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Blood donation knowledge and attitude in the Kingdom of Saudi Arabia

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ABSTRACT

Background: Currently, there is a shortage of an adequate supply of blood and blood products due to the unavailability of voluntary, non-remunerated donors from low-risk populations. Therefore, it is important to address the reasons for the unavailability of blood donors in order to increase recruitment. *Aim:* This study determined the level of knowledge and attitude in the wider Saudi Arabian population towards blood donation. *Methods:* A cross sectional study was conducted using an online questionnaire between Novembers 2021 and October 2022. *Results:* Of the 1506 individuals, only 17.9% were donors, of whom 11.2% had donated blood before. Through analysing the knowledge score, 81.9% of participants possessed knowledge regarding the necessity of screening a donation for infections and 90.5% positively confirmed that the HIV virus could be spread through the blood donation route, however, they were not familiar with other infections, such as syphilis. With regards to the levels of attitude, 74.2% of respondents strongly agreed on raising awareness of the importance of blood donation, whilst 54.2% strongly agreed that the availability of mobile blood donation centres would increase the level of donation drastically. *Conclusions:* Although the study showed that respondents were aware of certain factors regarding blood donation, there was an insufficiency of knowledge and attitudes regarding blood donation. This finding highlighted the need for identifying and addressing the defect of the knowledge that leads to an undesirable attitude towards blood donation.

Keywords: Blood Donation, Knowledge, attitude, Saudi Arabia

1. INTRODUCTION

The demand for safe blood has dramatically increased over the past few decades with an ageing and growing population. This is tomaintain a constant supply of blood and blood products (red cells, platelets, fresh frozen plasma and cryoprecipitate), which then maintain the effectiveness of the health care system. Since recruiting safe, low risk volunteer donors is a challenge in Saudi

Arabia, a better understanding of the knowledge and attitude of the general Saudi Arabian population regarding blood donation will lead to improved intervention to promote safe, voluntary, non remunerated donors. Research examining the influential factors that would affect blood donor recruitment and retention has shown that the willingness of an individual's decision to donate blood is influenced by the sociodemographic, organizational, physiological and psychological factors (Boulware et al., 2002; Mousavi et al., 2011; Abbasi et al., 2018).

Additionally, many countries that have voluntary and retaining donation systems offer incentives to recruit donors, these include free medical testing, blood credit, time off work, small tokens, refreshments and reimbursement of direct travel costs, free entry to social events and free lottery or raffle tickets, which are all compatible with a voluntary, non remunerated donation, but without receiving payment as physical money. In Saudi Arabia, each hospital has developed its own blood bank centre, where the majority of donations come from replacement donors rather than volunteer donors and with offering incentives such as time off work, blood credit card if they require blood in future and award medals (Alam and Masalmeh Bel, 2004). Furthermore, socio-demographic and geographic factors have an influence on blood donation attitude (Dubey et al., 2014; Dubey et al., 2014). Likewise, the convenience and satisfaction associated with when and where the donor gives blood were found to be important factors for donating blood (Boulware et al., 2002). Therefore, understanding the motivations a blood donor has and identifying and correcting the misconception regarding donation, will encourage someone to decide to donate blood and have a positive attitude toward being a volunteer donor on a regular basis. Thus, the present study evaluated the basic blood donation knowledge and attitude of individuals living in Saudi Arabia toward blood donation.

Key point

Determination of reasons behind insufficient level of blood donation in Saudi Arabia

Inadequate attitudes and knowledge of blood donation amongst the population reveal the dire need for increasing awareness to improve voluntary donation.

2. METHODOLOGY

A community based cross sectional study was conducted between November 2021 and October 2022 among the Saudi Arabian population, using a well structured and validated electronic self-administered questionnaire to assess the knowledge and attitude about blood donation. Figure 1 shows the consort diagram of the participation in the questionnaire.

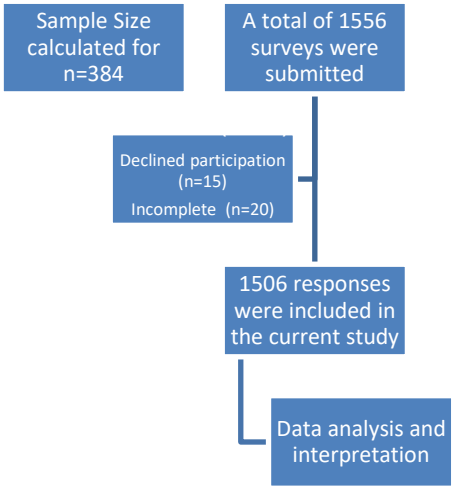

Figure 1 Consort diagram for the study and number of participants in the questionnaire.

Selection of Participants and Sample size calculation

The sample size of the current study was calculated to be a total of 384 individuals living in Saudi Arabia, aged 18 and more and included Saudi and non-Saudi participants. This sample size was estimated as described by (Kadam and Bhalerao, 2010), based on a confidence interval of 95% and 5% marginal error, with a 0.05 alpha level. However, in the current study, researchers obtained the required number of responses and collected a total of 1506 responses from individual participants.

Data collecting and survey design

Participation in this survey was voluntary; all contributors were given a briefing about the research objective and assured confidentiality in collecting personal information. Additionally, the contributors agreed on consent prior to completing the survey. The questionnaire consisted of four sections; socio demographic characteristics, general questions, knowledge and attitudes. The socio demographic section included ten questions that covered the necessary participant information, including; gender, age, nationality, marital status, religion, highest education level, occupation, monthly income, city and district. The blood donation practice section was utilised to evaluate the history of blood donation of the participant. The knowledge section was constructed to determine the participants' level of knowledge, structured with 12 questions that covered the benefits, requirements and restrictions of blood donation. A scoring system was used to understand the overall knowledge level; one score was given for each correct response and zero for the incorrect response, with a maximum of 12 points available (6 or more scores indicating good knowledge). The attitude section was structured to assess the attitude towards donating blood through nine questions with scale options from 7 (strongly agree) to 1 (strongly disagree). These questions were divided to assess either positive (6 questions) or negative (3 questions) attitudes.

Survey validation and pilot study

An online pilot study of 45 participants was conducted to ensure the survey's acceptability and consistency. Then, minor modifications were made according to the pilot study results.

Ethical approval

The Faculty of Applied Medical Sciences' ethics committee approved the project (AMSEC2-10-10-2017). Participants gave their informed agreement to participate in an online survey before the commencement of the survey. Also, the participants were requested to approve their participation. There were no monetary incentives for completing the survey.

Statistical analysis

The Statistical Package for Social Science (IBM SPSS) version 28 was used for data analysis. Findings were presented as mean, frequency and percentage tables; a Chi square test was performed to evaluate the relationships between categorical variables with $p < 0.05$. The One-Way ANOVA test determined the mean differences in quantitative variables between the two groups. The Spearman's rank correlation coefficient was evaluated to assess the association between knowledge and attitudes ($p< 0.05$). Additionally, the sum score of the outcome was evaluated according to Bloom's cut off point. The knowledge and attitude scores were transformed into mean percentage scores by dividing the sum scores obtained by the respondents by the number of items.

3. RESULTS

A total number of 1556 Saudi Arabian citizens took part in the current study. However, the statistical analysis was performed on 1506 individuals after data cleaning. The socio demographic information of the participants indicated that participants' average age was 25 years of age, whereas the majority 953 (63.3%) of participants, were between 20 to 29 years of age, all from different areas of the country (Table 1). Most of the participants were Muslims 1505 (99.9 %), Saudi Arabian 1415 (94%), females1285 (85.3%), single 1063 (70.6%) and from the western region 1080 (71.7%). More than half of the participants 823 (54.7%), were educated, had a bachelor's degree or higher and 1145 (76%) were employed, however, only 201 (13.3%) were working or studying a medical related speciality. In addition, 1178 (78.2%) of participants were in the lowest income bracket of 0-8699 Riyal Saudi.

A comparison of participants 'knowledge towards blood donation (Table 1, score mean ± S.D column) showed that participants aged 20 to 39 years old had a significantly higher average score (8.31±2.64 and 8.05±2.83) compared to other sand the male participants had a higher score (8.71±2.74) compared to the females (7.91±2.61). Furthermore, single participants had a higher average score (8.06 ±2.64) than the other groups without observation of any statistically significant differences. The lowest score was observed in the uneducated participants (3.67±1.15) and although only representing the minority of the population, it was found to be statistically significant. In this section, the results indicated a direct relationship between the score and educational level, where the higher the education level, the better the score. Additionally, a higher score was also observed for medical professionals (9.96±2.13) compared to the other two groups.

Table 1 Participants Socio demographic characteristics (n=1506)

	Group	n (%)	Score mean ±S.D
Age	Mean <20 20-29 30-39 40+	25±2.64 (±S.D) 252 (16.7) 953 (63.3) 187 (12.4) 114 (7.6)	 7.08_{a}± 2.34 8.31_{b}±2.64 8.05_{b}±2.83 $7.75_{a,b}$±2.47
Gender	Male Female	221 (14.7) 1285(85.3)	8.71_{a}±2.74 7.91_{b}±2.61
Marital status	Single Engaged Married Divorced Widowed	1063 (70.6) 64 (4.2) 345 (22.9) 29 (1.9) 5 (0.3)	8.06_{a}±2.64 7.81_{a}±2.77 8.03_{a}±2.63 7.76_{a}±2.96 7.00_{a}±1.41
Highest Education	Uneducated Elementary Intermediate High School Diploma Bachelor Higher Diploma Masters PhD	3 (0.2) 2 (0.1) 30 (2.0) 602 (40.0) 46 (3.1) 697 (46.3) 24 (1.6) 81 (5.4) 21 (1.4)	$3.67_{a,b}$±1.15 $7.00_{a,b,c}$±0.00 $6.63_{a,d}$±2.75 $7.46_{a,d}$±2.54 $8.57_{a,b,c}$±2.55 $8.47_{b,c}$±2.63 9.17_{c}±2.26 $8.33_{a,b,c}$±2.62
Nationality	Saudi Non-Saudi	1415 (94.0) 91 (6.0)	8.05_{a}±2.65 7.71_{a}±2.46
Religion	Non-Muslim Muslim	2 (0.1) 1505(99.9)	10.50_{a}±0.71 8.03_{a}±2.64
Monthly income in Saudi Riyal	0-8699 8700-11999 12000-15299 15300-20159 more than 20160	1178 (78.2) 124 (8.2) 87 (5.8) 71 (4.7) 46 (3.1)	7.93_{a}±2.66 8.51_{a}±2.76 8.39_{a}±2.56 8.32_{a}±2.26 8.15_{a}±2.40
Occupation	Student Unemployed Employed	201 (13.3) 160 (10.6) 1145(76.0)	7.92_{a}±2.55 7.89_{a}±2.61 8.27_{a}±2.78
Professional	Medical Non-medical Not specified	201 (13.3) 160 (10.6) 1146 (76)	9.96_{a}±2.13 7.68_{b}±2.51 7.74_{b}±2.60
Regional	Southern Eastern Northern Western Central northern	92 (6.1) 88 (5.8) 52 (3.5) 1080(71.7) 193 (12.8) 1 (0.1)	$8.46_{a,c,d}$±2.58 $8.88_{a,b}$±2.57 $8.47_{a,c,d}$±3.02 7.81_{c}±2.65 $8.55_{b,d}$±2.37

Note: Values in the Score mean ± S.D column of each variable not sharing the same subscript (a, b, c or d) are significantly different at $p<0.05$. Cells with no subscript were not included in the test. The Bonferroni correction was used to modify tests for all pair wise comparisons inside a row of each innermost sub-table.

Regarding the blood donation practice of the participants (Table 2), 1236 (82.1%) were non donors and the remaining participants either donated once, twice, three or more than three times (6.8%, 3.3%, 1.6% and 6.3%, respectively). Furthermore, 346 (23%) participants were rejected as blood donors. However, 1477 (98.1%) individuals believed that blood donation benefits patients and 1501 (99.7%) individuals thought that blood donation is important in society.

By evaluating the participants' blood donation knowledge in comparison to the blood donation practice (Table 2, score mean±S.D column), the results showed an increase in knowledge of participants as the number of donations increased (9.21±2.52) and if the participant did not donate blood (7.82±2.66). The rejected donors' scores also supported this compared to those who were accepted for donation (8.85±2.40 and 7.79±2.66, respectively). Similarly, individuals who believed that giving blood is beneficial to patients and important in society had a better knowledge score (8.04±2.64 and 8.04±2.64, respectively) compared to those who did not have those beliefs, although these scores were not statistically significant.

Table 2 Blood Donation practice of the participants (n=1506)

		n (%)	Score mean ±S.D
Previous blood donation	Did not donate	1236(82.1)	7.82_{a}±2.62
	Once	102 (6.8)	8.85_{b}±2.57
	Twice	49 (3.3)	$8.47_{a,b}$±2.40
	Three	24 (1.6)	9.71_{b}±2.40
	> three	95 (6.3)	9.21_{b}±2.52
Rejected as blood donor	Yes	346 (23.0)	8.85_{a}±2.40
	No	1160(77.0)	7.79_{b}±2.66
Do you believe that giving blood is beneficial to patients?	Yes	1477(98.1)	8.04_{a}±2.64
	No	29 (1.9)	7.48_{a}±2.79
Is blood donation important in society?	Yes	1501(99.7)	8.04_{a}±2.64
	No	5 (0.3)	6.00_{a}±3.32

Note: Values in the same Score mean ± S.D column of each variable not sharing the same subscript are significantly different at p<0.05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. The Bonferroni correction was used to modify tests for all pair wise comparisons inside a row of each innermost sub-table.

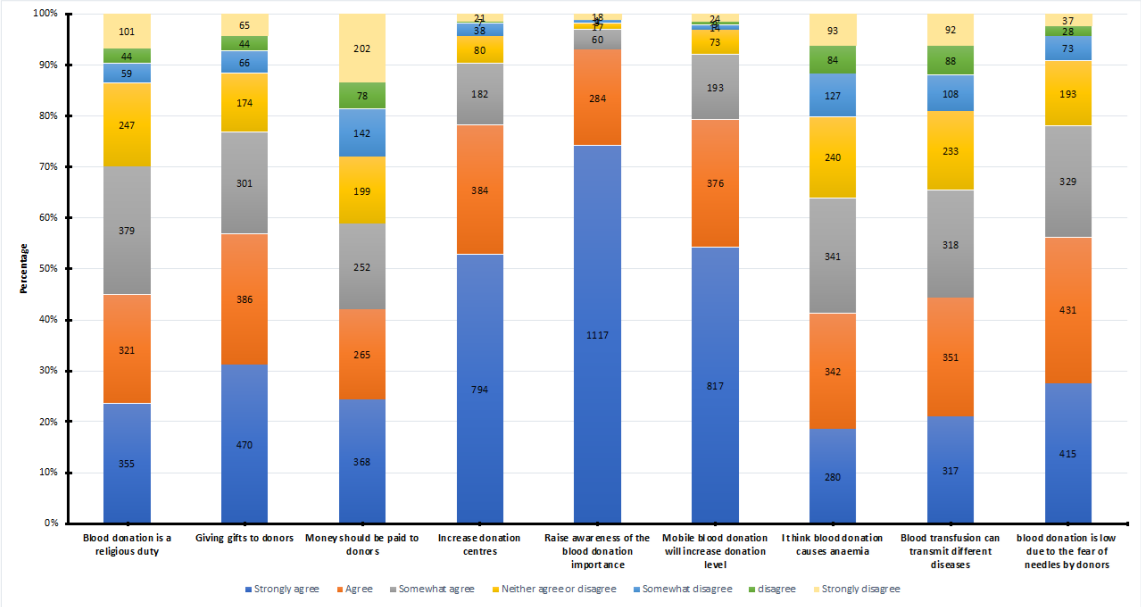

Figure 2 Responses to questions assessing the attitude of the Saudi Arabia population towards blood donation (n = 1506; number (%))

As shown in Figure 2, the participants strongly agreed that giving blood is a religious duty (355;23.6%) and the giving of gifts to donors would increase blood donations (470; 31.2 %); however, the majority agreed that cash incentives should be paid to donors (885; 58.8%). A majority of the participants (794; 52.7%) strongly agreed that increasing the number of donation centres and the existence of mobile blood donation units (817; 54.2%) would increase blood donation rates. Moreover, participants strongly agreed that awareness of the importance of blood donation should rise (1117; 74.2%), as 280 (18.6%) of the participants believed that blood donation causes anaemia, 317 (21%) believed that blood donation can transmit different diseases and 431 (28.6%) assumed that the phobia of donors to needles was the cause behind that low rate of donation.

4. DISCUSSION

Maintaining an adequate number of voluntary, non-remunerated blood donors in Saudi Arabia has become challenging, particularly with a continued escalation of blood demand. The current study was designed to evaluate the public's attitude and knowledge of Saudi Arabia towards blood donation through several evaluation factors.

The majority of respondents to this questionnaire were from single middle-aged groups (20-29 years.). This could be due to the curious nature of the younger groups, which are easily motivated to engage in the community and more influenced by their peers (Mousavi et al., 2011). In addition, females of this age group were more likely to contribute to the questionnaire than males. This result is in line with that of Atherley and his colleaguesrom Barbados, who showed that the number of females was three times higher than that of males after the questionnaire, was distributed using social media and emails (Atherley et al., 2016). However, this was contrary to findings by researchers from King Abdullah International Medical Research Centre (KAIMRC), which demonstrated that males, who answered a short survey in shopping malls in the city of Riyadh, were 50% more than female participants (Abolfotouh et al., 2014). This is also similar to the Saudi study conducted on students in the collage of applied medical sciences (Felimban et al., 2021). All these observations are more reflective of the overall population, as the demographic and attitudes of both males and females in the public arena differ compared to the privacy of their own homes, which is where Saudi females would more likely participate in a survey/questionnaire.

The core aspect of our study is evaluating the knowledge level regarding blood donation. Although the current study records a high level of respondents' knowledge regarding donor screening tests such as HIV virus (Acquired Immune Deficiency Syndrome-AIDS) and the safeness of the donation process on the donor, half of the respondents (47.3%) lack knowledge regarding the volume of donated blood and the required Hb level. Our finding agrees with a study by Abolfotouh et al., (2014), who recorded high levels of knowledge of the participants in their study. In contrast, Lownik et al., (2012) conducted a systematic review analysing 17 questions undertaken in several developing countries, Saudi Arabia being among one of them. Despite the fact that the precise misconceptions differed, every study revealed some amount of misunderstanding about the donation process. A similar finding was also reported by Kumari and Raina, (2017) that documented a misconception amongst the Indian population regarding AIDS disease.

Although blood banks apply the screening guide to guarantee that blood donation does not affect the donor, most of the respondents in the current study represented a negative attitude towards being a regular donor. This negative attitude, as described in this study, stems from the respondents being ill informed about the general information regarding blood donation, like the age and weight restrictions for blood donation and allowable intervals between blood donations. Undoubtedly, knowledgeable individuals are more possible to give blood as they better understand the donation process (Boulware et al., 2002). Hence, to increase the number of blood donors, a reduction in the misconception that blood donation is harmful to the donor is required (Al-Drees et al., 2008) and to provide sufficient information about the full blood donation process. Therefore, spreading accurate information regarding blood donation may aid in changing unfavourable attitudes into favourable ones and fostering a more altruistic attitude toward giving blood.

With respect to the positive attitude toward donation in the current study, results indicated that only 102 (6.8%) individuals donated once and a small group of whom tend to repeat the act of donation, where1236 (82.1%) individuals out of 1506 had not even donated previously. These results were contraindicated with previous research that demonstrated that the Saudi population had shown a high incidence of blood donation as well as a favourable attitude toward blood donation (Almutairi et al., 2018; Rizwan et al., 2022). These findings indicate the defect in both donor recruitment and retention for future repeat donations. Donor recruitment and retention is a challenging task that calls for dedicated and committed scientists who are enthusiastic to understand the issue and research any solution that can help.

Many research findings have indicated that the experience during the first donation appears critical for creating regular, committed blood donors (Van Dongen et al., 2015). Therefore, well trained staff with excellent interpersonal communication skills, able to listen to donors' concerns and fears and correct their misconceptions, will foster better donor retention (Boulware et al., 2002). Nevertheless, other more recent studies have reported that between 53.3% and 68.8% of participants had a previous history of blood donation (Abderrahman and Saleh, 2014; Abolfotouh et al., 2014), which indicates that those donors were motivated enough to maintain their positive attitude of being regular donors. Exploring every possible strategy to motivate donors will help in retaining them and increasing these numbers substantially. Thus, donor management (attracting and retention of blood donors) remains a vital focus for blood banks in order to guarantee a safe and sufficient blood supply and stocks. Therefore, resources and research should be devoted to these topics to ensure sufficient and adequate blood units within each establishment.

Another aspect that may influence the blood donation attitude is religion and adherence to the Islamic faith. Almost all the respondents were Muslim (99.9%), as Islam is deeply rooted in Saudi society. Comparisons of the findings with those of other studies confirm that higher donation rates (91%) are evident due to being Muslim (Abdel Gader et al., 2011). A possible explanation for this might be due to a religious fatwa (Islamic ruling) from the respected religious leader, Sheikh Abdul Aziz bin Baz, who said that it is the duty of a Muslim to donate blood to save the life of a needy person (Alfouzan et al., 2014), which is considered as both altruistic and charitable behaviour. However, being Muslim with altruistic and/or charitable behaviour may not necessarily be a substantial motivating factor in Saudi Arabia to donate blood (23.6%). In support of this, Ferguson et al., (2012) showed that the motivation for helping based on positive feelings (donors donating blood to feel good about themselves) is stronger than an altruistic one based on the benefit to society. Thus, understanding the motivations of blood donors will stress the positive attitude toward donation and should be investigated further to build a suitable message other than altruistic o blood donors' recruitment and retention by doing this, the impact will be felt ultimately on the blood unit number that can be maintained in the blood centre and good constant blood supplies serving the needs of the medical establishments.

One element that may influence the blood donation attitude is rewarding incentives. Whether giving incentives might raise the number of donations and finally end the blood supply shortages is a controversial issue and has been over the past few decades. One interesting finding in our study is that 31.2 % of the participants were in strong agreement regarding giving gifts to donors, 25.6% agreed and 20.0% somewhat agreed, a total combined number of over three quarters of the population. Abdel Gaderet al., (2011) also reported similar findings, where 63% accepted the idea of taking a gift as a replacement for donating blood. With respect to remuneration to the donor, 24.4% of the participants strongly agreed that money should be paid to the donor, where 17.6% agreed, and 16.7% somewhat agreed, a total well over 50% of the total population. Sachdev and his team were contrary to this position, where they reported that only 0.4% of the donors in North India requested some appreciation, such as gifts or money (Mishra et al., 2016), which most likely reflects the demographic location. The more balanced opinion is that giving incentives to the donor is not problematic and could be acceptable for two reasons. First, concerning blood safety, incentives are not as attractive as a cash payment to low-income individuals with higher disease transmission risks (Buyx et al., 2009). Secondly, there still needs to be more systematic data on the disease transmission risk ratio and giving non cash incentives, compared to paid donors, as identified in the USA (Buyx et al., 2009). Therefore, giving incentives is considered a middle way between reliance on altruism only on the one side, and offering cash payment on the other; therefore, incentives should be considered to stress the positive donation attitude.

The inhibiting factor for a positive donation attitude is the misconception that donated blood causesanaemia.22.7% of the responders agreed with the statement, "I think Blood donation causes anaemia". These results were in accordance with the Abolfotouh et al., (2014) study, where 8% believed that donation might cause anaemia. This misunderstanding is more common among females than males since they lose blood monthly through menstruation (Dilsad et al., 2014). Notably, in our study, 85.3 % of responders were female, which most likely accounts for the higher percentage observed. However, this negative factor can be overcome by giving iron supplements to the female donors and providing them with personalized monitoring to encourage their positive attitude to donate (Dilsad et al., 2014). This would be in addition to stressing the fact that blood is a regenerative liquid and donation of blood would not lead to anaemia.

Another inhibiting factor for having a positive donation attitude is needle phobia. The current study results show that 28.6% of participants agreed that fear of needles is the reason for the low blood donation rate. Prior studies have also noted that the most justification for not giving blood is a fear of needles at a similar level (27.4%) (Mishra et al., 2016) and another study identified that the cause of the low rate of blood giving is fear of both pains (55%) and needles (3.75%) (Desai and Satapara, 2014; Dubey et al., 2014; Dubey et al., 2014) the reduction in blood donors can be addressed by changing the public's mindset and keeping the topic of blood donation circulated in all media types (Dubey et al., 2014; Dubey et al., 2014; Felimban et al., 2021).

The current research has some limitations and although our study population appeared to be representative of the population living in Saudi Arabia, the data was mostly obtained from the Western region (1080 out of 1506 participants), where women

comprised the majority of 1285 (85.3%). Thus, results cannot be fully generalized to all segments of the population living in KSA, besides the possibility of a sampling bias cannot be excluded. Notable, only 91 non-Saudi responders (6%) participated in the study, which is not enough to evaluate the knowledge and the attitude toward blood donation among the ethnic minority population living in Saudi Arabia. Therefore, repeating the study with a bigger sample size covering all the kingdom's regions is highly recommended to verify our findings.

5. CONCLUSION

Although the Saudi Arabian healthcare system delivers highly specialised services with state-of-the-art equipment, inadequate knowledge and negative attitudes toward giving blood will subsequently lead to limited blood donation. Recruiting safe, low risk blood donors is a challenge in Saudi Arabia; however, understanding people's attitudes and knowledge about giving blood will help improve intervention to endorse safe, voluntary, non remunerated donors. As our studies indicate, the intervention could be achieved through the development of suitable educational material and designing communication strategies to obtain first time donors in the first instance then encourage them to return and give blood again in the future. Thus, the establishment of an adequate blood source in the blood banks across the country will be fulfilled.

Disclosure of Conflicts of Interest

The authors listed in this manuscript certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership or other equity interest; and expert testimony or patent licensing arrangements) or non financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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Authorship Contributions

Saeed Kabrah and Akhmad Aslam conceived of the presented idea, designed the study, developed the questionnaire, validated it, and carried out the experiment. The authors contributed to the final version of the manuscript. Saeed Kabrah conducted the statistical analysis and designed the tables. Samah Al-Subhi, WigdanBakary, Manal Al-Khalofah, Lama Alghashmari, Hatoon Badawood, Reem Alghuraybi Manal, Alsagaf Ibtesam Alattas, Najeeb O Filfilan and Haneen Subahi contributed to data collection and cleaning. Saeed Kabrah, Akhmad Aslam, Hebah Kabrah and Samah Al-Subhi discussed the results.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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