

Prevalence of anxiety and depression among end-stage kidney disease patients on dialysis: A cross-sectional multiple-centre study in Riyadh, Saudi Arabia

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Abstract

Introduction: Patients with end-stage kidney disease (ESKD) in need of renal replacement therapy are estimated to number between 4.902 and 7.083 million. Studies have shown that depression and anxiety are the most common mental illnesses among people with kidney disease and end-stage renal disease (ESRD). Anxiety is linked to mortality in dialysis patients with ESRD, as well as a lower perceived quality of life. The purpose of this study was to look into the prevalence of anxiety and depression in dialysis patients in Saudi Arabia, as well as the associated risk factors. Methods: This was a cross-sectional study that included patients receiving peritoneal and hemodialysis at two dialysis centers in Riyadh, Saudi Arabia, King Fahad Medical City and King Salman Dialysis Center. It was conducted from June 2021 to March 2022. There were 158 dialysis patients in all, including 135 hemodialysis patients and 23 peritoneal dialysis patients. Characteristics of patients were documented. Anxiety and depression were evaluated using The Hospital Anxiety and Depression Scale (HADS). Results: Our study yielded 158 responses, with the majority being females. Among the two dialysis populations studied, the type and duration of dialysis were not significantly associated with anxiety or depression. Our study revealed that the female gender was significantly associated with anxiety (P = 0.007); the female gender significantly increased the likelihood of anxiety (odds ratio [OR]: 3.4, 95% confidence interval [CI]: 1.47–7.9), whereas unemployment and male gender were significantly associated with depression, with a *P*=0.036 and *P* = 0.028, respectively. **Conclusion:** Anxiety and depression are common mental health conditions. Despite the limited number of studies on anxiety and depression in dialysis patients, it is evident that gender and employment status are significantly associated with anxiety and depression, respectively. More research is needed to shed light on this issue in Saudi Arabia. Identifying and treating mental health disorders in early-stage CKD patients may facilitate better disease management and improve the quality of life.

Keywords: Anxiety, CKD, chronic kidney disease, depression, dialysis, ESKD, ESRD, kidney failure,

Introduction

Patients with end-stage kidney disease (ESKD) in need of renal

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replacement therapy are estimated to number between 4.902 and 7.083 million. Chronic kidney disease (CKD) has been recognized as a significant public health issue around the world, with an estimated prevalence of 13.4% (11.7–15.1%).^[1] Stages 1–4 of CKD treatment (i.e. pharmacotherapy and diet) aim to slow the progression of kidney disease and prevent/treat complications and comorbid conditions. In contrast, renal replacement

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therapy (R5RT), such as dialysis or kidney transplantation, is necessary to maintain life in the final stage of CKD (i.e. stage 5 or end-stage renal disease [ESRD]).^[2]

CKD is a complex disorder in which the kidneys cannot function correctly due to structural or functional damage, resulting in excessive fluid and waste accumulation in the blood; it represents a significant cost burden on healthcare systems worldwide.^[3,4]

A total of 1.2 million people died from CKD in 2020, making it the 12th greatest cause of mortality worldwide.^[5] Due to the rising incidence and prevalence of ESKD among the Saudi population, CKD has become recognized as a significant health concern in the Kingdom of Saudi Arabia in recent decades. In 2010, it was estimated that 5.7% of people worldwide had CKD.^[6] Similarly, the number of people receiving hemodialysis has increased from 4,000 in 1995 to almost 18,000 in 2017.^[7] Diabetes, cystic kidney disease, glomerulonephritis, and hypertension are a few causes of ESRD.^[8]

Patients with ESRD have a limited range of treatment options, including dialysis (hemodialysis or peritoneal dialysis), kidney transplantation, and other forms of RRT.^[9,10] Although most doctors are aware that patients' emotional and psychological well-being can be adversely affected by various treatment approaches, they typically have limited time to examine and address their emotional states^[11] appropriately. Studies have shown that depression and anxiety are the most common mental illnesses among people with kidney disease and ESRD.^[2,12-16]

Anxiety is a feeling of worry, nervousness, or unease about everyday events or things, and if it is frequently related to financial crises, domestic issues, healthcare problems, or the future, it can be appropriate, but if it is experienced frequently, the individual may suffer from an anxiety disorder.^[17] Similarly, depression, which is often characterized by emotional turbulence and manifests as somatic, cognitive, and behavioral symptoms, is one of the most common psychiatric disorders, affecting billions of people and imposing a significant disease burden globally.^[18] Although anxiety disorders affect 21.1% to 53.4% of CKD patients undergoing pre-dialysis or hemodialysis, depression affects 22.8% of dialysis patients and 21.4% of pre-dialysis CKD patients globally.^[19,20]

Although there is little research on the prevalence of anxiety disorders in patients with renal disease, anxiety is linked to mortality in dialysis patients with ESKD, as well as a lower perceived quality of life.^[21] As of 2022, the national prevalence of anxiety and depression in Saudi Arabia was estimated to be 12.4% and 12.7%, respectively.^[22] Several factors have been identified to contribute to the development of anxiety and depression in Saudi Arabia; these include female gender, low income, low educational level, unemployment, and chronic illness.^[22]

Only a few studies on anxiety and depression disorders in CKD patients in Saudi Arabia exist.^[12] However, Turkistani I^[23] reported cases of anxiety and depression in 21% and 23.3% of CKD patients in Saudi Arabia, respectively.

To date, there is a limited number of research conducted in Saudi Arabia on this topic, which means that there is inadequate evidence to offer reasonable suggestions for patients on dialysis to improve their outcomes and lead healthier lives. As a result, a cross-sectional study was conducted in Riyadh, Saudi Arabia, to examine anxiety, depression, and related factors among patients with ESKD who were receiving hemodialysis or peritoneal dialysis. Three main objectives of the study were to examine the hypothesis that anxiety and depression are prevalent among ESKD patients, to estimate the prevalence of anxiety and depression among ESKD patients receiving dialysis, and to identify the demographics and risk factors that may increase the likelihood of developing anxiety and depression among ESKD patients on dialysis.

Materials and Methods

This cross-sectional study included all patients receiving dialysis at two dialysis centers in Riyadh, Saudi Arabia, King Fahad Medical City and King Salman Dialysis Center. The study was conducted from June 19, 2021, to March 2022. There were 158 dialysis patients, including 135 hemodialysis patients and 23 peritoneal dialysis patients. The study excluded patients whose cognitive impairment affected their interpretation of the questionnaire and who could not give informed consent.

The study's purpose and procedure were verbally explained to participants. All participants had the full right to stop the meeting at any time if they felt tired.

King Fahad Medical City Ethics Committee gave its approval before data collection. Data collected included age, gender, employment status, type, and duration of dialysis.

Anxiety and depression levels were evaluated using the Hospital Anxiety and Depression Scale (HADS). This emotional distress assessment tool comprises 14 items, each with a score of 0–3: with 0 being the lowest and 3 being the highest. The sum of scores for all 14 items is then categorized: 0–7 being normal, 8–10 is borderline, and 11–21 being abnormal. This assessment is applied to anxiety and depression (i.e. 14 items each). Hence, the emotional distress scale ranges from 0–42 in total. HADS Arabic version is available and has been validated for use in dialysis patients.^[24]

Statistical analysis

The SPSS 25 Statistics Package was used to enter and evaluate all data (SPSS Inc., Chicago, Illinois, USA). All categorical data were given descriptive statistics, which included frequencies and percentages. A list-wise exclusion approach was used to weed out cases with missing data from the regression analysis. The independent *t*-test was used for statistical analysis of continuous variables. The Chi-square test or Fisher's exact test was used for the comparison of categorical variables and to examine connections between relevant parameters and anxiety/depression. Binary logistic regression was used to predict likelihoods. A P value < 0.05 was considered statistically significant.

Results

A total of 158 patients were sampled, of which 83 were females and 75 were males. The majority of the patients, 51.3% (n = 81), were above 50 years of age. Of the total population, only 41 (25.9%) were employed, whereas 117 (74.1%) were unemployed. Two treatment categories were studied; the population undergoing hemodialysis and peritoneal dialysis were 135 (85.4) and 23 (14.6), respectively. The duration of dialysis was also considered; 27% of the population had been on treatment for less than 2 years, 32.9% between 2 and 4 years and 39.2% for more than 4 years. The demographic and clinical results are thus presented in Table 1. To identify any potential sociodemographic and clinical factors and examine their relationships with anxiety and/or depression, our questionnaire evaluated the age, gender, employment status, and duration of dialysis of the individuals surveyed.

From the descriptive analysis HADS assessment, a significant number (73.4%) of patients surveyed reported normal levels of anxiety and depression scale; 17.7% and 12.0% reported borderline anxiety and depression respectively, whereas 8.9% and 14.6% reported abnormal anxiety and depression, respectively. These figures could be referenced in detail as they are presented in Table 2.

Table 3 presents the association between anxiety scale classification and demographic/clinical factors. Of the patients surveyed aged above 50 years, 51.7% reported normal, whereas 46.4% and 57.1% reported borderline and abnormal anxiety

Table 1: Demographic and clinical characteristics of natients (n=158)			
Variables	Description	n (n %)	
Age	<50	77 (48.7%)	
	>50	81 (51.3%)	
Gender	Male	75 (47.5%)	
	Female	83 (52.5%)	
Employment	Yes	41 (25.9%)	
	No	117 (74.1%)	
Dialysis	Hemodialysis	135 (85.4%)	
	Peritoneal dialysis	23 (14.6%)	
Duration on	Less than 2 years	44 (27.8%)	
dialysis	2-4 years	52 (32.9%)	
	More than 4 years	62 (39.2%)	

Categorical data presented as frequency (%)

Table 2: Hospital Anxiety and Depression Scale (HADS)

prevalence					
Variables	Anx clas	iety scale sification	Depression scale classification		
Normal (0–7)	116	(73.4%)	116	(73.4%)	
Borderline (8–10)	28	(17.7%)	19	(12.0%)	
Abnormal (>10)	14	(8.9%)	23	(14.6%)	

range, respectively. With respect to gender, there were more female respondents than males; of the females, 45.7% showed normal anxiety, whereas 64.3% and 85.7% showed borderline and abnormal anxiety levels, respectively, which was remarkably significant with a *P* value < 0.05. Therefore, the analysis showed that age, employment status, as well as duration on dialysis, was not significantly associated with anxiety; only gender had a significant association.

Binary logistic regression findings in Table 4 reveals that female gender significantly predicted the likelihood of being diagnosed with anxiety (odds ratio [OR]: 3.4, 95% confidence interval [CI]: 1.47–7.99).

With respect to the association between depression and demographic/clinical factors, only gender and employment status showed a significant relationship. Additionally, more females fell within the abnormal depression level at 78.3% compared to other categories. Similarly, there were more unemployed respondents than employed; of the 117 unemployed participants, 69.0%, 94.7%, and 82.6% fell within normal, borderline, and abnormal depression levels, respectively. Analysis revealed a statistically significant relationship between gender and employment status with depression; with a P value = 0.028 and P value = 0.036, respectively. These figures are referenced in Table 5.

The findings in Table 6 indicate that only employment status significantly predicted the odds of being diagnosed with depression (OR: 3.46, 95% CI: 1.23–9.72). Patients who were unemployed and dependent had more likelihood of being diagnosed with depression than patients who were employed.

Discussion

Prevalence of anxiety and depression in ESRD patients

This study aimed to examine the prevalence of anxiety and depression among patients undergoing dialysis in Saudi Arabia, along with the associated risk factors. The study involved 158 hemodialysis and peritoneal dialysis patients, revealing a 26.6% prevalence of anxiety and depression. Binary regression analysis identified gender and employment status as strong independent predictors of anxiety and depression, with female gender significantly associated with anxiety (P < 0.004) and employment status significantly linked to depression (P < 0.019) among the participants.

In contrast to previous research that highlighted depression as the primary mental health concern in individuals with chronic kidney disease (CKD), our findings indicate that 26.6% of ESRD patients experience depression.^[2,12-16] These results align with Turkistan I's study, which reported a 23.3% depression rate among their patients.^[11,23] Previous studies have shown varying depression prevalence rates among ESRD patients, ranging from 25.3% to 60.5% based on different assessment tools and populations.^[25]

Table 3: Association between anxiety scale classification and demographic/clinical factors					
Factors	Description	Anxiety Scale Classification			
		0-7 Normal	8-10 Borderline abnormal	>10 Abnormal	
Age	<50	56 (48.3%)	15 (53.6%)	6 (42.9%)	0.792
	>50	60 (51.7%)	13 (46.4%)	8 (57.1%)	
Gender	Male	63 (54.3%)	10 (35.7%)	2 (14.3%)	*0.007
	Female	53 (45.7%)	18 (64.3%)	12 (85.7%)	
Employment	Yes	32 (27.6%)	6 (21.4%)	3 (21.4%)	0.738
	No	84 (72.4%)	22 (78.6%)	11 (78.6%)	
Duration on	Less than 2 years	37 (31.9%)	3 (10.7%)	4 (28.6%)	0.095
dialysis	2-4 years	38 (32.8%)	12 (42.9%)	2 (14.3%)	
	More than 4 years	41 (35.3%)	13 (46.4%)	8 (57.1%)	

Note: Categorical data presented as frequency; * shows that P value is significant at P<0.0

Table 4: Logistic regression result for the anxiety modelBinary Logistic Regression AnalysisB100: F114 Anxiety Scale

Classification (>7)					
Characteristic	Reference	OR	95% C.I. (LL-UL)	Р	
Step 1:					
Peritoneal dialysis	Ref. (hemodialysis)	0.44	0.1-1.85	0.261	
Age (> 50 years)	Ref. (≤ 50 years)	0.78	0.32-1.91	0.591	
Feminine gender	Ref. (Male)	3.7	1.45-9.41	0.006	
Dependent	Ref. (employee)	1.01	0.29-3.51	0.984	
Duration on dialysis					
2–4 years	Ref. (< 2 years)	1.14	0.36-3.63	0.822	
More than 4 years	Ref. (< 2 years)	2.53	0.87-7.31	0.087	
Step 4:					
Feminine gender	Ref. (Male)	3.42	1.47-7.99	0.004	
Duration on dialysis					
2-4 years	Ref (< 2 years)	1.32	0.43-4.09	0.629	
More than 4 years	Ref (< 2 years)	2.74	0.97–7.73	0.058	

Conversely, anxiety levels among CKD patients appear to be increasing. A recent study by Goh ZS, Griva K.^[2] estimated anxiety prevalence in CKD patients to range from 12% to 52%, consistent with our study's finding of anxiety in 26.6% of the study population.

The World Health Organization (WHO) recently noted a 25% rise in global anxiety and depression prevalence during the first year of the COVID-19 pandemic.^[26] However, post the initial COVID wave, the prevalence of depression and anxiety does not significantly differ from pre-pandemic estimates. Furthermore, a study by Marić *et al.*^[27] found no evidence that psychiatric disorders have exceeded pre-pandemic levels following the emergence of COVID-19-related stressors.

Sociodemographic factors influencing anxiety and depression

Age, gender, level of education, and employment status are crucial sociodemographic factors affecting the levels of depression and anxiety in patients.^[11,13] Although there is a minimal correlation between female gender and depression levels, our study found that women in our sample population exhibited significantly higher levels of anxiety than men (P < 0.05), aligning with the existing literature.

The global increase in anxiety levels due to the COVID-19 pandemic has had a significant impact, with female patients showing a tendency to develop anxiety, whereas male patients are more likely to exhibit depressive symptoms.^[11] This observation is consistent with previous studies on CKD patients.^[28,29] For instance, a 2020 study by Gadia et al.[28] involving 100 patients revealed that women scored notably higher on anxiety traits compared to men. Similarly, research conducted in Saudi Arabia by Mosleh et al.[11] indicated a higher prevalence of anxiety symptoms in women than in men. In line with a study from South Korea, which suggested that older women are more prone to depression than younger males across different CKD stages.^[30] Our findings support the general trend of females being more susceptible to anxiety, as highlighted in the 2022 WHO report, which noted a significant impact on children and women due to the global surge in anxiety levels driven by the COVID-19 pandemic.^[31] The historical roles of Saudi women as homemakers and Saudi men as breadwinners may contribute to the observed differences, with male unemployment being a more prevalent issue compared to female unemployment.

Impact of employment status on depression

In our study, out of the 158 patients evaluated, only 41 were employed, and we found a significant correlation between depression and employment status with a P value < 0.019. This aligns with the research by Saeed et al.^[32] which indicated that unemployment was associated with an increase in depressive symptoms, whereas household income showed a negative correlation with depression. Additionally, Andrade and Sesso noted a higher prevalence of depression among unemployed individuals and those lacking a stable income.^[33] Similarly, Andrade et al.[34] observed that patients without jobs had higher rates of depression compared to those who were employed. Changes in employment status are common within dialysis populations, affecting over 75% of individuals.[35] Various factors, such as the patient's residence, dialysis schedule (especially if they have limited control over their shift), and their pre-dialysis employment, can contribute to this trend. Patients with lower levels of education, such as those with primary and secondary school backgrounds, often express concerns about their job prospects, particularly if their work involves physical labor that may not be feasible after starting hemodialysis.[35]

Т	Table 5: Association be	tween Depression S	Scale Classification and demogra	phic/clinical factors	
Factors	Description	Depression Scale Classification			
		0–7 Normal	8–10 Borderline abnormal	>10 Abnormal	
Age	<50	58 (50.0%)	9 (47.4%)	10 (43.5%)	0.842
	>50	58 (50.0%)	10 (52.6%)	13 (56.5%)	
Gender	Male	60 (51.7%)	10 (52.6%)	5 (21.7%)	*0.028
	Female	56 (48.3%)	9 (47.4%)	18 (78.3%)	
Employment	Yes	36 (31.0%)	1 (5.3%)	4 (17.4%)	*0.036
	No	80 (69.0%)	18 (94.7%)	19 (82.6%)	
Duration on	Less than 2 years	33 (28.4%)	4 (21.1%)	7 (30.4%)	0.071
dialysis	2–4 years	43 (37.1%)	7 (36.8%)	2 (8.7%)	
	More than 4 years	40 (34.5%)	8 (42.1%)	14 (60.9%)	

Note: Categorical data presented as frequency; * shows that P value is significant at P<0.05

Table 6: Logistic regression results for the depression model Binary Logistic Regression Analysis Depression Scale										
							Classification	n (>7	/)	
						Characteristic	Reference	OR	95% C.I. (LL - UL)	Р
Step 1:										
Peritoneal dialysis	Ref. (hemodialysis)	0.98	0.3-3.22	0.973						
Age (> 50 years)	Ref. (≤ 50 years)	0.63	0.27-1.43	0.265						
Feminine gender	Ref. (male)	1.51	0.68-3.36	0.310						
Dependent	Ref. (employee)	3.83	1.13-12.95	0.031						
Duration on dialysis										
2-4 years	Ref. (< 2 years)	0.48	0.17-1.38	0.175						
More than 4 years	Ref. (< 2 years)	1.44	0.58-3.6	0.436						
Step 4:										
Dependent	Ref. (employee)	3.46	1.23-9.72	0.019						
Duration on dialysis										
2-4 years	Ref (< 2 years)	0.51	0.19-1.42	0.200						
More than 4 years	Ref (< 2 years)	1.39	0.57–3.37	0.468						

Association between dialysis and anxiety score

Our study aligns with the research by Cantekin *et al.*,^[19] who investigated the prevalence of anxiety and depression in CKD patients undergoing hemodialysis or peritoneal dialysis. Their study highlighted a notable correlation between dialysis and anxiety scores. Similarly, our findings indicate that dialysis often leads to an increase in anxiety scores.

Limitations

As with any research, our study had a few notable limitations. Although it was a multi-center study, the sample size was relatively small. The primary focus of the study was ESKD patients on dialysis, as there was no comparable data for different stages of CKD. It is evident from a plethora of research that mental health was significantly impacted by COVID-19. That being said, our study did not factor in pre-pandemic anxiety and depression rates among ESKD patients, nor did it exclude patients who have had a pre-existing history of anxiety and/or depression before ESKD; largely, due to the lack of such information in our database. However, one could argue that the prevalence of anxiety and depression in our patients before ESKD is likely comparable to the general population. Lastly, the scope of this study did not address the presence of other comorbidities that may play a role in the development and severity of anxiety and depression among our population. Dialysis patients undergo painful interventions such as needling and can also suffer from complications of dialysis. These factors are not addressed in our current study, and there are very limited data on this matter. Therefore, it is empirical to not overlook the level of physical distress during dialysis as a risk factor for mental distress.

Saudi Arabia is much like other countries that are facing challenges in addressing mental health disorders in the general population. Due to the increasing burden of mental health diseases, it is evident that early diagnosis and treatment could have a positive impact on the quality of life. Despite the importance of identifying mental health, many individuals with anxiety and depression remain undiagnosed. In a recent national screening study performed in Saudi Arabia, only a minute percentage of participants, 1.5% and 0.5%, had a current diagnosis of depression or anxiety, respectively, and were receiving treatment for those conditions.

This raises concerns about possible underdiagnosis and under-treatment of mental health issues in this community.^[22] This is largely due to the fact that early warning symptoms of anxiety and depression may be easily overlooked. Additionally, the stigma surrounding mental health and lack of awareness may prove as a challenge for early diagnosis and management of anxiety and depression.^[22]

Recommendations

Quality of life is a significant indication of welfare and aids in health planning by influencing care priorities and the efficacy of healthcare interventions. The evaluation of quality of life plays a crucial role in assessing the effectiveness of interventions for chronic diseases. ESRD imposes a substantial level of disability on patients and fundamentally transforms their way of life, leading to a significant deterioration in their overall quality of life.^[21] The existing body of research on the quality of life in patients with ESRD has predominantly been conducted beyond the borders of Saudi Arabia. As a result, there is a notable lack of quality-of-life studies pertaining to Saudi patients. To rectify this research gap, it is imperative that further investigation into this topic is undertaken. Previous studies have emphasized the significance of addressing modifiable risk factors including smoking, physical inactivity, and socioeconomic inequality through focused interventions.^[22] To improve the quality of life of ESRD dialysis patients, Lacson *et al.*^[36] proposed a number of strategies for lowering depression in dialysis patients, including antidepressant pharmaceutical medication, cognitive behavioral therapy, and physical activity and exercise regimens during hemodialysis. Because gender and unemployment are associated with anxiety and depression in dialysis patients, early screening and management for anxiety in female patients are warranted. Moreover, changing the dialysis schedule/time to accommodate the patient's work schedule may have a positive impact on depression in male dialysis patients.

Conclusion

Anxiety and depression are common mental health conditions worldwide. Despite the limited number of studies on anxiety and depression in dialysis patients, it is evident that gender and employment status are significantly associated with anxiety and depression, respectively. Dialysis type and duration had no impact on the severity of anxiety and depression in our study population. More research is needed to shed light on this issue in Saudi Arabia. Identifying and treating mental health disorders in early-stage CKD patients may facilitate better disease management and improve the quality of life. However, the literature is still lacking evidence for the outcomes of different management options for treating anxiety and depression in dialysis patients.

Author contributions

Conceptualization, Omar A. Alshammari and Khalid I.Almatham; methodology, Hussein Mohamed; software, Hussein Mohamed; validation, Omar A. Alshammari, Khalid I. Almatham and Hussein Mohamed; formal analysis, Hussein Mohamed, Sara O. AlFadil; investigation, Abdulaziz AlShabibi; resources, Mohammad Alomi; data curation, Mohammad Alomi, Abdulaziz AlShabibi, Omar A. Alshammari; writing—original draft preparation, Omar A. Alshammari; writing—review and editing, Sara O. AlFadil; visualization and supervision, Khalid I. AlMatham All authors have read and agreed to the published version of the manuscript.

Institutional review board statement

The study protocol was approved by the Institutional Review Board of King Fahad Medical City (protocol code 22-045 and approved on September 21, 2023).

Informed consent statement

The written informed consent from patients was waived due to the institute's policy.

Data availability statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.

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Conflicts of interest

There are no conflicts of interest.

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