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Meral Mese¹, Nurhan Seyahi², Tugba Cebioglu³, SerapYadigar¹

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Psychosocial outcome following kidney donation: A single-center experience

¹Dr. Lutfi Kirdar Kartal City Hospital, Department of Nephrology, Istanbul, Turkey

²Istanbul University-Cerrahpasa, Cerrahpasa Medical Faculty, Department of Internal Medicine, Istanbul, Turkey

³Dr. Lutfi Kirdar Kartal City Hospital, Department of Psychiatry, Istanbul, Turkey

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Abstract. Previous studies have reported wide ranges in the prevalence of post-donation anxiety, depression, and regret in living kidney donors (LKDs), with uncertain risk factors. We performed a cross-sectional study on the psychological status of former kidney donors. We aimed to determine the psychological characteristics of kidney donors compared to healthy controls.

Methods. Various tests were applied to 92 living kidney donors and a control group with similar characteristics. Beck Depression Inventory (BDI), State-Trait Anxiety Inventory (STAI) Positive and Negative Affect Scale (PANAS) World Health Organization Quality of Life Scale Short Form (WHOQOL-BREF) forms used to collect data on the psychological status and quality of life (QL) of the donors.

Results. Donors had a higher General QL score ($p=0.020$). There were no significant differences between donors and control groups in terms of depression, anxiety, mood, Physical QL, Psychological QL and Environment QL scale. Female donors had higher trait anxiety compared to male donors ($p=0.027$). Level of State Anxiety, Positive Affect, Social Relations QL, and Environment QL was higher in females. There were no statistically significant differences between female and male donors. Positive affect scores ($\beta = -0.221$ ($-0.403 - -0.040$)) and Psychological QL ($\beta = -0.131$ ($-0.250 -0.011$)) were associated with lower depression scores, while negative affect scores associated with higher depression scores ($\beta=0.201$ ($0.022 -0.381$)).

Conclusions. As the psychological status of former kidney donors was no worse than controls, carefully selected donors may not be associated with the psychological burden.

Keywords: kidney transplantation, living donors, quality of life, anxiety, depression.

Conflict of interest. The authors declare no conflict of interest.

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Correspondence should be addressed to Meral Mesem: mesemeral@gmail.com

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Мерал Месе¹, Нурхан Сейяхі², Тугба Чебіоглу³, Серап Ядігар¹

Психосоціальні наслідки донорства нирки: досвід одного центру

¹Міська лікарня доктора Лютфі Кирдар Картал, відділення нефрології, Стамбул, Туреччина

²Стамбульський університет-Черрагпаша, медичний факультет Черрагпаша, кафедра внутрішньої медицини, Стамбул, Туреччина

³Міська лікарня доктора Лютфі Кирдар Картал, відділення психіатрії, Стамбул, Туреччина

Резюме. Попередні дослідження свідчать про широкий діапазон поширеності тривоги, депресії та розкаяння після у живих донорів нирки (ЖДН) з невизначеними факторами ризику. Ми провели обсерваційне поперечне дослідження психологічного стану колишніх донорів нирок з метою визначити їх психологічну характеристику у порівнянні зі здоровою контрольною групою.

Методи. Різні тести були застосовані до 92 живих донорів нирок та контрольної групи зі схожими характеристиками. Інвентар депресії Бека (BDI), Інвентар стану-особистісної тривоги (STAI) Шкала позитивного та негативного афекту (PANAS) Коротка форма шкали якості життя Всесвітньої організації охорони здоров'я (WHOQOL-BREF) використовувалися для збору даних про психологічний стан та якість життя (ЯЖ) донорів.

Результати. У донорів був вищий загальний показник ЯЖ ($p=0.020$). Між донорами та контрольними групами не було значних відмінностей з точки зору депресії, тривоги, настрою, фізичної ЯЖ, психологічної ЯЖ та шкали ЯЖ середовища. Жінки-донори мали вищий рівень тривожності в порівнянні з чоловіками-донорами ($p=0.027$). Рівень стану тривоги, позитивного ефекту, ЯЖ соціальних відносин та ЯЖ середовища був вищим у жінок. Між жінками-донорами та чоловіками-донорами не було статистично значимих відмінностей. Позитивні показники афекту ($\beta = -0.221 (-0.403 - -0.040)$) та психологічної ЯЖ ($\beta = -0.131 (-0.250 -0.011)$) були пов'язані з нижчими показниками депресії, тоді як негативні показники афекту були пов'язані з вищими показниками депресії ($\beta=0.201 (0.022 -0.381)$).

Висновки. Оскільки психологічний стан колишніх донорів нирок не гірший, ніж у контрольних груп, уважно відібрані донори можуть не мати психологічного навантаження.

Ключові слова: пересадка нирки, живі донори, якість життя, тривога, депресія.

Introduction. Kidney transplantation is the best form of replacement therapy. Additionally, living kidney transplantation is associated with better graft survival [1, 2]. There are many international and local guidelines for the management of living donor selection [3] Even in carefully selected donors, there is a risk for adverse psychological outcomes, living kidney donation is a multi-layered and complex issue, and there are contradictory results regarding the psychological effects of living donation [4]. In some prospective studies, adverse psychosocial outcomes and increased depression and anxiety were reported after donation [5-10]. On the other hand, generally, descriptive studies found that donors show higher physical, psychological and social well-being than controls [11-13].

We hypothesize that country baseline socio-cultural factors might also be responsible for the observed discrepancies. Turkey is among the countries with the most living donor transplants per million population [14], However, psychological outcomes are not widely

studied. Recently, a study without a control group was conducted in Turkey and it was determined that living kidney donation did not have a negative effect on the life satisfaction and mood of the donors and it is a safe procedure [15].

The aim of our study is to determine the psychological state and well-being of living kidney donors, to evaluate their interactions and relationships with their subjective evaluations, and to determine the need for psychological support in the follow-up of living donors before and after transplantation, by comparing them with healthy controls. Therefore we conducted a study to examine the psychological status of living kidney donors and age- and sex-matched control group.

Material and Methods. We performed a cross-sectional study to collect data on the psychological status of former kidney donors who had transplantation operation in our hospital. Between January 2004 and August 2020, a total of 257 living donor nephrectomy was performed in our transplantation center. We collected the contact information of former donors from the recipients who were under follow-up. We made phone calls to invite former donors to participate in our study. We cannot make contact with 122 donors, 92 of the remaining 135 donors accepted to participate in our study. We also composed a control group of subjects who were willing to fill out the questionnaires. Control subjects were mainly hospital workers and their relatives.

Meral Mese

mesemeral@gmail.com

Data collection. All patients were evaluated by the psychologist using a standard form to collect data on the sociodemographic characteristics and clinical characteristics of the participants. In this form, gender, age, marital status, education, employment status, financial status, hereditary, mental, chronic disease, physical disability and treatment information, information on hereditary-chronic diseases, physical disability information of first-degree relatives, alcohol, smoking, and substance use were questioned. Chronic disease was defined as the presence of hypertension, diabetes mellitus and coronary artery disease.

Additionally, we used four different forms to collect data on the psychological status and quality of life of the donors.

Beck Depression Inventory (BDI). We used the validated Turkish version of the 21-item scale developed by Beck (1961) to measure the symptoms of depression in adults [16]. The 21-item scale includes different verbal expressions in the options “a”, “b”, “c” and “d”. These items get “0”, “1”, “2” and “3” points respectively. The lowest score obtained from the scale is 0, and the highest score is 63. The cut-off score is set at 17.

State-Trait Anxiety Inventory (STAI). On this scale, there are 40 expressions that individuals can use in expressing their feelings [17]. The first twenty of these measures the level of anxiety about the situation, and the second twenty measures trait anxiety. We used the validated Turkish version of this form and detailed calculations related to this scale is described elsewhere [18].

A Positive and Negative Affect Scale (PANAS). PANAS is an inventory of 20 questions developed by Watson, Clark, and Tellegen that measures positive and negative moods. Watson D, Clark A L ve Tellegen A (1988) [19]. The Turkish validity and reliability study was conducted by Gençöz. Gençöz T (2000) [20]. Ten questions of the scale measure Positive Emotion (PD) and ten questions measure Negative Affect (ND) sub-dimensions.

World Health Organization Quality of Life Scale Short Form (WHOQOL-BREF). It is a scale developed by the World Health Organization (WHO). Turkish validity and reliability were assessed by Eseretal. [21]. The short form (WHOQOL-27) consists of 26 questions and includes 4 sub-dimensions. These sub-dimensions measure the physical, psychological, social, and environmental quality of life. Each sub-dimension independently expresses the quality of life in its area. After the domain scores are calculated between 4-20, the percentage equivalents of these scores are determined and a high percentage value indicates a high quality of life [22].

Ethics. Ethics committee approval for the study was obtained from the ethical review board of Kartal Dr. Lutfi Kırdar City Hospital. All procedures were performed in accordance with the ethical standards of the Declaration of Helsinki. All participants gave written informed consent for the study.

Statistical Analysis. Descriptive data were presented as mean and \pm standard deviation (SD) and median and interquartile range (IQR) for the continuous variables and frequency and percentages (%) for the categorical variables. Continuous variables were evaluated for normality distribution using the Shapiro-Wilk test. Groups were compared using the independent sample t-test for normally distributed variables and the Mann-Whitney U test for non-normally distributed variables.

Categorical variables were compared by using Chi-Square or Fisher's Exact test for proportion. Univariate and multivariate regression analyses were applied to determine the association between Beck's depression and independent factors. Factors which significantly associated with Beck's depression in univariate analysis were included in multivariate analysis. All significance tests were 2-tailed, and values of $p < 0.05$ were considered statistically significant. All statistical analyses were performed by SPSS software version 21 (Chicago, IL).

Results. Demographic and clinical data. The demographic and clinical characteristics of the study groups are shown in Table 1.

Table 1

Demographic and socioeconomic characteristics of the study participants

	Donors (n = 92)	Control (n = 52)	P-value
Gender			
Male, n(%)	34(37)	20(38,5)	0.860
Female, n(%)	58(63,0)	32(61.5)	
Age, years	53,4 \pm 11,6	51,8 \pm 5,9	0.291
Educational level			
illiterate	19(20.7)	2(3.8)	0.038
Primary school	59(64.1)	57(71.2)	
Secondary-high school	14(15.2)	13(25.0)	

Continuation of Table 1

	Donors (n = 92)	Control (n = 52)	P-value
Martial status			
Single	2(2.2)	4(7.7)	0.264
Married	84(91.3)	44(84.6)	
Widow	6(6.5)	4(7.7)	
Relationship with the recipient			
Spouse	38	NA	NA
Child	33	NA	NA
Parent	5	NA	NA
Sibling	11		
Other	5		

Participants' mean age was 53.4 years (range 27 to 80 years) with 58 women(63%) and 34 men(37%) Similar to the kidney donors, participants of the control group were generally female and middle-aged. Thirty-eight (41.3%) donors were spouses; 33 (35.9%) were sons or daughters, 16(17.39%) were parents or siblings and the remaining 5 (5,43%) donors were other relatives. They had low education and they were generally married. The mean duration following transplantation was 78.0 ± 41.1 months.

At the time of the psychological evaluation, twenty-eight (30.4%) of the donors had a chronic disease, while the remaining 64 (69.6%) were physically healthy. None of the participants developed major surgical complications after donor nephrectomy.

Psychological status and quality of life. A comparison of donors with controls regarding the psychological status and quality of life was shown in Table 2.

Table 2

Results of t-tests and descriptive statistics of depression, anxiety, emotions and life quality by "donors and control group"

	Donors (n = 92)	Control (n = 52)	P-value
Beck Depression	6.0 (2.0-12.8)	7.5 (2.0-14.0)	0.433
State Anxiety	43.0 (38.0-48.8)	42.0 (39.3-48.0)	0.947
Trait Anxiety	47.63 \pm 7.93	45.85 \pm 6.04	0.154
Positive Mood	34.0 (27.0-39.0)	34.5 (27.3-40.0)	0.228
Negative Mood	16.5 (13.0-24.0)	19.0 (13.3-25.8)	0.451
QL General	63.0 (50.0-75.0)	62.5 (50.0-68.1)	0.020
QL Physical	71.0 (54.0-86.0)	71.4 (57.1-82.1)	0.697
QL Psychological	69.0 (54.0-82.0)	66.6 (50.0-82.0)	0.502
QL Social Relations	71.0 (50.0-83.0)	75.0 (50.0-83.3)	0.884
QL Environment	66.0 (53.0-78.0)	64.1 (53.17-6.0)	0.840

Values are presented as mean \pm SD and median with Interquartile range(IQR).

According to psychological evaluation tools, donors had a higher General Quality of Life score compared to that of the control group ($p=0.020$). Additionally, there were no significant differences between donors and control groups in terms of depression, anxiety, mood, physical quality of life, psychological quality of life and environmental quality of life scale.

Gender effect. There is a well-documented difference between genders regarding the psychological status [23] Therefore we compared the psychological status of kidney donors following stratification by gender (Table 3).

Table 3

Results of t-tests and descriptive statistics of depression, anxiety, mood, and quality of life (QL) by donors' gender

	Male (n = 34)	Female (n = 58)	P-value
Beck Depression	7.8 (1.7-14.7)	7.0 (2.0-12.0)	0.324
State Anxiety	41.0 (37.7-47.0)	45.5 (39.5-49.0)	0.090
Trait Anxiety	45.26±7.82	49.07±7.71	0.027
Positive Mood	30.82±8.49	33.90±8.04	0.086
Negative Mood	17.0 (13.0-20.3)	16.0 (13.8-28.0)	0.383
QL General	69.0 (50.0-75.0)	63.0 (50.0-75.0)	0.532
QL Physical	73.0 (54.0-86.8)	71.0 (54.0-83.0)	0.709
QL Psychological	71.26±16.24	66.93±18.35	0.257
QL Social Relations	67.0 (48.0-83.0)	75.0 (50.0-83.0)	0.375
QL Environment	60.41±16.46	67.71±17.87	0.055

***Values are presented as mean±SD and median with Interquartile range(IQR).*

We found that female donors had higher trait anxiety compared to male donors ($p=0.027$). Level of state anxiety, positive mood, social relations quality of life, and environment quality of life was higher in females, however, there were no statistically significant differences between female and male donors.

Determinants of depression. We used univariate analysis to determine the relationship between depression and all study parameters that were listed in Table 4. Then, we used variables that were significantly associated with depression in univariate analysis to construct a multivariate model.

Table 4

The relationship between depression and all study parameters

	Univariate Analysis		Multivariate Analysis	
	Beta	P-value	Beta	P-value
State Anxiety	0.249 (0.023-0.476)	0.031	0.182 (-0.002-0.365)	0.053
Trait Anxiety	0.326 (0.098-0.554)	0.006	0.112 (-0.078-0.301)	0.246
Positive Mood	-0.422 (-0.631- -0.212)	0.000	-0.221 (-0.403- -0.040)	0.017
Negative Mood	0.530 (0.333-0.728)	0.000	0.201 (0.022-0.381)	0.029
QL General	-0.266 (-0.342- -0.190)	0.000	-0.086 (-0.175-0.003)	0.057
QL Physical	-0.276 (-0.359- -0.192)	0.000	-0.046 (-0.145-0.053)	0.360
QL Psychological	-0.346 (-0.425- -0.267)	0.000	-0.131 (-0.250- -0.011)	0.032
QL Social Relations	-0.236 (-0.309- -0.164)	0.000	-0.069 (-0.150-0.013)	0.098
QL Environment	-0.218 (-0.425- -0.267)	0.000	0.057 (-0.037-0.151)	0.228
Chronic disease	4.509 (0.539-8.479)	0.026	0.313 (-2.596-3.223)	0.831

Positive mood scores ($\beta = -0.221 (-0.403 - -0.040)$) and psychological quality of life ($\beta = -0.131 (-0.250 - -0.011)$) were associated with lower depression scores, while negative mood scores associated with higher depression scores ($\beta = 0.201(0.022-0.381)$).

Discussion. We found that former kidney donors had similar psychological characteristics compared to age- and sex-matched healthy controls. The psychologi-

cal status of former kidney donors was evaluated in different studies. Holscher et al. used the PHQ-2 scale in order to assess the incidence of depression among 825 donors [10]. Siblings of the recipients constituted 21.1% of the participants, spouses or partners -20.1%, friends accounted for 14.2%, and 12.2% of the participants were recipients' parents. The study demonstrated that approximately 4.2% of donors showed depressive symptoms.

The occurrence of these symptoms was related to living without a partner and low education level compared to subjects with positive PHQ-2screen [10]. Sommerer et al. used the PHQ-9 questionnaire in a group of 295 donors. The majority were the recipient's parents (146 people), followed by their partners/spouses (93 people) and siblings (47 people). In 7.4% of donors, post-transplant depressive symptoms were detected, among which 5.4% were of mild severity, 1.4% of moderate severity, and 0.6% were severe [24].

Similar to our findings Wiedebusch et al. examined a group of 131 donors using HADS and demonstrated a slightly lower rate of donor depression compared to the healthy population. In that study, unmarried donors showed a higher propensity to develop a depressive disorder than married donors. There was no significant difference in terms of sex [25]. Another study also shows similar findings to our data; according to the study of Chen et al, the rate of depressive symptoms in the general population was similar to that observed in the parents [26]. Additionally, In the study conducted on 84 donors, Zhao et al. used BDI and demonstrated the occurrence of depressive symptoms in 7.1% of the participants after transplantation, but no major depressive disorders after the donation was observed [27].

A gender-based difference regarding psychological status is defined in various study groups [28]. The study by Lopes, et al. study was conducted on donor and recipient pairs (45 donors and 35 recipients); that study showed that the rate of depression was higher among female and unmarried patients [9]. Kidney transplantation is a very burdensome therapeutic process for both the donor and the recipient. For a patient receiving the kidney, it is often a life-saving operation. However, for the living donor, it is a selfless act, but also a decision potentially endangering their own health. The increasing number of treatments in which kidneys from living donors are used has resulted in the need to take a more detailed look at the factors affecting the mental health of this group.

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The results of the few studies carried out so far are surprisingly ambiguous. Nevertheless, usually, they show an improvement in the results of patients donating and receiving organs in terms of reducing anxiety and depression as well as increasing the quality of life in the post-transplant period, compared to the time before surgery. The type of emotional donor-recipient relationship requires further exploration, especially in the context of its evolution after the transplant.

Our results should be interpreted by taking the following limitation into account. Retrospective design is the major limitation of our study. We did not have a pre-donation psychological evaluation therefore it is hard to assess causality. We did not perform a formal power analysis however we tried to recruit all the patients that we can reach. We cannot contact a large proportion of our former donors and we cannot rule out survival ship bias. Finally, we selected donors of the recipients who were on regular follow-up with functional graph therefore our results might not be interpolated to the donors of the recipients who had graft failure.

Conclusions. In conclusion, the psychological status of former kidney donors was not worse than that of the age- and sex-matched controls. Living kidney donation might not be associated with psychological burden in carefully selected donors.

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The authors' contributions.

M. Mesem: Data collection and analysis, the manuscript writing, and final editing;

N. Seyahi: Data collection and analysis, the manuscript writing;

T. Cebioglu: Data collection;

S. Yadigar: A literature analysis.

All authors provided critical feedback and helped shape the research, analysis, and manuscript writing. All authors approved the final version of the manuscript.

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