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Depression and suicidality among Egyptian renal transplant recipients

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Abstract

Background: High rates of depression and suicidality risk have been reported after renal transplantation. The study aims to estimate the prevalence of depressive disorders and suicidality risk among Egyptian renal transplant recipients and their demographic and clinical correlates.

Results: The prevalence of depressive disorders among renal transplant recipients was (32.2%). Major depression (16.5%), adjustment disorder depressive type (9.13%) while dysthymic disorder occurred in (6.5%). Suicidality risk was present among 31.3% of the sample. Hopelessness was the commonest depressive symptoms within the depressed patients. There was a statistically significant association of depression and risk of suicidality, with age, educational attainment, employment, and the presence of side effects of medication. However, there was no significant correlation between depression or suicidality, with marital status, type of donor, duration of dialysis, and associated other medical illnesses. Despite there was no relation between gender and severity of depression, yet male recipients showed more pronounced suicidal risk.

Conclusions: The prevalence of depression and suicidality is quite high among post renal transplantation recipients (PRTRs). Early psychiatric evaluation and intervention together with regular long term follow-up from the multi-disciplinary team are necessary for recipients after renal transplant operation.

Keywords: Depression, Renal transplantation, Suicidality, Renal transplant recipients

Background

Renal transplantation (RT) could be the treatment of choice for some patients with end-stage renal disease (ESRD). It offers several advantages in terms of improved clinical outcomes and quality of life (QoL) compared to dialysis modalities [1, 2]. Despite the benefits of receiving a donor kidney, there is high evidence of developing depression in those who have been transplanted [3].

Depression may affect up to 25% of patients who underwent RT. Furthermore, it is associated with poor outcome following RT and related to poor postoperative patients' compliance to immunosuppressive drugs [1]. Thus, early detection and treatment of depression is important to improve patients' adherence to treatment, their QoL, and outcomes in transplant recipients [4]. Similarly, suicidal ideation and hopelessness are important symptomatology in transplant recipients in association with depression [5].

This research is the second part of an investigation of psychiatric morbidity among renal transplant recipients [6].

To our knowledge, no previous studies reported the prevalence of depression and suicidality among RT patients in Egypt. Thus, the aim of the current study is to estimate the prevalence of depression and suicidality among renal transplant recipients and to find the possible demographic and clinical correlates.

Methods

Participants

We conducted this cross-sectional observational study in two general hospitals in Cairo along 1 year. A stratified

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random sample of post renal transplant recipients (PRTRs) who came for follow-up in the renal transplantation clinic in both Ain Shams University Specialized Hospital and Naser Institute Hospital. We recruited 230 recipients that underwent renal transplant surgery. The sample size was calculated using the Epi-info program version 6 by a statistician. No inclusion or exclusion criteria were done. All participants received their implanted organs from living donors.

Assessment

We collected sociodemographic information, including age, gender, employment status, marital status, educational attainment, and social class. Most of our recipients belong to the low and middle socio-classes who attended state hospitals in which the cost of services is covered mostly by the government.

Also, we used the semi-structured questionnaire for renal transplant recipients to determine both the medical condition and the circumstances of the RT surgery among PRTRs [7].

We used the Structured Clinical Interview for DSM-IV Axis I disorder (SCID-I) [8] for the diagnoses of depression. We used the Arabic version which previously translated and validated [9]. Patients with diagnosis of depression were further assessed for severity of depression using the Beck depression inventory (BDI) [10], however we used the Arabic version by [11]. Suicidality was assessed for all the participants using the Suicide Probability Scale (SPS) [12], also we used the Arabic standardized version [13].

Ethical consideration

The study protocol was approved by the Ethical Committee Research of the Faculty of Medicine-Ain Shams University approvals from the hospital authorities were provided. An informed written consent was taken from all participants. Confidentiality was ensured and explanation of the nature of the research was ensured. Recipients were guaranteed that their participation was voluntarily, and refusal would not affect their clinical care.

Statistical methods

The collected data were analyzed using the statistical package for the social sciences [14]. Qualitative data was described using frequency and percentage. Quantitative data was described using mean and standard deviation. The following inferential statistical procedures were used; categorical data was compared using the chi-square test. Continuous variables were compared using the student "*t*" test and statistical significance was set at $p < 0.05$.

Results

The age ranged of the study groups was from 18 to 60 years old with a mean age of 37.3 ± 7.6 years. Seventy-two percent were males and 28% were females. The majority received a considerable year of education and (17.8%) were illiterate; most of the PRTRs (73%) were married, while the rest were single, divorced, or widow. A considerable percentage was employed (70%) and about 23% were unemployed and 7% were housewives. Sixty-nine percent of PRTRs got the transplant graft from non-relative donors, whereas 31% received it from relatives.

The duration of follow-up from the time of RTS until the time of conducting this research ranged from 3 months to 18 years.

Depressive disorders were found in 74 patients (32.2%). The commonest diagnosis is a major depressive episode (38 patients, 16.5%), followed by adjustment disorder depressive type (21 patients, 9.2%), and then dysthymia (15 patients, 6.5%). Those who had no depression were 156 patients (67.8%) (Fig. 1).

The severity of depression as estimated by BDI revealed that mild depression is the commonest (12.6%), followed by moderate depression (11.3%). While (8.3%) had severe depression (Fig. 2).

Risk of suicidality was detected in 72 patients (31.3%). Mild risk was the commonest (59 patients, 25.65%), followed by moderate risk (13 patients, 5.65%), and there was no severe risk of suicidality (Fig. 3). The commonest depressive symptoms detected according to the SPS subscales were hopelessness (46 patients, 20%), followed by suicidal ideation (17 patients, 7.39%), negative self-evaluation, and hostility (each, 1.3%) (Fig. 4).

Severity of depression and suicidality in relation to socio-demographic and clinical variables

Age was significantly associated with the severity of depression according to BDI. Our data revealed that severe depression is significantly highest (31.4%) in the youngest age groups (18-30 years) followed by the eldest group (50-60 years) (26.4%). Moderate depression was more pronounced in the age group 30-40 (38%) and the age group 40-50 (27.6%) $P < 0.01$. No severe risk of suicidality among our PRTRs as assessed by SPS, however, moderate suicidal risk was more pronounced in the age group (40-50 years) and mild form is more prevalent in the age group (50-60 years) (Tables 1 and 2).

Despite that, Table 1 shows non statistically significant difference between male and females recipients in relation to depression severity, yet moderate suicidality risk was extremely higher in male patients 76 (92%) (Tables 1 and 2). Severe depression and moderate risk of suicidality were by far more significantly pronounced in the educated patients who received 12 years or more of education $P < 0.01$.

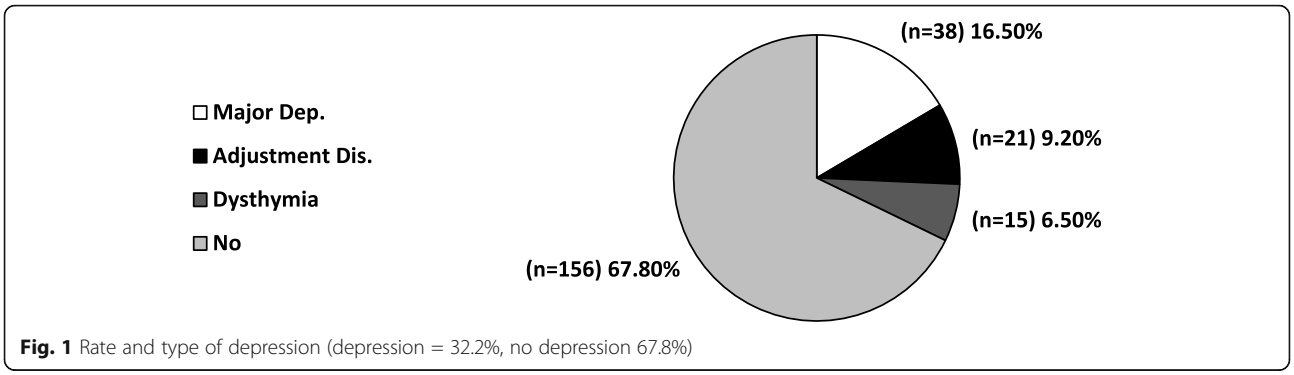

Fig. 1 Rate and type of depression (depression = 32.2%, no depression 67.8%)

Patients without a job had more significant higher level of moderate depression (69.23%) while unskilled and semiprofessionals showed a higher significant level of severe depression (52.63% and 47.36%) respectively (Table 1). Moderate suicidal risk was detected more in the semiprofessionals (76.9%), whereas mild risk prevailed among unskilled (30.5%) (Tables 1 and 2). There was no significant relationship between severity of depression or risk of suicidality with marital status. Severity depression and risk of suicidality were more common among patients suffering from medication side effects compared to those who did not record side effects. Furthermore, there were no statistically significant differences as regards, types of donors, presence of comorbid medical disease, and duration of hemodialysis prior to renal transplant or duration of the transplant graft.

Discussion

The International Federation of Renal Registries [15] estimated the prevalence of renal failure in Egypt according to its report in 2003 between 9-14.5%. Although the number of patients increases by time and the transplant activity program increased, yet still the rate of RTs in Egypt is slower in comparison to the Western world [16]. This may be due to the restriction of non-relative donors to guard against illegal organ commerce [17]. Living donation is the most prevalent type of donation, while the deceased donation is not well established in the Middle East probably due to religious issues [18].

A plethora of studies stated that the renal transplant recipients are at risk to develop psychiatric disorders specifically depression [19, 20]. Which may contribute to unfavorable outcomes, poor adherence to treatment plans, and low employment rate after RTs [3, 21, 22]. Despite the high rate of depression and suicidality after RTs, this field is still an unstudied area in Egypt. Thus, we aimed at measuring the rates of depression and suicidality and their sociodemographic and clinical correlates among Egyptian post renal transplant recipients.

In this study, 32.2% of the participants were diagnosed to have one of the depressive disorders according to the criteria of DSM-IV diagnostic system. Major depressive disorder was found in 16.5% of PRTR, also depressive symptoms as a part of adjustment disorder depressive type and dysthymic disorder were found in 9.13% and 8.23% respectively; these results suggesting that depressive symptoms were common among PRTR in Egypt. There was a wide range of variation in estimating the prevalence of depression among different countries. The lower rates (11.8%) were recorded in Panama [21], (22%) in Canada [3], (25.6%) in Sudan [23], and (25%) in Turkey [24]. On the other hand, higher rates (59.2%) were estimated in China [22], (75%) in Iran [25], and in Japan (41.4%) [26].

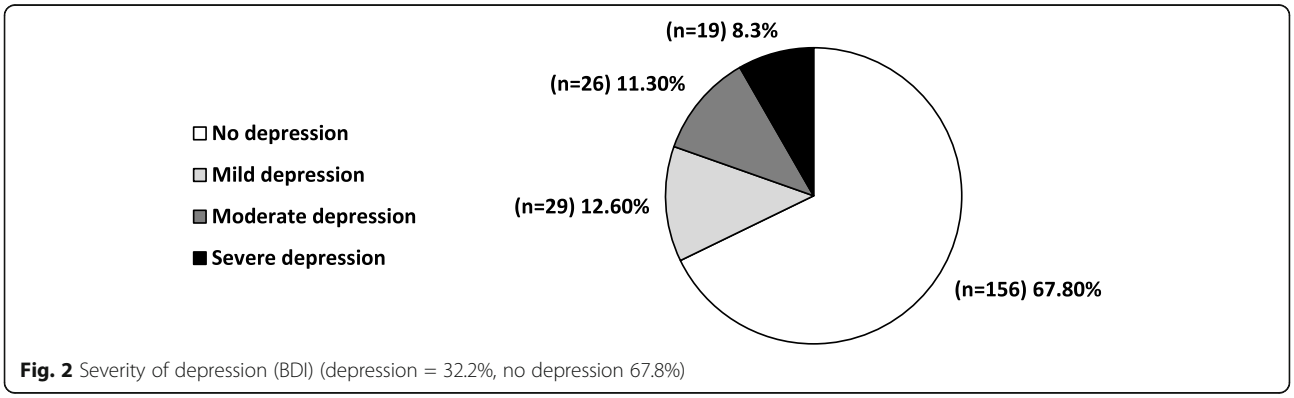

Fig. 2 Severity of depression (BDI) (depression = 32.2%, no depression 67.8%)

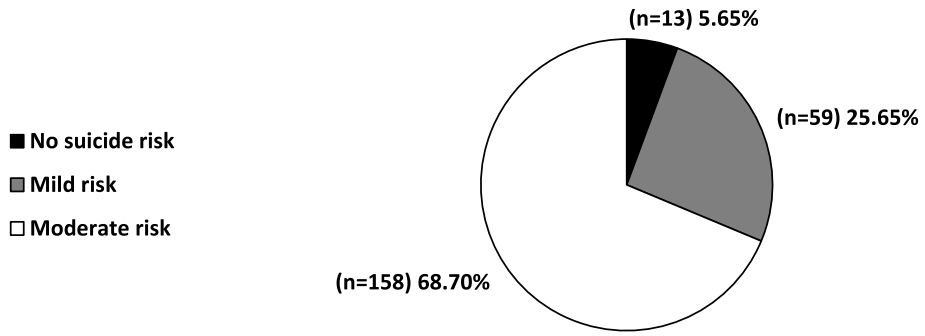

Fig. 3 Risk of suicide (SPS) (non risk = 68.7% and risk 31.3%)

The great variation of the prevalence of depression in different countries may be related to the use of different tools of screening and assessment. We use SCID-I for diagnosis of depression, similarly in Panama, the investigators used the Mini International Neuropsychiatric Interview (MINI) [21, 27].

While the use of CES-D = score > 18 and SCL-9 > 25 revealed that 22% and 31% respectively rate of depression among renal transplant recipients [28, 29]. Other studies used self-assessment tools as BDI which led to estimates ranging from 13 to 39% [27, 30].

Other variables that may be related to a wide variation of the prevalence of depression in different countries may be attributable to different sampling methods, presence of selection bias, and cultural differences affecting the patient perception of depression.

According to Chilcot and his coworkers [1], who stated that severity of depression is the most important issue in recognizing depression in the context of transplantation, we decided to use the Beck Depression Inventory to unravel the severity of depressive symptoms among our PRTRs. Findings revealed that 12.6% had mild and 11.3% had moderate depression while only 8.53% had severe depression. We are in concordance with the previous studies which recorded that the majority of PRTRs had mild to moderate depression [22, 23]. Moreover, moderate and severe depression in renal transplant were estimated by other investigators [24, 31].

There is no substantial information about suicidality after renal transplantation as this area is poorly studied. Kurella and his colleagues [32] stated that suicidal behavior is higher in PRTPs compared to the rates of the general population. In our study using SPS, the risk of suicide was detected in (72 patients, 31.3%). Mild risk was the commonest (59 patients, 25.65%), followed by moderate risk (13 patients, 5.65%) and there was no severe risk of suicide. The comparison of our findings with other studies was hampered by the lack of previous investigations highlighting this area.

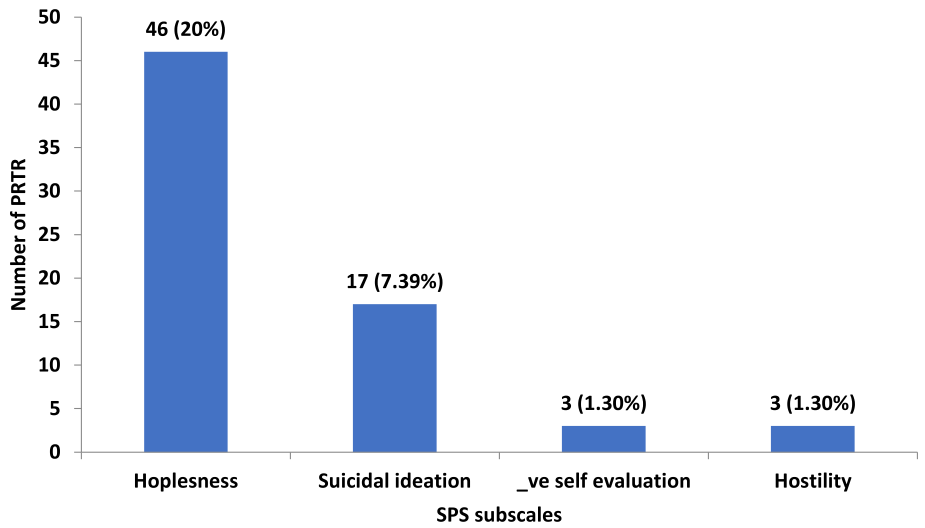

Fig. 4 Depressive symptoms (SPS-subscales)

Table 1 Severity of depression in relation to sociodemographic and clinical variables in PRTRs

Variables	Severe (*n* = 19)	Moderate (*n* = 26)	Mild (*n* = 29)	No depression (*n* = 156)	*X*2	*P* value
Age						
18-30 years	**6 (31.6%)**	**14 (53.9%)**	**6 (20.6%)**	**42 (26.9%)**	**18**	**< 0.01**
>30-40 years	**4 (21%)**	**3 (11.5%)**	**11 (38%)**	**53 (34%)**		
>40-50 years	**4 (21%)**	**5 (19.2%)**	**8 (27.6%)**	**44 (28.2%)**		
>50-60 years	**5 (26.4%)**	**4 (15.4%)**	**4 (13.8%)**	**17 (10.9%)**		
Sex						
Males	**11 (57.9%)**	**20 (76.9%)**	**20 (68.9)**	**114 (73%)**		**> 0.05**
Females	**8 (42.1%)**	**6 (23.1%)**	**9 (31.1%)**	**42 (27%)**		
Education						
Illiterate	**2 (10.52%)**	**0 (0%)**	**2 (6.89%)**	**37 (23.71%)**	**6.3**	**< 0.01**
6 years	**5 (26.31%)**	**4 (15.38%)**	**0 (0%)**	**16 (10.25%)**		
9 years	**0 (0%)**	**6 (23.07%)**	**5 (17.24%)**	**33 (21.15%)**		
12 years	**8 (42.10%)**	**5 (19.23%)**	**11 (37.93%)**	**30 (19.23%)**		
14 years	**4 (21.05%)**	**4 (15.38%)**	**3 (10.34%)**	**9 (5.76%)**		
> 14 years	**0 (0%)**	**7 (26.92%)**	**8 (27.58%)**	**31 (19.87%)**		
Occupational level						
Unemployed	**0 (0%)**	**18 (69.23%)**	**6 (20.68%)**	**29 (18.58%)**	**6.5**	**< 0.05**
Unskilled	**10 (52.63%)**	**2 (7.69%)**	**2 (6.89%)**	**44 (28.20%)**		
Semi skilled	**0 (0%)**	**2 (7.69%)**	**7 (24.13%)**	**17 (10.89%)**		
Semi professional	**9 (47.36%)**	**2 (7.69%)**	**7 (24.13%)**	**32 (20.51%)**		
Professional	**0 (0%)**	**0 (0%)**	**7 (24.13%)**	**18 (11.53%)**		
House wife's	**0 (0%)**	**2 (7.69%)**	**0 (0%)**	**16 (10.25%)**		
Marital status						
Single	**0 (0%)**	**4 (15.38%)**	**9 (31.03%)**	**41 (26.28%)**	**3**	**> 0.05**
Married	**19 (100%)**	**18 (69.23%)**	**19 (65.51%)**	**112 (71.79%)**		
Divorced	**0 (0%)**	**4 (15.38%)**	**1 (3.44%)**	**0 (0%)**		
Widow	**0 (0%)**	**0 (0%)**	**0 (0%)**	**3 (1.92%)**		
Type of donors						
Relative	**12 (63.15%)**	**4 (15.38%)**	**10 (34.48%)**	**45 (28.84%)**	**3.8**	**> 0.05NS**
Non relative	**7 (36.84%)**	**22 (84.61%)**	**19 (65.51%)**	**111 (71.15%)**		
Medical disease						
Present	**5 (26.31%)**	**5 (19.23%)**	**16 (55.17%)**	**61 (39.10%)**	**4.4**	**> 0.05NS**
Absent	**14 (73.68%)**	**21 (80.76%)**	**13 (44.82%)**	**95 (60.89%)**		
Duration of hemodialysis						
< 1 year	**0 (0%)**	**11 (42.30%)**	**23 (79.31%)**	**66 (42.30%)**	**1.9**	**> 0.05**
1-4 years	**19 (100%)**	**15 (57.69%)**	**2 (6.89%)**	**71 (45.51%)**		
4-7 years	**0 (0%)**	**0 (0%)**	**4 (13.79%)**	**19 (12.17%)**		
Side effects of drugs received after						
Side effects	**19 (100%)**	**12 (46.15%)**	**21 (72.41%)**	**88 (56.41%)**	**8.8**	**< 0.01**
No Side effects	**0 (0%)**	**14 (53.84%)**	**8 (27.58%)**	**68 (43.58%)**		
Duration of graft						
1 year	**8 (42.10%)**	**2 (7.69%)**	**10 (34.48%)**	**21 (13.46%)**	**2.8**	**> 0.05**
1-4 years	**2 (10.52%)**	**13 (50%)**	**2 (6.89%)**	**77 (49.35%)**		
4-8 years	**5 (26.31%)**	**4 (15.38%)**	**14 (48.27%)**	**48 (30.76%)**		
8-17 years	**4 (21.05%)**	**7 (26.92%)**	**3 (10.34%)**	**10 (6.41%)**		

Table 2 Severity of suicidality risk in relation to sociodemographic and clinical variables in PRTRs

Variable	Moderate (*n* = 13)	Mild (*n* = 59)	No (*n* = 158)	*X*2	*P* value
Suicidality					
Age					
18-30 years	**1 (7.69%)**	**17 (25%)**	**50 (73.5%)**	**23**	**< 0.01**
> 30-40 years	**3 (23.07%)**	**12 (16.9%)**	**56 (78.8%)**		
> 40-50 years	**9 (69.23%)**	**18 (29.5%)**	**34 (55.7%)**		
> 50-60 years	**0 (0%)**	**12 (40%)**	**18 (60%)**		
Sex					
Males	**10 (76.92%)**	**42 (71.18%)**	**113 (71.51%)**		**< 0.05**
Females	**3 (23.07)**	**17 (28.81%)**	**45 (28.48%)**		
Education					
Illiterate	**0 (0%)**	**6 (10.16%)**	**35 (22.15%)**	**5.9**	**< 0.01**
6 years	**0 (0%)**	**8 (13.55%)**	**17 (10.75%)**		
9 years	**0 (0%)**	**9 (15.25%)**	**35 (22.15%)**		
12 years	**13 (100%)**	**16 (27.11%)**	**35 (22.15%)**		
14 years	**0 (0%)**	**4 (6.77%)**	**16 (10.12%)**		
> 14 years	**0 (0%)**	**16 (27.11%)**	**30 (18.98%)**		
Occupational level					
Unemployed	**0 (0%)**	**11 (18.64%)**	**42 (26.58%)**	**7.8**	**< 0.05**
Unskilled	**0 (0%)**	**18 (30.50%)**	**40 (25.31%)**		
Semi skilled	**0 (0%)**	**14 (23.72%)**	**12 (7.59%)**		
Semi professional	**10 (76.92%)**	**9 (12.25%)**	**31 (19.62%)**		
Professional	**3 (23.07%)**	**4 (6.77%)**	**18 (11.39%)**		
House wife's	**0 (0%)**	**3 (5.08%)**	**15 (9.49%)**		
Marital status					
Single	**2 (15.38%)**	**11 (18.64%)**	**41 (25.94%)**	**1**	**> 0.05**
Married	**11 (84.61%)**	**48 (81.35%)**	**109 (75.31%)**		
Divorced	**0 (0%)**	**0 (0%)**	**5 (3.16%)**		
Widow	**0 (0%)**	**0 (0%)**	**3 (1.89%)**		
Type of donors					
Relative	**7 (53.84%)**	**11 (18.64%)**	**53 (33.54%)**	**3.3**	**> 0.05**
Non relative	**6 (46.15%)**	**48 (81.35%)**	**105 (66.45%)**		
Medical disease					
Present	**9 (69.23%)**	**17 (28.81%)**	**61 (38.60%)**	**3.2**	**> 0.05**
Absent	**4 (30.76%)**	**42 (71.18%)**	**97 (61.39%)**		
Duration of hemodialysis					
< 1 year	**6 (46.15%)**	**26 (44.06%)**	**66 (41.77%)**	**3.5**	**> 0.05**
1-4 years	**7 (53.84%)**	**29 (49.15%)**	**71 (44.93%)**		
4-7 years	**0 (0%)**	**4 (6.77%)**	**19 (12.02%)**		
Side effects of drugs received after					
Side effects	**13 (100%)**	**41 (69.49%)**	**8855.69**	**2.9**	**< 0.01**
No Side effects	**0 (0%)**	**18 (30.50%)**	**72 (45.56%)**		
Duration of graft					
1 year	**0 (0%)**	**11 (18.64)**	**30 (18.98%)**	**2.9**	**> 0.05**
1-4 years	**5 (38.46%)**	**21 (35.59%)**	**68 (43.03%)**		

Table 2 Severity of suicidality risk in relation to sociodemographic and clinical variables in PRTRs *(Continued)*

Variable	Moderate (*n* = 13)	Mild (*n* = 59)	No (*n* = 158)	*X*2	*P* value
4-8 years	**2 (15.38%)**	**21 (35.59%)**	**48 (30.37%)**		
8-17 years	**6 (46.15%)**	**6 (10.16%)**	**12 (7.59%)**		

No severity risk for suicidality has been recorded

Reporting symptoms of depression according to the SPS revealed that our patients scored higher in items of hopelessness (20%), suicidal ideation 7 (3.9%), negative self-evaluation (1.3%), and hostility (1.3%). In his study and Andrade and his coworkers [4] in Brazil 2015, used the Beck Hopelessness Scale (BHS) they found that 89% had minimal hopelessness symptoms, 10% had moderate, and only 1% have severe symptoms. Differences in these results may be due to the use of different tools of measurement.

Depression after renal transplantation is by multiple complex and overlapping factors. Thus, we analyzed the sociodemographic and clinical variables in relation to the intensity of depressive symptoms and suicidality risk. Age has previously shown to be predictive for depression in renal transplant recipients, our results are in accordance with previous studies [26, 29, 33]. The current study showed that severe depression was significantly associated with the youngest and eldest age groups while moderate depression and moderate risk of suicidality were prevalent among middle-age groups.

We assumed that depression in the youngest age group may be related to the fear of graft rejection or future complications, whereas in the eldest group may be related to lack of social support. Other reports found an insignificant relation between age and development of depression in renal transplant recipients [22, 24].

The current findings are in agreement with Arapaslan and his co-investigators [24] who found that there is an insignificant difference between males and females transplant recipients as regards the presence of depression. Moreover, we found that moderate and mild suicidality risks were higher in male patients. Our report comes primarily from males who comprised about 70% of our cases, probably this contributes to the fact that our results do not agree with previous findings which reported that women recipients have significantly higher rates of depression [34, 35]. Some investigators found that depression is more common in unmarried transplant recipients due to lack of social support [1, 34]. However; we are in agreement with other investigators who did not find any relation between marital status and developing depression among PRTRs [22].

On the contrary of the previous report which found that low educational attainment is predictive of depression in renal transplant recipients [21, 22, 36]; in the current study, we found that severe depression and moderate suicidality risk were more significantly common in educated patients. Similarly, Zarifian and his coworkers [37] concluded that depression is correlated with high educational attainment.

Education may give more chances to the patient to seek information and to know the hazards and complications of the surgery, weakened immune system, and possibility of graft rejection. Employment status is a major factor influencing the developing of depression in PRTRs. Our study showed that unemployed subjects had significant higher levels of moderated depression (69.23%). Similarly, McGee and Thompson [38] found that depression is significantly correlated to lower occupational level ($p < 0.05$), and this finding may be linked to impaired functioning, frequent absence from work, and low productivity in patients with depression. On the other hand, semiprofessionals and unskilled patients in our study showed a high level of severe depression and moderate suicidality risk. We assumed that fear of non-return to work and instructions to avoid exposure to a public place or to limit working hours are the possible factors behind depression in professionals and semi-skilled laborers.

Long pretransplant dialysis periods were reported by previous investigators to be associated with depression [3, 25]. While in this current research and in other previous publications, there was no such association [22]. There is little evidence that the duration of the transplant graft survival is associated with mood changes in renal recipient. In a previous report, there were no significant differences for different duration < 5, 5-10, 10-15, > 15 years duration of graft [22].

We agreed with these findings on the contrary of Akman and his colleagues [34] who found that patients with longer functional graft had lesser depression. Psychological problems may occur in association with immunosuppressive drugs and steroids in high doses [39, 40]. Similarly, we found that depression was more common among patients who suffered from side effects of post transplant medications (37.2%) compared to patients without side effects (24.5%) ($p < 0.01$).

This study was limited by its cross-sectional design, and limited recruitment from only two governmental hospitals, thus, we did not include private hospitals in which more affluent patients were presented making limitations in the generalizability of the obtained data. We did not explore some variables as past psychiatric history, coping strategies, and perceived social support. These points should be taken into consideration in future research.

Despite that renal transplantation is the only potentially curative treatment for end-stage renal failure and it might be thought that depression would decrease after operation, yet paradoxical depression is commonly happened and is considered the commonest long term complication after RTs [40]. A wide range of diverse, psychological, biological, and social factors are interrelated and may contribute to the development of depression among those patients [21, 41].

Conclusion

The prevalence of depression and suicidality is quite high among post renal transplantation recipients (PRTRs), that was associated with age, educational attainment, employment, and the presence of side effects of medication. Our findings pointed to the need of recognizing depression and its psychosocial correlates among renal transplant recipients. Accordingly, the multidisciplinary team should integrate mental health professionals to avoid the negligence of psychiatric morbidity and its correlates which can undermine the transplant success and lead to excessive suffering of those patients.

Abbreviations

BD: Beck depression inventory; ESRD: End-stage renal disease; PRTR: Post renal transplantation recipients; Qo: Quality of life; R: Renal transplantation; SCID-1: Structured Clinical Interview for DSM-IV Axis I disorder; SPS: Suicide Probability Scale

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Authors' contributions

NE: the conception, design of the work; the acquisition, analysis, interpretation of data; revised the manuscript. AS: the conception, design of the work; the acquisition, analysis, interpretation of data; revised the manuscript. SR: the acquisition, analysis, interpretation of data; drafted the manuscript; revised the manuscript. HE: the conception, design of the work; the acquisition, analysis, interpretation of data; drafted the manuscript; revised the manuscript. AA: the acquisition, analysis, interpretation of data; revised the manuscript. ME: the conception, design of the work; the acquisition, analysis, interpretation of data; revised the manuscript. RA: drafted the manuscript; revised the manuscript. All authors have read and approved the manuscript.

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None

Availability of data and materials

All data generated or analyzed during this study are included in this published article

Ethics approval and consent to participate

The study was approved by the ethics committee of the Faculty of Medicine, Ain Shams University, Cairo, Egypt (the reference number is not available). Consent for participation was obtained from all patients.

Consent for publication

Consent for publication was obtained.

Competing interests

None for all authors

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