Original paper

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Female Renal Donors: Impact of Donation on Anxiety, Depressive Symptoms and Quality of Life

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Abstract - Introduction: Donating one's kidney can be a complicated psychological experience. This study was designed to evaluate and compare anxiety, depression and quality of life of married female renal donors during the pre and post donation phase. Methods: In this prospective longitudinal observational study, 39 consecutive female renal donors were assessed using PHQ-9, HAM-A and the WHO QoL-Bref Questionnaire 2 weeks before and 3 months after kidney donation. Results: The mean age of female kidney donors was 41.74 ± 8.85. After donation, prevalence of depression increased from 43.59 % (n = 17) to 53.84 % (n = 21), (t(38) = -2.089, p = 0.04) while prevalence of anxiety in donors increased from 58.97 (n = 23) to 69.23 % (n = 27) and the difference was found to be statistically significant (t(38) = 2.47, p = 0.01). Kidney transplantation resulted in a significant decrease in overall perception score of WHOQOL-Bref Questionnaire. (t(38) = 3.504, p = 0.001), overall perception score of health (t(38) = 3.504, p = 0.001), physical domain (t(38) = 4.180, p = 0.000) and psychological domain (t(38) = 2.469, p = 0.018) after donation. There were no significant changes in the social relationship (t(38) = -0.80, p = 0.936) and environmental health domain scores (t(38) = 0.991, p = 0.328). On multiple regression analysis, presence of pre-transplant depression was independently associated with overall score of WHOQOL-Bref Questionnaire (β = -0.14, p = 0.002), perception of health (β = -0.08, p = 0.001), physical health (β = -1.91, p = 0.08) and psychological health (β = -2.57, p = 0.02). Pre-transplant anxiety was negatively related to overall perception of health (β = -0.08, p = 0.01), physical health (β = -2.05, p = 0.01) and psychological health (β = -1.94, p = 0.02). Conclusion: Significant reduction in quality of life, perception of health, physical health and psychological domain of female renal donors was observed after donation.

Keywords: female kidney donor; depression; anxiety; quality of life; prospective

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Introduction

Kidney transplant is the treatment of choice for end-stage kidney disease [1]. Due to organ shortage, living kidney donation is gaining increasing importance from the medical and ethical points of view [2]. The Human Organ Transplantation Act of India, 1994 allows the donation of kidneys by parents, siblings, children and spouse without the need for any further approval. Unrelated donors willing to voluntarily donate their kidney can do so after legal approvals [3].

Globally majority of living donors whether related or unrelated to recipients are females, whereas majority of transplant recipients are

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males [2,4]. In the developing countries, vulnerability in females due to lack of education and financial dependency is very common which is the reason for their predominance as kidney donors. In addition to that patriarchy, gender-based discrimination, higher employment status of males, and higher rate of cardiac morbidities in males also favours the female predominance as kidney donors [5,6]. Also, women have a greater sense of responsibility towards their family members and greater selflessness in comparison to men [7].

According to literature, renal donors may experience anxiety, depression and poor quality of life after donation but there is a scarcity of literature related to quality-of-life outcome after donation in renal donors [8-10]. Since the previous studies conducted so far have largely ignored the female gender while assessing anxiety, depressive symptoms and quality of life, the aim of this study was to address the gaps in literature by evaluating the impact of renal donation on anxiety, depression and quality of life in female renal donors before and after donation.

Subjects and Methods

This hospital based prospective longitudinal cohort study was conducted at psychiatry department of a tertiary care hospital attached to a medical college in India over a period of one and half year from January 2018 to June 2019 after due approval from the Institutional ethics committee.

Following were the inclusion and exclusion criteria in our study: Inclusion criteria were: (i) age between 18 and 50 years and female gender; (ii) participants fulfilling the National organ and tissue transplant organisation (NOTTO**)** criteria and awaiting surgery (iii) willing to participate and give consent [11]. Exclusion criteria were: (i) Past psychiatric history or family history of psychiatric illness; (ii) Coexisting medical illness. A total of 39 consecutive female living kidney donors fulfilling the inclusion and exclusion criteria were included in the study and were asked to complete two set of questionnaires each at two time points: before and 3 months after the renal transplant. The questionnaires included the Hindi version of PHQ-9 and Hamilton Anxiety Rating Scale (HAM-A) for assessing depression and anxiety symptoms respectively [12,13]. Quality of life was assessed using the Hindi version of World Health Organization Quality of Life Instrument, brief questionnaire (WHOQOL-BREF) [14].

The Patient Health Questionnaire (PHQ) is a self-administered version of the PRIME-MD diagnostic instrument. The PHQ-9 is the depression module, which scores each of the 9 DSM-IV criteria as "0" (not at all) to "3" (nearly every day). PHQ-9 has Cronbach's α of 0.89 with excellent internal reliability. PHQ-9 scores of 5, 10, 15, and 20 represent the lower limits of mild, moderate, moderately severe, and severe depression. Scores less than 10 were considered as a cut-off score to represent no/minimal depression [12,15].

Hamilton anxiety rating scale - This scale is used to determine the anxiety levels and the distribution of symptoms of patients. It consists of 14 questions that evaluate both somatic and mental findings. This scale can determine the presence and level of each item. HAM-A has Cronbach alpha of 0.893 indicating good internal consistency. Scores equal to and greater than 17 are signs that patients may have anxiety disorder. The optimal HAM-A score ranges were: mild anxiety = 8 - 14; moderate = 15 - 23; severe ≥ 24 (scores ≤ 7 were considered to represent no/minimal anxiety) [13,16].

World health organization quality of life –brief questionnaire (WHO QOL BREF Hindi version) – It is a shortened version of WHOQOL-100 and consists of 24 facets and provides a profile of scores on four dimensions of quality of life: physical health, psychological, social relationships, and the environment. It is a self-report instrument, scored on a 5-point Likert-type scale ranging from 1 (strongly agree) to 5 (strongly disagree), with the highest scores representing better quality of life. Raw scores on 4 domains were calculated by adding the values of single items and transformed on a scale ranging from 0 – 100, where 100 is the highest and 0 is the lowest. The WHOQOL-Hindi is a valid instrument (Cronbach alpha = 0.83) for comprehensively evaluating the QOL in health care settings in India [14,17].

Statistical analysis

Statistical analysis was performed using EZR software ((Easy R), which is based on R and R commander) for Windows (Version 1.54) [18]. Descriptive statistics was used to obtain the distribution of different variables of socio-demographic profile. Data were presented as mean ± standard deviation or median (range) or number (percentage) as appropriate. The changes in Anxiety, depression and quality of life in pre donation and post donation phase were studied by paired t test. Ordinal logistic regression was done using selected variables and odds ratios (ORs) were calculated. Statistical significance was assessed at 0.05 probability level.

Results

The characteristics of the donor population are shown in Table 1.

The mean age of the female donors in the present study was 41.74 ± 8.85 years. All the participants were married and about two third (n = 26.66 %) of the participants studied till secondary or more. Most of the participants were unemployed/housewife (n = 30, 76.9 %). Twenty-nine (74.35 %) participants belonged to rural area and most of the participants were living in a joint family (n = 35, 89.74 %). About 36 participants (92.30 %) had a family income of more than 10000 rupees per month. With respect to relationship with the recipient, 41.02 % (n = 16) of donors were mother, 41.02 % (n = 16) were wife, 12.83 % (n = 05) were sister and 5.13 % (n = 2) were not related to the donor. Around 79.5 % (n = 31) participants were living with the recipients (Table 1).

Table 1. Socio-demographic details of female kidney donors (n=39)

Variable	Female kidney donor N (%)
Age	41.74 ± 8.85 (Mean age ± SD)
Age group	
< 45 years	24 (61.54)
≥ 45 years	15 (38.46)
Marital status	
Married	39 (100)
Education	
Illiterate / Primary	13 (33.4)
Secondary / More	26 (66.6)
Employment	
Employed	09 (23.1)
Unemployed//housewife	30 (76.9)
Religion	
Hindu	34 (87.17)
Muslim	05 (12.83)
Domicile	
Rural	29 (74.35)
urban	10 (25.65)
Type of family	
Nuclear	04 (10.26)
Joint	35 (89.74)
Income (family)	
<10000	03 (7.70)
10000 - 20000	20 (51.28)
>20000	16 (41.02)
Relationship with recipient	
Parents	16 (41.02)
Spouse	16 (41.02)
Siblings	05 (12.83)
Unspecified	02 (5.13)
Living with recipient	
Yes	31 (79.5)
No	09 (20.5)

Anxiety and depressive symptoms

Table 2 and 3 show the PHQ-9 and HAM-A scores Mean (SD) of patients before and after renal transplant. In the pre-transplant phase, the average PHQ-9 score was 04.84 (SD = ± 03.80). Ten participants (25.64 %) were mildly depressed, 4 (10.26 %) were moderately de-

Table 2. The Patient Health Questionnaire (PHQ-9) and Hamilton Anxiety Rating Scale (HAM-A) scores Mean (SD) of patients before and after renal transplant (n=39)

PHQ-9 Score	Pre-transplant		Post-transplant		
	n (%)	Mean (SD)	n (%)	Mean (SD)	
No Depression (0 - 4)	22 (56.41)	02.86 (3.64)	18 (46.15)	01.33 (0.49)	P value = < 0.001***
Mild Depression (5 - 9)	10 (25.64)	07.10 (1.60)	12 (30.77)	06.75 (1.29)	
Moderate Depression (10 - 14)	04 (10.26)	12.00 (0.82)	07 (17.95)	11.71 (1.11)	
Moderately Severe Depression (15 - 19)	03 (07.69)	14.67 (02.52)	01 (02.56)	16.00 (NA)	
Severe Depression (20 - 27)	00 (00.00)	-	01 (02.56)	20.00 (NA)	
HAM-A Score	n (%)	Mean (SD)	n (%)	Mean (SD)	
No Anxiety (≤ 7)	16 (41.03)	04.62 (1.62)	12 (30.77)	5.08 (1.31)	P value = < 0.001***
Mild Anxiety (8 - 14)	17 (43.59)	11.58 (2.34)	13 (33.33)	11.46 (2.37)	
Moderate anxiety (15 - 23)	06 (15.38)	18.00 (1.67)	14 (35.90)	16.71 (1.14)	
Severe Anxiety (≥ 24)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	

***P ≤ 0.001

pressed, 3 participants (7.69 %) were moderately severe depressed while none of the participant was suffering from severe depression. On the other hand, during the post-transplant phase, the average PHQ-9 score was 05.69 (SD = ± 03.80). Number of participants suffering from mild depression increase to 30.77 % (n = 12). Number of participants suffering from moderate depression increased to 17.95 % (n = 7). Only one participant (2.56 %, n = 1) reported moderately severe depression and interestingly, one participant (wife of a donor) reported severe depression in post-transplant phase while none were severely depressed during the pre-transplant phase.

As visible in Tables 2 and 3, during the pre-transplant phase, the average HAM-A score was 9.72 (SD = ± 5.20) and 43.59 % (n = 17) participants were suffering from mild anxiety while 15.38 % (n = 6) were having moderately anxiety. During the post-transplant phase, the average HAM-A score increased slightly to 11.38 (SD = ± 5.07). Number of participants suffering from mild anxiety decreased when compared to pre-transplant phase but number of participants suffering from moderate anxiety increase from 15.38 % (n = 6) to 35.90 % (n = 14) during the post-transplant phase.

As shown in Table 3, statistically significant difference was observed in PHQ-9 (t(38) =

Table 3. Comparison of PHQ-9 and HAM-A score before and after donation

Variables	Before donation		After donation		t	df	p value
	Mean	SD	Mean	SD			
PHQ-9 Score	4.84	3.80	05.69	03.80	-2.089	38	0.040 (S)
HAM-A Score	9.72	5.20	11.38	05.07	-2.47	38	0.018 (S)

*P ≤ 0.05

Table 4. Comparison of World Health Organization Quality of Life Brief Scores (WHO QOL BREF) before and after donation

	Before Donation		After Donation		t	df	p value
	Mean	SD	Mean	SD			
Overall perception of QOL	4.07	0.98	3.77	1.04	3.504	38	0.001***
Overall perception of Health QOL	4.00	1.10	3.67	1.18	-3.504	38	0.001***
Physical QOL	74.53	17.13	63.66	22.96	4.454	38	0.000***
Psychological QOL	75.92	22.83	69.66	24.74	2.425	38	0.020*
Social QOL	71.51	20.84	71.84	17.88	-0.128	38	0.898
Environmental QOL	68.25	12.75	66.66	14.41	1.323	38	0.193

***P ≤ 0.001, **P ≤ 0.01, *P ≤ 0.05

-2.0893, p = 0.04), and HAM-A scores (t(38) = -2.470, p = 0.018) between pre and post-transplant phase. This statistically significant difference still existed, even after removing the data of single participant who reported severe depression and repeating the analysis.

Quality of life assessment

The WHOQOL-BREF scores for renal donors before and 3 months after kidney donation are summarized for the four domains, overall perception of quality of life and overall perception of health in Table 4 Kidney transplantation resulted in a significant decrease in Overall perception of WHOQOL BREF score (t(38) = 3.504, p = 0.001), Overall perception of health (t(38) = 3.504, p = 0.001), quality of life in physical domain (t(38) = 4.180, p = 0.000) and quality of life in psychological domain (t(38) = 2.469, p = 0.018). There were no significant changes in the social relationship (t (38) = -0.80, p = 0.936) and environmental health domain scores (t(38) = 0.991, p = 0.328) of the donor groups before and after kidney transplantation.

Table 5. Multiple regression results with WHOQOL-BREF dimensions as dependent variables and pre donation Patient Health Questionnaire (PHQ-9) and Hamilton Anxiety Rating Scale (HAM-A) scores as independent variables

WHOQOL-BREF	Pre-transplant Depression (PHQ-9 score)		Pre- transplant Anxiety (HAM-A score)	
	β (SE)*	P value	β (SE)*	P value
Overall perception of QOL	-0.14 (0.04)	0.002	-0.03 (0.03)	0.12
Overall Perception of Health QOL	-0.08 (0.03)	0.001	-0.07 (0.03)	0.014*
Physical	-1.91 (1.08)	0.08	-2.05 (0.73)	0.008**
Phycological	-2.57 (1.07)	0.02	-1.94 (0.75)	0.015*
Social	-0.94 (1.04)	0.40	-0.59 (0.69)	0.37
Environmental	-0.83 (0.77)	0.29	-1.05 (0.52)	0.06

***P ≤ 0.001, **P ≤ 0.01, *P ≤ 0.05

Table 5 presents the regression coefficients (β) for PHQ-9 and HAM-A scores in WHO-QOL-BREF domains score, which indicated significant difference in univariate analyses.

The results showed negative impact of presence of pre-transplant depression on patient's quality of life except in the "social" and environmental domain. Specifically, presence of pre-transplant depression was independently associated with Overall score of WHOQOL BREF (β = -0.14, p = 0.002), perception of health (β = -0.08, p = 0.001), physical health (β = -1.91, p = 0.08) and psychological health (β = -2.57, p = 0.02). On the other hand, pre-transplant anxiety was negatively related to overall perception of health (β = -0.08, p = 0.01), physical health (β = -2.05, p = 0.008) and psychological health (β = -1.94, p = 0.015) only.

Discussion

Susceptible renal donor in post-transplant phase may feel depressed, anxious, and distressed after donation. These Psychopathological consequences may influence the overall mental wellbeing and negatively affect the quality of life of the donor [19-21]. Since, there is a dearth of published data assessing the mental health and quality of life in female kidney donors prospectively in pre and post donation phase specially in India, our study is unique in a sense that it is a female gender specific prospective study assessing impact of donation on anxiety, depression and quality of life of female donors.

Participants in this study consisted of equal proportion of mothers and wives donating kidney to children or husband respectively and constituting 82 % of the total sample population. The preponderance of mothers and wives as donor in our study could be because of stronger conjugal relationships and a greater commitment towards the family by women in a conservative Indian household as observed by one another study [22]. Proto altruism, a biologically derived instinct as a possible reason behind predominance of mothers as donors has also been reported in literature [23]. In addition, high proportion of wives as a donor in present study could be due to the fact that the Indian females would go to any extent to save their spouse from the clutches of death. On the other hand, in contrast to the findings of few other studies which reported a high proportion of sibling donor in their study; only 13 % of the participants donors in our study were siblings [24,25].

Earlier, only first-degree near relatives were allowed to donate kidney by the Indian law but in 2014 a new amendment was implemented in Transplantation of Human Organs Act to legalize kidney paired donation in India with the potential to increase living kidney donation by 25 % [26]. It was interesting to observe two subjects donating kidney to recipients to whom they were not related as a part of paired kidney donation.

In our study all female donor were found to be married at the time of evaluation and belongs to age ranging from 22 to 50 years. The mean age in present study was 41.74 ± 8.85 which is also in accordance with previously done similar studies in India [22,27]. The proportion of illiterate subjects in the present study was slightly lower than similar previous study [22]. In our study, it may be explained by the fact that our sample consisted majority of donors with high education status and sound socioeconomic status who are more aware regarding donation process and are more willing to donate kidney as concluded by few other studies [28,29].

While assessing depression in participants, we found a significant increase in depressive symptoms from 43.59 % in pre donation phase to 53.84 % in post donation phase in the participants. Our findings are resonating with the findings of one another study [30]. As far as the severity of depression was concerned, one donor presented with severe depressive symptoms in post donation phase who donat-

ed kidney to the husband whereas none of the donor had severe depressive symptoms in pre donation phase. Our findings are similar to the finding of one another study which reported increase in moderate to severe depression in post donation phase from 16.3 % to 22.4 % [31]. On the other hand, our findings were in contrast with an Indian study conducted on female donor which reported a decline in the depressive score post donation [22].

Few studies have tried to explore the anxiety status of the donor's post donation and reported that donors who experienced post-operative complications and fear about dying after donation were found to have increase anxiety score [32,33]. In our study also anxiety symptoms worsened in post donation phase in participants when compared with pre donation phase. Similar observation was reported by other studies [8,31]. A significant decline was observed in the Overall perception of WHO-QOL BREF score and overall perception of health scores of the study group in the participants. There was a statistically significant decline in quality of life in physical as well as in psychological domain. These finding are supported by previous studies in which renal donors regardless of gender reported significantly lower QOL in Post donation phase [34,35]. In contrast to our findings, one another author reported significant improvement in all the domains of quality of life in post donation phase in female renal donors [22]. Using multiple linear regression, the risk factor identified for poor quality of life in renal donors after donation in this study were presence of depression and anxiety in the pre-donation phase.

This study is governed by certain limitations. First of all, the study included a modest number of participants, thereby restricting statistical power. Secondly participants were chosen using convenience sampling method at a single centre, which may limit the generalization of these findings because of sampling bias. Thirdly self-reporting of the depression symptoms by participants was another important limitation as there might be a discrepancy between the actual responses given to the real picture, which could potentially lead to inaccuracies in the information that has been reported. Lastly, we did not explore the recipient's status which may also affect long-term mental status of the donor.

To conclude, our study has revealed a high frequency of mild to moderate anxiety and depressive symptoms in female renal donors during the pre-donation phase and which increased both in severity and frequency in the post-donation phase thereby significantly affecting the quality of life of renal donors. Time should be given to explore the psychosocial implication in pre donation as well as post donation in both male and female donors for proper comparison and faster and better outcomes. A large-scale study is recommended to increase the validity of our findings. The preventive and corrective strategies should be targeted for the vulnerable donors. A prospective longitudinal community-based study with a larger sample size would be ideal to know the impact of donation on psychiatric morbidity and quality of life in female renal donors. In addition to that, future research should specifically focus on determining changes in quality of life, depression and anxiety of male and female gender donors before and after transplantation. An important factor that needs to be assessed in future studies is the risk factors such as expectations and coping which may influence psychosocial consequence in the donor.

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Conflict of interest

None to declare.

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