Knowledge and attitudes towards blood donation among students of the Faculty of Applied Medical Sciences at King Abdulaziz University

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Abstract

Background: This study aimed to assess knowledge about and attitude towards blood donation among students at the Faculty of Applied Medical Sciences at King Abdulaziz University. In Saudi Arabia, the shortage of blood donors is a major challenge in blood banks. This could be due to low levels of community knowledge and unfavorable attitudes. **Methods:** A community-based cross-sectional study was conducted between November 2017 and July 2018. A total of 350 students were randomly selected and interviewed using a well-structured and validated electronic self-administered questionnaire. **Results:** Among the 350 students, the mean age was 22; 345 (98.5%) of the students were Saudi Arabian. Ninety-three (26.6%) of the students had a prior experience of blood donation, while 257 (73.4%) had never donated blood before. Three-hundred-forty-nine (99.8%) of the students had a good attitude towards blood donation. The majority (86.9%) of the students had good knowledge about blood donation, while 13.1% had poor knowledge. Of the 350 students, 240 (68.6%) strongly agreed that increasing blood donation awareness could increase blood donations. Thirty-five (15.1%) of students strongly agreed that donating blood causes anemia and 54 (15.4%) strongly agreed with the statement: "Blood donation can transmit diseases". **Conclusion:** These results reflect a strong positive knowledge about and attitude towards blood donations. The negative responses from students provide a platform for a future campaign that should recruit donors and motivate them to donate blood.

Background

Blood transfusion is the process of transferring blood or blood components from a donor into a recipient's circulatory system, intravenously. It is considered to be a potentially life-saving procedure in both routine and emergency conditions that can help replace blood cells or blood products lost due to severe bleeding due to accident-related injuries, surgical procedures, severe anemia, cancer, chronic diseases, malignancies, pregnancy complications, and other medical conditions. The blood donation rate is an indicator of the general availability of blood in a country. There is a significant difference in the level of access to blood between low-income and high-income countries. According to the World Health Organization (WHO), the blood donation rate is 4.4 donations per 1000 people in low-income countries, 8.1 donations per 1000 people in lower-middle-income countries, 15.1 donations per 1000 people in upper-middle-income countries, and 32.6 donations per 1000 people high-income countries (1).

Research examining the influential factors that affect blood donor recruitment and retention has shown that people's willingness to donate blood is influenced by sociodemographic, organizational, physiological, and psychological factors (2). The number of active blood donors has decreased over the last several decades, so it is unable to meet the increased demands for blood transfusions. Moreover, most people do not donate blood voluntarily; they only donate for their relatives or friends in need of a transfusion. Very few blood donors are paid (3). Furthermore, the issue of safety related to blood donations and transfusions, such as avoiding transfusion-transmissible infections (TTI), is a crucial concern, especially in developing countries; thus, blood transfusion is limited to relatives with special precautions (4).

Many countries that have voluntary and retaining donation systems offer incentives to donors, varying from free medical testing and blood credit, to economic incentives, including entry to events and raffle tickets, but without any monetary payment. It is widely known that demographic and geographic factors have a positive impact on blood donation attitudes (5). Furthermore, the convenience and satisfaction associated with when and where the donor gives blood were found to be important factors that govern the altruistic nature of donating blood (6).

While studies have indicated that knowledge about and attitudes towards blood donation are high, the level of donating blood is low (7). The knowledge and attitude of most Saudi Arabians has been reported to be good; and a high prevalence of blood donation was found, as was a favorable attitude toward donating blood (8). However, there are misconceptions about donating blood among the Saudi population. Thus, education about donating blood and increasing the motivation to do so are needed; this can be accomplished by disseminating information about blood donations, particularly using electronic media (9). In Saudi Arabia, each hospital has developed its own blood bank center that usually depends on a donor replacement program, although donors are not offered any incentives, even with the extensive and rapid modernization and development in the Saudi health services. Although the healthcare system in Saudi Arabia delivers highly specialized services with state-of-art equipment, it lacks detailed information on blood donor knowledge and attitudes. The present study was undertaken to examine the basic knowledge and attitudes that individuals living in Saudi Arabia have toward blood donation by assessing those factors in students at the Faculty of Applied Medical Sciences) FAMS at King Abdulaziz University (KAU).

Methods

A community-based cross-sectional study was conducted among FAMS students at KAU. The participants were undergraduate and postgraduate students from four departments: medical laboratory technology (MLT), physiotherapy, clinical nutrition, and radiology. A well-structured and validated electronic self-administered questionnaire was distributed to assess the students' knowledge about and attitudes towards blood donation.

The questionnaire consisted of four sections: sociodemographic characteristics (5 questions), general questions (5 questions), knowledge (12 questions), and attitudes (9 questions). The sociodemographic section included five questions pertaining to information about the participants, including gender, age, marital status, program, and year of study. General questions were used to assess the participants' blood donation practice. The knowledge part contained 12 questions covering donor selection criteria and blood donation screening. The attitude for blood donation was assessed using nine questions with scale options ranging from 1 (strongly agree) to 7 (strongly disagree). These questions were divided into positive attitudes (6 questions) and negative attitudes (3 questions).

Participation in the questionnaire was voluntary, and all the FAMS students were provided with a brief explanation of the research objective. They were only allowed to proceed and fill out the questionnaire

after they provided their informed consent. The study was conducted between November 2017 and July 2018; Arabic e-questionnaires were distributed to the students through official communication channels. Ethical approval was obtained from the unit of ethics, FAMS, Applied Medical Sciences, KAU, with the number (095–October/16/2017).

The sample size of this study was calculated to be a total of 350 full-time individuals studying at FAMS-KAU during the study period, as described by Kadam and Bhalerao (2010) (10), based on a confidence interval of 95% and a 5% margin of error, with an alpha level of 0.05.

A scoring mechanism was used to understand the participants' overall knowledge level; a score of 1 was given for each correct response and a score of 0 was given for an incorrect response, with a maximum of 12 points (a score of 6 or more indicated a good level of knowledge). All data were analyzed using Statistical Package for the Social Sciences (SPSS) version 24 software (SPSS Inc., Chicago, IL, USA).

Results

FAMS students' sociodemographic characteristics

The sample's sociodemographic characteristics, including age, gender, nationality, marital status, program, and year of study, were evaluated. A total of 350 students participated in the study and answered the questionnaire; the mean age of the respondents was 22.4, and 345 (98.5%) of the students were Saudi Arabian. Among them, 144 (41.1%) were men and 206 (58.9%) women. Of the 350 students, 286 (81.7%) were single, 48 (13.7%) were married, 15 (4.3%) were engaged, and 1 (0.3%) was widowed. Of the 350 participants, 179 (51.1%) were MLT students, 53 (15.1%) were physiotherapy students, 55 (15.7%) were clinical nutrition students, and 63 (18.0%) were radiology students (Table 1).

FAMS students' blood donation history

The results showed that 93 (26.5%) of the FAMS students had a prior experience of blood donation, while 257 (73.4%) of the students had never donated blood. Of those who had previously donated blood, 58 (16.6%) were MLT students, 29 (8.3%) were in the fourth year, and 61 (17.4%) were male. The results indicate statistical differences between the FAMS students' gender, program, and year of study, and their history of blood donation.

FAMS students' attitude toward blood donation

Table 2 indicated that almost the majority, 341 (97.4%), of the FAMS students had good attitude towards blood donation and thought that blood donation is important to patients. MLT, physiotherapy, and radiology students shown to have a better level of attitude when compared to clinical nutrition students. However, there was no statistical differences between FAMS students believe and sociodemographic factors.

FAMS students' level of knowledge about blood donation

The results describe the level of knowledge that FAMS students have about blood donation in comparison to the sociodemographic variables, including age, gender, program, study year, and nationality (Table 3). Generally, the majority (86.9%) of the FAMS students in all departments had a good level of knowledge about donating blood and blood transfusions; only 13.1% had a poor level of knowledge about donating blood. As illustrated in Table 4, the highest level of knowledge about blood donation was reported among FAMS students with an average age of 212; the average age of the FAMS students with a poor level of knowledge was 234.

In this study, females had a higher level of knowledge about blood donations than males. The data in Table 3 shows that 32.6% of the male FAMS students and 54.3% of the female FAMS students had a good level of knowledge about blood donations, while only 13.2% of the students of both genders had a poor level of knowledge. Furthermore, 85.4% of the Saudi FAMS students and 1.4% of the non-Saudi FAMS students had a good level of knowledge about blood donations; in comparison, 46% of the Saudi FAMS students and 0% of the non-Saudi FAMS students had a poor level of knowledge about blood donations.

The study year was found to be statistically significantly associated with knowledge about blood donation ($p < 0.005$). As seen in Table 3, the knowledge level (good) about blood donation was higher among FAMS students with the following study years: second (19.7%), third (23.1%), fourth (26.9%), MSc (9.7%), and internship (7.4%) years. In comparison, the knowledge level about blood donation was poor among FAMS students in the second (8%), third (2.6%), fourth (1.7%), MSc (0.3%), and internship (0.6%) years. This study also found that the majority of the FAMS students (73.4%) had never donated blood and only 26.5% had donated blood. Moreover, of the FAMS students with a good level of knowledge about blood donation, 25.1% had donated blood and 61.7% had not. In comparison, of the FAMS students who had a low level of knowledge about donating blood, 1.4% had donated blood and 11.7% had not.

FAMS students' positive attitudes toward blood donation

As shown in Table 4, 20.3% of the FAMS students strongly agreed, 19.7% agreed, 27.7% somewhat agreed, 15.7% neither agreed nor disagreed, 6.9% somewhat disagreed, 4.6% disagreed, and 5.1% strongly disagreed with the statement: "Blood donation is a religious duty." Moreover, 98 (28%) students strongly agreed and 79 (22.6%) agreed that giving gifts and money to donors could increase the number of blood donations. A total of 163 (46.6%) FAMS students strongly agreed that increasing the number of blood centers could increase the number of blood donations. Over half of the students (68.6%) strongly agreed that increasing blood donation awareness could also increase the number of blood donations. Only 187 (53.4%) of the 350 FAMS students strongly agreed that cell phone applications for a blood donor could increase the number of blood donations.

FAMS students' negative attitudes toward blood donation

Of the 350 FAMS students, 73.4% had never donated blood. Table 6 indicates the reasons for the shortage of blood donors among FAMS students. Generally, a lack of awareness about the importance of blood donation was the most prevalent reason among non-donors, and this survey showed that the reasons for the shortage of blood donors among FAMS students included the fear of needles and beliefs that blood donations cause anemia and can transmit diseases.

As shown in Table 5, 15.1% of the FAMS students strongly agreed that blood donations cause anemia, although 5.7% of them strongly disagreed with that statement. Furthermore, of the 350 FAMS students, 15.4% strongly agreed, 21.4% agreed, 22% somewhat agreed, 19.4% neither agree nor disagreed, 10.9% somewhat disagreed, 4% disagreed, and 6.9% strongly disagreed with the statement: "Blood donations can transmit diseases". About 80.8% of the FAMS students believed that the reason for the shortage of blood donors is due to their fear of needles, while 7.4% of the students did not hold that belief. However, 18.6%, 19.4%, and 11.8% of the FAMS students neither agreed nor disagreed (neutral) about the reason for the shortage of blood donors due to beliefs that blood donations cause anemia, beliefs that blood donations can transmit diseases, or the fear of needles, respectively.

Discussion

The shortage of blood supply in hospitals and blood donation centers may lead to global health problems for recipients. The main reasons for this shortage are associated with the need to recruit donors, and keep them motivated and committed to donating blood for blood transfusions. These factors are affected by the cultural, social, and educational backgrounds of the donors. The young population of university-level students are highly influential (3, 11, 12). Therefore, the present study aimed to analyze their behavior, knowledge about, and attitudes toward blood donation and to examine the factors that negatively influenced their willingness to donate blood within their community. This study is a community-based cross-sectional study that targeted FAMS students. First, it looked at the sociodemographic differences among the FAMS students and their current knowledge about and attitudes towards donating blood. The sociodemographic data of our FAMS students shows that the male-to-female ratio in this study was 1:1.4 and their mean age was 22 years; most were students in the MLT department at FAMS. The remaining students were from the radiology, clinical nutrition, or physiotherapy programs. We aimed to identify the percentage of students who had previously donated blood, in general, and to determine if their decision was impacted by the specialty area they were studying within FAMS.

Our data showed that the number of FAMS students who had previously donated blood was less than 30% of the total number of students at KAU; this shows a shortage in number of FAMS students that have participated in blood donations. The majority of these donors were male and were enrolled in the MLT program. It is not surprising to see increased rates of male donors because it correlates with many studies in the literature that have reported high blood donation rates from male donors in different

communities (11, 13, 14). In the MLT program, the undergraduate and postgraduate courses enable students to be more exposed to blood banks from a clinical, diagnostic, or research point of view, which might have played a role in the high rate of previous blood donations from the MLT students in our study. While the specialty that the students chose may have affected the number of donors in our study, we did not find any correlation between the students' academic level or progression and previous blood donations.

The second part of the study addressed the current awareness of how significant blood transfusions are for patients in need of such a procedure and for the community. In general, the FAMS students had a positive response to the question that measured their understanding of the health benefit of blood donation on a recipient's health. Interestingly, only 9 of the 350 FAMS students (2.6%) disagreed with the fact that blood donation is essential for a patient's health. The remaining 341 students acknowledge the health benefits of blood transfusions, particularly on a recipient's health. This data indicates that the majority of the FAMS students are aware of blood donations, regardless of their field of study or their academic level. This finding also means that the reduction in number of donors among FAMS students is not due to the lack of knowledge about its importance to health.

We then investigated if the students' age, gender, the program that each student was enrolled in, and their academic year affected their knowledge about donating blood. Our statistical analysis shows that the main factor that contributed to a good level of knowledge about blood donation was the students' field of study within the FAMS. Only 11.1% to 14.9% of the physiotherapy, clinical nutrition, and radiology students had a good level of knowledge about blood donation, in comparison to 47.4% of the students in the MLT program. This could be due to the fact that students in the MLT program are the only FAMS students that are eligible to work in blood bank laboratories in hospitals or blood donation centers as one of their career options after they graduate, as previously mentioned.

Among the questions that measured positive attitudes toward blood donations, the main factors that FAMS students believed would increase blood donations were increasing the accessibility and availability of blood donation centers and increasing the public's awareness about the necessity of blood donations. Most of the FAMS students responded positively to the fact that using an application to facilitate access to information about donating blood and registering to do so, would improve the current responses and lessen the need for recruiting donors in Saudi Arabia. We cannot ignore the importance of technology to this generation. Red Cross and Blood Donor Finder applications by Neologix are examples of applications that are available in the market that can facilitate communication with registered donors. The BLOODR application is currently being used by donors, requestors, and administrators to create a communication channel to contact local donors based on matching blood groups to the needs of recipients (15). Therefore, to increase the rates of donors in our centers, we need ensure that these types of applications are made accessible to the blood bank services and among the donor-recipient community.

Religion is a deeply rooted aspect of life in Saudi Arabia, and there is little doubt how that factor motivates donors, as they believe that donating is a religious duty. The current study emphasizes that

point, showing that 67.7% of all the FAMS students agreed on the importance of blood donation, from a religious perspective. However, 16.6% of the students in the present study did not agree with the fact that blood donation may be a religious act. The FAMS students in this study were members of a young population. Therefore, receiving something in return for donating blood was one of the motivational factors that most of them believed would increase the number of blood donations. The two incentives that were chosen in this study were gifts and money. Most of the study participants agreed with the idea of giving donors gifts in comparison to paying them for donating blood. Only a minority of the study participants objected to receiving monetary compensation in return for donating blood. In Saudi Arabia, the blood supply has shifted dramatically from using imported blood to paying local donors, and, lately, to complete dependence on the indigenous population, which comprises 71% of all voluntary donors and 29% of all involuntary donors who donate only if a relative, a friend, or coworker needs a transfusion (3).

Some of the factors included in the questionnaire aimed at measuring the students' negative attitudes or misconceptions about blood donations. These factors included questions related to the possible reasons for the low number of donors among FAMS students and if that was due to the fact that they think that donating blood might cause anemia or might transmit diseases, or if it might be due to the fear of needles. Interestingly, the majority of FAMS students agreed that blood donation could be a predetermining factor for anemia in donors. According to several studies, blood donation is associated with positive health outcomes. It can lower the risk of cardiovascular disease (CVD) by up to 88% in donors in comparison to non-donors (16, 17). Moreover, repeated donations can ultimately reduce blood viscosity and, potentially, lower blood pressure (18). It is also known that one event of whole blood donation would reduce the availability of heme iron for oxidative stress, thereby protecting cells from malignancy, insulin resistance, and atherosclerosis (19, 20).

In the present study, it is not surprising to find that most of the FAMS students responded yes to a question asking about the relationship between blood donations and transmitting diseases. In Tanzania, and areas where HIV is a common problem, people are, typically, discouraged from donating blood due to the fear of contracting the human immunodeficiency viruses (HIV) (21). In areas, such as Scotland, where acquired immunodeficiency syndrome (AIDS) is not a main health concern, responders did not express any concerns about transmitting HIV to blood donors (22). Therefore, it is imperative to identify the main issues that discourage a certain group in our society and correct any misconceptions they have when donor recruitment campaigns occur.

The number of pathogens that can be transmitted in a red blood cell transfusion to recipients, but not donors, was updated recently to include more than 22 viruses, 14 types of bacteria, and six species of protozoa (23). Fortunately, the number of recipients infected as a result of a blood transfusion is extremely rare; it is 1 in 1.5 million cases for HIV, 1 in 1.1 million cases for hepatitis C virus, and 1 in 282,000 cases for hepatitis B, due to strict adherence to screening tests prior to donation (24). According WHO, it is mandatory to screen for HIV-1, HIV-2, hepatitis B surface antigen (HBsAg), hepatitis C combination of antigens and antibodies or HCV antibodies, and syphilis. Other blood-borne diseases, such as malaria or Chagas, are only screened in areas where the disease is epidemic (25). Finally, and

considering that the mean age of the FAMS students was around 22 years, fear of needles was the main reason that the FAMS students thought caused a low rate of donating blood or blood components.

Conclusion

There is a great need to create awareness among a population of students about blood donations in order to maintain a regular blood supply. The data we gathered from the FAMS students reflect the baseline level information that our students have about blood transfusions. It shows that the reasons for the low rates of blood donors from FAMS students is not due to lack of knowledge about the necessity of blood transfusions to a patient's survival and to the health of the community. The negative responses we obtained from the FAMS students in this study provide a platform for future blood donation awareness campaigns that should help recruit donors and keep them motivated to consistently donate blood. This can be accomplished by answering all the common questions, correcting any misconceptions about blood donations, and ensuring to that the blood donation process is as comfortable as possible. Recruitment strategies should include well-planned incentives that suit the target group. A post-donation reward, in the form of gifts, was highly accepted in this group of FAMS students, so it should be considered. Any future recruitment campaign that results from this survey should aim at increasing the number of indigenous voluntary donors among the community until it is possible to meet the WHO recommendation of absolute dependence on voluntary donors who donate without anticipation of any compensation for their donation.

Declarations

- List of abbreviations: *AIDS: Acquired immunodeficiency syndrome; CVD: Cardiovascular disease; FAMS: Faculty of Applied Medical Sciences; N: Frequency; HBsAg: Hepatitis B surface antigen; HIV: Human immunodeficiency viruses; KAU: King Abdulaziz University; MLT: Medical laboratory technology; M: Mean; MSc: Master; SD: Standard deviation; SPSS: Statistical Package for the Social Sciences; TTI: Transfusion-transmissible infections; WHO: World Health Organization*
- Ethical approval and consent to participate: All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (the unit of ethics, FAMS, Applied Medical Sciences, KAU, with the number (095–October/16/2017). Informed consent was obtained from all individual participants included in the study.
- Consent to publish: Not applicable.
- Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.
- Competing interests: All authors declare that they have no competing of interest associated with this publication.
- Funding: There is no funding for this research. All cost of data collection and analysis were covered by the authors.

- Authors' contributions: *RF is the primary investigator on knowledge and attitude issues. RF and HS have been involved in the conception of the study, designed the study, contributed to data acquisition and assisted in the preparation of the manuscript. SK performed the electronic self-administered questionnaire, statistical analysis and interpretation of the data. RS assisted in the electronic self-administered questionnaire, text and table revisions, and manuscript edition. RF, SK, HS, RS assisted in providing a critical appraisal and review of the manuscript. All authors read and approved the final manuscript.*
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Tables

Due to technical limitation, Tables 1-5 are only available for download from the Supplementary Files section.

Supplementary Files

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