

# Knowledge, Attitude and Awareness towards Corneal Donation in Aseer Region, Saudi Arabia

Abdulrahman Mohammed Al-Amri (1)  
 Faisal Misfer Alqahtani (1)  
 Hassan Abdullah Alqahtani (1)  
 Mansour Salem Alqahtani (1)  
 Mohammed Moshabbab Alqahtani (1)  
 Musaad Abdulrhman Al Shibli (1)  
 Riyadh Ali Almastour (1)  
 Abdulrahman Mohammed Al-Amri (2)

(1) Medical Student, College of Medicine, King Khalid University, Saudi Arabia

(2) Professor, Department of Surgery, College of Medicine, King Khalid University, Saudi Arabia

## Corresponding author:

Abdulrahman Mohammed Al-Amri, MD  
 Professor of Ophthalmology  
 College of Medicine, King Khalid University  
 P.O. Box 641, Abha 61421, Saudi Arabia  
 Email: profalamri@hotmail.com

Received: September 2021; Accepted: October 2021; Published: November 1, 2021.

Citation: Abdulrahman Mohammed Al-Amri et al. Knowledge, Attitude and Awareness towards Corneal Donation in Aseer Region, Saudi Arabia. World Family Medicine. 2021; 19(11): 68-76 DOI: 10.5742/MEWFM.2021.94162

## Abstract

**Background:** Corneal transplantation is the mainstay procedure performed for sight restoration in patients with corneal blindness, which can be caused by infection, corneal dystrophy, degenerative disorders such as keratoconus or traumatic causes. Most corneal transplants in Saudi Arabia are performed using imported corneas.

**Aims:** To determine the level of knowledge and awareness and the factors affecting corneal donation in Aseer region, Saudi Arabia.

**Subjects and Methods:** A descriptive cross-sectional approach was used targeting the population of Aseer region aged 18 years and above. The data were collected using electronic self-administered questionnaire. The tool covered the participants' biodemographic data, knowledge related questions and willingness of corneal donation and factors affecting such attitudes.

**Results:** Of the 641 participants, 66.1% were males, 47.6% were in the age group 20 – 30 years and 19.2% claimed to have enough knowledge about corneal donation. The mean knowledge score (SD) was 2.13 (1.757) out of 8. Regarding participants' attitude, 26.7% were willing to donate their own cornea. The willingness was significantly associated with good level of knowledge ( $p = 0.008$ ). Females were more inclined to donate their corneas than males (30.9% vs 24.5%,  $p = 0.025$ ).

**Conclusion:** The study revealed a low level of knowledge of corneal donation in Aseer region, Saudi Arabia. Approximately one quarter of the participants reported willingness of corneal donation. Lack of knowledge was the main barrier, as it was reported by almost two thirds.

**Key words:** Cornea, Donation, Awareness, Penetrating Keratoplasty, Saudi Arabia

## Background

The cornea is the transparent layer that covers the iris and the pupil, and it is the main refractive surface that focuses light into the retina. Permanent loss of corneal transparency caused by traumatic or pathological conditions will lead to corneal blindness. Globally, 4.9 million and 23 million individuals have bilateral or unilateral corneal blindness, respectively (1). Fortunately, corneal blindness is fully reversible with a corneal transplant. The pathological conditions that lead to loss of corneal function include infection, corneal dystrophy or degenerative disorders such as keratoconus (2).

The burden of corneal diseases in Saudi Arabia is a major concern as it contributes to 3.5% – 9.5% of cases of visual impairment (3). In Aseer region the estimated incidence of keratoconus is 20 new cases per 100,000 population (4). Furthermore, keratoconus is ranked as the first diagnosis requiring corneal transplantation at King Khalid Eye Specialist Hospital (KKESH) (5,6).

Corneal transplantation is the mainstay procedure performed for sight restoration in patients with corneal blindness. The optimal time for harvesting the donor's cornea is within 6 hours after death (7). The procedure is done by excising the cornea with a rim of the sclera (8). The donor-recipient blood group matching is not mandatory for the donation and the contagious conditions such as viral hepatitis or Human Immunodeficiency virus (HIV) being the only contraindication (7).

One of the main challenges that encounter the eye banks is the increasing demand for corneal transplantation. A worldwide survey of eye banking and corneal transplantation done by Gain et al. found a shortage of transplantable corneal tissues indicated by a ratio of approximately 1:70 of people benefiting from, and those waiting for, corneal transplantation (9). Locally, the majority of corneal transplants in Saudi Arabia are performed using imported corneas (5,10). KKESH alone imported 16,800 corneas with a rough estimated cost 179.76 million Saudi Riyals (10). According to the Saudi Center of Organ Transplantation, the cornea is the least donated organ (11).

Several studies have been conducted in Saudi Arabia to assess the level of awareness of corneal donation. Some of them targeted medical students (7,12,13). Others targeted the general population and they showed low level of awareness (10,14,15).

The main purpose of this study was to determine the level of knowledge and awareness and the factors affecting corneal donation including motives and barriers among the population in Aseer region, Saudi Arabia.

## Subjects and Methods

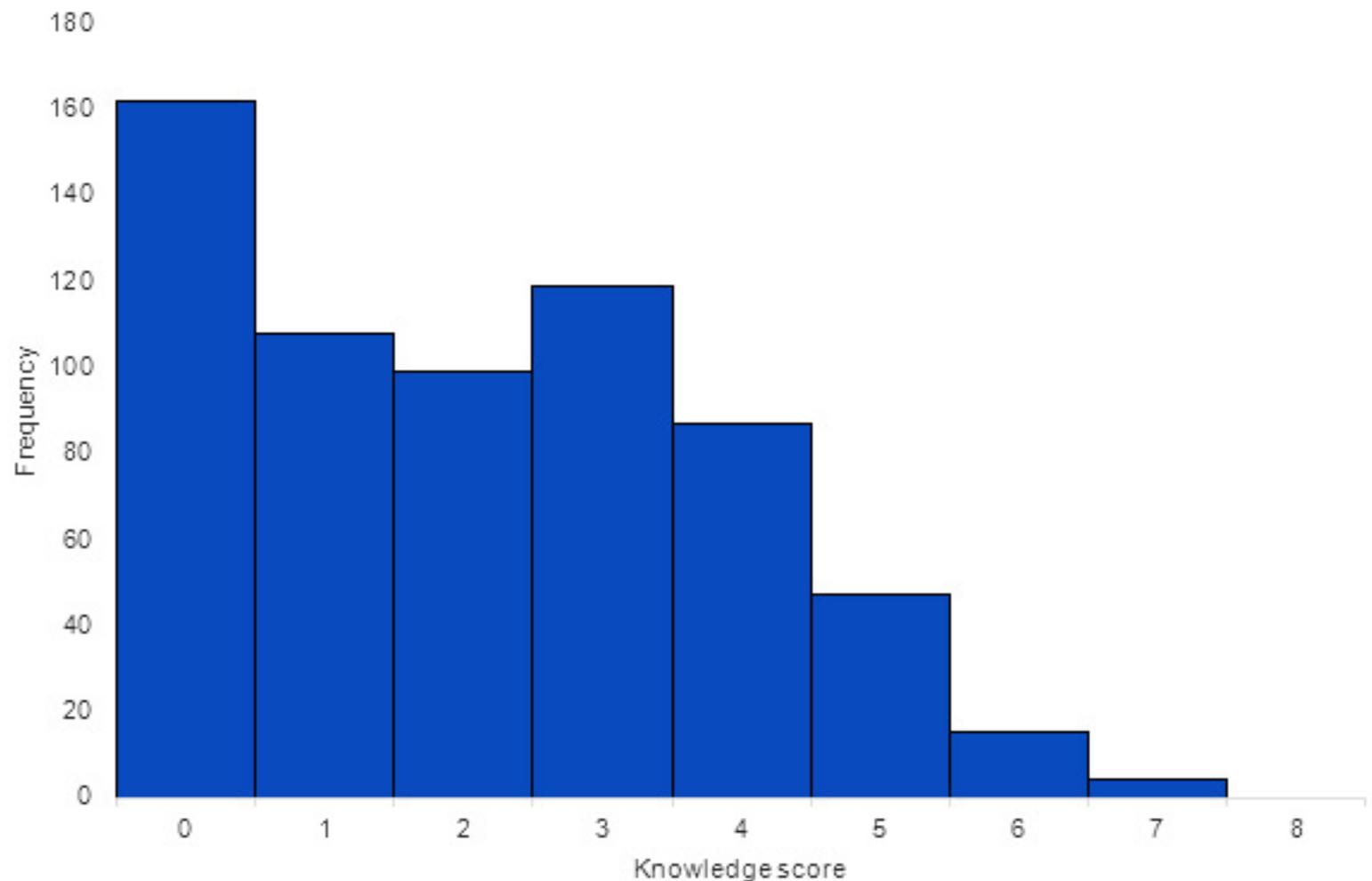
This descriptive cross-sectional study targeted the population of Aseer region aged 18 years and above. Those who cannot read or understand Arabic were excluded. The data were collected using electronic self-administered questionnaire distributed via social media platforms during August 2021.

The questionnaire was developed after revision of the past literature. The tool covered the following three parts: (1) biodemographic data; (2) knowledge related questions consisting of self-assessed level of knowledge followed by a question about the source of the knowledge and a subscale of knowledge containing eight questions assessing different domains of knowledge about corneal donation; and (3) willingness of corneal donation and factors affecting such attitudes.

For knowledge questions, each correct answer was scored one point. Thus, a total knowledge score (0 – 8) was calculated. A participant with a score between (5 – 8) was considered to have good knowledge. On the other hand, poor knowledge was considered if the participant had a score of (0 – 4).

The data were analyzed using IBM SPSS Statistics, descriptive statistics (mean, SD, frequencies and percentages) were obtained. The primary outcome variable, knowledge score, was not normally distributed (Figure 1), tested by Kolmogorov-Smirnov test ( $p < 0.001$ ) and Shapiro-Wilk test ( $p < 0.001$ ). Thus, non-parametric tests including Mann-Whitney U test and Kruskal-Wallis test were used to estimate the association between continuous and categorical variables and Chi-Square test was used for the categorical variables. P-value  $\leq 0.05$  is considered significant.

Informed consent was obtained from all participants. Collected data were kept confidential and used only for research purposes. Furthermore, the questionnaire was anonymous. The ethical approval was obtained from the Research Ethics Committee at King Khalid University, Abha, Saudi Arabia,

**Figure 1: A histogram showing right skewness of the distribution of the knowledge score**

## Results

A total of 641 participants were enrolled in the present study. Almost two thirds of them were males (66.1%), and 47.6% were in the age group 20 – 30 years. The majority of the participants were Saudi (98.1%). Most of the participants had a high educational status, as 75% had a bachelor's degree or higher. Only 187 (29.2%) were involved in the medical field. Exactly 123 (19.2%) claimed to have enough knowledge about corneal donation

(Table 1), with doctors and health care workers being the most frequently reported source of information (58.5%) (Figure 2).

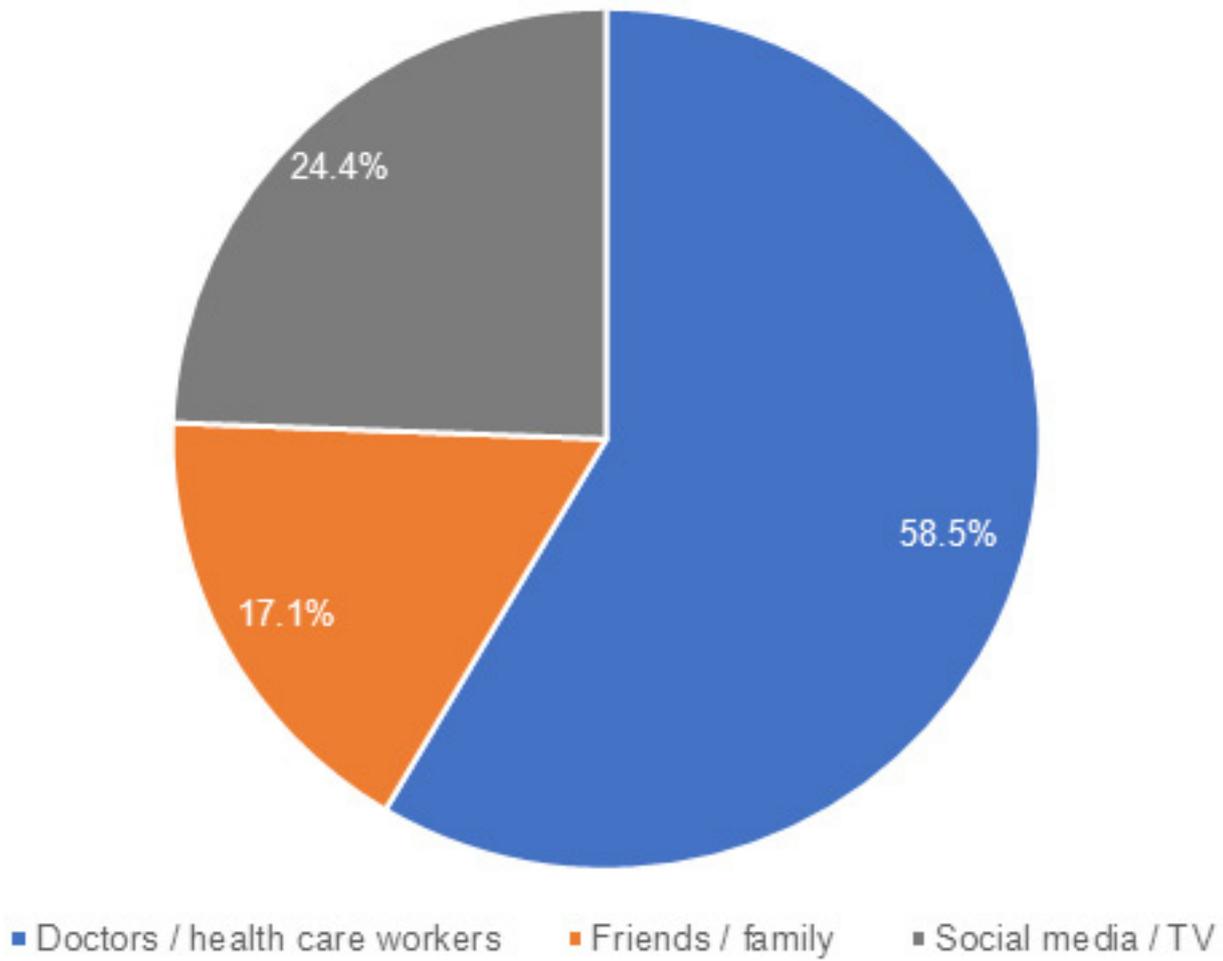
The question asking about the eye part concerned with corneal donation was the most correctly answered question (cornea, 47.7%), followed by whether corneal donation treats all eye diseases (no, 43.8%). The least correctly answered question was the appropriate age for corneal donation (more than 1 year, 2.2%). 30.9% of the participants knew that blood group mismatch is not a contra-indication for corneal donation. Only 134 (20.9%) claimed to know where and how to apply for corneal donation. 44.1% to 59% of the participants declared having no knowledge about the question being asked (Table 2).

The mean knowledge score (SD) was 2.13 (1.757). It was higher among medical versus non-medical (2.93 vs 1.80,  $p < 0.001$ ). Those who claimed to have enough knowledge had statistically significant higher knowledge score (3.37 vs 1.83,  $p < 0.001$ ). However, no association of knowledge score was found with age ( $p = 0.139$ ), gender ( $p = 0.207$ ) or educational level ( $p = 0.541$ ) (Table 3).

Regarding participants' attitude, 26.7% were willing to donate their own cornea, and 14.4% were willing to donate their first-degree relative's cornea (Table 2). The association between willingness of corneal donation and different factors is shown in Table 3. The willingness was reported by 30.9% of females compared to 24.5% of males ( $p = 0.025$ ), and by 39.4% of participants classified to have good knowledge versus 25.2% of participants with poor knowledge ( $p = 0.008$ ). The most frequently reported barrier against corneal donation was the lack of knowledge (Figure 3). On the other hand, the religious belief of doing good was the main motive, as it was reported by 543 (84.71%) (Figure 4).

**Table 1: Bio-demographic characteristics of the participants**

	Factor	Frequency	Percentage
Age (years)	Less than 20	53	8.3
	20 – 30	305	47.6
	31 – 40	111	17.3
	More than 40	172	26.8
Gender	Male	424	66.1
	Female	217	33.9
Nationality	Saudi	629	98.1
	Non-Saudi	12	1.9
Educational level	Up to middle school	21	3.3
	High school	139	21.7
	Bachelor	434	67.7
	Post-graduate study	47	7.3
Career / study field	Medical	187	29.2
	Non-medical	454	70.8

**Figure 2: Source of previous knowledge**

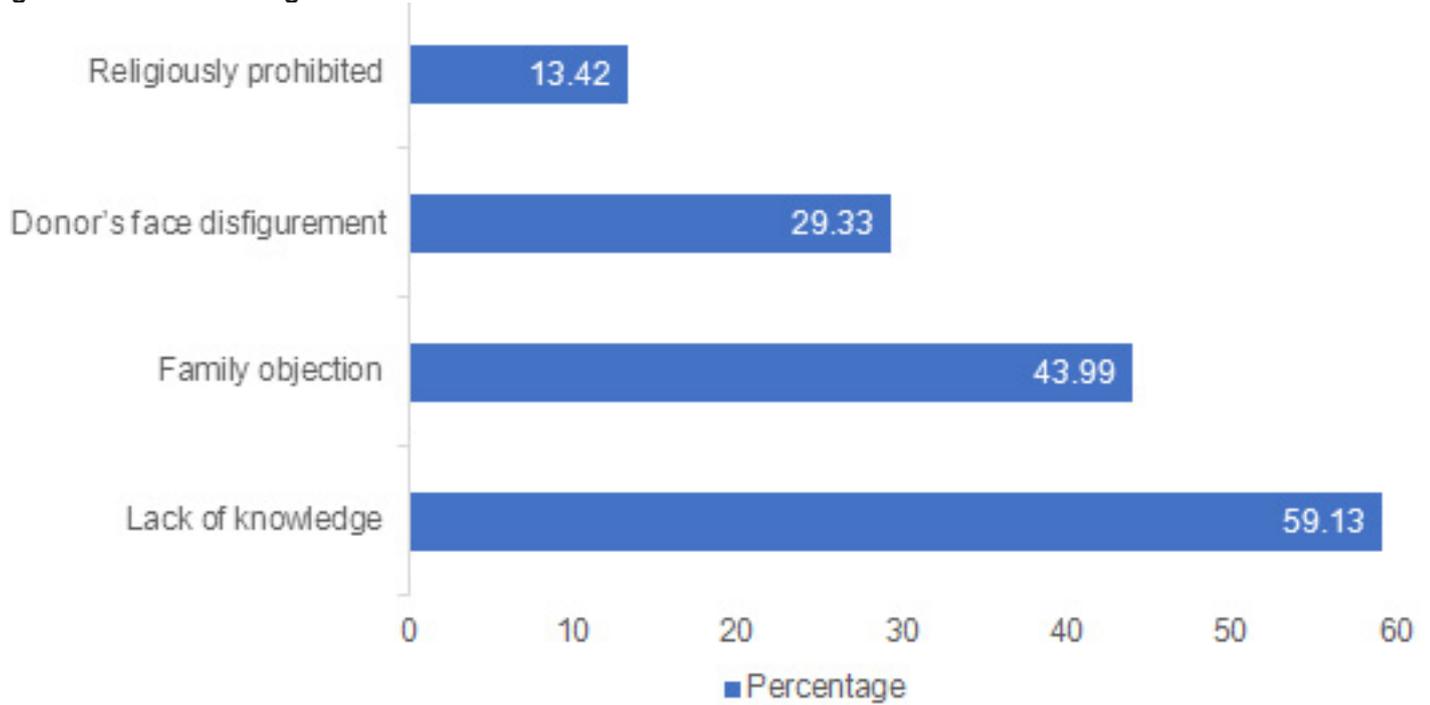
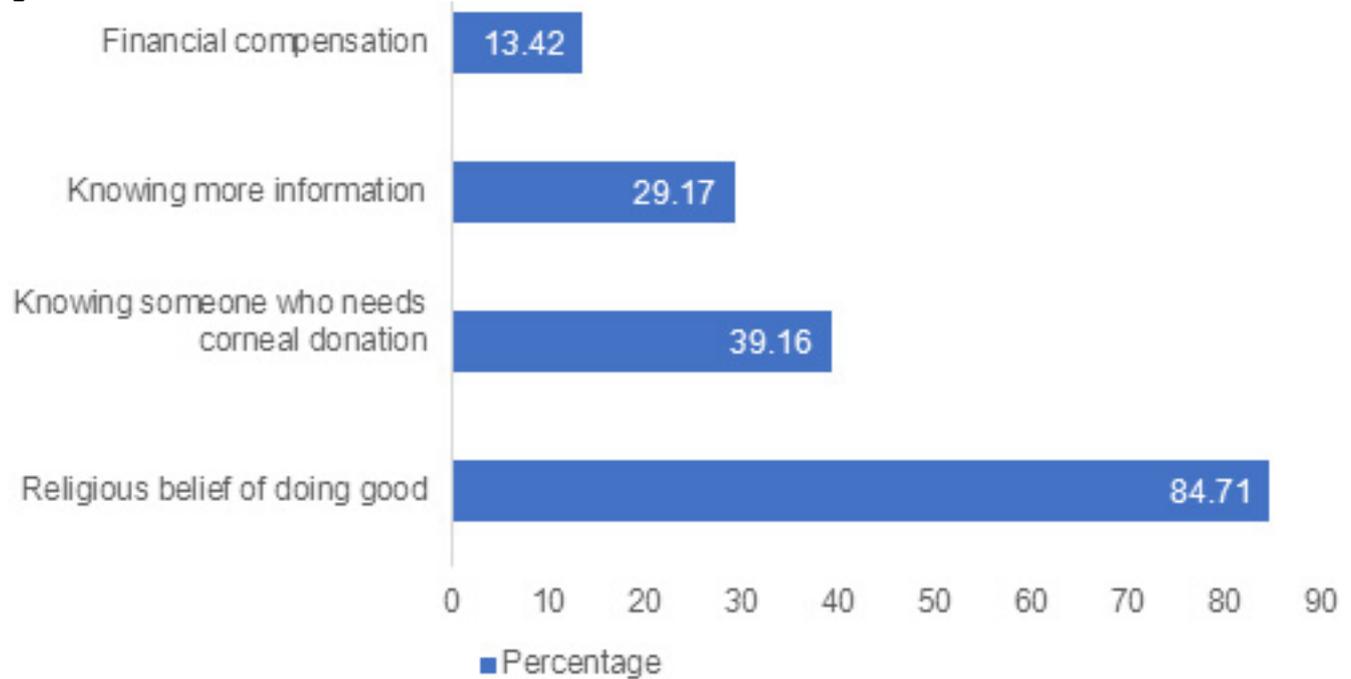
Note. The percentages are calculated based on the number of participants who claimed to have enough knowledge

Table 2: Participants' knowledge and attitudes towards corneal donation

The question		Frequency	Percentage
Eye part to be donated	All eye parts	45	7.0
	Cornea	306	47.7
	Retina	4	0.6
	Lens	3	0.5
	Don't know	283	44.1
Ideal time to harvest the cornea	As fast as possible	152	23.7
	Within 6 hours	107	16.7
	24 hours – 1 week	31	4.8
	Don't know	351	54.8
Appropriate age for corneal donation	Birth – 75 years	103	16.1
	More than 1 year	14	2.2
	More than 10 years	146	22.8
	Don't know	378	59.0
Contra-indication of corneal donation	Optic nerve affection	119	18.6
	Retinal affection	81	12.6
	Viral hepatitis/ HIV	104	16.2
	Don't know	337	52.6
Corneal donations treat all eye diseases	Yes	50	7.8
	No	281	43.8
	Don't know	310	48.4
Blood group mismatch is a contra-indication	Yes	112	17.5
	No	198	30.9
	Don't know	331	51.6
Living person can donate his cornea	Yes	138	21.5
	No	220	34.3
	Don't know	283	44.1
Do you know where and how to apply for corneal donation?	Yes	134	20.9
	No	507	79.1
Are you willing to donate your cornea?	Yes	171	26.7
	No	154	24.0
	Uncertain	316	49.3
Are you willing to donate your relative's cornea?	Yes	92	14.4
	No	268	41.8
	Uncertain	281	43.8

**Table 3. Knowledge score and corneal donation willingness and their association with the biodemographics**

Factor	Knowledge score			Corneal donation willingness			
	Mean	SD	p	Frequency	Percentage	p	
Age (years)	Less than 20	2.17	1.661	0.139	20	37.7	0.057
	20 – 30	2.27	1.791		89	29.2	
	31 – 40	1.83	1.583		31	27.9	
	More than 40	2.06	1.817		31	18.0	
Gender	Male	2.08	1.838	0.207	104	24.5	0.025
	Female	2.21	1.587		67	30.9	
Nationality	Saudi	2.12	1.765	0.442	167	26.6	0.838
	Non-Saudi	2.42	1.311		4	33.3	
Educational level	Up to middle school	1.90	1.895	0.541	7	33.3	0.323
	High school	2.24	1.736		45	32.4	
	Bachelor	2.08	1.754		104	24.0	
	Post-graduate study	2.32	1.807		15	31.9	
Career / study field	Medical	2.93	1.836	< 0.001	58	31.0	0.166
	Non-medical	1.80	1.614		113	24.9	
Do you have enough knowledge?	Yes	3.37	1.651	< 0.001	40	32.5	0.093
	No	1.83	1.651		131	25.3	
Level of knowledge	Good				26	39.4	0.008
	Poor				145	25.2	

**Figure 3. The barriers against corneal donation****Figure 4. The motives for corneal donation**

## Discussion

In this study, the knowledge and awareness levels among the population were assessed and showed a low-level of knowledge, with only 10.3% of the participants having good knowledge based on our corneal donation knowledge scoring system, and 19.2% claimed to have enough knowledge. Religious belief of doing good and lack of knowledge were the most frequently reported motive and barrier to corneal donation, respectively.

The level of knowledge and awareness regarding corneal donation in our study is in agreement with those reported by other studies in the kingdom (10,14,15). The findings of this study showed that being involved in a medical field has a positive impact on the level of knowledge indicated by the mean knowledge score (2.93 vs 1.80,  $p < 0.001$ ). Higher levels of knowledge and awareness were reported in studies targeting the medical students (7,12,13). The age was not a significant factor for the level of knowledge. However, Alibrahim and Al Jindan, (14) revealed that older participants are more knowledgeable.

The overall percentage of participants who declared to be willing to donate their own corneas was 26.7%. A similar percentage (28.5%) was reported by Alibrahim and Al Jindan, (14), and a higher percentage (61.5%) was reported by Bugis et al., (15). The females were significantly more inclined to donate their corneas than the males (30.9% vs 24.5%,  $p = 0.025$ ). On the contrary, Alanazi et al., (10) reported that females are 35.3% less likely to declare willingness of corneal donation than males.

Lack of knowledge was the most frequently reported barrier, as it was reported by 59.13%, followed by family objection (43.99%). On the other hand, the most frequently reported motive was religious belief of doing good (84.71%). The factors affecting the corneal donation reported by this study are consistent with those reported by Alanazi et al., (10).

The limitation of this study includes not structurally recruiting a random sample from the entire population of Aseer region. Another limitation was using self-reporting questionnaire, and subsequently some questions might be misinterpreted.

## Conclusion

In conclusion, the study revealed a low level of knowledge of corneal donation in Aseer region, Saudi Arabia. Approximately one quarter of the participants reported willingness of corneal donation. Lack of knowledge was the main barrier, as it was reported by almost two thirds. These results highlight the necessity for campaigns and other modalities to improve the level of awareness of corneal donation.

## References

- Brunette I, Roberts CJ, Vidal F, Harissi-dagher M, Lachaine J, Sheardown H, et al. ALTERNATIVES TO EYE BANK NATIVE TISSUE FOR CORNEAL STROMAL REPLACEMENT. *Prog Retin Eye Res* [Internet]. 2017;59:97–130. Available from: <http://dx.doi.org/10.1016/j.preteyeres.2017.04.002>
- Lamm V, Hara H, Mammen A, Dhaliwal D, Cooper DKC. Corneal blindness and xenotransplantation. *Xenotransplantation*. 2014;21(2):99–114.
- Parrey MUR, Alswelmi FK. Prevalence and causes of visual impairment among Saudi adults. *Pakistan J Med Sci*. 2017;33(1):167–71.
- Assiri AA, Yousuf BI, Quantock AJ, Murphy PJ. Incidence and severity of keratoconus in Asir province, Saudi Arabia. *Br J Ophthalmol*. 2005;89(11):1403–6.
- Wagoner MD, Gonnah ES, Al-Towerki A-E. Outcome of primary adult optical penetrating keratoplasty with imported donor corneas. *Int Ophthalmol*. 2010;30(2):127–36.
- Wagoner MD, Gonnah ES, Al-Towerki AE, Teichmann KD, Goins KM, Kitzmann AS, et al. Outcome of primary adult penetrating keratoplasty in a Saudi Arabian population. *Cornea*. 2009;28(8):882–90.
- Ibrahim Y, Mirghani HO, Aljohani OD, Eid HA, Aljehani EA, Alhawiti AE. Knowledge and attitude about eye donation and corneal transplantation among medical students and interns in Tabuk, KSA. *Basic Res J Med Clin Sci*. 2017;6(1):1–8.
- Paton D, Tabbara K, Penna E. Penetrating Keratoplasty ( Corneal Transplantation ) in Saudi Arabia. *Ann Saudi Med* [Internet]. 1984;4(3):2–7. Available from: <https://doi.org/10.5144/0256-4947.1984.235>
- Gain P, Jullienne R, He Z, Aldossary M, Acquart S, Cognasse F, et al. Global survey of corneal transplantation and eye banking. *JAMA Ophthalmol*. 2016;134(2):167–73.
- Alanazi LF, Aldossari SH, Gogandy MA, Althubaiti GA, Alanazi BF. Attitude, beliefs and awareness towards corneal donation in Saudi Arabia. *Saudi J Ophthalmol* [Internet]. 2019;33(2):121–9. Available from: <https://doi.org/10.1016/j.sjopt.2019.02.003>
- Saudi Center For Organ Transplantation [Internet]. [cited 2021 Aug 3]. Available from: <https://www.scot.gov.sa/en>
- Alruwaili KH, Alanazy TA, Zaki KA, Alruwaili KK, Alhamad TM, Alanazi MO. Awareness, knowledge, and attitudes regarding eye donation and corneal transplantation among medical and paramedical students. *Int J Med Dev Ctries* [Internet]. 2019;3(11):889–93. Available from: <https://doi.org/10.24911/IJMDC.51-1559497693>
- Hameed N, Jadidy E. Knowledge and Attitude Regarding Eye Donation and Corneal Transplantation among Medical Students of Taibah University in Medina , Saudi Arabia 2015. *Int J Acad Sci Res*. 2015;3(4):18–26.
- Alibrahim E, Al Jindan M. Knowledge and attitude about corneal donation and transplantation in Eastern province: a population-based study. *Int J Med Dev Ctries* [Internet]. 2020;4(2):409–16. Available from: <https://doi.org/10.24911/IJMDC.51-1576182666>
- Bugis A, Ali A, Almaghrabi A, Alharbi A, Fatani Y, Alem S, et al. Knowledge and attitudes regarding eye donation and corneal transplants in Saudi Arabia: A cross-sectional study. *Int J Med Heal Res*. 2018;4(2):6–9.