

The willingness toward deceased organ donation among university students

Implications for health education in Saudi Arabia

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ABSTRACT

الأهداف: التعرف على مدى رغبة طلاب الجامعات في المملكة العربية السعودية في التبرع بالأعضاء من المتوفين دماغيا.

الطريقة: استخدمت هذه الدراسة استبيان جمع معرفة الطلاب وسماتهم الشخصية المتعلقة ببعض المعارف عن التبرع بالأعضاء والأنسجة من المتوفين دماغيا وذلك من خلال عينة من طلاب وطالبات جامعة الملك سعود-مدينة الرياض خلال شهري مايو ويونيو عام 2008م. تم توزيع 600 استبيان عشوائيا وقد تم استرجاع 487 (81.2%) استبيان كامل. تم تحليل البيانات باستخدام الإحصاء الوصفي ومربع كاي وتحليل الانحدار الثنائي.

النتائج: أظهرت النتائج أن غالبية الطلاب (70.6%) لديهم الرغبة في التبرع بالأعضاء أو الأنسجة في حالة الوفاة الدماغية، ولكن لم يكن بين هؤلاء المجيبين من يحمل بطاقة التبرع بالأعضاء، كما أن 66% منهم أبدى استعدادهم للتوقيع على بطاقة التبرع فيما لو طلب منهم ذلك. تشير النتائج إلى أن الطلاب الذين لديهم معرفة بمفهوم الوفاة الدماغية هم الأكثر قبولا للتبرع بالأعضاء. أوضح الطلاب أن كل من النقص في المعلومات، والاتجاهات الشخصية، والعامل الديني للمجيبين هي أكثر العوامل المؤدية إلى عدم قبول التبرع بالأعضاء للمتوفين دماغيا.

خاتمة: إن أغلب الطلاب لديهم الرغبة في التبرع بالأعضاء، وأن تزويد أفراد المجتمع بالمعلومات الضرورية عن هذا الموضوع يمكن أن يزيد من الوعي العام للمجتمع، بما فيهم الطلاب، تجاه أهمية التبرع وزراعة الأعضاء في المملكة العربية السعودية.

Objectives: To shed light on the willingness to donate deceased organs and tissues among university students in Saudi Arabia.

Methods: This cross-sectional survey employed self-administered questionnaires to collect data on demographic characteristics, and knowledge-related

aspects of students on organ and tissue donation. The questionnaires were distributed randomly to 600 students, of which 487 (81.2%) completed the questionnaire at King Saud University, Riyadh, Saudi Arabia, from May to June 2008. The data were analyzed by descriptive statistics, chi-square tests, and logistic regression analysis.

Results: Most students (70.6%) were willing to donate deceased organs and tissues. None of these students had a donation card, and 66% of them were ready to sign a donor card. The results indicate that those who had information and knowledge on the deceased organ donation concept were more willing to donate organs and tissues. Students reported that lack of information, personal attitudes, and religious beliefs were among the objecting reasons for deceased organ/tissue donation.

Conclusion: The majority of students were willing to donate organs, and more dissemination of information can increase the awareness of the public, including students, to the importance of organ donation and transplantation in Saudi Arabia.

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Organ and tissue transplantation has become a common life-saving and life-enhancing procedure, with excellent outcomes as a result of advances in technology, new immunosuppressive drugs, and improved organ preservation solutions.¹ In the Kingdom of Saudi Arabia (KSA), the organ supply for transplantation does not correspond to the increasing demand. Despite efforts to tackle the problem of organ-donor shortage, the number of organ donors has not paralleled the growing waiting list, and lack of organ donation in KSA remains a major limiting factor in transplantation.^{2,3} However, the shortage of transplantable organs is a global problem. Previous research indicates that the major limiting factor to donation is the low consent rate.⁴ Accordingly, identifying, and addressing the barriers to organ donation remains the focus of many who are interested in improving access to transplantation.⁵ Authors report that it is important to identify specific subpopulations, less likely to embrace organ donation in order to efficiently direct the attention to these groups.^{6,7} Efforts aimed at narrowing the gap between the supply and demand of organ transplantation have begun to focus on young people, such as university students as strong potential donors.⁸ Several studies focused on university students as potential donors, as they are usually more inclined to sign an organ donor card,^{7,8} characterized by higher socioeconomic status, younger and healthier (such as, better donor candidates), and they engage in riskier behaviors than other age groups do. The meta-analysis carried out by Feeley in 2007⁹ identified that students are more open to new knowledge and information, especially as it relates to important national health, and human services issues. Previous surveys in KSA among young people and students showed higher percentage of acceptance of the concept of organ donation. These studies suggested that there is a great need for education of the new generation on the importance of organ donation, and that changes in opinion through education will significantly increase the number of donors, and the rate of transplantation.^{10,11} Despite the importance of the issue, no studies have been conducted among university students in KSA, regarding the willingness toward deceased organ and tissue donation. Therefore, the objectives of the present study were: 1) to assess the willingness of the university students regarding deceased organ and tissue donation, 2) to determine the influence of selected characteristics on the students' decision to donate organs or tissues, and 3) to identify students' reasons for consenting, or objecting to deceased organ/tissue donation.

Methods. This is a cross-sectional study conducted to explore the willingness to donate deceased organs/

tissues among university students. Stratified random sampling was used to represent students from the science and non-science colleges. Science colleges included 3 medical-related colleges (Medicine, Dentistry, and Pharmacy). Non-science colleges included 3 colleges (Arts, Education, and Languages and Translation). In each college, 100 students (50 males and 50 females) were selected using systematic random sampling. Accordingly, 600 self-administered questionnaires were distributed, of which 487 (81.2%) questionnaires were successfully completed, and returned. The remaining 113 questionnaires (18.8%) were not completed due to students' lack of time. The study took place at King Saud University, Riyadh, KSA, from May to June 2008, after the approval of the research center committee was obtained. King Saud University is the largest university in KSA with many students coming from all parts of the Kingdom to join the various colleges and specialties. Accordingly, it is fairly assumed that King Saud University students reflect the whole Kingdom university students. The questionnaire was divided into 4 sections. The first section included questions on gender, age, educational level, specialty of study, and cultural background of students. The second section consisted of questions on knowledge-related aspects, which may have an impact on the willingness towards deceased organ/tissue donation, such as knowledge on "brain death" concept, and donation card. Students were also asked whether they know someone who had been a deceased organ donor, whether they had discussed organ donation with others, and whether they recognize that organ shortage is the primary problem in transplantation. Section 3 consisted of 3 questions regarding the deceased organ/tissue donation. The first question asked students whether they are willing to donate deceased body organs or tissues. Those who answered in the affirmative were asked whether they hold a donation card and if not, whether they are willing to sign a donation card if they were given it today. In section 4, students were asked to report their reasons for consenting, or objecting to deceased organs/tissues donation. In this section, respondents were instructed to mark as many reasons that apply. In order to increase the content validity of the questionnaire, a review of the relevant literature was carried out, 3 academic staff reviewed the draft questionnaire, and it was pilot-tested. On the basis of the suggestions of the reviewers and the outcome of the pilot survey, the final questionnaire was reformulated. The respondents were assured of confidentiality and provided with an explanation regarding the purpose of the study, and the importance of their contribution. The subjects gave verbal consent to participate in the study. All questionnaires were distributed by well-trained

postgraduate students, and were completed during the students' break time between classes in their respective colleges. Students were classified into 2 groups; those who were "willing," and those who were "unwilling" to donate organs/tissues.

Chi-square test was used to determine the differences between these 2 groups according to: 1) demographic-related characteristics, which included respondents' gender, age, educational level, specialty of study, and cultural background, and 2) knowledge-related aspects that included students' knowledge regarding brain death concept, donation card, whether the student know someone who had donated/received an organ, or in the waiting list, whether the students had discussed the topic with others, and whether the student recognized organ/tissue shortage as a problem. A logistic regression analysis was performed to identify factors that significantly influenced respondents' willingness to donate organs after death. The multivariate-adjusted odds ratio (OR), and the corresponding 95% confidence intervals (CI) were calculated. All tests were 2-tailed with a statistical significance level of 0.05. The data for this study were entered and analyzed using the Statistical Package for Social Sciences version 11 (SPSS Inc, Chicago, IL, USA).

Results. A total of 487 students were surveyed. They were predominantly young with an average age of 22.2 ± 1.9 years (range: 17-29 years). Of these, 208 (42.7%) were males, and 279 (57.3%) were females. Undergraduate students constituted most of the respondents (83.2%), and those pursuing their postgraduate studies comprised 16.8%. Respondents were recruited from both science (medical-related [35.7%]), and non-science colleges (64.3%). The study sample was split between students with rural (49.3%), and urban (50.7%) cultural background. As shown in Table 1, students who were willing to donate deceased organs constituted 70.6%, whereas those unwilling to donate constituted 29.4% of the total respondents. Among the students who were willing to donate organs/tissues, none had signed or held a donation card, and only two-thirds of them expressed their willingness to sign the donation card if they were asked to do so today. Table 2 shows the difference between students who were willing to donate organs/tissues, and those unwilling to donate according to their demographic characteristics. There were no statistically significant differences between those who completed and those who did not complete the questionnaire in terms of their demographic characteristics. Undergraduate respondents were more willing to donate organs/tissues than graduate respondents ($p < 0.000$). Respondents from the non-science colleges were more willing to donate

Table 1 - Willingness to donate deceased organs and tissues in the study sample (N=487).

Items	n	(%)
<i>Willingness to donate organs/tissues (n=487)</i>		
Willing	344	(70.6)
Unwilling	143	(29.4)
<i>Having signed (hold) a donation card (n=344)*</i>		
Yes	none	-
No	344	(100)
<i>Willing to sign a donation card (n=344)*</i>		
Yes	227	(66)
No	117	(34)

*Only for students willing to donate organs or tissues

Table 2 - Willingness to donate deceased organs/tissues according to selected demographic characteristics (N=487).

Characteristics	Willing n=344 %	Unwilling n=143 %	χ^2	P-value
<i>Gender</i>				
Male	72.6	27.4	0.517	0.472
Female	69.2	30.8		
Mean age (years)	22.3	22.9		0.409*
<i>Educational level</i>				
Undergraduate	75.3	24.7	23.99	0.000
Graduate	47.6	52.4		
<i>Specialty of study</i>				
Medical	62.6	37.4	7.75	0.005
Non-medical (non-science)	75.1	24.9		
<i>Cultural background</i>				
Rural	74.2	25.8	2.715	0.113
Urban	67.2	32.8		

*t-test=0.826

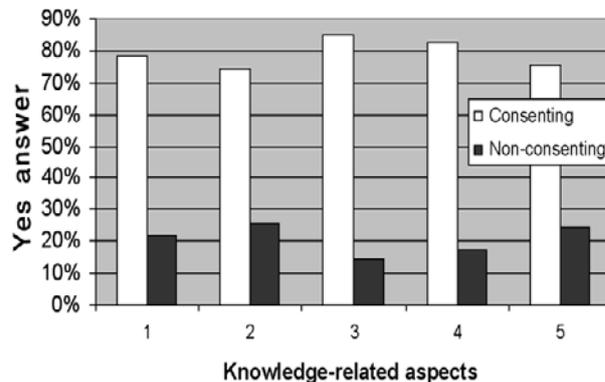


Figure 1 - Differences between consenting and non-consenting students in terms of knowledge-related aspects: 1. have information regarding brain death concept, 2. have information on donation card, 3. know someone who had donated, or in the waiting list, 4. had discussed organ donation with others, 5. recognizing that organ shortage is a problem in transplantation.

Table 3 - Students' reasons for consenting and objecting to deceased organ/tissue donation.*

Reasons	n	(%)
<i>Consenting reasons</i> [‡] (N=344)		
Regard it as a humanitarian duty	279	(81.1)
Save other people's lives	252	(73.3)
Religious reason	235	(68.3)
Motivated by family or friends	21	(6.1)
Other reasons	56	(16.3)
<i>Objecting reasons</i> [‡] (N=143)		
Inadequate information on organ donation	124	(86.7)
Personal attitude	93	(65.0)
Religious reason	71	(49.7)
Lack of family and relatives support	23	(16.1)
Other reasons	41	(28.7)

*Students were instructed to select as many reasons that applies, [‡]based on students who were willing to donate deceased organs, [‡]based on students who were unwilling to donate deceased organs

Table 4 - Characteristics associated with willingness to consent to deceased organ donation.

Characteristic	OR (95% CI)	P-value
Age, years	0.89 (0.84-0.96)	0.200
<i>Gender</i>		
Female	1.00 (reference)	0.381
Male	1.22 (0.78-1.90)	
<i>Educational level</i>		
Graduate	1.00 (reference)	0.000
Undergraduate	5.21 (2.61-10.4)	
<i>Specialty of study</i>		
Medical	1.00 (reference)	0.149
Non-medical (non-science)	0.71 (0.44-1.13)	
<i>Cultural background</i>		
Urban	1.00 (reference)	0.024
Rural	1.67 (1.07-2.61)	
<i>Have information on brain death concept</i>		
No	1.00 (reference)	0.003
Yes	2.97 (1.44-6.14)	
<i>Have information on donation card</i>		
No	1.00 (reference)	0.000
Yes	3.39 (1.98-5.18)	
<i>Know someone who had donated deceased organ/tissue, or on the waiting list</i>		
No	1.00 (reference)	0.045
Yes	2.01 (1.02-3.98)	
<i>Have discussed organ donation with others</i>		
No	1.00 (reference)	0.009
Yes	2.41 (1.25-4.64)	
<i>Recognizing that organ shortage is the primary problem in transplantation</i>		
No	1.00 (reference)	0.834
Yes	1.08 (0.53-2.22)	

OR -odds ratio, CI - confidence interval

organs than students from medical colleges ($p=0.005$). Gender, age and cultural background of the students did not have a significant influence on the willingness to donate organs/tissues. Figure 1 illustrates the difference between consenting and non-consenting students to deceased organ donation in terms of knowledge-related aspects. In all aspects, students who had information or knowledge on these aspects were more positive toward the willingness of organ donation, than those who did not attain such knowledge, or information. Table 3 summarizes the students' reasons for consenting and objecting to organ/tissue donation. More than 80% of students who were willing to donate deceased organs reported sympathetic reasons, such as "regard it as a humanitarian duty," and approximately three-quarters indicated to "save others' lives". Among students who were opposed to deceased organ donation, more than three-quarters indicated that they did so because of "inadequate information on deceased organ donation," and approximately two-thirds gave "personal attitude" as their reason for not willing to donate. Religious reasons were cited by more than two-thirds of the consenting students, and less than half of the objecting students. Table 4 summarizes the results of the binary logistic regression analysis of willingness to consent to deceased organ donation. The results indicate that undergraduate students, and students who came from rural areas were more willing to donate deceased organs and tissues. The results also show that students who had information on brain death, and donation card, and knew someone who had donated, or had discussed the issue with others were more likely to consent to deceased organ/tissue donation, than those who lack such information and knowledge.

Discussion. The results reported in this study indicate that more than 70% of the students were willing to donate organs and tissues. Previous studies conducted in several countries such as the United States,¹² Hong Kong,¹³ China,¹⁴ Brazil,¹⁵ and Iran¹⁶ vary in their estimation of the percentage of university students who give their consent to donate organs and tissues. Comparing the results of the present study with those obtained from other countries is difficult, since societies are different in their way of dealing with issues, such as organ donation. However, authors of previous studies⁹ indicate that students are open to new knowledge and information, especially as it relates to important national health and human services issues, such as the shortage of organ donation and transplantation.

Interestingly, this study found that only two-third of the students who were willing to donate organs consented to sign the donation card if they were asked to do so. Moreover, none of the students in the study sample

had signed a donor card. These results are consistent with studies reported earlier.^{8,14} For example, one study reported that only 40% of all potential organ donors, and 24% of potential tissue donors actually become active donors.¹⁷ Similarly, a study in Hong Kong reported that although most public citizens supported organ donation, the percentage signing an organ donor card was low.¹³ These results imply that efforts are needed to encourage young people to commit themselves to organ donation.^{18,19} Some authors indicated that it is possible that there are mistaken beliefs among individuals that signing a donor card, or granting consent for donation will not permit them to change their decisions on donation.¹³

In this study, the bivariate and logistic regression analyses identified the importance of the attainment of information and knowledge regarding organ/tissue donation in many aspects. For example, students who had information on brain death concept, or had information regarding the donation card were more consenting to donate organs than those who lack such information. Similarly, students who knew someone who had donated/received organ, or who knew someone in the waiting list for transplantation were more favorable to donating organs. Moreover, the results indicated that those who had discussed the topic with others (such as health professionals, relatives, and friends) were more willing to donate, than those who lack such attainment of knowledge. These results are in line with the results reported earlier in the literature.^{17,20} Therefore, it appears that the attainment of knowledge, or information on deceased organ/tissue donation play a significant role in the students' decision to donate organs, or tissues.

Respondents who were willing to donate organs/tissues indicated that they were doing so, because they "regard it as a humanitarian duty," and to "save other people's lives." These reasons have been cited by the public in other studies.^{13,21} For example, it has been found that many people support the concept of organ donation, because they felt that organ donation allows something positive to come from a person's death.²¹ Other studies reported that the positive feelings on organ donation have been found to be derived from personal satisfaction, beliefs in the humanitarian benefit of donation, and feelings of pride in being a donor.¹³ In general, studies in the literature indicates that individuals with strong positive attitudes toward donation have been found to be the most willing to commit to donation, and sign a donor card.^{22,23} Among the reasons that hinder students from consenting to deceased organ donation are: "inadequate knowledge or information," and "personal attitude." The importance of these 2 reasons was reported in previous research.^{9,24} For example, one study indicated that information provided to the public regarding organ donation will

positively affect their attitudes.²⁴ With regard to personal attitudes towards deceased organ donation, a number of studies indicated that attitudes, opinions, and emotions of the individuals play a significant role in the decision to donate organs.¹⁹

In this study, approximately two-thirds of the respondents in the study sample indicated that religious belief has influenced their decision towards deceased organ/tissue donation. These findings were consistent with studies in the literature, which indicated that religious belief has an impact on the decision to donate,¹³ and that many people often cite religious beliefs as their reason for choosing not to donate deceased organs. However, other studies investigated several populations from different religions, and reported that all major religions support organ and tissue donation.^{21,22} In general, the previous research indicates that individuals who have higher level of education, or higher socio-economic status are better informed on organ donation,²⁴ and accordingly they are more inclined to donate organs than those in lower socio-economic status. However, university students, compared to the general public at large, are more positive, and willing to be a potential donor.²⁵⁻²⁷

Several limitations should be considered when interpreting the results of the present study. First, the study was limited to deceased organ/tissue donation. Nevertheless, the findings have implications for living organ donation as well. Second, due to time and financial constraints, the present study was limited to a single university in Riyadh city. Third, the results reported here were based on information collected by questionnaires, and were subjected to the disadvantages of using such a data collection tool. A qualitative approach using in-depth interviews is recommended to further explore this national topic.

Finally, the methodology employed in this study, together with the types of data collected may have influenced the results reported here. Future research should attempt to address some of the concerns indicated in these limitations. Despite these limitations, the study provides valuable insight into the possible deficiencies in knowledge among university students regarding deceased organ and tissue donation in KSA.

In conclusion, the majority of students were willing to donate and that more dissemination of information can increase the awareness of the public, including students to the importance of organ donation and transplantation. This suggests that institutions such as schools, universities, and health facilities, together with religious leaders, and the media should work together to increase awareness on organ donation. If appropriate strategies for increasing the level of organ donation and transplantation are to be developed, larger

surveys involving other universities in the Kingdom are necessary before implementing any measures to change the health education. More dissemination of information, taking into account the particularities of the Saudi population, can increase the awareness of the public, including students to the importance of organ donation and transplantation.

References

- Burroughs TE, Hong BA, Kappel DF, Freedman BK. The stability of family decisions to consent or refuse organ donation: would you do it again? *Psychosom Med* 1998; 60: 156-162.
- Al-Sebayel MI. The status of cadaveric organ donation for liver transplantation in Saudi Arabia. *Saudi Med J* 2002; 23: 509-512.
- El-Shoubaki H, Bener A. Public knowledge and attitudes toward organ donation and transplantation: a cross-cultural study. *Transplant Proc* 2005; 37: 1993-1997.
- Siminoff L, Gordon N, Hewlett J, Arnold R. Factors influencing families' consent for donation of solid organs for transplantation. *JAMA* 2001; 286: 71-77.
- Sanner M. A Swedish survey of young people's views on organ donation and transplantation. *Transpl Int* 2002; 15: 641-648.
- Haustein S, Sellers M. Factors associated with (un)willingness to be an organ donor: importance of public exposure and knowledge. *Clin Transplant* 2004; 18: 193-200.
- Tokalak I, Kut A, Moray G, Emiroglu R, Erdal R, Karakayali H, et al. Knowledge and attitudes of high school students related to organ donation and transplantation: a cross-sectional survey in Turkey. *Saudi J Kidney Dis Transpl* 2006; 17: 491-496.
- Canova D, De Bona M, Ruminati R, Ermani M, Naccarato R, Burra P. Understanding of and attitudes to organ donation and transplantation: a survey among Italian university students. *Clin Transplant* 2006; 20: 307-312.
- Feeley TH. College students' knowledge, attitudes, and behaviors regarding organ donation: an integrated review of the literature. *Journal of Applied Social Psychology* 2007; 37: 243-271.
- Aswad S, Souqiyeh M, Huraib S, El-Shihabi R. Public attitudes toward organ donation in Saudi Arabia. *Transplant Proc* 1992; 24: 2056-2058.
- Shaheen F, Souqiyeh M, Al-Attar B, Jaralla A, Al-Swailem A. Survey of opinion of secondary school students on organ donation. *Saudi J Kidney Dis Transpl* 1996; 7: 131-134.
- Sander SL, Miller BK. Public knowledge and attitudes regarding organ and tissue donation: an analysis of the northwest Ohio community. *Patient Educ Couns* 2005; 58: 154-163.
- Yeung I, Kong SH, Lee J. Attitudes towards organ donation in Hong Kong. *Soc Sci Med* 2000; 50: 1643-1654.
- Chen JX, Zhang TM, Lim FL, Wu HC, Lei TF, Yeong PK, et al. Current knowledge and attitudes about organ donation and transplantation among Chinese university students. *Transplant Proc* 2006; 38: 2761-2765.
- Sasso-Mendes KD, Curvo PA, Silveira RC, Galvão CM. Organ donation: acceptance and refusal among users of the public health system from Brazil. *Transplant Proc* 2008; 40: 660-662.
- Sanavi S, Afshar R, Lotfizadeh A, Davati A. Survey of medical students of Shahed University in Iran about attitude and willingness toward organ transplantation. *Transplant Proc* 2009; 41: 1477-1479.
- Siminoff LA, Arnold RM, Caplan AL, Virnig BA, Seltzer DL. Public policy governing organ and tissue procurement in the United States. Results from the National Organ and Tissue Procurement Study. *Ann Intern Med* 1995; 123: 10-17.
- Parisi N, Katz I. Attitudes toward posthumous organ donation and commitment to donate. *Health Psychol* 1986; 5: 565-580.
- Ríos A, Conesa C, Ramírez P, Sánchez J, Sánchez E, Ramos F, et al. Information requested about organ donation in primary health care centers. *Transplant Proc* 2006; 38: 2367-2370.
- Conesa C, Ríos Zambudio A, Ramírez P, Canteras M, del Mar Rodríguez M, Parrilla P. Socio-personal profile of teenagers opposed to organ donation. *Nephrol Dial Transplant* 2004; 19: 1269-1275.
- Al-Mousawi M, Hamed T, Al-Matouk H. Views of Muslim scholars on organ donation and brain death. *Transplant Proc* 1997; 29: 3217.
- Randhawa G. An exploratory study examining the influence of religion on attitudes towards organ donation among the Asian population in Luton, UK. *Nephrol Dial Transplant* 1998; 13: 1949-1954.
- Schweda M, Schicktanz S. Public ideas and values concerning the commercialization of organ donation in four European countries. *Soc Sci Med* 2009; 68: 1129-1136.
- Alam AA. Public opinion on organ donation in Saudi Arabia. *Saudi J Kidney Dis Transpl* 2007; 18: 54-59.
- Kubler A, Lipinska-Gediga M, Kedziora J, Kubler M. Attitudes to brain death and organ procurement among university students and critical care physicians in Poland. *Transplant Proc* 2009; 41: 1473-1476.
- Mekahli D, Liutkus A, Fargue S, Ranchin B, Cochat P. Survey of first-year medical students to assess their knowledge and attitudes toward organ transplantation and donation. *Transplant Proc* 2009; 41: 634-638.
- Colak M, Ersoy K, Haberal M, Gurdamar D, Gerçek O. A household study to determine attitudes and beliefs related to organ transplantation and donation: a pilot study in Yapratic Village, Ankara, Turkey. *Transplant Proc* 2008; 40: 29-33.