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ORIGINAL ARTICLE

KNOWLEDGE AND ATTITUDE OF THE HEALTHCARE STUDENTS REGARDING ORGAN DONATION AT THE UNIVERSITY OF TABUK, KINGDOM OF SAUDI ARABIA

Mathar Mohideen Nagoor Thangam, Arwa Saud Bashaeer Albalawi, Nouf Ali Mohammed Alhawiti, Renad Abdulhamid Atallah Qubali, Taif Abdullah Hammad Alatawi, Taif Holayel Eid Atawi, Wejdan Hussain Mohammed Mutambik

Department of Nursing, Faculty of Applied Medical Sciences, University of Tabuk, Kingdom of Saudi Arabia

ABSTRACT

Background: Many countries in the world are facing challenges in organ donation due to a shortage of organ availability. It leads to increased waiting time and delays the treatment time among the recipients. Knowledge and attitude among healthcare students is the key element in increasing the registration rate. This study aimed to assess the knowledge and attitude of undergraduate medical students towards organ donation at the University of Tabuk.

Materials & Methods: A descriptive cross-sectional survey was performed from December 2022 to February 2022, using a pre-designed online questionnaire among healthcare students. Eighty five percent of the calculated response rate with the fulfilled criteria was included in the study. Data was analyzed through Statistical Package for Social Sciences (SPSS) software version 26.

Results: More than half of the healthcare students had shown good knowledge regarding organ donation (53.89%). About 40.56% of the students reported a positive attitude toward organ donation and more than half had a neutral attitude (53.3%). The relationship between knowledge and attitude was highly significant ($P<0.001$). Program and previous knowledge are factors which had shown significant results with the knowledge of organ donation. Age, studying year and previous information had shown significant effects on attitude toward organ donation and transplantation.

Conclusion: This study concluded that the participants had an average level of awareness regarding knowledge and attitude toward organ donation. This result creates the need for the inclusion of organ donation content in the curriculum among the health care courses, especially in the allied health sciences courses. Educating the students on this aspect is essential to create a joined community effort.

KEY WORDS: Organ donation; organ transplantation; Knowledge; attitude; willingness.

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INTRODUCTION

Organ donation saves lives and increases the survival of the recipients. Organ donation needs are increasing day by day. Globally organ donation rate is lower than the organ demand. Chronic kidney disease is the major burden of the Kingdom of Saudi Arabia (KSA), due to the rising number of people with End Stage of Renal Failure (ESRD) and diabetes mellitus.[1] The only best treatment for the End Stage of Kidney Disease is a kidney transplant. The most transplanted organ in the world is the kidney followed by the liver. In 2021, the number of organ transplants reported was 144, 302.[2,3]

Long waiting times have been reported among the recipients of organ donation. The registration of organ donation rate is low compared to the waiting list locally and internationally. Despite advanced healthcare in Saudi Arabia, the rate of organ donation is comparatively lower than in other countries in the Middle East region. [4] The following actual data as per 2022 statistics shows the differences: KSA (3.5 per

Corresponding Author:

Dr. Mathar Mohideen Nagoor Thangam
Assistant Professor
Department of Nursing,
Faculty of Applied Medical Sciences
University of Tabuk, Saudi Arabia
E-mail: mohideennursing@gmail.com

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million population (pmp)), UAE (5.5 pmp), QATAR (4.13 pmp) and Kuwait (8 pmp). The reported data in 2022 is as follows based on the country database: USA (44.5pmp), United Kingdom (21.08pmp) and Australia (17.48pmp).[5]

The first organ donation in Saudi Arabia occurred in 1978 from a living donor. The National Kidney Foundation launched the deceased kidney transplant program in 1984. This project was expanded in the Kingdom in 1993 to include organ transplants of the kidney, liver, heart, lungs, pancreas and intestine, as well as retrieved tissues such as the heart for valves, bones and cornea.[6] KSA has launched many measures to raise awareness and encourage registration. However, in a recent poll, the Arab community acknowledged a lack of proper information to encourage organ donation.[7] Major challenges in organ donation programs include a scarcity of organs and a low number of persons registered to donate. Recent national statistics in KSA revealed a significant disparity between actual organ donation and the need for organ donation.[8]

In an Arab population-based study conducted in 13 Saudi Arabian provinces, 54% of younger and 47% of older respondents expressed support for organ transplantation, whereas just 4% of younger and 3% of older participants registered in the national donor database.[7] A Hong Kong research identified three predictors of organ donation registration: awareness of organ donation, commitment to organ donation and exposure to organ donation. In this survey, the majority of students had positive sentiments regarding organ donation, yet only 28.1% of medical students registered for organ donation.[9] These data revealed that the real knowledge and attitude about organ donation did not correspond with the registration rate.[6]

A recent cross-sectional study from the eastern region of Saudi Arabia reported a 63.03% unwilling rate towards organ donation among the public.[10] Different surveys had reported the willingness in organ donation rate is 50- 80%.[11-13] A National survey from the US Department of Health reported that 69% of participants were willing to donate organs.[14] The pooled willingness rate of organ donation was reported as 49.8%, from a meta-analysis of the Middle East region.[15]

Many attempts are being done in Saudi Arabia to promote awareness among the population. Previous investigations, however, found that the general people had average knowledge and poor attitudes.[12, 16, 17] Even research in the field of healthcare had average findings.[18] Health care professionals are the primary sources of health information.[19] Healthcare students are the backbone of the healthcare delivery system. They may readily influence public opinion on organ donation. The healthcare industry is the primary source of persons who are directly involved in the process of organ donation. So, increasing the number of health-care workers with strong knowledge and attitudes helps to raise public awareness.

According to a study in Riyadh, KSA, most medical students were strongly in favor of organ donation, but some of the medical students expressed concerns and negative attitudes about organs whether they are alive or dead. [20] Since medical training and attitude toward organ donation may vary over time and between provinces, this survey aimed primarily to describe the effect of academic progression on the knowledge and attitude of Saudi undergraduate medical students concerning organ donation. Secondarily, it intended to verify whether senior students have better knowledge and explore other hypothetical factors. The ultimate goal was to guide future pedagogical interventions in medical education.

Objectives

1. To assess the level of knowledge and attitude of healthcare students about organ donation.

2. To identify the association between knowledge of organ donation and demographic variables.

3. To rule out the association between attitude towards organ donation and demographic variables.

MATERIALS& METHODS

A descriptive Cross-sectional survey was adopted design for this study. This study was carried out from December 2022 to February 2023 by using a convenient sampling technique. The population of this study was healthcare students of the University of Tabuk. It included Medical, Nursing, Medical Lab Technology, physical therapy and pharmacy students. A survey link was sent to all the students from healthcare colleges. A total of 230 responses were received from the online survey. Out of that, 180 were eligible with the research criteria (response rate, 78%).

The initial part of the survey consisted of the consent form, which included the information of the study and confidentiality assurance. A previously validated questionnaire by Woodman et al., 2022 on knowledge (based on qualification and experience) and attitude (based on motivational reasons behind the decision) toward organ donation was administered. The tool permission was obtained.[18]

The questionnaire consisted of two domains:

1. Sociodemographic questions: It included seven items (Gender, age, program, studying year, marital status, previous information and educational programs in the Tabuk region).

2. Organ donation and transplantation knowledge and attitudes questions; and reasons for consenting or refusing to donate either living, diseased, or dead donors because perceptions may change.

- Demographic variables: 7 Items
- Knowledge items: 14 items
- Attitude items: 14 items

The knowledge domain levels were categorized into low, average and high based on the scoring of its items and attitude domain levels were categorized into negative, neutral and positive. The data were analyzed by using Statistical Package for the Social Sciences (SPSS) version 26. Frequency and percentage were used to describe the sample characteristics. Knowledge scores were calculated and the relationship with the attitude scores with the Pearson's correlation test. T-test and ANOVA used to identify the difference between the groups regarding knowledge and attitude regarding organ donation.

RESULTS

Baseline characteristics

Table 1: Distribution of subjects according to their demographic variables

Demographic variables	f	%
1. Gender:		
Male	68	37.78
Female	112	62.22
2. Age in years:		
18-20 years	55	30.56
21-22 years	95	52.78
23 and above	30	16.67
3. program studying currently:		
Medicine	37	20.56
Nursing	77	42.78
Medical lab technology	26	14.44
Physical therapy	21	11.67
Pharmacy	19	10.56
4. Studying year:		
First	28	15.56
Second	22	12.22
Third	22	12.22
Fourth	76	42.22
Fifth and above	32	17.78
5. Marital status:		
Single	175	97.22
Married	4	2.22
Divorced	0	0
Widowed	1	0.56
others	0	0
6. previous information: Yes	150	83.33
Not sure	14	7.78
No	16	8.89
7. Educational programs organized in the Tabuk Province:		
Yes	43	23.89
Not sure	43	23.89
No	94	52.22

Table 1 shows the demographic characteristics of the participants. Three fifth of the participants were female students (62.22%), half of them from 21-22 years of age (52.78%), 42% of the students from nursing, one-fifth of them studying medicine (20.6%), 97.2% of them were single, 83.3% of them had previous information about organ donation and half of them stated that they did not attend to any educational program organized in Tabuk.

Table 2: Overall wise Mean, SD and mean% to Assess the knowledge and attitude of organ donation and transplantation

Knowledge and attitude	Max score	scores		
		Mean	SD	Mean%
Knowledge Overall	24	16.09	2.91	67
Attitude overall	71	45.25	10.74	64

Table 2 revealed the Mean knowledge and attitude of the participants. The overall mean knowledge was 16.09 ±2.91 with a mean percentage of 67%. The overall mean attitude was 45.25 ±10.74 with a mean percentage of 64%.

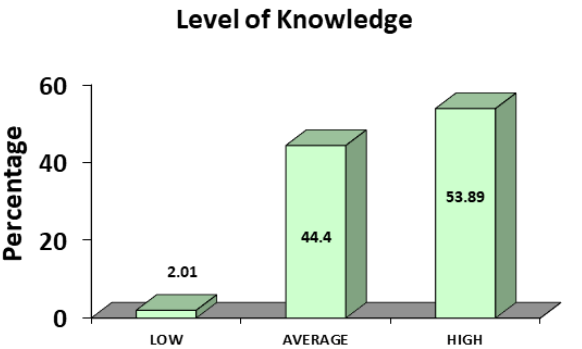

Figure 1: percentage of level of knowledge regarding organ donation

Figure 1 shows the level of knowledge among the participants. More than half of them had high knowledge (53.89%) and 44.4% of them had average knowledge.

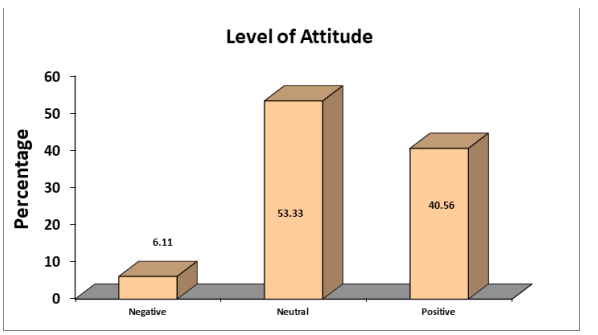

Figure 2: Percentage of the level of attitude of the participants

Figure 2 shows the level of attitude among the participants. More than half of them had neutral attitude (53.33%) and 40.56% of them had positive attitude.

Table 3: Correlation between level of knowledge and level of attitude

	Mean ±SD	'r'-value	p-value
Knowledge	16.09±2.92	0.405	P<0.001***(HS)
Attitude	45.25±10.74		

HS-Highly Significant

Table 4 : Difference in level of knowledge and selected demographic groups

Demographic variables	n	Knowledge Score Mean	Knowledge Score SD	't' /F- value	p-value	Post hoc test (scheffe test)
1.Gender:						
Male	68	16.02	3.39	t=0.247	0.805	NA
Female	112	16.13	2.59	(df=3)	NS	
2.Age in years:						
18-20 years	55	15.87	2.85	F=1.809	0.167	NA
21-22 years	95	15.94	2.74	(df=2,177)	NS	
23 and above	30	17.01	3.44			
3.program studying currently:						
Medicine	37	17.63	2.78			Medicine VS Nursing (p=0.02*) & Medicine Vs Physical therapy (p=0.029*)
Nursing	77	15.62	2.89	F=4.716	P<0.001***	
Medical lab technology	18	16.43	2.48	(df=5,174)	HS	
Physical therapy	21	14.91	2.74			
Pharmacy	19	16.87	2.34			
Others	8	14.00	3.15			
4.studying year:						
First	28	15.03	2.53			
Second	22	16.03	3.04	1.821	0.127	NA
Third	22	16.42	1.79	(df=4,175)	NS	
Fourth	76	16.02	3.07			
Fifth and above	32	17.01	3.20			
5.previous information:						
Yes	150	16.33	2.77	3.046	0.051	S
Not sure	14	15.02	3.72	(df=2,177)	S	
No	16	14.82	3.13			
6. Educational programs organized in the Tabuk Province:						
Yes	43	16.90	2.86	0.5981	0.003	HS
Not sure	43	16.44	3.24	(df=2,177)	HS	
No	94	15.20	2.78			

*p<0.05 significant, ** p<0.01 & ***p<0.001 Highly significant.

Table 3 identified the positive correlation between the knowledge and attitude regarding organ donation (r-0.405, P<0.001), so the knowledge scores rises the attitude towards organ donation. Hence H3 is accepted.

Table 4 identified the significant difference between the knowledge of organ donation and the program of study (F=4.716, P<0.001) and previous information (F=3.04, p=0.051).

Table 5: Difference in the level of attitude and selected demographic data

Demographic variables	n	Attitude Score		't' /F- value	p-value	Post hoc test (scheffe test)
		Mean	SD			
1.Gender:				t=0.009 (df=178)	0.993 NS	NA
Male	68	45.26	11.30			
Female	112	45.25	10.42			
2. Age in years:				F=5.26 (df=2,177)	P=0.006** HS	18-20 VS 21-22 (p=0.007**)
18-20 years	55	41.45	13.64			
21-22 years	95	47.11	8.03			
23 and above	30	46.37	10.79			
3.program studying currently:				F=0.881 (df=5,174)	P=0.495 NS	NA
Medicine	37	47.19	9.98			
Nursing	77	44.84	11.49			
Medical lab technology	18	44.39	12.66			
Physical therapy	21	42.62	10.51			
Pharmacy	19	48	8.26			
Others	8	42.63	6.84			
4.studying year:				3.906 (df=4,175)	0.005** HS	First vs Third (p=0.029*)
First	28	39.96	14.46			
Second	22	41.59	13.31			
Third	22	49.82	8.71			
Fourth	76	46.50	7.95			
Fifth and above	32	46.31	10.21			
5.previous information:				8.108 (df=2,177)	P<0.001*** HS	No VS Not sure (P=0.048*)
Yes	150	46.35	10.09			
Not sure	14	34.79	13.66			
No	16	44.19	9.32			
6. Educational programs organized in the Tabuk Province:				0.118 (df=2,177)	0.889 NS	NA
Yes	43	45.86	12.48			
Not sure	43	45.40	12.64			
No	94	44.91	8.89			

*p<0.05 significant, ** p<0.01 & ***p<0.001 Highly significant.

Table 5 identified the significant difference between attitude and Age (p=0.006), year of study (0.005) and previous information (P<0.001) had significant differences with the attitude regarding organ donation.

Table 6: Reason to refuse to organ donation

What are the reasons for you to refuse organ donation?								p-value
		Yes		No		Not Sure		
		f	%	f	%	f	%	
General Health	Female	39	21.7	6	3.3	67	37.2	**P=0.558(NS)**
	Male	20	11.1	6	3.3	42	23.3	
Religion	Female	65	36.1	15	8.3	32	17.8	**P=0.068(NS)**
	Male	30	16.7	7	3.9	31	17.2	
Fear of losing an organ	Female	53	29.4	10	5.6	49	27.2	**P=0.339(NS)**
	Male	30	16.7	11	6.1	27	15	
Don't want my body to be cut	Female	51	28.3	14	7.8	47	26.1	**P=0.776(NS)**
	Male	29	16.1	7	3.9	32	17.8	
Mistrust of medical personnel in the diagnosis of brain death	Female	64	35.6	18	10	30	16.7	**P=0.012***
	Male	24	13.3	13	7.2	31	17.2	
Smoking	Female	82	45.6	7	3.9	23	12.8	**P=0.05***
	Male	38	21.1	8	4.4	23	12.2	

Table 6 identified the reason for the refusal of organ donation. A significant difference between the male and female students on the reasons for refusing organ donation was seen in two areas: Mistrust of medical personnel in the diagnosis of brain death (p=0.012) and Smoking (p=0.05). This study found that 50 percent of the participants stated that the refusal of organ donation is religion.

Most of the male and female students responded that the major reason for the organ donation is helping others (Male – 19.4% and female – 30.6%).

DISCUSSION

The best and often the only treatment for end-stage organ failure is an organ transplant. The latest figures from the WHO Global Observatory on Donation and Transplantation meet only about 10 percent of the world's needs.[2] The aim of the study was to assess the knowledge and attitude of health students about organ donation. Previous studies reported that medical students had more knowledge and understanding about organ donation than non-medical students.[18,21] However, no study showed high knowledge or high registration rates among medical students. Health professionals are more or less directly involved in organ recovery and recipient eligibility. Doctors have a significant influence on the attitudes and willingness of citizens regarding organ donation and transplantation, which helps to remove barriers and increase organ donation.

This study found that most medical students have a good to average level of knowledge and a positive to neutral attitude toward organ donation. In agreement with our findings, a study among Turkish medical students reported a positive attitude toward organ donation with inadequate knowledge regarding organ donation.[22] A similar comparable result was reported by another study from Turkey at the Fırat University Medical School.[23] Some of the studies reported a lack of knowledge among the majority of the participants: only 34.1% with good knowledge among general students in Omam and 51.9% of students with lack of knowledge in Jouf University KSA, low knowledge among students from a study in the eastern province KSA, uniformly low knowledge scores from a study at central region KSA.[12,13,18] Knowledge and a positive attitude increase the willingness.[16] It is essential to develop awareness programs to target healthcare students are essential.

In a study conducted in Bahrain reported that the medical students had a highly positive attitude and great willingness toward organ donation, their level of knowledge was fairly good El-Agroudy et al.[24] Contrastingly another study from KSA among the adult population from Jazan reported more than half of the participants the low attitude scores and only one-tenth of the study population had positive attitudes.[17] A study from Qatar reported high knowledge, but 83.3% expressed a negative attitude and more than half plan to be buried with all their organs intact.[25]

This study reported a willingness of 68% among the health care students. But the registration rate is very low. Some of the studies reported lower willingness among students.[26,27] In a recent Canadian survey, most medical students (n = 613/750; 82%) had formally consented to organ donation after death. Nonetheless, despite their positive attitude, medical students in that survey only had a limited understanding of organ donation.[28] Only 22% of medical students in Spanish universities consider themselves to be well-informed about organ donation.[29] In this Spanish survey, it's interesting to note that the survey found that a significant portion of these students had been exposed to negative information on the topic. Some of the studies from KSA had shown excellent willingness rates.[13,30] The majority of these studies generally showed a positive correlation between knowledge and attitude. Similarly, in this study highly significant correlation between attitude and level of knowledge was observed.

In agreement with our study, a study conducted in Saudi Arabia found a significant association between level of knowledge and specialty.[12] The study found students of medicine and physiotherapy had a higher level of knowledge than other specialties. Medical students reported higher knowledge of organ donation than in other courses and higher academic level students reported higher scores. These results coincided with the results of the study from Majmah.[20] A study from Alkaraj, Saudi Arabia also reported higher knowledge scores among the medical students than the nurse. This study also addressed the positive correlation between the level of knowledge and the willingness toward donation.[30]

The level of knowledge on organ donation among the female and male students did not differ significantly, similar results were observed in a study at Eastern provenience Saudi Arabia.[20] An Ethiopian study identified higher knowledge of organ donation among male students than among female students (Odds Ratio =1.156). A study from KSA reported that female students had significantly higher scores in knowledge, attitude, and willingness.[20]

Our study also demonstrated that medical students' level of knowledge regarding organ donation and transplantation improves as they go through the grade levels. These findings imply that these medical students' motivation might improve with additional knowledge and suitable instruction. Promoting organ donation, improving donor availability, and lowering death rates on waiting lists would all be made possible by better educating and training medical students and staff about organ donation and transplantation. The implications from the previous studies and the present study together recommend strengthening the education programs and their reachability. Arab population study identified that healthcare workers were the most influential people in organ donation. [7]

This study showed that a common intention to donate organs was to help others. These results are the same as the results of the Eastern Province KSA survey.[18] Similar results have been reported in most KSA studies.[4,13,17,18] Prior knowledge about organ donation significantly influenced knowledge and attitude about organ donation. Only 23.89% of the participants heard about organ donation from educational programs organized in Tabuk, 83.33% of them heard, read or saw information about organ donation in the last year. The main reasons for not wanting to donate organs were family and social barriers, fear of talking about death, lack of information about donation and unfair selection of organ recipients.[17,31] KSA Council of Islamic Jurisprudence Assembly allowed dead and living donations in 1982. A study conducted in KSA before examined the misconceptions associated with organ donation within the framework of Islam, while more recent studies have shown a much smaller proportion of students who had misconceptions about organ donation in Islamic perspective.[19] In a recent survey conducted in the Taif region, 37% stated that religious concerns were the main reason for refusing organ donation.[31] Many people who participated in the KSA survey stated that they were unsure about the Islamic permission of organ donation.

The Saudi Arabian government encourages and supports donors in various ways. These include awarding the donor with the King Abdul-Aziz Medal, a domestic flight discount of up to 50 and 50,000 Saudi Riyals, which will be fully awarded immediately after the donation. They are also supported by travel and bank cards. Donors have full-time access to health services.[8] This study identified the common intention to donate organs was to help others.

CONCLUSION

This study recommends that organ donation be included in the health care program curriculum to increase knowledge and willingness to donate organs. This study showed that most health students lack attitude and knowledge about organ donation. The study found a relationship between knowledge and attitude, indicating the need for educational programs and motivational letters about organ donation and transplantation before medical students can fully engage in organ donation campaigns and the entire transplantation process. Significant improvement is needed on organ donation during medical training. An organized educational program on all aspects of organ donation appears to be necessary. Saudi Arabia has already provided organ donation platforms and websites, including the National Donation Platform, Tawakkalna website and the Saudi Health Council for Organ Transplantation, so it is crucial to educate medical students on how to apply for organ donation. . In future studies, it is recommended to conduct the study with a larger sample and involve

medical students from all over the Kingdom.

The Strengths and Limitations of the Study: The strength of the current study is that it is one of the few studies that attempted to understand the knowledge and attitudes about organ donation among medical students in Tabuk, Saudi Arabia, while the smaller sample size may be a limitation of the study. Another limitation is that the study was conducted in a single university; the results must be taken with caution to be generalized to all medical students in Saudi Arabia or Gulf countries with the same culture.

REFERENCES

1. Alotaibi A, Perry L, Gholizadeh L, Al-Ganmi A. Incidence and prevalence rates of diabetes mellitus in Saudi Arabia: An overview. J Epidemiol Glob Health. 2017;7(4):211-218. https://doi.org/10.1016/j.jegh.2017.10.001
2. Global Observatory on Donation and Transplantation (GODT) [(accessed on 9 October 2023)]. Available online: https://www.transplant-observatory.org/2021-global-report-5/
3. John Elflein, Global number of organ transplantations 2021, https://www.statista.com/statistics/398645/global-estimation-of-organ-transplantations/
4. Alobaidi S. Beliefs and Intention to Organ Donation in Saudi Arabia: An Online Cross-Sectional Survey. Healthcare (Basel). 2023 Jun 12;11(12):1716. https://doi.org/10.3390/healthcare11121716
5. Country Database. International Registry in Organ Donation and Transplantation (IRODaT). 2022 Published Available from: http://www.irodat.org/.
6. Attar, Besher Al. The Critical Pathways of Deceased Organ Donation in Saudi Arabia. Saudi Journal of Kidney Diseases and Transplantation2022; 33(1):p 225-35. http://doi.org/10.4103/1319-2442.367822
7. Almubark RA, Alghonaim M, BinDhim NF, Attar B, Abaalkhail F, Ammary FA, et al. Attitudes Toward Organ Donation in an Arab-Based Population. Transplantation Proceedings. 2022; 54(8): https://doi.org/10.1016/j.transproceed.2022.08.017
8. Saudi Center for Organ Transplantation & King Salman Center for Kidney Diseases. [Jun; 2022]; http://www.rcrc.gov.sa/en/projects/pskc
9. Chu ST, Chung PPW, Hui YL. Knowledge and attitude regarding organ donation among medical students in Hong Kong: a cross-sectional study Postgraduate Medical Journal. 2022. https://doi.org/10.1136/pmj-2022-141781
10. Alessa MY, Albedaiwi MS, Al-Mousa AM, Alhassan GM, Alnefaie BT. Knowledge and attitude of organ donation in the Eastern region of Saudi Arabia and the influence of social media campaigns: a cross-sectional study. Annals of Medicine & Surgery 2023; 85(3):p 403-410. https://doi.org/10.1097/MS9.0000000000000258
11. Alwahaibi N, Wahaibi AA, Abri MA. Knowledge and attitude about organ donation and transplantation among Omani university students. Frontiers in Public Health 2023;11. https://doi.org/10.3389/fpubh.2023.1115531
12. Almutairi S. Knowledge, Attitude and Willingness Towards Organ Donation Among Medical and Health Sciences Students in Central Region, Saudi Arabia. Transplant Research and Risk Management. 2020;12:23-28. https://doi.org/10.2147/TRRM.S264872
13. Almutairi S. Knowledge, Attitude and Willingness Towards Organ Donation Among Medical and Health Sciences Students in Central Region, Saudi Arabia. Transplant Research and Risk Management. 2020;12:23-28. https://doi.org/10.2147/TRRM.S264872
14. Thirunavukkarasu A, Alanazi MOH, Albulayhid SBH, Alinad AKM, Alqader SA, Aljudia HAS. Knowledge, attitude and barriers toward organ donation among healthcare science students of Jouf University, Saudi Arabia: a cross-sectional study. IJMDC. 2020; 4(6): 996-1001. https://doi.org/10.24911/IJMDC.51-1589736821
15. US Department of Health and Human Services, Health Resources and Services Administration, Healthcare Systems Bureau. National survey of organ donation attitudes and practices, 2019: report of findings
16. Mekkodathil A, El-Menyar A, Sathian B, Singh R, Al-Thani H. Knowledge and Willingness for Organ Donation in the Middle Eastern Region: A Meta-analysis. J Relig Health. 2020 Aug;59(4):1810-1823. https://doi.org/10.1007/s10943-019-00883-x
17. Sharaan R, Alsulami S, Arab R, Alzeair G, Elamin N, Alsaywid B et all. Knowledge, Attitude and Willingness Toward Kidney Donation Among Health Sciences Students at King Saud Bin Abdulaziz University. Front Public Health. 2021; 7;9:667582. https://doi.org/10.3389/fpubh.2021.667582
18. Somaili, Mohammed. Knowledge and Attitude Toward Organ Donation Among the Adult Population in Jazan, Saudi Arabia. Cureus. 2022; 14(7). https://doi.org/10.7759/cureus.27002
19. Woodman A, Al-Jamea LH, Zahrani EMA, Elsafi SH, Waheed KB, Al-Yami FS et all. Knowledge, Attitude and Behavior Toward Organ Donation and Transplantation Among Medical Students in the Eastern Province of Saudi Arabia. Transplant Proc. 2022 Sep;54(7):1690-1696. https://doi.org/10.1016/j.transproceed.2022.05.034
20. Alduraywish SA, Altamimi LA, Aldhuwayhi RA, AlZamil LR, Alzeghayer LY, Alsaleh FS et all. Sources of Health Information and Their Impacts on Medical Knowledge Perception Among the Saudi Arabian Population: Cross-Sectional Study. J Med Internet Res. 2020 Mar 19;22(3):e14414. https://doi.org/10.2196/14414
21. AlShareef SM, Smith RM. Saudi medical students knowledge, attitudes and beliefs with regard to organ donation and transplantation. Saudi journal

of kidney diseases and transplantation: an official publication of the Saudi Center for Organ Transplantation, Saudi Arabia. 2018;29(5):1115-1127. https://doi.org/10.4103/1319-2442.243963

22. Almohsen SS, Alobaishy SM, Alghammas NI. Attitudes and beliefs on organ donation among students in a university in Central Saudi Arabia. Saudi medical journal. 2016;37(5):591. https://doi.org/10.15537/smj.2016.5.14701
23. Akbulut S, Demyati K, Toman I, Gaygili Z, Kaya S, Akpolat VR et all. Medical students' knowledge, attitudes and awareness toward organ donation. Transpl Immunol. 2022 Aug;73:101634. https://doi.org/10.1016/j.trim.2022.101634
24. Kaygusuz, T. O., & Pırıncı, E. Evaluation of the opinions and knowledge of medical school students on organ donation and transplantation. The Turkish Journal of Gastroenterology. 2021; 9(32): 790. https://doi.org/10.5152/tjg.2021.20937
25. El-Agroudy AE, Jaradat A, Arekat M, Hamdan RM, AlQarawi N, AlSenan ZK et all. Survey of medical students to assess their knowledge and attitudes toward organ transplantation and donation. Saudi J Kidney Dis Transpl. 2019 Jan-Feb;30(1):83-96. https://doi.org/10.4103/1319-2442.252936
26. Alsaied O, Bener A, Al-Mosalamani Y, Nour B. Knowledge and attitudes of health care professsionals toward organ donation and transplantation. Saudi J Kidney Dis Transpl 2012;23:1304-10.
27. Al-Abbasi G, Al-Jasim A. Attitudes and perceptions among Iraqi young adults towards organs donation and transplantation: A call for action. J Public Health Res. 2020 Dec 18;9(4):1857. https://doi.org/10.4081/jphr.2020.1857
28. Anwar ASMT, Lee JM. A Survey on Awareness and Attitudes Toward Organ Donation Among Medical Professionals, Medical Students, Patients and Relatives in Bangladesh. Transplant Proc. 2020 Apr;52(3):687-694. https://doi.org/10.1016/j.transproceed.2019.12.045
29. Robert, P., Bégin, F., Ménard-Castonguay, S. Attitude and knowledge of medical students about organ donation - training needs identified from a Canadian survey. BMC Med Educ 21, 368 (2021). https://doi.org/10.1186/s12909-021-02736-2
30. Ríos A, López-Navas A, López-López A, Gómez FJ, Iriarte J, Herruzo R et all. A Multicentre and stratified study of the attitude of medical students towards organ donation in Spain. Ethn Health. 2019 May;24(4):443-461. https://doi.org/10.1080/13557858.2017.1346183
31. Agrawal S, Binsaleem S, Al-Homrani M, Al-Juhayim A, Al-Harbi A. Knowledge and attitude towards organ donation among adult population in Al-Kharj, Saudi Arabia. Saudi J Kidney Dis Transpl. 2017;28(1):81-89. https://doi.org/10.4103/1319-2442.198150
32. Vincent BP, Kumar G, Parameswaran S, Kar SS. Knowledge, attitude and perception on organ donation among undergraduate medical and nursing students at a tertiary care teaching hospital in the southern part of India: A cross-sectional study. J Educ Health Promot. 2019 Aug 30;8:161. https://doi.org/10.4103/jehp.jehp_439_18
33. Bukhari MA. Willingness for Solid-Organ Donation in Saudi Arabia: A Skyscape View. Exp Clin Transplant. 2022 May;20(5):500-513. https://doi.org/10.6002/ect.2020.0180

CONFLICT OF INTEREST
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	MMNT, ASBA, NAMA
Acquisition, Analysis or Interpretation of Data:	MMNT, ASBA, NAMA, RAAQ, TAHA, THEA
Manuscript Writing & Approval:	MMNT, ASBA, NAMA, RAAQ, WHMM

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.