

Awareness of brain death, organ donation, and transplantation among medical students at single academic institute

ABSTRACT

Objective: To assess the knowledge of the concept of brain death, attitude, and level of awareness towards organ donation and transplantation, among medical students and interns at the University of Jeddah, Kingdom of Saudi Arabia.

Methods: A cross-sectional study via electronic questionnaire over period of 3 weeks to 2nd through 6th year medical students and interns at university of Jeddah.

Results: A response rate of 113 out of 151 (74.83%) was achieved. Among participants, 36% expressed uncertainty when questioned about the concept of brain death. 8.8% of the participants were against the idea of organ donation. 60% of those who refused to contemplate organ donation were unfamiliar with the brain death concept. No significant difference was seen regarding fears about cosmetic disfiguration between those familiar and unfamiliar with the concept of brain death. 60.2% of the study cohort would consider donating their organs to family members but only 29.2% of them had discussed the matter of organ donation and transplantation with them, while 44.2% had discussed the matter with their friends. Majority of medical students (71.7%) were interested in being organ donors.


Conclusion: Knowledge of organ donation and transplantation were adequate. Matter accepting brain death and its implication still not clear for most of participants. We believe there is still room to improve. This could be achieved by integrating more education about different aspects of brain death and its implications through medical school years.

Key words: Brain death; knowledge; medical students; organ donation

Introduction

Brain death implies the irreversible absence of cerebral and brainstem function.^[1] In most countries brain death is understood as the death of a person.^[2] Most organ donors are patients who meet the criteria for neurologic brain-death.^[3]

Organ transplantation has saved hundreds and thousands of lives in patients with end-organ failure.^[4] There is a lack of organ donors globally; more than 20% of patients on waiting lists die every year due to lack of donor organs.^[5] Uncertainty about brain death concept and adverse religious beliefs of the general population play an important role

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in affecting the decision to donate cadaveric organs for transplantation.^[6]

The Kingdom of Saudi Arabia established the Saudi Center for Organ Transplantation (SCOT) to supervise organ donation and the transplantation program.^[7] There has been a subsequent annual increase in the number of transplanted organs.^[8]

In 2016, potential brain-dead donors numbered 646, with 410 deemed potential donors, 333 eligible, 92 actual donors and 85 utilized. Since 1986, the possible deceased brain death donors reached 11866, 7257 potentials, 6119 eligible, 2020 actual donors, and 1816 actual cases.^[7] However, with the increased demand for organ transplantation, number of actual cases is not necessarily increased. Increasing awareness and education of organ donation need is becoming crucial in the society.^[9]

Health care providers have important role in affecting public awareness regarding brain death and organ donation,^[10] and therefore medical students' awareness and acceptance of the subject are important in affecting health workers practicing and the community beliefs about brain death and organ donation in the future, as they represent the future physicians.^[2]

Few studies have assessed the knowledge and awareness of the concept of brain death among students. A cross sectional study in Spain on 9275 medical students in 2010 indicated that 67% of students have adequate knowledge about brain death while 28% didn't know the meaning of brain death and 5% didn't believe brain death heralded the *de facto* death of a person.^[2]

Prince Sultan Military College of Health Sciences (Saudi Arabia) surveyed 434 health students to analyze their attitude toward organ donation. 44% of the students had a positive attitude toward donation.^[11]

Aim

Knowledge and awareness assesment of medical students and interns regarding brain death, organ donation and transplantation.

Methodology

Study design and setting

The study was approved by the Institutional Review Board of the Medical College at the University of Jeddah (IRB No. 642-19). A cross sectional study was carried out at the University of Jeddah, Kingdom of Saudi Arabia, in January 2019. All undergraduate medical students from second to sixth years and intern were considered eligible to

participate. 1st year medical students excluded as curriculum involve basic science only. All participants were notified about the study objectives, response confidentiality, and consent to participate obtained electronically.

We used stratified sampling and the calculated sample was 109 out of 151 medical students to achieve 95% confidence level. This was calculated using Raosoft software (Raosoft, Seattle, WA, USA).^[12]

Study instrument

Permission was taken from Rios *et al.*^[2] to use their questionnaire, and to adapt it based on local cultural norms and practice. An anonymous questionnaire was used and distributed as an electronic form using Google forms and the data was collected by spread excel sheet. The questionnaire contains two part; One part of the questionnaire demonstrated demographic distribution while the other were related to research topic (brain death and organ donation).

Study variable

Brain death concept and students' knowledge were categorized to one of the following:

Correct concept: Identifying brain death as the *de facto* death of a person.

Incorrect concept: Not identifying brain death as a person's death.

Unknown concept: Lack of awareness of the concept of brain death.

The survey contained 29 questions and was divided into four parts. The 1st part dealt with personal data and social variables, the 2nd part dealt with the variability of knowledge about donation and transplantations, the 3rd part about variables of a religious nature and the 4th part attitude to organ donation and transplantation.

Statistical analysis

Descriptive statistics were used to present respondents' socio-demographic characteristics, questions related to organ donation and brain death. Comparisons between respondents' knowledge of brain death and was the association between brain death knowledge and socio-demographic characteristics, was performed using the Chi-square test.

The analysis was performed using the Statistical Package for Social Science (SPSS), version 23.0 (IBM, Armonk, NY, USA).

Results

A total of 113 individuals responded. The median age was 22 years old; the overwhelming majority of the respondents were male 106 (93.8%) as female medical college started two year ago. All respondents were Saudi nationals [Table 1].

Twenty-three (20.4%) respondents had a family member or friend who needed an organ transplant. Only 18 (15.9%) respondents thought that the need for organ transplantation need was met. Table 2 shows all organ transplantation knowledge-related responses for all study participants and participants split by knowledge of brain death. No statistically significant difference was found between the groups (all *P* values > 0.05) [Table 2].

Table 1: Socio-demographic characteristics of all respondents (n=113)

Characteristics	Attributes	n (%)
Age	Mean±SD	22.04±1.90
	Median	22
Gender	Male	106 (93.8)
	Female	7 (6.2)
Academic year	Second	18 (15.9)
	Third	20 (17.7)
	Fourth	24 (21.2)
	Fifth	20 (17.7)
	Sixth	17 (15.0)
	Intern	14 (12.4)
Residence	Jeddah	100 (88.5)
	Other	13 (11.5)
Smoking status	Non-smoker	77 (68.1)
	Ex-smoker	9 (8.0)
	Smoker	26 (23.0)

*Nationality of all respondents was Saudi, and marital status of all respondents was single

Table 2: Respondents' knowledge regarding organ donation

Questions	Possible responses	All respondents n (%)	Respondents with brain death knowledge	Respondents with no knowledge of brain death	<i>P</i>
Do you know of any family or friends who have needed or received an organ transplant?	No	90 (79.6)	48 (81.4)	42 (77.8)	0.637
	Yes	23 (20.4)	11 (18.6)	12 (22.2)	
Do you know of any family or friends who have donated an organ?	No	94 (83.2)	50 (84.7)	44 (81.5)	0.643
	Yes	19 (16.8)	9 (15.3)	10 (18.5)	
Do you think the needs of transplant organs are covered?	No	95 (84.1)	52 (88.1)	43 (79.6)	0.217
	Yes	18 (15.9)	7 (11.9)	11 (20.4)	
Have you received any talk about organ donation and transplantation?	No	51 (45.1)	28 (47.5)	23 (42.6)	0.604
	Yes	62 (54.9)	31 (52.5)	31 (57.4)	
If you had to decide, would you donate the organs of a member of your family?	No	9 (8.0)	3 (5.1)	15 (27.8)	0.394
	I don't know	36 (31.9)	21 (35.6)	6 (11.1)	
	Yes	68 (60.2)	35 (59.3)	33 (61.1)	
Have you discussed the matter of organ donation and transplantation with your family?	No	80 (70.8)	45 (76.3)	35 (64.8)	0.181
	Yes	33 (29.2)	14 (23.7)	19 (35.2)	
Have you discussed the matter of organ donation and transplantation with your friends?	No	63 (55.8)	33 (55.9)	30 (55.6)	0.968
	Yes	50 (44.2)	26 (44.1)	24 (44.4)	

Chart 1 shows respondents' source of information regarding organ donation. 62.8% of respondents stated that the most prominent source of information favoring of organ donation was health professionals. 18.6% of respondents stated that the source of information not in favor of donation was "family". Only 1.8% respondents received knowledge from social media [Chart 1].

Organ donation related behavior/attitude-related questions are presented in Table 3. Differences in responses between the groups did not reach statistical significance (*P* values >0.05) [Table 3]. Only fourteen (12%) respondents knew brain death is a terminal event with no possibility of recovery or resolution [Chart 2].

The Chi-square test was applied to assess the association between brain death knowledge and socio-demographic characteristics. No statistically significant association was found (*P*-values > 0.05) [Table 4].

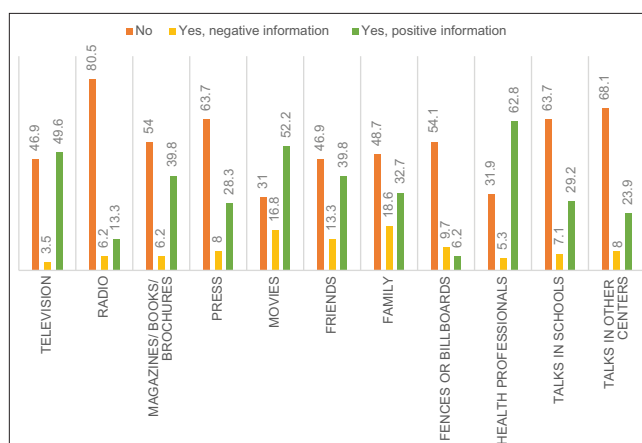


Chart 1: Respondents' source of information regarding organ donation. *Multiple response question

Table 3: Respondents' attitude regarding organ donation

Questions	Possible responses	All respondents n (%)	Respondents with brain death knowledge n (%)	Respondents with no knowledge of brain death	P
Would you donate your own organs?	No	10 (8.8)	4 (6.8)	6 (11.1)	0.697
	Note sure	40 (35.4)	22 (37.3)	18 (33.3)	
	Yes	63 (55.8)	33 (55.9)	30 (55.6)	
Are you a blood donor?	No, but I would be willing	53 (46.9)	28 (47.5)	25 (46.3)	0.678
	No, I'm not and I won't be	3 (2.7)	2 (3.4)	1 (1.9)	
	Yes, occasionally or once	41 (36.3)	19 (32.2)	22 (40.7)	
	Yes, usually	16 (14.2)	10 (16.9)	6 (11.1)	
If you donate your organs would you be concerned that your body will be left scarred or mutilated from organ extraction?	Don't know/no answer	30 (26.5)	16 (27.1)	14 (25.9)	0.966
	I don't mind	57 (50.4)	30 (50.8)	27 (50.0)	
	Yes, it concerns me a lot	26 (23.0)	13 (22.0)	13 (24.1)	
Do you know the opinion of your father towards organ donation?	I don't know his opinion	77 (68.1)	46 (78.0)	31 (57.4)	0.123
	Yes, he is against	16 (14.2)	6 (10.2)	10 (18.5)	
	Yes, he is in favor	18 (15.9)	6 (10.2)	12 (22.2)	
	Other opinion	2 (1.8)	1 (1.7)	1 (1.9)	
Do you know the opinion of your mother towards organ donation?	I don't know her opinion	69 (61.1)	40 (67.8)	29 (53.7)	0.493
	Yes, she is against	26 (23.0)	11 (18.6)	15 (27.8)	
	Yes, she is in favor	16 (14.2)	7 (11.9)	9 (16.7)	
	Other opinion	2 (1.8)	1 (1.7)	1 (1.9)	
If you have a partner, do you know their opinion about organ donation?	I don't have a partner	78 (69.0)	40 (67.8)	38 (70.4)	0.706
	I don't know his/her opinion	24 (21.2)	13 (22.0)	11 (20.4)	
	Yes, he or she is against	1 (0.9)	0 (0.0)	1 (1.9)	
	Yes, he or she is in favor	10 (8.8)	6 (10.2)	4 (7.4)	
Do you think you might need an organ transplant one day?	I don't know	57 (50.4)	27 (45.8)	30 (55.6)	0.421
	It is possible that I might become ill and need one	51 (45.1)	30 (50.8)	21 (38.9)	
	No, because I have a healthy lifestyle	5 (4.4)	2 (3.4)	3 (5.6)	
Do you think a talk about organ donation would be interesting for you?	Don't know, I would have to hear it	20 (17.7)	11 (18.6)	9 (16.7)	0.733
	No	12 (10.6)	5 (8.5)	7 (13.0)	
	Yes	81 (71.7)	43 (72.9)	38 (70.4)	
Do you think that your information about organ donation is?	Null	2 (1.8)	2 (3.4)	0 (0.0)	0.188
	Bad	8 (7.1)	2 (3.4)	6 (11.1)	
	Little	31 (27.4)	17 (28.8)	14 (25.9)	
	Normal	51 (45.1)	25 (42.4)	26 (48.1)	
	Good	21 (18.6)	13 (22.0)	8 (14.8)	
Do you trust your family doctor?	I do not trust	9 (8.0)	7 (11.9)	2 (3.7)	0.287
	Quite	44 (38.9)	20 (33.9)	24 (44.4)	
	Regular	39 (34.5)	22 (37.3)	17 (31.5)	
	Totally	21 (18.6)	10 (16.9)	11 (20.4)	
Do you collaborate in non-governmental organization, volunteer activities or pro-social activities (volunteer or unpaid social work)?	Don't know/no answer	15 (13.3)	8 (13.6)	7 (13.0)	0.278
	No, but I would be willing	47 (41.6)	26 (44.1)	21 (38.9)	
	No, nor am I	12 (10.6)	8 (13.6)	4 (7.4)	
	Yes, occasionally	32 (28.3)	12 (20.3)	20 (37.0)	
	Yes, usually	7 (6.2)	5 (8.5)	2 (3.7)	

Table 4: Association between knowledge of brain death and socio-demographic variables

Socio-demographic characteristics	Odds ratio	P
Age		0.692
Gender	2.908	0.196
Academic year		0.557
Residence	1.537	0.474
Smoking		0.659

*Odds ratio could be calculated for dichotomous socio-demographic variables

Discussion

Knowledge of medical students and their attitude toward brain death and organ donation is important in addressing issues of deficiency in the medical curriculum, ensuring that doctors who are graduating are able to advocate for organ donation once they join the medical workforce but also to improve public awareness.^[2,11]

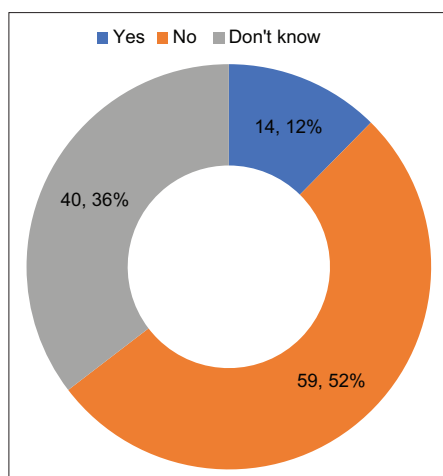


Chart 2: Responses to the question – ‘Is there any possibility that a person with brain death might recover and continue living?’

Other studies have assessed the knowledge of brain death and organ donation among medical students.^[2] However, there are few studies have assessed the attitude toward organ donation among university students in Saudi Arabia.^[11]

In the present study, only 59.52% of medical students understood the brain death concept, while 40.36% expressed uncertainty as to whether brain death was synonymous with patient demise.

In comparison to studies of Japan,^[13] Spain,^[2] and America^[14] that assessed the knowledge of the brain death concept among medical students, our study shows that the general knowledge about the concept was in adequate range. Despite this, the level of understanding and knowledge among Saudi medical students needs to be improved. This can be achieved by exposure during clinical clerkships, formalized study of brain death criteria and transplant surgery and principles.^[13]

Our results indicate that a majority of students surveyed are aware of the importance of organ donation. 60.2% expressed a willingness to donate the organs of family members were they to be diagnosed with brain death, while 31.9% were not sure if they would. 55.8% were willing to donate their own organs, with 23% concerned about being scarred or mutilated as a result of organ extraction.

Student’s opinions could be affected by their family and community, 18.6% affected negatively by family opinion followed by movies (16.8%) and friends (13.3%). Religious beliefs of a community may affect personal decision toward donation of cadaveric organs for transplantation but we did not navigate through it.^[6,15]

Saudi center for organ transplantation (SCOT) has prepared programs and contributed to the increase the number of donors over the years, and there are some results have shown an improvement in public responses toward consent for organ donation.^[7,8]

Even with increasing of donors in Saudi Arabia, there is still shortage of organs for transplantation.^[7,16]

There are several limitations of this study. Owing to the curriculum design, medical students in the basic science years (second and third years) have limited access to hospitalized patients, in contrast to students in the clinical years (fourth, fifth, and sixth years) and interns. We also restricted our survey to students of one institution and as a result, it is uncertain if these results are generalizable to the entire medical student body in the Kingdom of Saudi Arabia.

Conclusion

Regarding attitude toward organ donation, there is no big difference between medical students with brain death knowledge and students without brain death knowledge. Comparing with other countries our results show that we are in the average. We recommend doing the same study in more universities and colleges in Saudi Arabia so these studies can be generalized and also to improve medical students’ knowledge and awareness for organ donation.

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Conflicts of interest

There are no conflicts of interest.

References

1. Young GB, Aminoff MJ. Diagnosis of brain death. UpToDate (June 5, 2008). 2009. Available from: <https://www.uptodate.com/contents/diagnosis-of-brain-death>. [Last accessed on 2019 Aug 20].
2. Ríos A, López-Navas A, López-López A, Gómez FJ, Iriarte J, Herruzo R, et al. Do Spanish medical students understand the concept of brain death? *Prog Transplant* 2018;28:77-82.
3. Youn TS, Greer DM. Brain death and management of a potential organ donor in the intensive care unit. *Crit Care Clin* 2014;30:813-31.
4. Arbour R. Clinical management of the organ donor. *AACN Clin Issues* 2005;16:551-80; quiz 600-1.
5. Cantarovich F. Improvement in organ shortage through education. *Transplantation* 2002;73:1844-6.
6. Cantarovich F. Public opinion and organ donation suggestions for overcoming barriers. *Ann Transplant* 2005;10:22-5.
7. Saudi Center for Organ Transplantation. Directory of the Regulations of Organ Transplantation in the Kingdom of Saudi Arabia. 2nd ed. Saudi Arabia: Saudi Health Council; 2014. Available from: <http://www>.

- scot.gov.sa/webb/Str/42?lang=En. [Last accessed 2016 Dec 09].
8. Alam AA. Public opinion on organ donation in Saudi Arabia. *Saudi J Kidney Dis Transpl* 2007;18:54.
 9. Shaheen FA, Souqiyeh MZ. Increasing organ donation rates from Muslim donors: Lessons from a successful model. *Transplant Proc* 2004;36:1878-80. Elsevier.
 10. Schaeffner ES, Windisch W, Freidel K, Breitenfeldt K, Winkelmayr WC. Knowledge and attitude regarding organ donation among medical students and physicians. *Transplantation* 2004;77:1714-8.
 11. Elsafi SH, Al-Adwani MM, Al-Jubran KM, Hassan MA, Al Zahrani EM. Factors influencing the willingness of allied health students to donate organs or tissues. *Transplant Proc* 2017;49:1215-20. Elsevier.
 12. Raosoft I. Sample size calculator. Available from: <http://www.raosoft.com/samplesize.html>. [Last accessed on 2019 Sep 14].
 13. Ohwaki K, Yano E, Shirouzu M, Kobayashi A, Nakagomi T, Tamura A. Factors associated with attitude and hypothetical behaviour regarding brain death and organ transplantation: Comparison between medical and other university students. *Clin Transplant* 2006;20:416-22.
 14. Tawil I, Gonzales SM, Marinaro J, Timm TC, Kalishman S, Crandall CS. Do medical students understand brain death? A survey study. *J Surg Educ* 2012;69:320-5.
 15. Aghaee MA, Dehghani M, Sadeghi MA, Khaleghi E. Awareness of religious leaders' fatwa and willingness to donate organ. *Int J Organ Transplant Med* 2015;6:158.
 16. Aldawood A, Al Qahtani S, Dabbagh O, Al-Sayyari AA. Organ donation after brain-death: Experience over five-years in a tertiary hospital. *Saudi J Kidney Dis Transpl* 2007;18:60.

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