

Knowledge and Attitude Towards Corneal Donation

Saudi medical students' perspective

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ABSTRACT: Objectives: To attain more local corneal donations, awareness of corneal donations must be raised among doctors and medical students. This study aimed to evaluate the knowledge and attitude of medical students regarding corneal donations. **Methods:** This cross-sectional study was conducted among male fifth- and final-year medical students at the College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Saudi Arabia, between August and October 2019. Non-probability convenience sampling was used and an English-language self-administered questionnaire was administered to evaluate different aspects of the participants' knowledge regarding and attitudes towards corneal donation. Data were analysed using descriptive statistics, analysis of variance, and independent samples t-test. **Results:** A total of 141 students participated in this study (response rate: 53%). A mean score of 3.24 ± 1.86 was achieved by the participants on the knowledge test. Approximately 47% of the sample correctly recognised that people who die of AIDS cannot donate an eye. The most common reason for eye donations was to provide vision to a blind person (47%), while a lack of understanding of benefits to others (55%) and religious beliefs (44%) were seen barriers. The internet was identified by 56% as the most common source of information. There was no significant difference in the knowledge of fifth-year and final-year medical students (3.31 ± 1.84 versus 3.17 ± 1.89 ; $P = 0.65$). **Conclusion:** This study showed a low level of knowledge of corneal donations among the participants. Raising awareness among medical students is important to increase donation rates. However, media and the internet are not enough to achieve this. Basic knowledge of corneal donations to students by organising awareness-raising activities and motivating them for voluntary participation is important to fill this knowledge gap.

Keywords: Knowledge; Attitude; Cornea; Medical Students; Saudi Arabia.

ADVANCES IN KNOWLEDGE

- This study showed that the knowledge of corneal donations was low among medical students in Saudi Arabia.
- Religious beliefs and family pressure were found to be significant hindering factors in corneal donations.

APPLICATION TO PATIENT CARE

- With an increase in knowledge and a positive attitude, the quality of patient care will improve.
- Individuals with corneal defects will be able to regain their vision through increased awareness of eye donation.
- Physicians will be able to help provide information on eye donation and transplantation to patients and society.
- Strategies should be developed and implemented to raise awareness of corneal donations. Furthermore, emphasis should be placed on knowing why some people are willing to donate while others are not. Linking the level of awareness and willingness for eye donation among students may help in designing a curriculum and developing strategies for health promotion.

CORNEAL DISEASES ARE ONE OF THE PRIMARY causes of visual impairment and blindness, which are commonly reported in developing countries.^{1,2} Corneal transplantation is the most effective method for treating and restoring the sight of blind patients suffering from corneal disease; this can be achieved through the contribution of eye donors. Thus, the public should be made aware of the importance of eye donation. However, knowledge of this concept varies from person to person and depends on the culture. In this regard, awareness among doctors of eye donation is significant in attaining more corneal donations at the local level. There is not much literature related to eye donation in the Asian-Pacific

region. The available literature consists of studies focusing on the awareness among students from nursing, academic and medical colleges.³⁻⁶ Studies conducted among student populations found a lack of awareness on eye donation.^{7,8}

The eye is the most essential organ for humans to experience life. Loss of this organ or parts of it impedes a person's vision, which is an incredible loss to the individual.⁹ A study suggested that raising awareness of basic eye healthcare and eye donation can help in limiting cases of visual impairment caused by the lack of knowledge, advanced methods, and training.¹⁰ Since doctors deal with the health aspect of most members of society, the knowledge of the level of

understanding of medical students can provide a good predictive value to what future physicians would know and therefore, what improvements can be made to the system to increase their understanding. The literature suggested that there is a dire need for eye donations worldwide and emphasises physicians' role in increasing corneal donation rates by improving donor knowledge and addressing their concerns.¹¹ A systemic review conducted in Saudi Arabia reported that the prevalence of visual impairment and blindness was 2.6%, which is 20 times higher than that in America.¹² All concerned governmental and non-governmental organisations must take serious measures to address the issue of shortage of eye donations in any country.¹³

The current study aimed to assess the level of knowledge of medical students regarding eye donations and to determine the role of future physicians in boosting corneal donation awareness, especially that of students planning to specialise in ophthalmology. Using their awareness, these physicians can request the family of the deceased to donate the cornea of the departed, which will help in reducing the wastage of healthy corneas.¹⁴ Moreover, their contributions will increase local investments for artificial corneas and other cornea-related issues. Additionally, to disseminate information effectively and motivate the community and the family of the deceased for corneal donations, medical students should be well-informed.¹²

Methods

This cross-sectional study was conducted among fifth- and final-year medical students in phase III (clinical phase) over a three-month period between August and October 2019 at the College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Saudi Arabia. The college has a segregated system, with two separate campuses for male and female students. The latter group was difficult to approach; therefore, only male students were included.

The target population was the fifth- and final-year male medical students. A non-probability convenience sampling technique was used. The male medical students in the clinical years (phase III) who agreed to participate in the study were included. Non-medical students and pre-clinical students (phase II) with no exposure to real patients and those who refused to participate were excluded. Students were chosen for this study because they were young, were undergoing training in medicine, and were expected to be better informed about the importance of cornea donation. The sample size was calculated using Raosoft (Raosoft

Inc., Seattle, Washington, USA) based on a confidence level of 95% and a 5% margin of error. The total sample size calculated was 266.

A validated English-language self-administered questionnaire was used for the study.¹⁵ The authors approached students in their respective classes and provided them with printed copies of the questionnaire. Pre-testing was done to assess the reliability of the questionnaire for the sample. The 22-item questionnaire enquired about students' knowledge of eye donation (13 questions) and their ideas and attitudes towards pledging their eyes posthumously (nine questions). The items were related to information sources, knowledge of eye donation, the age limit for donation, reasons for pledging and not pledging eyes, conditions that make for an unfit eye donor, the perfect time to remove eyes after death, the part of the eyeball used for transplantation, donation, medical students' perspective on revealing the identity of eye donors and ethics concerning the selling of the donated eye or parts of it. All the questions were closed-ended, with most of the questions having 'Yes', 'No', and 'Don't know' options.

The scores for knowledge and attitude domains were obtained by averaging all the responses to obtain an overall result for the knowledge and attitude items. Cronbach's alpha was calculated to assess the reliability of the questionnaire with respect to the study population; Cronbach's alpha was 0.78 for all the items. After data cleaning and assigning codes, Statistical Package for the Social Sciences (SPSS), Version 20.0 (IBM Corp., Chicago, Illinois, USA) was used for data analysis. Descriptive statistics were presented as frequencies and percentages for categorical variables, and mean \pm standard deviation was used for the numerical variables. The analysis of variance (ANOVA) was conducted to highlight the relationship between the correct knowledge score and parental education level. The total score for the correct answers (out of 12) was compared between the fifth- and final-year medical students using the independent samples t-test. The association between the demographics, knowledge scores, and willingness to pledge cornea was determined using regression analysis. A $P < 0.05$ was considered statistically significant.

All participants signed the informed consent for the pre-test and for participating in the study. The participants were assured about the confidentiality of data and their rights to withdraw from the study at any point. Utmost caution was exercised to ensure their anonymity and confidentiality. The study was approved by the Institutional Review Board of King Abdullah International Medical Research Center (code SP18R/44/11).

Results

A total of 141 students participated in this study (response rate: 53%). The mean age of the participants was 23.4 ± 2.0 years. The participants attained a mean score of 3.24 ± 1.86 out of 12 on the background knowledge test; this shows a poor level of knowledge [Table 1].

A large part of the sample ($n = 99$; 70%) knew about the important role of vitamin A in the prevention of childhood blindness. Surprisingly, despite attending the medical college for four years, only 18 (13%) participants knew that there is an eye bank facility in the country and that the perfect time for cornea donation is within 2-6 hours after death [Table 2].

A total of 66 (47%) participants knew that people who die from AIDS cannot donate their eyes and 58 (41%) participants correctly identified that having hepatitis makes a person unfit to make an eye donation. Only 2% of the participants believed there were no restrictions to eye donation. Providing vision to a blind person as a result of eye donation was the most cited reason for eye donation ($n = 66$, 47%), followed by cornea donation being a 'noble initiative' for many participants ($n = 59$, 42%). The most common barrier

Table 1: Participant's parent's qualifications, age and knowledge score regarding corneal donations (N = 141)

Parameter	n (%)
Mean age in years \pm SD	23.4 \pm 2.0
Mean knowledge score \pm SD	3.24 \pm 1.86
Father's qualification	
Illiterate	1 (1)
Elementary	7 (5)
Intermediate	3 (2)
High School	16 (11)
College	46 (33)
Postgraduate (Masters/PhD)	67 (48)
Did not respond	1 (1)
Mother's qualification	
Illiterate	1 (1)
Elementary	16 (11)
Intermediate	9 (6)
High School	25 (18)
College	56 (40)
Postgraduate (Masters/PhD)	32 (23)
Did not respond	2 (1)

SD = standard deviation; PhD = Doctor of Philosophy.

Table 2: Frequencies of correct answers and "don't know" responses to knowledge questions regarding eye donation among medical students in Saudi Arabia (N = 141)*

Item #	Question and response	n (%)
1	When should the first eye screening be done?	
	Between six months and three years of age	14 (10)
	Don't know	53 (38)
2	Does vitamin A have an important role in the prevention of childhood blindness?	
	Yes	99 (70)
	Don't know	30 (21)
3	Whom do you approach for eye donation?	
	Eye specialist (ophthalmologist)	52 (37)
4	What is the age limit for eye donation?	
	Less than a year of age	9 (6)
5	Which part of the eyeball is removed from the donor (transplanted structure)?	
	Cornea	47 (33)
	Don't know	69 (49)
6	Who should remove the eye from the donor?	
	Eye specialist (ophthalmologist)	86 (61)
	Don't know	40 (28)
7	Eyes need to be removed within how much time after death?	
	2-6 hours	18 (13)
	Don't know	96 (68)
8	Is there any eye bank in Saudi Arabia?	
	Yes	18 (13)
9	How long can the donor's eye be preserved before transplanting it to the recipient?	
	7-12 hours	7 (5)
	Don't know	104 (74)
10	Does the donor or the donor's family have the right to sell the eye after the donor's death?	
	Yes	20 (14)
11	Will the identity of the donor be revealed to the recipients?	
	Yes	26 (18)
12	Do you think that there are synthetic substitutes for a patient in need of an eye donation?	
	Yes	39 (28)
	Don't know	75 (53)
13	Are you willing to donate your eyes?	
	Yes, willing to donate	36 (26)
	Not willing to donate	105 (74)

*Does not include incorrect answers to the knowledge items, therefore percentages do not add up to 100%.

Table 3: Perceived medical conditions that make the donor unfit for eye donation, reasons for donating and not donating eyes and source of eye donation knowledge among medical students in Saudi Arabia (N = 141)

Perceived medical condition	n (%)
AIDS	66 (47)
Don't know	65 (46)
Hepatitis	58 (41)
Blindness caused by optic nerve or retinal disease	44 (31)
Active syphilis	35 (25)
Acute viral encephalitis	34 (24)
Active meningitis	33 (23)
Rabies	27 (19)
Acute septicaemia	27 (19)
Acute leukaemia	26 (18)
No restrictions	3 (2)
Apparent reason for corneal donation	
Providing vision to a blind person	66 (47)
Cause as noble as others	59 (42)
Financial benefits	45 (32)
Eyes donated by a relative or friend	11 (8)
Other	5 (4)
Perceived reason for not donating eyes	
Lack of understanding of benefits to others	78 (55)
Religious	62 (44)
Familial pressure	45 (32)
Myths	34 (24)
Other	10 (7)
Source of awareness	
Internet	79 (56)
Doctors	39 (28)
Lectures	28 (20)
Television	18 (13)
Health awareness campaigns	18 (13)
Friends	17 (12)
Family	10 (7)
Other	10 (7)
No sources (don't know)	19 (13)

to donating eyes was found to be the lack of awareness of the benefits to eye recipients (n = 78, 55%) followed by religious beliefs (n = 62, 44%), family pressure (n = 45, 32%). Regarding the source of information, 19 (13%)

Table 4: Association between knowledge of eye donation and parental education in medical students in Saudi Arabia

Variables	n	Mean knowledge score ± SD*	P value
Father's qualification			
Less than high school	11	2.6 ± 1.9	0.69
High school	16	3.3 ± 1.8	
College	45	3.4 ± 2.3	
Postgraduate (Masters/ PhD)	67	3.2 ± 1.8	
Mother's qualification			
Less than high school	26	3.5 ± 1.9	0.84
High school	25	3 ± 2.1	
College	56	3.3 ± 2.6	
Postgraduate (Masters/ PhD)	32	3.1 ± 1.5	

SD = standard deviation; PhD = Doctor of Philosophy.

*Maximum score = 12.

Table 5: Difference between the knowledge levels of two year-groups of medical students based on number of correct answers to 12 knowledge questions

Year of study	n	Mean ± SD	Independent samples t-test	
			t value	P value
Fifth year	71	3.27 ± 1.87	0.30	0.76
Final (sixth) year	70	3.17 ± 1.89		

participants stated that they lacked any knowledge of eye donation. The internet was identified as the most common source of information about eye donation (n = 79, 56%). Only 28 participants (20%) reported that lectures had contributed to their current knowledge of eye donation [Table 3]. In the study population, 37 (26%) participants expressed their desire to pledge their eyes.

An ANOVA test revealed no association between the knowledge score and the education level of the father (P = 0.69) or the mother (P = 0.84) [Table 4]. When comparing the knowledge score of fifth-year to final-year students, no significant difference was found (3.27 ± 1.86 versus 3.17 ± 1.89; P = 0.76) [Table 5].

The relationship between participants' demographics, knowledge scores, and willingness to pledge their cornea was studied. After adjusting the factors of knowledge score, age, year of study, parental education, and willingness to donate eyes, results indicated an association between knowledge and willingness to donate (odds ratio [OR] = 1.31, 95% confidence interval [CI]: 1.02–1.68; P = 0.038). Similarly, the sixth-

Table 6: Relationship between characteristics, correct knowledge scores and willingness to donate cornea among medical students in Saudi Arabia

Characteristic	OR (95% CI)	P value
Knowledge score	1.31 (1.02–1.68)	0.0438
Mean age	0.90 (0.69–1.17)	0.418
Year of study		
Final (sixth) year	3.86 (1.49–10.04)	0.006
Fifth year*	1.00	
Mother's qualification		
Less than high school	5.84 (0.51–67.33)	0.157
High school	0.59 (0.09–3.83)	0.578
College	1.67 (0.56–5.01)	0.363
Postgraduate (Masters/ PhD)*	1.00	
Father's qualification		
Less than high school	0.33 (0.05–2.19)	0.248
High school	0.85 (0.18–3.89)	0.833
College	0.78 (0.23–2.71)	0.698
Postgraduate (Masters/ PhD)*	1.00	

OR = odds ratio; CI = confidence interval; PhD = Doctor of Philosophy.

*Reference group.

year students' willingness to pledge eyes was almost four times more than that of the fifth-year students (OR = 3.86, 95% CI: 1.49–10.04; $P = 0.006$). However, no association was found between the father's and mother's education levels and willingness to donate [Table 6].

Discussion

This study aimed to evaluate medical students' level of knowledge regarding and attitude towards corneal donations in Saudi Arabia. Although a corneal donation is considered a noble cause, similar to all types of organ donations, the literature suggests there is a shortage of donated corneas, especially in developing countries.¹⁶ In particular, this is due to the lack of knowledge among health professionals, the community and medical students.¹⁷ It is the responsibility of all concerned parties to develop strategies for increasing awareness of eye donation in society and clarifying misconceptions to increase the number of eye donors.¹⁸

The current study's participants performed well on only a limited number of questions. For instance, 66 (47%) participants knew that people who die from AIDS cannot donate their eyes; only 18 (13%) knew

that the perfect time for donation is within 2–6 hours after death, while a similar study revealed a higher level of knowledge among students (68.7%).¹⁹ Moreover, the mean knowledge score of the participants was just 3.24 out of 12, which shows a profound lack of knowledge of eye donation.

The internet was the main source of knowledge of eye donation for most of the current study's participants (56%) while television was the primary source for 41% of the medical students in a tertiary care hospital in Bangalore, India.²⁰ Expectedly, only 26% of the participants were willing to donate their eyes compared to 40.7% in another international study.³ Although lack of knowledge would surely have contributed to a decreased desire to donate, another reason could be cultural differences between Saudi Arabia and other countries.²¹

In the current study, participants stated that one of the reasons why eye donations must be encouraged is that this can provide vision to a blind person. Furthermore, eye donation was regarded as a 'noble cause' by some participants.²² Nevertheless, another study revealed that the majority of the study population (93%) believed that pledging corneas will be their way of contributing to society even in death. Moreover, the other commonly cited reason was the donors would live in the recipients' vessels even after death.²³ Regarding the barriers to eye donation, more than half of the current participants believed that the lack of understanding of its benefits to others was the main reason in Saudi Arabian society. The literature suggests many hindering factors of eye donation. Religious beliefs, cultural factors and familial influence were found to be the major issues for eye donation in developed countries.²⁴

Although most of the current participants' parents had at least a college degree, which signified that most of the participants came from educated backgrounds, the reasons for not donating eyes included religious beliefs and familial pressure to not donate. In a study conducted in a medical college with a similar setting, the most commonly cited reason for not pledging cornea was objections from family.²³ The current study did not find any association between the knowledge of eye donation, parental education, and willingness to pledge eye; therefore, a further study to compare the level of parental education and attitude towards eye donation on the largest possible sample is recommended.

The current study reported a significant association of knowledge level and the year of study with a willingness to donate eyes. These results are similar to a study that reported the presence of better knowledge and greater willingness to pledge eyes among medical

students.²⁴ However, another study found a lack of knowledge and willingness among third-year medical students.²⁵

Overall, the current participants demonstrated a decreased level of knowledge in many areas compared to other international studies, as the participants performed poorly in the knowledge test.^{19,25} Data from the current study showed that relying only on media to increase the knowledge of medical students regarding eye donation is not sufficient. Therefore, including different curative and preventative features of corneal blindness through basic eye health care in the curriculum is greatly needed.²⁵ This will help future physicians understand how they can spread awareness of eye donation among patients, family members and friends.

The study was subject to certain limitations. First, this study had a poor response rate and the sample comprised only of male participants. Since the study findings are based only on male perspectives, to obtain more accurate and generalisable results, female subjects should be included in future studies. Second, as this was a single institution-based study with medical students who have similar demographic characteristics, the sample does not encompass the varied demographic and cultural diversity in Saudi Arabia's medical student population. Finally, this study was cross-sectional in nature and could therefore not determine the cause and effect of the responses. Nevertheless, this study provides information that may be useful for academic institutions and health professionals in developing awareness-raising and community-oriented programmes to improve students' understanding of the important concept of corneal donation.

Conclusion

The study showed that a large percentage of the participants lacked knowledge of eye donation. While it is important to raise awareness of the benefits of donating eyes, the perceived reasons for not donating eyes must be considered and addressed. To raise awareness of eye donation in society as well as to correct any misconceptions, topics related to eye donation must be included in medical curricula, as it may result in an increase in awareness of eye donations from future physicians and the society they interact with.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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AUTHORS' CONTRIBUTION

KMA conceived the idea and SWHS designed and implemented the research. AAA collected the data and handled the technical details. KMA, AAA, SA and SWHS drafted the manuscript. SA supervised the work, performed the computations and reviewed the manuscript. All authors approved the final version of the manuscript.

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