# ORIGINAL ARTICLE

## Depression, Anxiety and Quality of Life in Patients Undergoing Hemodialysis and Renal Transplantation

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| **Background** | The aim of this study was to compare the presence and severity of depression and accompanying anxiety symptoms between patients undergoing hemodialysis (HD) and renal transplant recipients (RTRs); and to correlate depression and anxiety, with the quality of life (QoL) and life satisfaction affection in both groups. |
| **Patients and Methods** | A comparative cross-sectional study was conducted on 64 patients with end-stage renal disease (ESRD) who were recruited consecutively from the nephrology outpatient clinic of Kasr Al Ainy, Cairo University Hospitals over a period of one year. Beck Depression Inventory (BDI), Middlesex Hospital Questionnaire (MHQ), PCASEE Questionnaire for QoL and Life Satisfaction Scale (LSS) were applied. |
| **Results** | The study results showed that depression, anxiety and somatization in the HD group had significant higher scores than the RTRs group. Patients on HD were significantly less satisfied with their life and showed lower scores on the physical domain while patients with RTRs had significant lower scores on the economic domain of QoL. Life satisfaction and most domains of QoL were negatively correlated with depression, anxiety and somatization in the HD group. |
| **Conclusions** | In conclusion, Depression accompanied with a variety of anxiety symptoms constituted determinants of poor QoL in the setting of ESRD and consequently, less life satisfaction. |
| **Keywords** | End stage renal disease, PCASEE, Renal transplant recipients, Somatization. |

## INTRODUCTION

End-stage renal disease (ESRD) is defined as an irreversible decline in the individual's own kidney function, which is severe enough to be fatal without dialysis or transplantation (Abbasi *et al.,* 2010). The number of people with this condition is growing rapidly worldwide, especially in developing countries. This is partly linked to better identification of cases, improvement in the physical health care, and longer life expectancy of those owing to advancement in their care (Olagunju *et al.,* 2015).

Review of literature from developed countries suggests poor quality of life (QoL) and high emotional burden among individuals with ESRD (Lew and Patel, 2007). There are several reasons suggesting that people with ESRD in developing countries suffer poor QoL and psychiatric morbidities. Such reasons include poor health insurance coverage, lack of governmental funding, and unequal distribution of renal dialysis as well as transplantation services. Even when such services are available, they are predominantly urban-based and may be inaccessible for some patients (Kimmel *et al.,* 2003).

Regarding psychiatric comorbidities, depression is the most important of them, due to its high prevalence, adverse

effect on quality of life, and its potential to increase mortality. Yet, depressive disorders are commonly accompanied by anxiety symptoms in individuals with ESRD and those on HD (Kimmel *et al.*, 1998). Depression accompanied with anxiety in ESRD negatively affects the clinical course, morbidity, and outcome as well as constitutes independent associated factor of QoL reduction in ESRD (Vazquez *et al.*, 2003). Hence, monitoring the psychological aspects is just as important as monitoring the disease progress.

HD and kidney transplantation are types of renal replacement therapy (RRT). Although hemodialysis is the most widely used modality of RRT, patients on hemodialysis show severe depression, anxiety and low QoL. Estimate rates of depression and anxiety are 15 to 60% and 27 to 45.7%, respectively, in patients with chronic renal failure (Mollahadi *et al.*, 2010). Their functional capacity was strongly correlated with severity of their psychiatric illness (Kimmel *et al.*, 2003).

On the contrary, renal transplantation (RT) offers a near-normal life to patients with ESRD for up to twenty years and more, with less physiological effects on recipients (El-Agroudy *et al.*, 2008). Although renal transplant recipients (RTRs) showed better functional and employability status than either HD or Continuous Ambulatory Peritoneal Dialysis (CAPD) patients (Panagopoulou *et al.*, 2009), yet renal transplantation and CAPD are much less affordable or available (Soliman *et al.*, 2012). In developing countries, renal transplantation can be of greater benefit as it reduces the morbidity and the dialysis expenses (El-Agroudy *et al.*, 2004). There is little information about depression, anxiety and their correlation with QoL and life satisfaction in ESRD patients in Egypt. The aim of this study was to compare the presence and severity of depression and accompanying anxiety symptoms in patients undergoing hemodialysis and kidney transplantation; and to correlate depression and anxiety, with the QoL affection in both groups of patients.

Our hypothesis was that HD patients have a higher rate and severity of depression and anxiety symptoms with poorer QoL and life satisfaction than RTRs.

## PATIENTS AND METHODS

A comparative cross-sectional study was conducted on 64 patients (thirty-five males and twenty-nine females) with ESRD who were recruited consecutively from the nephrology outpatient clinic of Kasr Al Ainy, Cairo University Hospitals during the period between August 2012 and September 2013. The inclusion criteria were individuals, aged 18-60 years, who were clinically diagnosed with ESRD (defined by glomerular filtration rate <15mL/min) and provided informed consent to participate in the study and patient anonymity was

preserved. Patients who were severely ill, or those who were attending the clinic for the first time were excluded. Participants were categorized into two groups: Group (A) comprised patients on hemodialysis and group (B) comprised renal transplant recipients. At the time of the assessment, none of the patients had been treated for any psychiatric symptoms. The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

## Measures
The following tools were applied on all participants:

### 1. Beck Depression Inventory (BDI) (Beck, 1961)
It was applied to assess the presence and severity of depression in the study sample showing high reliability, capacity to discriminate between depressed and non-depressed subjects and structural validity (Wang and Gorenstein, 2013). It consists of twenty-one questions. Scores range from 0 to 63 and are graded as follows: not depressed (0-9), mildly depressed (10-15), moderately depressed (16-23) and severely depressed (24-63).

### 2. Middlesex Hospital Questionnaire (MHQ) (Crown and Crisp, 1966)
It was used to screen for psychiatric morbidity. It is a reliable self-assessment questionnaire which consists of forty-eight questions and is composed of six subscales (anxiety, phobia, obsession, somatization, depression and hysteria), each of which has eight questions.

### 3. PCASEE Questionnaire for QoL (Bech, 1993)
It is a validated questionnaire that clarifies the subjective expression of the QoL of the patients. It consists of six domains to estimate the degree of impairment in the QoL. These domains are Physical, Cognitive, Affective, Social, Economic and Ego (personality). This clinical instrument showed good interrater reliability, ranging from 0.85 to 0.97. The construct validity of the scale is fairly supported by factor analysis and convergent validation with the Lehaman QoL interview (Beck *et al.*, 1993).

### 4. Life Satisfaction Scale (LSS) (Al-Desouki, 1998)
It was used to assess subjective experience of life satisfaction. It consists of 5 scales: happiness, social, secure, psychological satisfaction, and social appreciation. Each scale consists of 12 phrases which has 5 degree from 0-4, then the whole sum is calculated. High grades indicate high degree of life satisfaction and low grades indicates low degree of life satisfaction.

## Statistical Analysis
Data were coded and entered using the statistical package SPSS (Statistical Package for the Social Sciences)

version 25. Data was summarized using mean±standard deviation (SD) in quantitative data and using frequency (count) and relative frequency (percentage) for categorical data. Comparisons between quantitative variables were done using the non-parametric Kruskal-Wallis and Mann-Whitney tests. For comparing categorical data, Chi square ($\chi^2$) test was performed. Exact test was used instead when the expected frequency is less than 5. Correlations between quantitative variables were done using Spearman correlation coefficient ($r$). P-values less than 0.05 were considered as statistically significant. Cramer's $V$ was used to analyze the effect sizes.

## RESULTS

The mean age of patients was 33.41±12.38 years old (with a mean age of 39.94±12.36 years for group A and 25.52±6.45 years for group B, $p <0.001$). Patients in both groups were matched regarding gender, education, occupation and social status (Table 1). The mean scores of depression, as assessed by BDI and the depression subscale of MHQ, were statistically significantly higher in group A (Table 2). In addition, 34.3% of patients in group A suffered from severe depression while nearly half (51.7%) of the patients of group B had normal scores on the BDI and none of them was severely depressed ($p <0.001$) (Figure 1). Moreover, scores of anxiety and somatization subscales of MHQ were statistically significantly higher in group A compared to group B. Patients of group A were significantly less satisfied with their life and showed lower scores on the physical domain of QoL questionnaire compared to group B. On the other hand, patients of group B had statistically significant lower scores on the economic domain of QoL questionnaire compared to A group (Table 2).

**Table 1:** Socio-demographic data of dialysis and transplant groups:

|  | Group A | | Group B | | *p* value |
|---|---|---|---|---|---|
|  | N | % | N | % | |
| **Gender** | | | | | |
| Male | 19 | 54.3 | 16 | 55.2 | 0.943 |
| Females | 16 | 45.7 | 13 | 44.8 | |
| Total | 35 | 100 | 29 | 100 | |
| **Education** | | | | | |
| Illiterate | 5 | 14.3 | 5 | 17.3 | 0.731 |
| Read & Write | 3 | 8.6 | 3 | 10.3 | |
| Primary | 7 | 20.0 | 9 | 31.0 | |
| Preparatory | 14 | 40.0 | 8 | 27.6 | |
| High | 6 | 17.1 | 4 | 13.8 | |
| Total | 35 | 100 | 29 | 100 | |
| **Occupation** | | | | | |
| Working | 11 | 31.4 | 7 | 24.1 | 0.904 |
| Not working | 24 | 68.6 | 22 | 75.9 | |
| Total | 35 | 100 | 29 | 100 | |
| **Social Status** | | | | | |
| Without partner | 18 | 51.4 | 17 | 58.6 | 0.852 |
| With partner | 17 | 48.6 | 12 | 41.4 | |
| Total | 35 | 100 | 29 | 100 | |

$\chi^2$: test and exact test. *P* value more than or equal to 0.05 is nonsignificant.

**Table 2:** Psychological and Quality of Life profile of group A and group B:

|  |  | Group A | | Group B | | *p* value | Cramer's V Effect size |
|---|---|---|---|---|---|---|---|
|  |  | Mean | SD | Mean | SD | | |
| **BDI** | | **21.4** | **1.91** | **8.97** | **6.82** | **<0.001** | **0.566** |
| MHQ | | | | | | | |
| | Depression | 10.23 | 4.15 | 7.52 | 2.95 | 0.006 | 0.341 |
| | Anxiety | 9.60 | 5.13 | 6.0 | 3.98 | 0.003 | 0.366 |
| | Phobia | 7.51 | 3.44 | 6.9 | 3.44 | 0.405 | 0.104 |
| | Obsession | 8.17 | 3.94 | 9.48 | 3.24 | 0.272 | 0.137 |
| | Somatization | 9.69 | 4.21 | 6.83 | 3.14 | 0.005 | 0.351 |
| | Hysteria | 5.57 | 2.6 | 6.79 | 3.51 | 0.142 | 0.184 |
| PCASEE | Physical | 21.26 | 10.57 | 27.72 | 9.85 | 0.017 | 0.297 |
| | Cognitive | 27.31 | 8.32 | 29.93 | 8.92 | 0.203 | 0.159 |
| | Affective | 23.77 | 9.84 | 26.14 | 8.42 | 0.329 | 0.122 |
| | Social | 22.97 | 10.81 | 23.31 | 10.48 | 0.713 | 0.046 |
| | Economic | 25.89 | 11.03 | 18.62 | 13.41 | 0.018 | 0.295 |
| | Ego | 23.66 | 7.02 | 23.10 | 8.34 | 0.973 | 0.004 |
| LSS | | 74.2 | 21.95 | 94.31 | 15.76 | <0.001 | 0.467 |

BDI: Beck Depression Inventory; MHQ: Middlesex Hospital Questionnaire; PCASEE: Physical, Cognitive, Affective, Social, Economic and Ego Questionnaire for QoL; LSS: Life Satisfaction Scale; Chi square test; Mann-Whitney test. *P* value <0.05 is significant.

Regarding correlative results, in patients of group A, the scores of depression, anxiety, somatization and phobia subscales of MHQ were positively correlated. Furthermore, life satisfaction and all domains of QoL scales, except the economic one, were negatively correlated with depression, anxiety and somatization. The physical domain of QoL questionnaire was significantly correlated with depression, anxiety and somatization in the group B (Table 3).

In group B, the scores of depression of both BDI and depression subscale of MHQ were positively correlated with somatization and hysteria subscales. Scores of anxiety subscale were positively correlated with those of phobia and obsession subscales. Regarding QoL, depression was negatively correlated with the cognitive domain and somatization was negatively correlated with the affective domain. Moreover, phobia was negatively correlated with the ego domain and obsession was negatively correlated with the economic domain. LSS scores were negatively correlated with depression and positively correlated with social domain of QoL (Table 4).

## DISCUSSION

The findings of our study support the hypothesis that patients on hemodialysis showed significant higher rate and severity of depression, significant more anxiety and somatization symptoms, less life satisfaction and poorer QoL as regard the physical domain, compared to renal transplant recipients. Life satisfaction and QoL except the economic domain were significantly negative correlated with depression, anxiety and somatization in patients undergoing HD. In RTRs, only the physical domain of QoL was significantly positive correlated with depression, anxiety and somatization. Life satisfaction was negative correlated with depression and positive correlated with social domain of QoL.

**Table 3:** Correlation between psychological profile and quality of life scores among group A patients:

|  |  | Anxiety | | Phobia | Obsession | Somatization | Depression | Hysteria | LSS |
|---|---|---|---|---|---|---|---|---|---|
|  |  | BDI | MHQ | MHQ | MHQ | MHQ | MHQ | MHQ | score |
| BDI | r | 1.000 | 0.628 | 0.537 | 0.101 | 0.767 | 0.783 | 0.270 | -0.788- |
|  | P value | - | <0.001 | 0.001 | 0.565 | <0.001 | <0.001 | 0.116 | <0.001 |
| MHQ Depression | r | 0.783 | 0.777 | 0.579 | 0.259 | 0.683 | 1.000 | 0.316 | -0.708- |
|  | p value | <0.001 | <0.001 | <0.001 | 0.133 | <0.001 | - | 0.064 | <0.001 |
| MHQ Anxiety | r | 0.628 | 1.000 | 0.614 | 0.236 | 0.734 | 0.777 | 0.316 | -0.663- |
|  | p value | <0.001 | - | <0.001 | 0.173 | <0.001 | <0.001 | 0.064 | <0.001 |
| MHQ Somatization | r | 0.767 | 0.734 | 0.471 | 0.174 | 1.000 | 0.683 | 0.176 | -0.729- |
|  | p value | <0.001 | <0.001 | 0.004 | 0.318 | - | <0.001 | 0.312 | <0.001 |
| PCASEE Physical | r | -0.572- | -0.759- | -0.520- | -0.202- | -0.594- | -0.716- | -0.213 | 0.605 |
|  | p value | <0.001 | <0.001 | 0.001 | 0.245 | <0.001 | <0.001 | 0.219 | <0.001 |
| PCASEE Cognitive | r | -0.454- | -0.637- | -0.308- | -0.052- | -0.443- | -0.548- | -0.319 | 0.525 |
|  | p value | 0.006 | <0.001 | 0.072 | 0.765 | 0.008 | 0.001 | 0.061 | 0.001 |
| PCASEE Affective | r | -0.729- | -0.701- | -0.445- | -0.217- | -0.630- | -0.773- | -0.394 | 0.721 |
|  | p value | <0.001 | <0.001 | 0.007 | 0.210 | <0.001 | <0.001 | 0.019 | <0.001 |
| PCASEE Social | r | -0.371- | -0.625- | -0.269- | 0.034 | -0.410- | -0.615- | -0.209 | 0.406 |
|  | p value | 0.028 | <0.001 | 0.118 | 0.848 | 0.014 | <0.001 | 0.229 | 0.016 |
| PCASEE Economic | r | -0.062- | -0.161- | 0.237 | -0.077- | -0.255- | -0.093- | -0.045 | 0.171 |
|  | p value | 0.725 | 0.356 | 0.171 | 0.659 | 0.140 | 0.593 | 0.797 | 0.327 |
| PCASEE Ego | r | -0.568- | -0.621- | -0.440- | -0.098- | -0.439- | -0.617- | -0.199 | 0.546 |
|  | p value | <0.001 | <0.001 | 0.008 | 0.575 | 0.008 | <0.001 | 0.251 | 0.001 |

BDI: Beck Depression Inventory; LSS: Life Satisfaction Scale; MHQ: Middlesex Hospital Questionnaire; PCASEE: Physical, Cognitive, Affective, Social, Economic and Ego Questionnaire for Quality of Life. Spearman correlation coefficient. P value less than 0.05 is significant.

**Table 4:** Correlation between duration of illness, psychological profile and quality of life scores among group B patients:

| | | BDI | Anxiety MHQ | Phobia MHQ | Obsession MHQ | Somatization MHQ | Depression MHQ | Hysteria MHQ | LSS score |
|---|---|---|---|---|---|---|---|---|---|
| BDI | r | 1.000 | 0.229 | 0.114 | 0.252 | 0.480 | 0.110 | 0.487 | -0.445 |
| | p value | . | 0.232 | 0.555 | 0.188 | 0.008 | 0.571 | 0.007 | 0.016 |
| MHQ Depression | r | 0.110 | 0.346 | 0.759 | 0.516 | 0.529 | 1.000 | 0.212 | -0.091 |
| | p value | 0.571 | 0.066 | <0.001 | 0.004 | 0.003 | . | 0.268 | 0.638 |
| MHQ Anxiety | r | 0.229 | 1.000 | 0.427 | 0.654 | 0.353 | 0.346 | 0.262 | -0.057 |
| | p value | 0.232 | . | 0.021 | <0.001 | 0.061 | 0.066 | 0.170 | 0.771 |
| MHQ Somatization | r | 0.480 | 0.353 | 0.340 | 0.531 | 1.000 | 0.529 | 0.232 | -0.092 |
| | p value | 0.008 | 0.061 | 0.071 | 0.003 | . | 0.003 | 0.226 | 0.635 |
| PCASEE Physical | r | -0.428 | -0.509 | -0.279 | -0.457 | -0.539 | -0.403 | -0.359 | 0.129 |
| | p value | 0.021 | 0.005 | 0.142 | 0.013 | 0.003 | 0.030 | 0.056 | 0.505 |
| PCASEE Cognitive | r | -0.497 | 0.050 | 0.030 | -0.006 | -0.213 | -0.040 | -0.354 | 0.286 |
| | p value | 0.006 | 0.797 | 0.878 | 0.975 | 0.267 | 0.839 | 0.059 | 0.133 |
| PCASEE Affective | r | -0.146 | -0.127 | -0.237 | -0.110 | -0.373 | -0.304 | -0.343 | 0.212 |
| | p value | 0.448 | 0.510 | 0.216 | 0.569 | 0.046 | 0.109 | 0.068 | 0.270 |
| PCASEE Social | r | -0.156 | -0.088 | -0.114 | -0.119 | -0.103 | 0.025 | -0.135 | 0.411 |
| | p value | 0.419 | 0.649 | 0.555 | 0.537 | 0.594 | 0.898 | 0.484 | 0.027 |
| PCASEE Economic | r | 0.076 | 0.273 | 0.137 | -0.552 | 0.158 | 0.193 | 0.323 | 0.067 |
| | p value | 0.694 | 0.152 | 0.478 | 0.002 | 0.412 | 0.316 | 0.087 | 0.729 |
| PCASEE Ego | r | -0.192 | -0.102 | -0.428 | -0.055 | -0.287 | -0.333 | 0.000 | 0.227 |
| | p value | 0.319 | 0.599 | 0.021 | 0.779 | 0.131 | 0.078 | 0.999 | 0.236 |

BDI: Beck Depression Inventory; LSS: Life Satisfaction Scale; MHQ: Middlesex Hospital Questionnaire; PCASEE: Physical, Cognitive, Affective, Social, Economic and Ego Questionnaire for Quality of Life. Spearman correlation coefficient. *P* value less than 0.05 is significant.
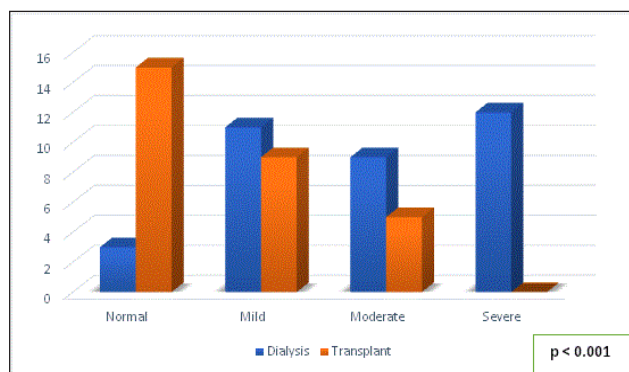


**Figure 4:** Severity of depression by BDI in dialysis and transplant groups. *P* value less than 0.05 is significant. BDI, Beck Depression Inventory.

The significant higher mean scores of depression in patients on HD compared to RTRs were consistent with Kimmel (2000) and Virzi *et al.,* (2007). The experience of several losses, including kidney function, the serious influence on family roles, work competence, mobility, sexual function and time significantly and negatively affect the lives of sufferers (Chilcot *et al.,* 2008). In addition, further stressors, including effect of medications, dietary restrictions, fear of death, and dependency upon treatment may affect the quality of life and exacerbate feelings of depression and loss of control (Armaly *et al.,* 2012). Furthermore, pain is a significant problem for nearly half of HD patients where Davison and Jhangri (2005) revealed that there was a higher prevalence of depression in HD patients with moderate or severe chronic pain compared to patients with mild or no pain. Anxiety symptoms and somatization were significantly higher in patients on HD which was in line with Novaković (2007) who found that anxiety appeared in all tested dialysis patients. He concluded that anxiety may be independent, somatized as part of another mental disorder or reinforced by some sort of cognitive damage.

Less satisfaction of life and poorer physical domain QoL in the HD group might be explained by the stressful circumstances of the dialysis, as many patients on dialysis acquire the sense of life-long dependence on the machine, procedure, and the group of medical professionals (Olagunju *et al.,* 2015). Also, the additive impact of comorbid disease in the group of patients who were awaiting transplantation could be another contributing factor of lower QoL. Pain, poor appetite and disturbance of sleep structure were additional factors to the subjective dissatisfaction of sense of physical well-being in HD

patients in this study. This was in concordance with Cinar et al., (2009) who reported that patients undergoing HD confront stressful issues like dependence on the machine and health care persons. Hence, the patients perceived that their overall lifestyle was negatively affected by the long duration associated with the HD therapy. All domains of QoL, except the economic domain, in the HD group were inversely correlated with depression, anxiety and somatization and this was supported by Li et al., (2016) study. They found that in relatively healthy maintenance hemodialysis patients, QoL scores are usually decreased in those with depression and/or anxiety but appears to be normal in those without depression or anxiety.

On the other side, the better quality of physical health of the RTR group agreed with the study of Tayyebi et al., (2010) who found that RTR patients have higher QoL in the global physical health compared to patients on HD. In the same context, Baguelin-Pinaud et al., (2009) study showed that health perceived by the patients was greater after renal transplantation. In fact, it was observed during the current study that RTRs comprised healthier and younger individuals compared to those in the HD group. Such individuals were assumed to be more fit for the transplant procedure.

However, the significant lower scores of the economic domain in RTRs compared to the HD group was consistent with Elsharif et al., (2010) who found that HD was less expensive than kidney transplantation. Similarly, Kapoor et al., (2015) found that more than 65% of their patient population had poor socio-economic rehabilitation even after a successful renal transplant. Nevertheless, Tayyebi et al., (2010) stated that satisfaction from the economic situation was higher in RTRs as the costs of HD far greater than that of RT and maintenance. The difference in the above studies could be explained by the serious global unfairness in access to transplantation that exists internationally. Transplantation programs face many challenges in low and middle-income countries due to the lack of infrastructure, financial constraints and inadequate cadaveric donor programs (Kapoor et al., 2015). Another explanation could be the delay of transplantation due to the long waiting list, as it is obvious that transplants performed preemptively reduce the costly complications such as acute rejection, delayed graft function, and allograft failure (Abecassis et al., 2008). Furthermore, Gaston and Thomas (2005) found that only 24% of patients who were on HD for more than one year, returned to work after RT, compared with at least one half of those who received a RT preemptively.

In the RTR group, the physical health domain of QoL was inversely correlated with depression, the affective domain was inversely correlated with somatization and

the ego domain was inversely correlated with phobia, which were in line with Jana et al., (2014) who found that depression, anxiety and alteration of body image were observed as comorbid conditions in patients with RT where they might adversely affect the adherence and thereby cripple effective immunosuppression. In addition, high rates of fear and phobia may be related to concerns about rejection to the graft and returning to the HD state.

Ganji et al., (2014) have reported that patients with RT had excessive worries about the costs of transplant and donor evaluations, post-transplantation costs (paying for expensive immunosuppressant medications and losing the coverage of their health insurance) and living donor expenses. This was further supported in the current study by the negative correlation between obsession and economic domain of QoL.

Regarding the positive correlation between depression and somatic symptoms, dysfunctional hypothalamic and sleep centers may be of importance, all influenced by both serotonin and norepinephrine and they are also mediated by different malfunctioning neuronal circuits regulated by multiple neurotransmitters (Demyttenaere et al., 2005). Thus, the typical form of presenting depression is via somatization and this is considered one of the main reasons for low rates of recognition of depression in such patients. Different causal illness interpretations, a tendency to exaggerate somatic distress, and difficulties in identifying and dealing with emotional distress, all have an impact on the extent and form of a somatic mode of presentation (Henningsen et al., 2005).

Regarding the positive correlation of cognitive symptoms with depression in both groups, cognitive complaints are core symptoms of acute major depressive episodes as diminished ability to think or concentrate and/or indecisiveness are criterion items for the diagnosis of major depressive disorder (Lam et al., 2014). Poor sleep quality of the depressed group might have negatively affected their cognitive performance.

## LIMITATIONS
It was found that RT was preferred by younger patients due to many advantages of the intervention e.g. physical and social independence on the HD unit. From the other side, old age was a relative contraindication of RT because of increased association with other medical diseases and the lower donor availability. Thus, the age difference between both groups may be considered a limiting factor in this study.

Although the study results showed that RT is the superior form of renal replacement therapy regarding health related QoL, the issue of donor organ availability

and eligibility remains a key limiting factor in many developing countries. Duplication of the study in multi-centers is a necessity to be able to generalize the results by increasing the sample size as recruiting such type of study subjects from one location may be a second limitation.

## RECOMMENDATION

The strong correlation between depression, anxiety and quality of life, in HD or RTR patients emphasizes the need of a multidisciplinary approach to facilitate early referral and intervention. In addition, a follow up study is needed to detect the long-term effect of renal replacement therapy on patients and improve the renal transplantation program in Egypt.

## CONCLUSION

Depression accompanied with a variety of anxiety symptoms constituted determinants of poor QoL in the setting of ESRD and consequently, less life satisfaction. HD patients showed higher levels of depression, anxiety and somatization along with poorer quality of life and less life satisfaction than patients with RT.

## FINANCIAL SUPPORT AND SPONSORSHIP
Nil.

## CONFLICTS OF INTEREST
There are no conflicts of interest.

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