

Psychosocial Determinants of Living Kidney Donors: A Cross-Sectional Study

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Background: End-stage renal disease (ESRD) is a global health issue that significantly impacts patient mortality and morbidity. Living kidney donors play a crucial role in addressing the shortage of available organs for transplantation.

Objective: This study aims to identify the characteristics of potential kidney donors at King Fahad Specialist Hospital in Dammam (KFSH-D), Saudi Arabia and to assess the psychosocial factors influencing their willingness to proceed with the donation process.

Methods: This cross-sectional study included 1523 individuals who applied to donate kidneys at KFSH-D. Data were retrieved from the hospital's transplant department electronic database, encompassing psychosocial variables such as gender, marital status, and age, along with the outcomes of donation intentions (ie, proceeded with donation, did not proceed due to unwillingness). Descriptive data analysis was conducted using chi-square tests and independent sample *t*-tests.

Results: Of the 1523 potential donors, 997 proceeded with the donation. Key factors influencing the willingness to donate included gender ($\chi^2=5.098$, $P=0.024$), age ($t=2.175$, $P=0.030$), and existing relationships with recipients ($\chi^2=162.664$, $P=0.001$). However, marital status, nationality, blood group, BMI, weight, and height were not significantly associated with the decision to donate.

Conclusion: Several psychosocial factors significantly influence the willingness of potential donors to complete the donation process. Understanding these factors can enhance predictive models and improve donor recruitment strategies, ultimately increasing the availability of kidneys for transplantation.

Keywords: end-stage renal disease, living kidney donation, donor characteristics, psychosocial factors, donor willingness, kidney transplantation, healthcare policy, risk management, predictive models

Introduction

Many people around the world are suffering from organ failure. As of 2019, around 13,731 patients were on the waiting list for organ transplants in Saudi Arabia, highlighting a gap between demand and supply.¹ Organ failure might include kidney failure, liver failure, and/or other organ failure. The government of Saudi Arabia established the Saudi center of organ transplantation (SCOT) in 1984. This center governs the organ donation by a robust legal and regulatory framework to ensure ethical practices and safeguard donor and recipient rights. The Saudi Center for Organ Transplantation (SCOT) oversees organ donation activities, sets standards, and monitors transplant programs.^{2,3}

The Kingdom operates under an opt-in system for living and cadaveric organ donation, requiring explicit consent from individuals or their immediate family members for organ donation. This approach aligns with Islamic teachings, which permit organ donation under specific conditions, emphasizing the sanctity of human life and the altruistic nature of donation.⁴ To combat illicit organ trade, Saudi Arabia has enacted laws prohibiting the commercialization of organ donation and imposing severe penalties on those involved in such activities.⁵ These measures aim to protect donors and recipients and uphold the integrity of the transplantation system.

There are multiple stages of kidney failure, and the most severe stage is End-Stage Renal Disease (ESRD). Kidney transplantation is one treatment that can be performed for patients with End-Stage Renal Disease (ESRD). Furthermore,

living kidney donor donation is the favorable treatment for patient with end-stage renal disease.⁶ According to Nayak, Kshtriya and Neugebauer,³ kidney donors or other organ donors could have different factors that may affect their willingness to donate.

Age could be a factor influencing the donors' willingness to donate, where younger individuals are more willing to donate in a study conducted in Turkey in 1991,⁷ and in Singapore in 2012.⁸ Furthermore, males are more likely to donate compared to females according to a study conducted in Singapore by Meng, Lim, Leng, van der Erf, Joshi, Sin, Hong, Chye, Seng and Yi-Shern.⁸ In addition, a US study conducted by Sachdeva, Sunday, Israel, Varghese, Rosen, Bhaskaran, Molmenti and Mattana⁹ found that obesity can frequently hinder the process of living kidney donation. Further, single or divorced participants were more willing to donate compared to married participants according to study conducted by Meng, Lim, Leng, van der Erf, Joshi, Sin, Hong, Chye, Seng and Yi-Shern.⁸ The donor's relationship with the recipient is linked to the likelihood of donation.⁸ Further research is needed in Saudi Arabia to find out the most influencing factors on willingness to donate.

There are some gaps that were found in literature review, one of these gaps was that there are no studies that discuss the factors that are directly related to withdrawal of donors after willing to donation. Furthermore, there were few studies in Saudi Arabia that discussed the reasons behind whether the donor proceeds to donate or not compared with the abovementioned literature from other countries.^{3,7,8} Therefore, the aim of this study is to identify the characteristics of donors who will proceed to donate and to find the factors influencing the potential donor's decision to proceed with the donation or to withdraw.

Methods

Study Design

This is a quantitative retrospective cross-sectional study. The independent variables are all the factors that might affect decisions of donors to donate (ie, their willingness). While the dependent variable is whether the donor proceeded with the donation or not.

Setting

The study was performed in the kidney transplant department in King Fahad Specialist Hospital in Dammam (KFSH-D), Saudi Arabia. Data were extracted from 2011 to early 2020.

Participants

The participants included in the study were all the donors who applied to donate for a kidney transplantation in the past five years in KFSH-D; whether the donation proceeded or not (ie, the participant did not donate because they were not willing). Eligibility criteria include all participants who applied to donate.

All participants who did not proceed to donate for reasons related to the recipient (including the recipient closed their file, the recipient already received a transplant or will be receiving one from another donor, or the recipient transplanted outside of the study setting and thus their record was not available) were excluded. Exclusion criteria also include potential donors who were rejected for eligibility reasons (eg, medically not fit, or not being a match for the recipient), or potential donors who died or were imprisoned (Table 1).

Data Collection

Participants' information was collected from the transplant electronic database, along with some information from the hospital's database. Collected information include: the potential donor's marital status, age, gender, nationality, whether they are related to the recipient, ABO blood type, their BMI including weight and height.

Ethical Considerations

Ethical requirements indicated by the Declaration of Helsinki were applied. Ethical approval was obtained from the Institutional Review Board in Imam Abdulrahman bin Faisal university (IRB-U GS-202003022) and from King Fahad Specialist Hospital in Dammam (MOT0320). All participants signed informed consent forms upon admission to the

Table 1 Characteristics of Potential Donors and Their Outcome (Categorical Variables)

Variables	Donate	Did Not Donate				
		Donor Not Eligible	Donor Not Willing	Donor Dead or in Prison	Recipient-Related Reason	No Reason Mentioned
	n= 997 (%)	n= 968 (%)	n= 526 (%)	n= 5 (%)	n= 461 (%)	n= 16 (%)
Marital status						
Married	480 (48)	503 (52)	237 (45)	1 (20)	197 (43)	0 (0)
Unmarried	386 (39)	279 (29)	175 (33)	1 (20)	174 (38)	1 (6)
Missing	131 (13)	186 (19)	114 (22)	3 (60)	90 (20)	15 (94)
Gender						
Male	704 (71)	693 (72)	400 (76)	5 (100)	331 (72)	12 (75)
Female	293 (29)	275 (28)	126 (24)	0 (0)	130 (28)	4 (25)
Nationality						
Saudi	937 (94)	946 (98)	499 (95)	5 (100)	437 (95)	16 (100)
Non-Saudi	57 (6)	22 (2)	27 (5)	0 (0)	24 (5)	0 (0)
Missing	3 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Related to recipient?						
Yes	865 (87)	477 (49)	226 (43)	2 (40)	219 (48)	0 (0)
No	59 (6)	217 (22)	118 (22)	1 (20)	30 (7)	1 (6)
Missing	73 (7)	274 (28)	182 (35)	2 (40)	212 (46)	15 (94)
ABO						
A	209 (21)	147 (15)	62 (12)	0 (0)	61 (13)	3 (19)
B	148 (15)	88 (9)	51 (10)	2 (40)	51 (11)	0 (0)
O	606 (61)	345 (36)	140 (27)	1 (20)	141 (31)	2 (13)
AB	26 (3)	22 (2)	0 (0)	0 (0)	8 (2)	0 (0)
Missing	8 (1)	366 (38)	273 (52)	2 (40)	200 (43)	11 (69)
BMI (Mean $\pm$ SD)	27.5 $\pm$ 5	28.3 $\pm$ 5	26.9 $\pm$ 5	30.4 $\pm$ 3	27.8 $\pm$ 5	-
Weight (KG) (Mean $\pm$ SD)	76.8 $\pm$ 16	79.8 $\pm$ 16	75.8 $\pm$ 16	94.3 $\pm$ 16	77.9 $\pm$ 16	-
Height (CM) (Mean $\pm$ SD)	167.1 $\pm$ 9	166.8 $\pm$ 9	167.6 $\pm$ 10	157.4 $\pm$ 7	167.4 $\pm$ 9	-
Age (Years) (Mean $\pm$ SD)	36 $\pm$ 9	37 $\pm$ 10	35 $\pm$ 8	39 $\pm$ 4	36 $\pm$ 9	36 $\pm$ 9

hospital that stated their information might be used for research purposes and confidentiality is guaranteed for all obtained data. In addition, all kidneys were donated voluntarily with written informed consent, and all organ donations in the study setting were conducted in accordance with the Declaration of Istanbul.

Analysis

Descriptive data analysis was conducted using means and frequencies. The statistical package for social sciences (SPSS) v.25¹⁰ was used to conduct the necessary analyses for this study. *P*-value of less than 0.05 is considered statistically significant. Bivariate analysis is done through using chi-square test and independent sample *t*-test, to find the factors significantly influencing the willingness to proceed with the donation. Missing data were addressed as missing and were shown in the tables.

Results

The total number of participants in the study was 1523 consisting of 997 participants that completed the donation and 526 who did not complete the donation because of their lack of willingness to donate. The total number of males in the study was 1104. Of those, 704 proceeded to donate, representing 64% of all male participants. Seventy percent of all female participants (n=419) proceeded to donate (Table 2). Most of the participants in the study are married (n=717, 56% of all participants). Most of the potential donors in the study are Saudis (n=1436, 94%), and only 65% of those proceeded to donate (Table 2).

More than half of the potential donors were related to the recipients (n=1091, 72%), of those, only 865 (79%) proceeded to donate. More than 17% (n=255) of the records did not indicate whether the donor is related to the recipient or not. Most of the participants were from the blood group O (n=746, 49%), while 227 records did not include the blood group of the potential donor (Table 2).

The mean Body Mass Index (BMI) for all study participants was 27 ± 5 , with a mean weight of 77 ± 16 kilograms, and a mean height of 167 ± 9 CM. The mean age of the study participants was 36 ± 9 years old (Table 2).

Bivariate analysis showed some variables that could be related to the completion of the transplant. Gender in this study is significantly associated with if the participants completed the donation or not ($\chi^2 = 5.098$, $P = 0.024$). Although the

Table 2 Factors Influencing the Willingness to Donate

Variables	Groups	Donate, n= 997	Did Not Donate/Not Willing, n= 526	Total, n= 1523	Test (P-Value)
Gender	Female (%)	293 (70)	126 (30)	419 (28)	$\chi^2 = 5.098 (0.024)$
	Male (%)	704 (64)	400 (36)	1104 (72)	
Marital status	Married (%)	480 (67)	237 (33)	717 (47)	$\chi^2 = 0.499 (0.48)$
	Not married (%)	386 (69)	175 (31)	561 (37)	
	Missing (%)	131 (53)	114(47)	245 (100)	
Nationality	Saudi	937 (65)	499 (35)	1436 (94)	$\chi^2 = 0.238 (0.625)$
	Non-Saudi	57 (70)	27 (32)	84 (6)	
	Missing	3 (100)	0 (0)	3(100)	
Related to recipient?	No	59 (33)	118 (67)	177 (12)	$\chi^2 = 162.664 (0.001)$
	Yes	865 (79)	226 (21)	1091 (72)	
	Missing	73 (29)	182(71)	255 (100)	
ABO	A	209 (77)	62 (23)	271 (18)	$\chi^2 = 5.866 (0.118)$
	B	148 (74)	51 (26)	199 (13)	
	O	606 (81)	140 (19)	746(49)	
	AB	26 (74)	9 (26)	35 (2)	
	Missing	8(3)	264(97)	272 (100)	
BMI (Mean $\pm$ SD)		27 ± 5	27 ± 5	27 ± 5	$t = 1.526 (0.134)$
Weight (KG) (Mean $\pm$ SD)		77 ± 16	76 ± 16	77 ± 16	$t = 0.972 (0.331)$
Height (CM) (Mean $\pm$ SD)		167 ± 9	168 ± 10	167 ± 9	$t = -0.832 (0.405)$
Age (Mean $\pm$ SD)		36 ± 9	35 ± 8	36 ± 9	$t = 2.175 (0.030)$

Notes: Bold indicates significant associations.

number of male participants is more than female in the study ($n_{\text{Male}} = 1104$), female participants are more likely to complete the donation compared to male participants ($n = 239$, 70% of all female participants).

The relationship between participant and recipient is a major factor in the study that is significantly associated with the participants donation status ($\chi^2 = 162.664$, $P = 0.001$). Most participants were related to the recipient ($n_{\text{RelatedToRecipient}} = 1019$ of all participants); however, 79% of related participants proceeded to donate, while 33% of all non-related participants ($n = 59$) proceeded to donate.

Age is significantly associated with the donor's completion of donation ($t = 2.175$, $P = 0.030$). Participants who completed their donation had an average age of 36 ± 9 , while the ones who did not complete donation because of their unwillingness had an average age of 35 ± 8 .

There are six variables that may not affect the completion of the donation process, these are: Marital status of the potential donor ($\chi^2 = 0.499$, $P = 0.48$), nationality of the potential donor ($\chi^2 = 0.238$, $P = 0.625$), blood type (ABO) of the potential donor ($\chi^2 = 5.866$, $P = 0.118$), BMI of the potential donor ($t = 1.526$, $P = 0.134$), the participant's weight ($t = 0.972$, $P = 0.331$), and the participant's height ($t = -.832$, $P = 0.405$).

Discussion

This study measured the factors that are associated with a person's willingness to donate kidneys in Saudi Arabia. Out of the 2973 records of potential donors, only a third of those proceeded to donate (997 donors). The study showed that there are three variables that could impact on donors' willingness to complete donation: gender, having an existing relationship with the recipient, and age.

In this study, participant gender played a significant role in determining whether the donor would complete the donation. Despite having a higher number of male participants ($n_{\text{Male}} = 1104$), female participants demonstrated a greater likelihood of completing the donation, with 239 females completing it, accounting for 70% of all female participants. This difference may be attributed to the greater altruism observed in women compared to men.¹¹ Furthermore, other studies suggest that emotional factors might influence females more strongly than males, particularly when there is a personal connection between the donor and the recipient.¹² Consequently, the combination of altruism and emotional sensitivity in women could explain their higher willingness to donate compared to men.

The study found that the existing relationship between the recipients and the potential donor may influence the donation process. Participants who are related to the recipient have more chance to complete donation compared to those who are not related to the recipient. This factor was not supported by any of the studies in the literature review. People may care more about who they know more than others which can influence their willingness to donate.

This study found that the age of the participant may impact on their willingness to complete the donation. Participants of a lower age are more likely to donate. Similarly, Bilgel⁷ performed a survey in the Turkish community with 1030 participants and found that people aged between 18 and 37 years are the most likely to donate. Another article was performed in Singapore with 1520 participants which supported that potential donors are more likely to be under the age of 40.⁸ This might be because as people get older, chronic conditions and/or comorbidities may increase while their fears will increase so they will hesitate to proceed with the donation.

The current study found that marital status could not affect participants' completion of donation. A study in the United States of America supports that there is no difference between married and unmarried people regarding their donation preference.¹³ While a few studies found that married individuals have less willingness to be donors compared to unmarried ones.^{8,14} Taylor and McMullen¹³ concluded that spouses do not have a negative effect on their partner's willingness to donate, as they support the donation decision of their partner. However, according to the United Network for Organ Sharing (UNOS), 15% of patients with end-stage renal diseases could be cured when spouses begin to donate.¹⁴ Marital status does not affect the willingness to donate because the donation decision is a self-made decision.

However, the study found that the BMI of the participants is not significantly associated with the person's willingness to donate. Likewise, a study explored that obesity has no contraindication with kidney donation.¹⁵ Thus, having a high or low BMI does not impact the donor's decision. The hospital could use the BMI for eligibility purposes and not willingness to complete the donation process. However, the participants' eligibility to donate does not mean they are willing to donate.

Furthermore, upon examining our data, there is a noticeable decline in the frequency of live kidney donation in 2020, where only five cases (0.2%) were recorded, compared to 459 cases (15.4%) in 2019. This stark reduction aligns with global trends observed during the COVID-19 pandemic, as reported in the literature. According to Ugur and Molina Pérez,¹⁶ the pandemic significantly disrupted organ donation and transplantation activities worldwide due to factors such as healthcare resource reallocation, travel restrictions, and heightened infection risks.

One of the major strengths of this study is that it is the first study of its kind in Saudi Arabia. This will help decision makers establish predictions on potential donor's willingness to proceed with the donation.

It is important to highlight the limitations of this study. As a single-center, descriptive study, the findings are inherently limited in scope and may not be generalizable to other settings or populations. The data collected from the hospital required extensive cleaning, which was time-consuming and added pressure to the authors due to the fixed timeline of the study. Furthermore, the study was constrained by the unavailability of certain donor-related medical information, such as the donor's general health status or the presence of chronic diseases, which could have provided a more comprehensive understanding of the factors influencing the willingness to donate. This limitation is particularly significant given the scarcity of related data in the Saudi literature. These constraints underscore the challenges of conducting a single-center study and highlight areas for further research.

Conclusion

In conclusion, kidney transplant donors are likely to proceed with donation after expressing willingness, depending on several significant factors. Males, older individuals, and those who are not related to the recipient are less likely to donate compared to females, younger individuals, and those related to the recipient. Hospitals should prioritize targeted interventions to improve donation rates among men, older individuals, and unrelated donors, as these groups demonstrate lower likelihoods of completing the donation process.

This study, being the first of its kind in the Saudi context, provides valuable insights that can enhance the organ transplant process. By utilizing the results to predict the willingness of potential donors, hospitals can save considerable time and effort that might otherwise be spent on individuals unlikely to proceed with the donation.

Data Sharing Statement

The authors would like to declare that the data used in the study are from the electronic system in the study setting and is owned solely by the hospital. The authors had an excel dataset pertaining all the necessary data to perform the study. The data were anonymous, as no names or medical record number or any identifying information were provided to the research team by the hospital.

Funding

The authors would like to declare that there are no grants or funding relevant to this study.

Disclosure

The authors declare no competing interest relevant to this study.

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