diabetic patients, who do not typically require transfusions unless complications are present. This suggests mostly accurate knowledge with some confusion about clinical indications.

Attitudes and beliefs toward voluntary donation

When asked how safe they perceived the blood donation process to be, 39% considered it very safe, and 33.3% somewhat safe. Only 1.2% believed it was unsafe, but a notable 25.9% responded "I don't know", reflecting uncertainty about safety protocols.

The study showed that most participants (85.2%) believed blood donation is a moral responsibility, indicating strong ethical motivation. Similarly, 85% expressed willingness to donate voluntarily, while 12% were uncertain. The result of this study found no statistically significant association between gender and attitude toward blood donation among the medical students in this sample ($p > 0.05$). Regarding the health benefits of blood donation, 56.8% believed it is beneficial, 38.3% were unsure, and the rest disagreed showing mixed perceptions about its personal impact.

A very high proportion (95%) stated they would donate blood if a friend or family member needed it, suggesting strong altruistic tendencies. Participation in college-organized campaigns was also supported, with 64% expressing willingness and 31% choosing "maybe".

Regarding mandatory donation policies for medical students, 42% supported the idea, 21% opposed it, and 37% were uncertain indicating diverse perspectives and some ambivalence toward making donation compulsory within medical education.

Practices and barriers related to blood donation

Only 26.8% of participants had previously donated blood, while the majority had never donated. Among those who had donated, 14.6% reported donating once, and 10% had donated two to three times. This study found a statistically significant association between gender and previous blood donation ($p < 0.01$). Male students (44%; 18 out of 41) were more likely to have donated blood compared to female students (20%; 40 out of 202). Regarding motivations, the most commonly re-

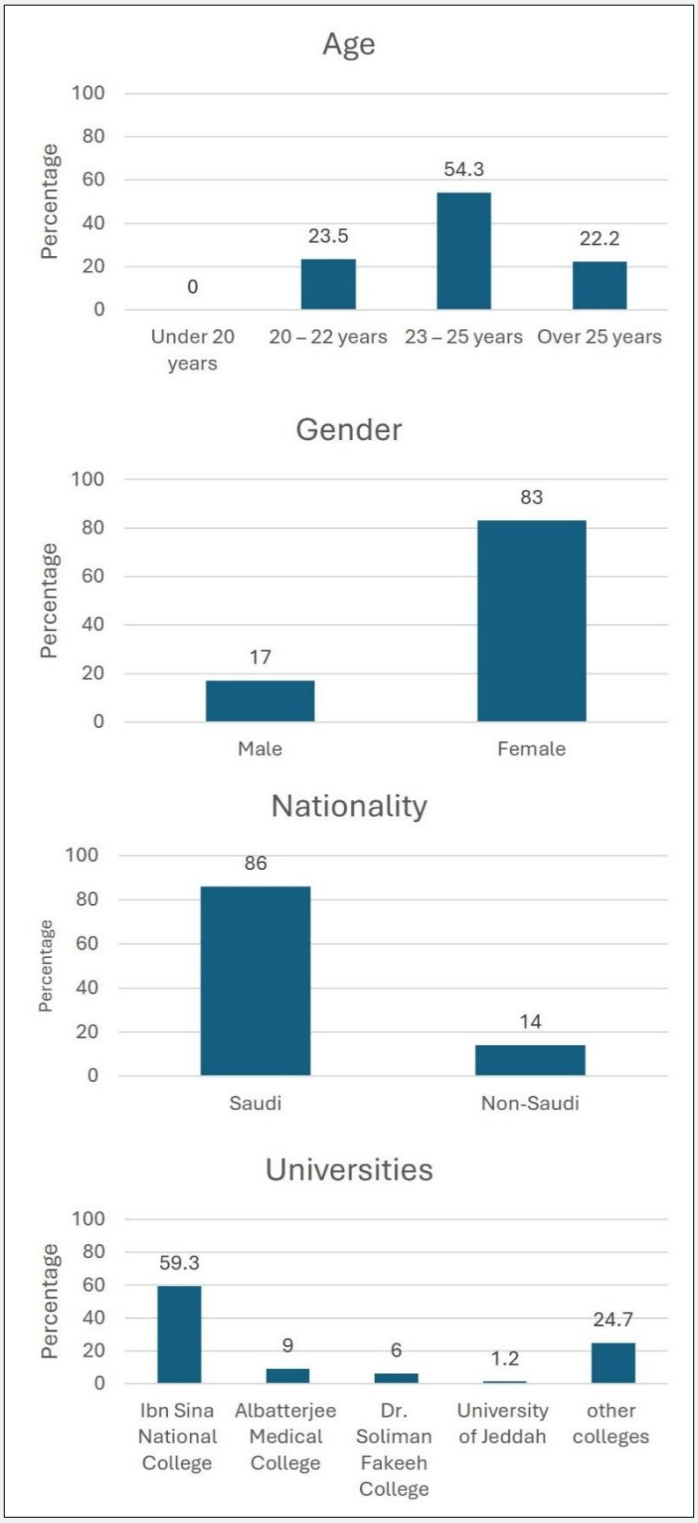

Figure 1. Demographic data of the study participants.

ported reason was to help others (46%), followed by a personal or family medical emergency (30.5%), religious reasons (12.3%), and college campaigns (10%). Notably, 51% selected "other", suggesting a wide range of individual motivations.

When asked about reasons for not donating blood, 20.7% cited health issues, 16% reported fear of needles, 18.3% gave other personal reasons, 8.2% noted ineligibility, and 5.7% expressed distrust in the safety of the process. A substantial proportion (56.7%) chose "other" reasons, again highlighting diverse personal and situational barriers to donation (Table 4).

DISCUSSION

This study explored the knowledge, attitudes, and practices related to blood donation among 243 undergraduate medical students in western Saudi Arabia. The findings provide valuable insight into the current state of awareness and behavior among future healthcare professionals, an essential group that plays a key role in shaping public perception and participation in voluntary blood donation programs.

Knowledge of blood donation criteria

The study revealed a moderate level of knowledge among participants regarding blood donation eligibility. For example, while a strong majority (75.6%) correctly identified the minimum legal age for blood donation in Saudi Arabia as 18 years, only 46.9% correctly identified 50 kg as the minimum weight. A nearly equal proportion (49.4%) believed the requirement was 55 kg, indicating confusion around this standard. These findings align with previous research in Saudi Arabia, such as Felimban et al., which highlighted knowledge gaps among students at Applied Medical Sciences regarding donation criteria [9].

Additionally, awareness of donation frequency was variable, with only 29.6% correctly stating the three-month interval for whole blood donation. However, a study conducted at Riyadh City has found that 92.2% of participants had good knowledge about the frequency of blood donation being every 3 months [10].

When asked about the time required for blood donation, only 39.5% correctly selected 10 - 15 minutes. These misconceptions reflect a lack of understanding of the procedural aspects of donation, which could lead to unnecessary anxiety or avoidance. Another regional study by Rizwan in Taif, had found similar confusion among university students, which reported inconsistent responses regarding donation time and eligibility [11]. Encouragingly, a large majority (90%) knew that fasting is not a requirement for blood donation. However, knowledge related to antibiotic use was less accurate; only 47% correctly responded that individuals taking antibiotics should not donate, while 44% believed donation was permissible with physician advice. These figures suggest a need for clearer educational messaging about temporary deferrals due to medication, a finding also reflected in literature from Qatar and India [12,13].

Knowledge of blood safety and transfusion risks

The present study findings showed that the majority of participants correctly recognized that HIV (98.7%), hepatitis B (95.1%), and malaria (68.7%) are transmissible through blood transfusions. However, a small proportion (5%) mistakenly identified diabetes as a transfusion-transmissible condition, indicating some confusion between communicable and non-communicable diseases. Similar misconceptions were reported in a study by Olaiya et al. in Nigeria, where 12% of respondents believed non-communicable conditions could be transmitted via transfusion [14].

Correct identification of blood recipients was generally strong, with most participants selecting accident victims, surgical patients, and cancer patients. However, a minority (7.4%) incorrectly included diabetic patients. This finding is comparable to reports from other studies in the region that found moderate gaps in clinical understanding among students [5].

Attitudes toward blood donation

In this study, the overall attitude toward blood donation among participants was predominantly positive. A majority (85.2%) believed that blood donation is a moral responsibility, and 85% expressed willingness to donate voluntarily. These findings are consistent with a previous study conducted among graduating undergraduate health science students in Ethiopia, where 79.2% of respondents held a positive attitude and considered blood donation a moral duty [15]. In contrast, a study by Ahmed et al. among Saudi medical students at Ibn Sina National College reported a lower proportion (47.9%) of students with a positive attitude toward blood donation [7].

Perceptions of safety were mixed, with only 39% reporting that they considered the donation process “very safe” and 25.9% indicating uncertainty. This reflects an area of concern, especially among medical students, who are expected to champion safe blood donation practices in the future. A similar trend of uncertainty about safety was reported in a study by WHO, emphasizing the ongoing need to improve knowledge about the safety and regulation of donation procedures [16]. Interestingly, 56.8% believed blood donation has health benefits for the donor, while 38.3% were unsure. This ambiguity reflects findings from global literature, where students often conflate scientific benefits with myths (e.g., improved immunity or strength). A recent study by Salem et al., presented 10% of medical students believed that blood donation could harm the donor health [3].

A strong altruistic sentiment was evident, as 95% of participants indicated willingness to donate if a friend or family member needed blood. This mirrors findings from other Saudi-based studies [5,6], which reported a high likelihood of conditional donations, although fewer

participants supported regular voluntary donation.
Regarding institutional involvement, 64% were willing to participate in college-organized blood drives, and 42% agreed that donation should be mandatory for medical students. However, 37% were uncertain, reflecting ethical or logistical reservations. Mandatory policies remain controversial in the literature; while some studies suggest they could improve supply, others argue they may reduce trust or autonomy [16].
Notably, the study found no statistically significant association between gender and attitude toward blood donation ($p > 0.05$), suggesting that both male and female students share similarly positive outlooks. Similarly, there was no statistically significant difference observed between female and male students' attitude at Taif University [11]. This is in contrast to some studies that reported gender-based differences, such as Bagot et al., where females were more hesitant due to fear or health concerns [17].

Practices and barriers
Despite high awareness and positive attitudes, only 26.8% of students had ever donated blood, reflecting a significant gap between intention and action. This is a recurring theme in global blood donation literature. The current study found a statistically significant association between gender and blood donation behavior ($p < 0.01$), with 44% of males having donated compared to only 20% of females. This gender disparity is consistent with a study from Syria, where male students were significantly more likely to donate with 69% of male participants having donated blood before [3]. However, another study showed no statistically significant difference in practices observed between female and male medical students [11]. This discrepancy may be attributed to variations in sociocultural norms, health beliefs, and institutional settings across different regions. In some countries, females may face greater physical or societal barriers to donating blood, such as concerns about anemia, and fear of needles. In contrast, in other settings where equal access, awareness, and encouragement are provided to both genders, these differences may diminish, leading to no statistically significant disparity. Moreover, this study reported common barriers for females include anemia, low weight, fear of needles, or cultural considerations.
The most common motivation for donation was helping others (46%), followed by personal or family medical need (30.5%). Religious motivation (12.3%) and college campaigns (10%) also played a role. These findings align with a study by Salaudeen et al. in Nigeria, where altruism was the top reason for donation, followed by emergencies and religious influence [18].
Among non-donors, commonly cited reasons included health issues (20.7%), fear of needles (16%), and ineligibility (8.2%). Notably, 56.7% selected "other" personal reasons, indicating a range of individual barriers that are often underexplored. These diverse factors underscore the need for targeted educational interventions and flexible donation strategies. Previous literature, such as the review by Dorle et al., emphasizes the effectiveness of emerging technologies, including social media outreach, peer-led campaigns, and counseling, in addressing such barriers and enhancing blood donation practices [19].

Limitations and recommendations
While the study provides important insights, it is limited by its cross-sectional nature and self-reported data, which may be subject to bias. Additionally, the gender imbalance (83% female) may have influenced outcomes, particularly behavioral associations. Future research should include qualitative approaches to better understand personal motivations and barriers.

CONCLUSION

This study found generally good knowledge and positive attitudes toward blood donation among medical students, but actual donation rates remain low. Significant gender differences exist in donation behavior, and various misconceptions persist regarding eligibility and health effects. Addressing these gaps through targeted interventions could enhance donation rates among this influential population group.

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Declaration of Interest:
The authors declare that they have no conflicts of interest.

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