Original Article

Knowledge and awareness of kidney donation among King Faisal University medical students in Al-Ahsa, Saudi Arabia

Running Title: Knowledge & awareness of kidney donation

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Abstract:
Objective:
This study aimed to assess the awareness of kidney donation, study attitudes and beliefs with regard to kidney donation as well as to compare the knowledge between different levels among medical students at King Faisal University in Al-Ahsa, Eastern province of Saudi Arabia.

Methods:
A cross-sectional study using an online questionnaire was distributed throughout social media websites and applications. The data were collected from medical students from all levels at King Faisal University.

Result:
Around, 261 participants had an idea about organ donation, of which 63% were willing to donate a kidney, and 83% were ready to educate the people about it. Over 50% had wrong idea about kidney donation and its effects on the donor. Gender and marital status did not significantly (P>0.05) affect the knowledge and awareness of kidney donation. Most participants got information about kidney donation from education and lectures, followed by social media. Most participants believed that kidney donation's main cause was to save someone's life. Most participants believed that health education and media are important tools to increase the number of donors.

Conclusion:
The medical curriculum should increase students' awareness about the kidney shortage problem in the Saudi Arabia. Intensive efforts should be provided to raise the knowledge among medical students to inform the people about it.

Keywords: Kidney donation, knowledge, awareness, medical students, Saudi Arabia

Introduction:
Patients with end-stage organ disease preferred to be treated with organ transplantation. The cadaver organs are not commensurate with the need to supply them [1]. In most countries, the organ supply for transplantation does not cover the rising demand [2]. Kidney transplantation is the preferred management option for patients with End Stage Kidney Disease (ESKD). Currently, 45% kidney transplants in the United States and 19.5% in Germany are from living donors, with constantly rising rates [3]. Saudi Arabia ranked fourth in kidney transplant requirements globally, with 14,000 patients on the waiting list for a transplant, with only 120-130 kidney donors per year [4].

There are many long and short-term benefits to the recipients. The most important ones are the improvement in survival and quality of life [5]. On the other hand, donors have no clear health benefits [5, 6]. In 1991, World Health Organization recommended rules for living organ donation to relatives. In 1993, the interest in living-related and non-related organ donation expanded from kidney donation to lung, liver, and bone marrow donation to increase the availability of organs.

Since the early stages of kidney transplant programs, individuals have come forward and donated kidneys with reasonable success rates [7]. Some short-term postoperative complications could occur, including anesthesia-related complications, bleeding, thrombosis events, pneumonia, wound infections, and urinary tract infections [8]. However, the mortality rate ranges from none to 1 death per 1,600 donors [7].

Living kidney donation is a complex ethical, moral and medical issue because of its short and long-term impact on the donor’s physical and mental health. Physical health, like pain, fatigue, and physical disability; psychological health, like negative feelings; social relationships, like social support; and environmental, like freedom, safety, and security, are all features of the quality of life [5].

According to the high number of kidney transplant requirements and small numbers of kidney donors, the supply of kidney donors available for transplantation is insufficient to meet the demand for kidney transplantation. In Saudi Arabia, the number of patients with ESKD is growing, and living kidney donors can improve outcomes for these patients [4, 6].

Insufficient knowledge about organ donation legally and medically in the general population and the failure of the system to identify the proper way to find possible donors are considered contributing factors responsible for the shortage of available organs [9]. Healthcare professionals are the main core to enhance public awareness about organ donation [1]. Since they should have the greatest knowledge about organ donation and are the first to get to know potential donors and donors' families, they convene them and raise awareness of organ
donation [10]. Consequently, their attitudes and knowledge could influence public opinion [1].

As future doctors, medical students would take the major responsibilities in promoting organ donation in publicity [9]. Assessing medical students’ knowledge and attitudes regarding organ donation is important for the future organ supply [11, 12]. Thereby, this study aimed to assess the awareness about kidney donation, study attitudes and beliefs with regard to kidney donation as well as to compare the knowledge between different levels among medical students at King Faisal University.

**Subjects and Methods:**
A cross-sectional study using a descriptive, analytical, and online questionnaire was conducted on all medical students at King Faisal University from January to February 2021. The sample age mostly ranged from 18 to 25 years. The inclusion criteria for subjects’ recruitment into the study were all medical students studying at King Faisal University from all levels, from preparatory year to intern year. Whereas, excluding criteria was non-medical students, and medical student not studying at King Faisal University.

The sample size was 261 participants, calculated by the Raosoft sample size calculator. Based on the estimated population (P=1,279) was needed to achieve a confidence level of 95%, with a margin of error of 5% to estimate the knowledge and attitude towards Kidney donation.

An online-based questionnaire was designed to collect the data and was distributed throughout social media websites and applications. The data was self-filled by the participants. The questionnaire was designed by the researchers and organized in a Google Form. The questionnaire was based on valid questionnaires in previous research.

A set of variables were selected, first demographic data, which includes (age, gender, marital status, and educational level). The next part was talking about organ donation overall and their general information. The last part talked about kidney donation and specific questions about its effects on donors. Finally, the participants had to indicate their responses as either yes/no/don't know or agree/disagree/don't know.

The data were analyzed in SPSS (Statistical Package for the Social Sciences) (version 25). Categorical variables were indicated as frequency (%) and continuous variables as mean (SD). The set of co-variables was compared across the nature of the outcomes, and co-variables determined the chi-square test used. Statistical significant differences between different groups were determined with ANOVA, independent t-test, and P values of 0.05; a confidence interval (CI) of 95% was considered significant.
Results:
A total of 261 medical students were included, of which 28 (10.6%) participants were from the preparatory year, 7 (2.7%) from the first year, 16 (6.1%) from the second year, 102 (38.8%) from the third year, 15 (5.7%) from the fourth year, 36 (13.7%) from the fifth year, and 57 (22.1%) were interns. Around 121 (46.4%) were females, and 140 participants (53.6%) were males, and most of them (80.5%) were single, and only 51 (19.5%) were married. It was found that gender, marital status and class group does not significantly (P>0.05) affect the knowledge and awareness of kidney donation among the participants (Table 1).

Table 1: Effect of Gender, marital status and class groups on different aspects of kidney donation using Chi-Square

<table>
<thead>
<tr>
<th>Factors</th>
<th>1. Do you know Organ Donation</th>
<th>Total</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>117</td>
<td>4</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>139</td>
<td>1</td>
<td>140</td>
</tr>
<tr>
<td>Marital Status</td>
<td>Single</td>
<td>205</td>
<td>5</td>
<td>210</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>51</td>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td>Class group</td>
<td>Non Clinical</td>
<td>137</td>
<td>16</td>
<td>153</td>
</tr>
<tr>
<td></td>
<td>Clinical</td>
<td>101</td>
<td>7</td>
<td>108</td>
</tr>
</tbody>
</table>

2. Do you think there is a lack of information about kidney donation in our country among the masses?

<table>
<thead>
<tr>
<th>Factors</th>
<th>2. Do you think there is a lack of information about kidney donation in our country among the masses?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gender</td>
</tr>
<tr>
<td></td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>Male</td>
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<tr>
<td>Marital Status</td>
<td>Single</td>
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<tr>
<td></td>
<td>Married</td>
</tr>
<tr>
<td>Class group</td>
<td>Non Clinical</td>
</tr>
<tr>
<td></td>
<td>Clinical</td>
</tr>
</tbody>
</table>

3. Should kidney donation be promoted?

<table>
<thead>
<tr>
<th>Factors</th>
<th>3. Should kidney donation be promoted?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gender</td>
</tr>
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<td></td>
<td>Female</td>
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<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Marital Status</td>
<td>Single</td>
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<tr>
<td></td>
<td>Married</td>
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<tr>
<td>Class group</td>
<td>Non Clinical</td>
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<td></td>
<td>Clinical</td>
</tr>
</tbody>
</table>

Effects of gender, marital status and class group were also analyzed on different aspects of organ donation. It was found that gender and marital status does not significantly (P>0.05) affect the knowledge and awareness of kidney donation among the participants. However, the
clinical year group significantly (P<0.05) affect some aspects of kidney donation knowledge and awareness (Table 2).

<table>
<thead>
<tr>
<th>Different aspects of Organ Donation</th>
<th>Gender</th>
<th></th>
<th></th>
<th>Marital Status</th>
<th></th>
<th></th>
<th>Clinical Year Group</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>df</td>
<td>F</td>
<td>Sig.</td>
<td>df</td>
<td>F</td>
<td>Sig.</td>
<td>df</td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Are you willing to donate your kidney</td>
<td>1</td>
<td>.403</td>
<td>.526</td>
<td>1</td>
<td>.001</td>
<td>.979</td>
<td>1</td>
<td>.726</td>
<td>.395</td>
</tr>
<tr>
<td>Long-term health problems in living donors are rare after kidney donation</td>
<td>1</td>
<td>2.821</td>
<td>.094</td>
<td>1</td>
<td>3.060</td>
<td>.081</td>
<td>1</td>
<td>1.157</td>
<td>.283</td>
</tr>
<tr>
<td>Immediate surgical side effects in donors are common and may be life-threatening.</td>
<td>1</td>
<td>.200</td>
<td>.655</td>
<td>1</td>
<td>.006</td>
<td>.939</td>
<td>1</td>
<td>4.608</td>
<td>.033</td>
</tr>
<tr>
<td>Kidney transplantation is preferred over dialysis for the treatment of kidney failure.</td>
<td>1</td>
<td>.769</td>
<td>.381</td>
<td>1</td>
<td>.004</td>
<td>.951</td>
<td>1</td>
<td>7.553</td>
<td>.006</td>
</tr>
</tbody>
</table>

Most of the participants got their information about kidney donation through education and lectures followed by social media (Figure 1).

Fig. 1 The sources of information about kidney donation
Most participants believed that kidney donation's main cause is to save someone's life (Figure 2).

**Fig. 2** What are the causes behind organ donation? [AQ2: Kindly provide editable version of Figure 2].

Most participants believed that health education and media are important tools to increase the number of donors (Figure 3).

**Fig. 3** The measures to increase the number of donors. [AQ3: Kindly provide editable version of Figure 3].

The participants believed that the donor should not have blood-borne disease or cancer or should not be badly injured were the main criteria to qualify the ideal organ donor (Figure 4).
The fear of surgery or losing life was the main cause of unwillingness to donate organs as believed by the study participants (Figure 5).

Discussion:
In this cross-sectional survey, knowledge and attitudes on organ and kidney donation of medical students at King Faisal University in Al-Ahsa, Saudi Arabia, was evaluated. In this population, there was a difference in the level of education, and this research hypothesized that the education level of medical students was positively related to their willingness to donate a kidney. But there was no difference in knowledge and attitude according to their level of education with a P-value of 0.186, which could reject the hypothesis. A study conducted in Germany among physicians and medical students showed healthcare professionals at various career stages had increased knowledge than medical education [13].
It was also discovered that attitude improved with more advanced training in medicine. The likelihood of being willing to give a kidney was found to be independently correlated with attitude, knowledge, and education level in a multivariate analysis with a significant correlation coefficient of 0.395 [14]. Also, there were no significant differences in knowing what organ donation was between women and men, with significance 0.526.

However, the insignificance of the relation between the level of education and the attitude and knowledge towards kidney donation doesn't significantly mean that there was lack of knowledge among all levels about kidney donation. That could be associated with the lack of information in the country.

For instance, Weaver et al., offered reassuring proof that a high school health education program positively impacted knowledge about organ donation and that attitudes toward organ donation changed in response to knowledge gains [15]. An earlier survey by Younger et al., who stated that increased knowledge alone do not necessarily lead to other cognitive changes among health professionals [16]. In this research, despite the decreased knowledge, the attitude of the students toward kidney donation was positive since 62.5% of them were willing to donate a kidney; 5% irrespective of circumstances and 57.5% in special circumstances.

There were approximately 80 participants who refused to donate a kidney for several reasons. Possible causes include the lack of emphasis in curriculum on recruiting organ donors, students' lack of exposure to and comprehension of the full transplantation process, and the absence of widespread community efforts to raise awareness of organ donation. So, awareness and lectures about organ donation overall and kidney donation in particular should be included in curriculum. Medical students, as future doctors, are the first step in building awareness among the population [17].

It is great to educate the population about kidney donation since 261 participants thought that health education should promote kidney donation, privileges to the donors, and media awareness like TV, newspaper, and others. A survey conducted in Qatar showed that over 80% of men and women believed that health education was the best method for increasing the number of donors [18].

The knowledge not just gives the idea about the benefits of donation to the recipient but also to the donors and the society. Rising awareness of kidney transplantation surgery and correcting the misunderstanding about kidney donation's long and short-term effects on donors. Publishing research about the quality of life among kidney donors ensures the effect of kidney donation on the donors in more than the health side but another life side [19, 20].
Further, 66.3% participants answered that their families wouldn't support their decision to donate a kidney. Previous studies showed in Chinese populations, family pressure to maintain an intact body for their dead or cadaver person is a major barrier to cadaveric organ donation. That pressure could affect the opinion of living donors [21], as shown in the current study. On the other hand, also religious aspects have great importance in encouraging organ donation; in this study, 10% thought organ donation is against religion. Furthermore, 76.6% of the participants thought that sometimes misused organs could be corrected and governed by the government, which could prevent misuse and comfort the people to donate with the full trust that they could donate to the right person and administration. Around 98.5% students thought a law should govern the donation process. An American survey revealed a profound mistrust in the fairness of organ allocation and the medical profession in people who perceived themselves as non-donors [22]. Sensational television reports especially were thought to harm public attitudes toward organ donation. The government should have a safe qualified system to govern the donation process and make the citizens aware of any local or international legislation for organ donation. On the other hand, it could decrease the load on the ministry of health financially and practically. For instance, a study by researchers at the University of Maryland revealed that starting 2.7 years after the transplant, each patient who received a kidney transplant rather than continuing to get dialysis saves nearly $27,000, annually [23]. A kidney hospital patient also avoids the discomfort and inconvenience of continuing dialysis therapy and saving tens of thousands of dollars [24]. The government should be vigilant in raising public awareness and professional education initiatives to enhance donation rates to address the severe and growing organ scarcity [25].

There were some limitations of this study including that there was a lack of credibility with the online survey, unlike paper or onsite surveys. There was no equal access to all-level students, even though all these limitations did not affect the study's validity. Thus, it is recommended that the awareness activities between early years of medical schools should be improved and a full curriculum about organ transplantation should be designed. Further research should include different levels in the medical field and the other population to detect their awareness and act accordingly. Furthermore, paper or onsite surveys could be considered instead of an online survey to improve credibility. And well-structured questionnaire should be designed specifically to detect the awareness among the masses.
Conclusion:
The vast majority of the study students had 'positive' attitudes toward kidney donation, which were not affected by the years they spent in medical school. The current survey studies that medical education positively influences the acceptance of kidney donation but doesn't necessarily mean that they, as medical students are fully knowledgeable about kidney donation. These findings support the need to expand the content of education and discussion among health professionals about clinical and conceptual aspects of organ recruitment. The medical curriculum should include modules on organ transplantation to better equip future doctors with knowledge and confidence in counseling on organ donation issues. In addition, well-designed publicity campaigns to address cultural beliefs, correct misconceptions, and more convenient donor registration systems are needed.

Conflict of Interest:
The authors declare that there is no conflict of interest regarding the publication of this article.

Funding:
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Consent for publication:
Written informed consent was obtained from all the participants

Ethical Approval:
Ethical approval was acquired from the Scientific Research Ethic Committee in the college of medicine at King Faisal University.

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