











Prevalence of depression in patients with end-stage renal disease undergoing hemodialysis in Saudi Arabia: A cross-sectional study

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Abstract

Background: A hemodialysis is a treatment option for patients with End-Stage Renal Disease (ESRD). However, patients undergoing hemodialysis three times per week may experience psychological issues, including depression, which are highly prevalent among patients. Unfortunately, most healthcare providers fail to recognize the symptoms of depression due to overlap with other somatic symptoms; thus, depression remains undiagnosed.

Objective: This study aimed to estimate the prevalence of depression and compare the differences in depression symptoms according to the sociodemographic characteristics of patients with ESRD undergoing hemodialysis.

Method: A descriptive, cross-sectional study was conducted from August to October 2021 with a total of 132 hemodialysis patients using the Beck Depression Inventory (BDI II) questionnaire to examine symptoms of depression at multiple health centers in Jeddah. Descriptive statistics, Mann-Whitney U, Kruskal-Wallis, Post-hoc analysis using Conover tests were used for data analysis.

Results: The prevalence of depression in hemodialysis patients was 51.5%, 25.8%, 15.9%, and 6.8%, with minimal, mild, moderate, and severe symptoms, respectively. Depression exhibited a significant relationship with sex ($p = 0.034$), with females showing higher mean depression scores than males. Additionally, depression scores were statistically significant across the different levels of education ($p = 0.019$), with the mean depression scores significantly highest in subjects who had only primary school level of education. Furthermore, the most common symptoms associated with depression were found to be energy loss and fatigue.

Conclusion: Depression prevalence was relatively low among patients with ESRD undergoing hemodialysis, and a loss of energy and fatigue were the most common symptoms correlated with depression. Hence, nurses should be trained on how to routinely use psychological screening scales among patients with ESRD undergoing hemodialysis.

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Article info:

Received: 1 March 2022

Revised: 27 June 2022

Accepted: 2 August 2022

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E-ISSN: 2477-4073 | P-ISSN: 2528-181X

Keywords

prevalence; depression; hemodialysis; end-stage renal disease; ESRD; cross-sectional study; nursing; Saudi Arabia

Background

End-Stage Renal Disease (ESRD) is a major public health issue, defined as ‘... kidney failure sufficiently severe to require maintenance dialysis or kidney transplantation to maintain health and life (Semaan et al., 2018). It is a global phenomenon whose prevalence is largely attributed to the increased cases of lifestyle diseases worldwide, such as diabetes and hypertension (Ganu et al., 2018). However, advances in medicine and contemporary understanding of

chronic kidney disease (CKD) and its complications have led to the development of treatments that increase the survival rates of patients with ESRD.

Maintenance dialysis of ESRD presently involves hemodialysis and peritoneal dialysis as the primary forms of ESRD treatment, even though the former is the most commonly used (Fadzli et al., 2021; Semaan et al., 2018). Despite this progress, some studies report that patients who undergo maintenance hemodialysis report lower overall outcomes, given the burden that dialysis has on the patient's

physical, biological, psychological, social, and cultural dimensions. The diseases can restrict physical functioning, undermine psychological health, increase dependency on caregivers to carry out activities of daily living, limit one's ability to engage in social activity, and increase susceptibility to comorbidity and medical complications – all of which are considered factor determinants of one's general well-being (Ganu et al., 2018; Teles et al., 2018).

In addition, the imposition caused by ESRD and dialysis treatments on patients' well-being can result in psychological stress and anxiety, which may contribute to the depressive symptoms observed in dialysis patients. According to Chan et al. (2017), depression is a highly common comorbidity in patients with ESRD on hemodialysis, with a prevalence rate of up to 46%. Goh and Griva (2018) assert that people with ESRD are five times more likely to suffer from depression than the general population. Depression can be defined as '... a common mental disorder characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, tiredness, and poor concentration (World Health Organization, 2021). An interactive relationship between the psychological stress caused by the ESRD and hemodialysis burden and depressive symptoms could adversely affect the patient's physiological, functional, social, and emotional outcomes (Abdi et al., 2018). It is considered the leading cause of disability, conceptualized as the impact depression has on functional competence in the various aspects of daily life (AlShahrani et al., 2018). Reyes et al. (2021) note that such outcomes could undermine the patient's road to recovery, resulting in poor treatment adherence and worsening their mental health status – a critical challenge for the nursing practice.

In addition to those associated with maintenance hemodialysis of ESRD, patients who develop depression may exhibit various symptoms such as fatigue, sleep disorders, treatment limitations, changes in family roles and social communication, limited daily activities, uncertainty about the future, unemployment, dependence on healthcare professionals, and reduced sexual performance (Abdi et al., 2018; Sriyuktasuth & Phligbua, 2021). The challenge with this, however, is that some of these symptoms may be mistaken for the side effects of hemodialysis, making it quite challenging for early diagnosis and assessment to help improve patients' well-being as they go through the maintenance hemodialysis process. The issue has been acknowledged by various authors, who establish that depression and uremic symptoms sometimes overlap, which makes it difficult to diagnose and assess depression for this particular patient group (Abdi et al., 2018; Al Awwa & Jallad, 2018). Thus, a complete and separate evaluation of these disorders would establish that the symptoms result from a psychiatric disorder – depression and not part of the uremic milieu – to help provide the most appropriate care and enhance overall well-being throughout maintenance hemodialysis for ESRD (Cohen et al., 2016).

Two critical concepts to help us discern between depressive and uremic symptoms are the prevalence and incidence of the targeted symptoms. Prevalence refers to the percentage of people who meet the diagnostic criteria for a condition – depression, in this case, at a particular time, usually 30 days before the examination (Ormel et al., 2022). On the other hand, incidence refers to the rate at which

individuals develop the condition for a period (Wang & Cheng, 2020). The two evaluations can help us understand the issue's significance and the context within which it occurs, such as understanding the various risk factor variables that influence depressive symptoms in patients with ESRD on hemodialysis. Ultimately, these will help inform the key recommendations for medical practice on helping identify and assess depression to work towards better management of post-treatment patient outcomes to enhance the utility of maintenance hemodialysis. For example, El Filali et al. (2017) ascertain that the use of prevalence for a particular patient population can help with understanding the severity of the issue in terms of susceptibility, the risk imminent for patients, and the need to develop critical measures to mitigate the adverse psychological implications of hemodialysis. Incidence would help facilitate the development of these measures by helping establish the risk factors that nursing practice should target to reduce susceptibility and enhance the quality of living as the primary objective.

Most studies that sought to determine the prevalence of depression in patients with ESRD on hemodialysis, focusing on isolating depressive symptoms, affirmed a positive association between maintenance hemodialysis and depression (Al Awwa & Jallad, 2018; Khan et al., 2019; Ravaghi et al., 2017). However, the prevalence rates vary with the population observed, with authors reporting different findings though the average reports usually place depression prevalence between 10 and 45% for patients with ESRD on hemodialysis (Chan et al., 2017; Yang et al., 2021). For example, Al Awwa and Jallad (2018) discovered a prevalence rate of 29% for patients with ESRD on hemodialysis. Semaan et al. (2018) reported a depression prevalence rate of 40.8% and an anxiety rate of 39.6%. Of the selected sample, about 24.1% had comorbid depression and anxiety. In contrast, Ravaghi et al. (2017) observed an overall prevalence of depression of 62% for maintenance hemodialysis patients in Iran. These observations highlight a differential aspect in the target population which can be segmented based on various characteristics, referred to as predictors of prevalence, which can be used to properly and effectively manage patient outcomes post-treatment, as noted by Khan et al. (2019).

The differences in prevalence outcomes position the idea that populations may vary based on their characteristics, which challenges the nursing practice's ability and competence to meet the specific needs of these changing and diverse demands from patients with ESRD on hemodialysis. Nobahar and Tamadon (2016) argue that patients with ESRD on maintenance hemodialysis require specialized care to meet specific needs, and the differences in care needs can be effectively addressed if an analysis of barriers and facilitators of proper patient management is conducted. The rationale stems from the view that each person is unique, and the combination of various social and demographic factors may influence how each person responds to hemodialysis and the burden of ESRD (Gerogianni et al., 2018). The social element is informed by the view that the social environment in which patients live or influence their interactions will influence the perception of available social support to help deal with the adverse consequences of hemodialysis (Lilympaki et al., 2016). As such, a contextual analysis of social and demographic characteristics for all patients can help inform

best-practice recommendations for nursing practice, with favorable outcomes for patient quality of living. These characteristics may be spread through various demographic variables, including age, gender, sex, lifestyle, socio-economic and socio-cultural factors, family status, and other significant factors that could influence patients' mental health and wellbeing.

This research aimed to estimate the prevalence of depression and compare the differences in depression symptoms according to the sociodemographic characteristics of patients with ESRD undergoing hemodialysis. To achieve the overall research aim, two key objectives were explored. First, the prevalence of depression in patients with ESRD on hemodialysis was analyzed. The goal was to ascertain the relational dynamics between hemodialysis and depression to validate the findings on the supposed relationship. Further, the research sought to compare the differences in depression symptoms according to the sociodemographic characteristics of patients with ESRD undergoing hemodialysis.

Methods

Study Design

A descriptive, cross-sectional study design was conducted among 132 patients diagnosed with ESRD and on hemodialysis. The prevalence of depression among these patient groups and the factors that could potentially influence an individual's susceptibility to develop depressive symptoms were investigated. The study was conducted with and targeted hemodialysis patients from multiple health centers in Jeddah. The reason for selecting these particular centers was the convenience it provided the authors due to the presence in these health centers of a department for dialysis that allowed greater access to many potential participants and insights from data collected by the institutions.

Samples/Participants

The sample size included 132 patients undergoing hemodialysis. This was considered ideal for the current study, having been calculated using the Raosoft software (Raosoft, 2004), which suggested 132 as the minimum with a 90% confidence interval. Convenience sampling was used to collect the data. The inclusion criteria were patients diagnosed with ESRD under hemodialysis, at least 18 years old, and able to speak Arabic or English. The exclusion criteria were patients under 18 years undergoing peritoneal dialysis and temporary hemodialysis and exhibiting mental impairments, such as speech or cognitive dysfunction, which could hinder their understanding of the questionnaire.

Instruments

The Beck Depression Inventory (BDI II) was used to assess affective, cognitive, and somatic symptoms of depression, as presented in the Arabic version (Bashir, 2010) translated from the English version by Aaron T. Beck (Beck, 1996). The questionnaire has two components. The first component comprises questions examining five items related to socio-demographic characteristics, including age, sex, marital status, educational level, and living arrangements. The second component includes 21 items measured on a Likert scale ranging from 0 to 3, where '0' signifies an absence of

symptoms and '3' represents the presence of severe symptoms. A score of 0–13 indicates minimal depression; 14–19 mild depression; 20–28 moderate depression; and 29–63 severe depression (Jackson-Koku, 2016).

Data Collection

Data were collected face-to-face using a closed-ended questionnaire. The questionnaire included an informative section containing information orienting participants on the primary objective of collecting their responses and other critical knowledge they needed to be aware of before agreeing to have their responses included in the study – informed consent. In addition, the questionnaire gathered data concerning respondents' socio-demographic aspects and symptoms of depression (absent, mild, moderate, or severe) based on the BDI II. Each process lasted between 15 and 20 minutes. The data were collected between August and October 2021.

Data Analysis

Data were analyzed using IBM SPSS Statistical software for Windows version 26.0 (IBM Corp., Armonk, N.Y., USA). Descriptive statistics (mean, standard deviation, frequencies, and percentages) were used to describe the quantitative and categorical variables. As the depression scores did not fulfill the assumption of the normality test, non-parametric statistical tests were used. The Mann-Whitney U-test was used to compare the mean ranks of depression scores in relation to the categorical study variable, which has two categories (gender and living status). In contrast, the Kruskal-Wallis test was used to compare the mean ranks of depression scores in relation to the categorical study variables, which have more than two categories (age groups, marital status, and level of education), followed by the Post-hoc analysis using Conover test. The reliability analysis of the BDI-II scale was carried out using Cronbach's alpha which measures the internal consistency of items. A p -value of <0.05 and 95% confidence intervals were used to report the statistical significance and precision of the results.

Ethical Considerations

The study was approved by Nursing Research Ethics Committee (NREC) at the Faculty of Nursing at King Abdulaziz University (NREC Serial No: Ref No 2M. 66) and the Ministry of Health Institutional Review Board (IRB; IRB No. H-02-J-002; Research No. 1533). In addition, all participants signed an informed consent form prior to data collection containing the aim of the study and a statement that they could withdraw from the study at any stage for any reason. The participants were also informed that the information would be collected for research purposes only and not be used for anything else. Finally, the research did not cause harm or integrate elements that would further exacerbate psychological stress in participants, and their data were anonymized – with no names or medical record numbers published.

Results

Table 1 summarizes the descriptive outcome of the study participants and their socio-demographic characteristics. There were 132 participants, of whom the majority were

between 46 and 65 years old (53; 40.2%), while a few were between 36 and 45 years (20; 15.2%). The majority of the study participants were males (73; 55.3%). About 63% of the participants were married, and most (88.6%) lived with their families. The educational level of the participants was noted as Illiterate (10.6%), three types of school level (primary, middle & secondary - 59.2%), and remaining participants (30.3%) were with bachelor degrees and above.

Table 1 Distribution of socio-demographic characteristics of the participants (N = 132)

Characteristics	n (%)
Age groups (in years)	
18-35	36 (27.3)
36-45	20 (15.2)
46-65	53 (40.2)
>65	23 (17.4)
Gender	
Male	73 (55.3)
Female	59 (44.7)
Marital status	
Married	83 (62.9)
Single	33 (25.0)
Divorced & Widowed	16 (12.1)
Level of education	
Illiterate	14 (10.6)
Primary school	22 (16.7)
Middle school	20 (15.2)
Secondary school	36 (27.3)
Bachelor and above	40 (30.3)
Living status	
Alone	15 (11.4)
With family	117 (88.6)

The prevalence of four levels of depression among the study subjects is given in **Table 2**, where 56.8% of participants had

minimal, 25% with mild, 12.1% with moderate, and only 6.1% of them were suffering from severe depression. The mean depression score of all study subjects was 13.33.

Table 2 Prevalence of depression and mean depression score

Level of depression	n (%)	95% CI
Minimal	75 (56.8)	47.90 to 65.39
Mild	33 (25.0)	17.88 to 33.28
Moderate	16 (12.1)	7.07 to 18.91
Severe	8 (6.1)	2.68 to 11.64
Mean (SD): 13.33 (8.92)		

Table 3 presents the descriptive statistics and reliability analysis of each of the 21 items of the BDI-II scale. The mean value of each of the 21 items of the BDI-II scale ranged between 0.07 to 1.51, where 0.07 related to the item of 'Suicidal thoughts/wishes' and 1.51 associated with the item of 'loss of energy'. Only five out of 21 items had a mean value of more than 1.0 (loss of pleasure:1.05; loss of energy: 1.51; changes in sleeping pattern: 1.18; changes in appetite: 1.05 & tiredness or fatigue: 1.32). Out of the 4-point scale responses (0, 1, 2, & 3) to the items, 1 indicated a mild positive response to that item. This indicated that our study participants (patients undergoing hemodialysis) had the above five problems (loss of pleasure, loss of energy, changes in sleeping pattern, changes in appetite, and tiredness or fatigue). The mean values of the remaining 16 items are less than 1.0. The reliability analysis of the 21 items of the BDI-II scale shows a statistically significant internal consistency where the Cronbach's alpha value was found to be 0.866 ($p < 0.0001$), which is more than 0.70, therefore, indicating that the scale has good reliability. Also, the Cronbach's alpha values did not change much if any one of the 21 items were deleted. The corrected item-total correlation values were greater than 0.30, indicating a good correlation of items.

Table 3 Descriptive statistics and reliability analysis of each of the 21 items of the BDI-II scale

Name of BDI-II items	Mean	Standard Deviation	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sadness	0.58	0.643	0.505	0.859
Pessimism	0.60	0.890	0.582	0.855
Past failure	0.27	0.664	0.511	0.859
Loss of pleasure	1.05	1.040	0.497	0.859
Guilty feelings	0.53	0.824	0.322	0.865
Punishment feelings	0.27	0.604	0.489	0.860
Self-dislike	0.27	0.721	0.366	0.863
Self-criticalness	0.64	0.839	0.449	0.861
Suicidal thoughts or wishes	0.07	0.253	0.503	0.864
Crying	0.68	0.868	0.451	0.861
Agitation	0.45	0.670	0.407	0.862
Loss of interest	0.55	0.935	0.509	0.858
Indecisiveness	0.39	0.760	0.439	0.861
Worthlessness	0.21	0.654	0.510	0.859
Loss of energy	1.51	0.985	0.484	0.860
Changes in sleeping pattern	1.18	0.931	0.407	0.863
Irritability	0.45	0.724	0.467	0.860
Changes in appetite	1.05	0.991	0.421	0.862
Concentration difficulty	0.33	0.843	0.542	0.857
Tiredness or fatigue	1.32	0.868	0.586	0.855
Internal consistency of BDI-II scale = 0.866 (0.831 to 0.897) ($p < 0.0001$)				

Table 4 provides a comparison of the mean ranks of depression scores in relation to the socio-demographic

characteristics of the study subjects. A statistically significant difference in the mean ranks of depression scores of males

and females ($p = 0.034$) was found. That is, females had statistically significantly higher mean depression scores when compared with males. Also, the mean ranks of depression scores were statistically significantly different across study participants among the five levels of education ($p = 0.019$), where the mean depression scores were significantly higher in the participants who had only primary school level of education when compared with the participants of other levels of education. In addition, the Posthoc analysis shows that the

mean depression scores of those with a primary school level of education were statistically significantly higher than the mean depression scores of those with a secondary level of education and subjects with a bachelor degree and above, but not significantly different with mean depression scores of those with illiterate and middle school level of education. Finally, the mean ranks of depression scores were not statistically significantly different in relation to age groups, marital status, and living status of the study participants.

Table 4 Comparison of mean ranks of depression scores in relation to the socio-demographic characteristics

Characteristics	Mean (SD)	Mean ranks	Mann-Whitney U / Kruskal-Wallis	p-value
Age groups (in years)			3.033	0.387
18-35	11.64 (10.08)	57.15		
36-45	16.10 (12.99)	72.00		
46-65	13.42 (6.86)	69.36		
>65	13.35 (6.60)	69.76		
Gender			1691.50	0.034*
Male	12.21 (9.57)	60.17		
Female	14.71 (7.92)	74.33		
Marital status			5.55	0.062
Married	13.17 (8.20)	66.39		
Single	11.03 (8.28)	57.73		
Divorced & widowed	18.88 (11.71)	85.16		
Level of education			11.81	0.019*
Illiterate	13.71 (4.94)	73.50		
Primary school	18.09 (8.28)	89.00		
Middle school	12.80 (6.97)	68.58		
Secondary school	12.47 (10.41)	58.86		
Bachelor and above	11.60 (9.21)	57.51		
Living status			875.50	0.989
Alone	14.33 (12.25)	66.63		
With family	13.20 (8.46)	66.48		

*Statistically significant

Discussion

This study aimed to estimate the prevalence of depression symptoms in patients undergoing hemodialysis and examine its association with socio-demographic variables. The two primary objectives were to establish the relationship between hemodialysis treatment and the development of depressive symptoms to validate the general view within the literature that patients with ESRD on maintenance hemodialysis develop depressive symptoms. In addition, the research also sought to establish potential factors of prevalence using socio-demographic factor variables. The study results show a positive association between hemodialysis and depressive symptoms, with loss of energy and tiredness and fatigue being the most significant indicators of depression and the most significant contextual predictors being sex and level of education.

Our study showed that the majority (56.8%) of patients with ESRD on hemodialysis exhibited minimal depression symptoms according to the BDI II. This is significantly lower in comparison with a recent study conducted in Palestine, which found that the prevalence of depression was moderate in 33.9% and severe in 29% of participants, with 19.2% and 17.8% of patients minimally and mildly depressed, respectively (Al-Jabi et al., 2021). This difference in the severity and prevalence of depression might arise because of changes in sample size, tools used to estimate the prevalence of depression, and the patient's cultural background. The

positive association between hemodialysis and depression corroborates much of the existing literature on the two variables, affirming that depression is a certain outcome or consequence of hemodialysis (Chan et al., 2017; Semaan et al., 2018; Yang et al., 2021). It is arguably the most common psychiatric illness in patients with end-stage renal disease, which affirms the view that the combination of disturbing physical stress from the disease and psychological distress results in depression (Ma & Li, 2016). Hence, it would be advisable to integrate a psychological intervention aspect or insight when developing a post-treatment regimen for patients on hemodialysis to mitigate or reduce the potential implications of developing depression. Doing so would help identify, determine, and manage various depression levels in patients, with the prospect of developing effective solutions to address and optimize patient outcomes. In addition, it was observed that the risk of developing depressive symptoms increases with the number of treatment sessions an individual undertakes during their prescribed regimen. This aligns with the general view that depressive symptoms are more evident during dialysis (Shafi & Shafi, 2017). As such, the more a patient is exposed to the process and the consequent side-effects of treatment, the more they are susceptible to developing depressive symptoms.

A significant association was found between two socio-demographic variables and determinants of depression susceptibility and severity: sex and level of education. This study concluded that patients are most susceptible to exhibit

higher rates of depression between the ages of 44 and 65 years, which corroborates a recent study conducted in Palestine, in which the depression rate was high in patients aged 60 years and above (Al-Jabi et al., 2021). Furthermore, it has been shown that the older one gets, the more susceptible to depression one gets. This could be mostly due to the lack of engagement and reduced productivity and functionality, with ESRD further limiting the ability of individuals within this age bracket. Matsuzawa et al. (2017) reinforced this rationale by ascertaining that physical exercise has the potential to increase positive effects on physical function for frail individuals.

Our results also showed that sex was a significant factor in depression prevalence, inferring that females are more susceptible and at risk of developing depressive symptoms than males. This finding is in line with the results of other studies that consider depression more predominant in females than males. According to Kuehner (2017), females are five times more likely to develop depression in their lifetime than men, meaning that every ratio of prevalence rate for depression between males and females will more likely be higher for the latter. On the other hand, Athanasiadis et al. (2018) that studies show lower prevalence rates for depression in women, which could be due to many factors, the first being a lack of adequate diagnostic processes to recognize depression in males. Alternatively, there is the view that males have lower social support than females due to misinterpretation of masculinity and social support among males, which leads them to suppress manifesting depressive symptoms or seek help to mitigate or treat their condition (Call & Shafer, 2018).

Finally, the current study also found that one's level of education could influence the prevalence rate of depression for patients with ESRD on hemodialysis. Being with a primary level of school education was found to be significantly related to higher levels of depression reported among this group of hemodialysis patients compared to those of the other educational levels. This finding is in agreement with that of Othayq and Aqeeli (2020) and Gerogianni et al. (2018), who also reported increased depression rates among hemodialysis patients with low levels of education. Furthermore, Semaan et al. (2018) also reported explicitly that illiterate hemodialysis patients had significantly higher depression scores than those with higher levels of education, although this was not the case with our study. Post-hoc analysis of our study showed that the mean depression scores of subjects with a primary school level of education were statistically significantly higher than the mean depression scores of subjects with a secondary level of education and subjects with a bachelor degree and above, but not significantly different with mean depression scores of illiterate subjects and subjects with middle school level of education. Therefore, it is recommended that future studies are conducted using larger sample sizes to confirm the current findings.

The current study results from the BDI II revealed that the most common symptom related to depression in hemodialysis patients was the loss of energy. In contrast, a study conducted in Nepal (Agrawaal et al., 2019) suggested that fatigue was the most common symptom in patients undergoing hemodialysis, experienced by 82% of its participants. In general, these are common symptoms experienced by

patients on hemodialysis and may differ from one patient to another. The prevalence of depression and its incidence in patients undergoing hemodialysis treatment remains to be elucidated. Further studies with depressed hemodialysis patients are needed and should focus on the long-term outcomes of the psychological influences of ESRD.

Implications for Nursing Practice

Several critical implications for the nursing practice can be gleaned from this study. The first and most outright implication is that caregivers should be more vigilant in isolating depressive symptoms from uremic symptoms to help provide more specialized and satisfactory care. It follows from a growing need and consequent significance of monitoring and assessing psychiatric symptoms in patients undergoing any treatment, but more so the prevalence of depression in patients with ESRD on hemodialysis. Managing the initial stage of depression may improve outcomes and concordance with treatment. A growing number of studies suggest that nurses should be trained to use psychological scales, particularly in relation to depression symptoms. Training them on using such scales could enable nurses to identify the symptoms early, allowing for enhanced holistic nursing care and subsequently referring patients for further assessment and treatment by psychologists and psychiatrists. Failure to treat psychological issues such as depression diminishes patients' mental health and wellbeing; therefore, proper implementation of screening and diagnosis strategies for depression would be a useful protocol (Semaan et al., 2018).

In addition, the study proves that some groups are more at risk than others, informed by the significant sex and level of education categories. The insights suggest that nursing practitioners for the particular population studied in Jeddah should be concerned mostly with female patients with only primary school education level compared to subjects of other levels of education, as they are considered the most at-risk among patients with ESRD on hemodialysis. The group is an excellent target for educational, prevention, and treatment interventions. Also, understanding various elements and determinants of prevalence would help practitioners develop more appropriate and specialized interventions. Hence, developing competence and leveraging culturally appropriate methods to help patients most likely to develop depression would enhance the perceived quality of care, patient satisfaction, and overall patient outcomes. Such competence may involve the development of interpersonal relationship skills and abilities and cultural competence to equip nurses with operational capabilities to help assess, diagnose, and engage patients for more personalized care (Hackett & Jardine, 2017; Zhang et al., 2021). Hence, nurses will be able to address the specific needs of their patients effectively.

Limitations

This study has some key limitations that might have affected the results. First, the relatively small sample size ($n = 132$) was an obstacle. The COVID-19 pandemic hindered the ability to include a large number of hemodialysis patients. Numerous hemodialysis centers and hospitals restricted entry to patients only and did not accept IRB applications due to concerns regarding their patients with ESRD. The small sample size affected the diversification of our study group; therefore,

further studies with a greater number of participants are needed. The second limitation of this study was the quarantine period, which adversely affected data collection.

The final limitation was the use of convenience sampling, which increases the risk of bias and limits the generalizability of the study. Although this study reported a low prevalence of depression among hemodialysis patients, early assessment and treatment of depression are needed. Structured assessment tools, early screening, and treatment of depression in hemodialysis patients would improve psychological aspects, health status, and overall patient outcomes, thereby reducing the negative impacts of depression, such as sleep disturbance, fatigue, and decreased daily activity. Moreover, a larger sample size would improve study outcomes in future research. Aside from this, using a qualitative study design might improve the understanding of patients' feelings and experiences, providing more in-depth and detailed research results.

Conclusion

Based on the results of this cross-sectional study, we could draw several conclusions. First, a reasonably low percentage of patients with ESRD undergoing hemodialysis experienced depression. Second, the prevalence of depression was associated with patients' socio-demographic factors, including sex and educational level. Third, a loss of energy and tiredness or fatigue were the most common symptoms correlated with depression, followed by changes in sleeping patterns, loss of pleasure, and changes in appetite in patients undergoing hemodialysis. Finally, the study reveals an urgent need for increased awareness regarding depression associated with hemodialysis treatment among healthcare providers such as physicians, nurses, and specialists.

Declaration of Conflicting Interest

The authors declare no conflicts of interest concerning the research, authorship, and publication of this article.

Funding

The authors received no external funding for the research, authorship, and publishing of this article.

Acknowledgment

The authors would also like to thank the health care centers in Jeddah for their collaboration and for allowing us to reach hemodialysis patients. Finally, special thanks to our parents for their love, support, and continuous encouragement.

Authors' Contributions

Conceptualization, SA and ZK; methodology, LSS, RA; software, ZA; validation, LS; formal analysis, SA, RA, ZK, and ZA; investigation, RA; resources, SA, NS; data curation, ZK; writing-original draft preparation, LS; writing-review and editing, FS, LSS; visualization, ZA; supervision, LS, LSS and FA; project administration, SA, ZK, RA, ZA, and LSS. All authors agreed to be accountable for all contents of the study and agreed with the final version to be published.

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Data Availability

The datasets generated during and analyzed during the current study are available from the corresponding author on reasonable request.

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Cite this article as: Sallam, L., Alsharif, F., Abaalalaa, S., Alakeely, R., Abdullah, Z., Alkhamis, Z., Sindi, N., & Sharif, L. S. (2022). Prevalence of depression in patients with end-stage renal disease undergoing hemodialysis in Saudi Arabia: A cross-sectional study. *Belitung Nursing Journal*, 8(4), 296-303. <https://doi.org/10.33546/bnj.2080>