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Frequency and risk factors associated with depression in hemodialysis patients, Gadarif Nephrology Center, Sudan

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Abstract

Background: Throughout the course of chronic kidney disease (CKD), patients encounter significant psychological challenges that affect their well-being, including coping with the life-threatening diagnosis and lifelong treatment, dialysis techniques, treatment side effects, and complications.

Objective: This study aimed to assess depression among patients with end-stage kidney disease (ESRD) undergoing hemodialysis (HD) at Gadarif Nephrology Center, Gadarif State, Sudan

Methods: a descriptive, cross-sectional hospital-based study was conducted at Gadarif Nephrology Center in Gadarif State from Jun 2024 to October 2024. Data were collected through an interview-administered questionnaire. Depression level was assessed using Beck Depression Inventory scale. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26.

Results: The study included 290 patients, the age distribution revealed that the majority of participants, 36.9% (107/290), were in the 44–56 years age group, followed by 76 (26.2%) in the 57–73 years group. Male was predominant gender with frequency of 74.8% (217/290). Decreased physical function was the most observed risk factor for depression, affecting 74.8% (217/290). No participants reported a decline in sexual function or cognitive skills as a risk factor for depression. Based on the beck Depression Inventory Assessment, 91.7% (266/290) of participants showed no signs of depression while mild depression was identified in 5.5% (16/290) of participants. No significant association was observed between the depression and age, sex, education and disease duration among study subject. The study documented significant association between the depression among study subject and occupation (P-value = 0.028) and, residence (P-value = 0.001).

Conclusion: The study detected a relatively low frequency of depression among studied ESRD cases in Gadarif State, Sudan.

Keywords: Depression; Hemodialysis; Gadarif; Sudan

1. Introduction

Depression is defined as a mental disorder that results in a prolonged loss of interest in activities, and is considered a growing public health phenomenon. [1]. There are two main types of depression; First: major depression with loss

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interest symptoms, Second: persistent depressive disorder which is characterize by mild symptoms [2]. Depression manifests itself in a variety of emotional, physical, and behavioral symptoms that severely impact an individual's daily life and well-being. Emotionally, one of the most common signs is a persistent feeling of sadness, anxiety, or a general feeling of emptiness that lasts for a long time. Physically, depression can lead to chronic tiredness and lack of energy. Behavioral changes include irritability, withdrawal from social interactions, increased impulsivity, and substance abuse, for example, alcoholics [3].

End-stage kidney disease (ESKD) is a chronic situation characterize by permanent renal failure [4], recently this medical issue was classified as one of the major causes of death through the world [5]. Throughout the course of chronic kidney disease (CKD), patients encounter significant psychological challenges that affect their well-being, including coping with the life-threatening diagnosis and lifelong treatment, dialysis techniques, treatment side effects, and complications [6]. Depression is reported to be the most common psychological aberration among ESKD patients [7] [8]. There is an increasing emphasis on dialysis patients' mental health and quality of life, with some suggesting that it is a key predictor of death and morbidity. The World Health Organization (WHO) defines quality of life as an individual's opinion of their life situation, taking into account their cultural environment, values, objectives, expectations, standards, and concerns. Quality of life is widely utilized to assess the health and prognosis of dialysis patients [9]. This study aimed to assess depression among ESRD patients undergoing HD at Gadarif Nephrology Center, Gadarif State, Sudan.

2. Methods

2.1. Design and settings

The study was descriptive, cross-sectional hospital-based. It was conducted at Gedarif Nephrology Center, in Gedarif State, Eastern Sudan, which is a major nephrology center that contains the capacity of 220 patients on regular hemodialysis (HD) and 15 patients for emergency. The period was from Jun 2024 to October 2024.

2.2. Population

The study involved ESRD patients underwent HD admitted Gedarif Nephrology Center. Participant of age > 18 years and who were on regular HD were included while those who refused to enroll in the study and/or does not fulfill inclusion criteria were excluded.

2.3. Sampling

Convenience non probability sampling technique was used to collect the samples.

The sample size of this study was calculated using Cochran's (Robert Mission) Sample Size Formula:

$$N = \frac{Z^2\, pq}{d^2}$$

Where:

- N: the sample size required by the study,
- Z (1-alph): standard normal variant at 5% type 1 error ($p < 0.05$)
- It is 1.96
- p: the expected prevalence of an event
- q = 1-p
- d: absolute error or precision = 5% (0.05)

Prevalence of depression among ESRD patients is estimated to be around 25% [56] p = 0.25

$$(1.96^2) \times (0.25) \times (0.75) \div (0.05^2) = 288 \text{ patients}$$

2.4. Data collection tools

The data was collected by the primary researcher through a comprehensive structured close-ended questionnaire via direct interviews with patients. The questionnaire included demographic data, risk factors, clinical features, and the grade of depression among ESRD patients. Results were obtained from routine investigations conducted in the clinic or from patient records.

2.5. Study variables

The dependent variables are clinical presentation, severity of depression, and the prescribed management. The independent variables are demographic data, age, sex, occupation, education, and residence.

2.6. Statistical analysis

The data entry was in an excel sheet. Data were analyzed by Statistical Package for Social Sciences (SPSS) Version 26. The data were calculated as percent, and frequencies and then presented in Tables and Figures. The chi-square test was used for categorical variables and to find associations among them. Statistically, $P \leq 0.05$ was considered a significant difference.

2.7. Beck Depression Inventory

This scale provides the therapist with a reliable and rapid assessment of the level of depression. The scale consists of (21) questions. Each question has a graduated series of four alternatives arranged according to their severity, which represent symptoms of depression. Numbers from (0-3) are used to indicate the severity of the symptoms.

- The scale is applied to persons of (15) years of age or older.
- The examinee chooses one of the alternatives that best suits his current situation, by circling it.
- The score of each question is the number of the statement chosen by the examinee. For example, if the examinee chooses alternative number (3), his score for this question is (3), and so on.
- Note / In question (19), the examinee is asked if he is currently undergoing a weight loss program? If the answer is yes, he is given zero, and if no, he is given the score according to his choice of alternatives, and the total score is added and described (Table 1).

Table 1 Beck Depression Inventory score

Score	Interpretation
0-9	No depression
10-15	Mild depression
16-23	Moderate depression
24-36	Severe depression
> 37	Very severe depression

2.8. Ethical consideration

The proposal for thesis was submitted to Ethics Review Committee of the Sudan Medical Specialization Board, for approval of the study.

3. Results

In total 290 ESRD patients underwent HD were recruited. The mean age of the participants was 46.7 years (SD ± 12.8 years). The age distribution revealed that the majority of participants, 36.9% (107/290), were in the 44–56 years age group, followed by 76 (26.2%) in the 57–73 years group. Male was predominant gender with frequency of 74.8% (217/290). Urban residence, occupation free and secondary school education participants accounted to 72.8% (211/290), 72.8% (211/290) and 33.1% (96/290) respectively. Majority of patients 55.2% (160/290), having undergone HD for 1 – 3 years (Table 2).

Among the risk factors for depression in the study population, decreased physical function was the most prevalent, affecting 74.8% (217/290). No participants reported a decline in sexual function or cognitive skills as a risk factor for depression (Table 3).

Based on the beck depression Inventory assessment, 91.7% (266/290) of participants showed no signs of depression while mild depression was identified in 5.5% (16/290) of participants (Table 4). No significant association was observed between the depression and age, sex, education and disease duration among study subject (Table 5) (Table 6)

(Table 7) (Table 10). The study documented significant association between the depression among study subject and occupation (P-value = 0.028) and, residence (P-value = 0.001) (Table 8) (Table 9).

Table 2 Distribution of ESRD patients' according to sociodemographic characteristics. No 290

Variable		**Frequency (%)**
Age	18-30 years	42 (14.5)
	31-43 years	65 (22.4)
	44-56 years	107 (36.9)
	57-73 years	76 (26.2)
Sex	Male	217 (74.8)
	Female	73 (25.2)
Residence	Rural	79 (27.2)
	Urban	211 (72.8)
Occupation	Employee	36 (12.4)
	Teachers	2 (0.7)
	Workers	41(14.1)
	Not occupation	211 (72.8)
Education	Illiterate	55 (19)
	Primary school	89 (30.7)
	Secondary school	96 (33.1)
	University or above	50 (17.2)
Duration of HD	< 1 years	56 (19.3)
	1-3 years	160 (55.2)
	4-6 years	49 (16.9)
	7-9 years	16 (5.5)
	10-13 years	9 (3.1)

Table 3 Frequency of ESRD patients' according to the observed depression risk factors. No 190

Risk factors	**Frequency**	**(%)**
Decreased physical function	217	74.8%
Loss of work	78	26.9%
Loss of a primary role in their occupation or family	8	2.8%
Decline in sexual function	0	0%
Diminution of cognitive skills	0	0%

Table 4 Beck depression inventory result among ESRD patients. No 290

Beck Depression Inventory	Frequency	(%)
No depression	266	91.7%
Mild depression	16	5.5%
Moderate depression	5	1.7%
Severe depression	3	1%
Total	290	100%

Table 5 Association between depression and age of ESRD patients. No 290

Age groups	Beck Depression Inventory				Total
	No depression	Mild depression	Moderate depression	Severe depression	
18-30 years	36	3	2	1	42
31-43 years	61	2	1	1	65
44-56 years	99	7	1	0	107
57-73 years	70	4	1	1	76
Total	266	16	5	3	290
P-value = 0.730					

Table 6 Association between depression and sex of ESRD patients. No 290

Gender	Beck Depression Inventory				Total
	No depression	Mild depression	Moderate depression	Severe depression	
Female	70	2	1	0	73
Male	196	14	4	3	217
Total	266	16	5	3	290
P-value = 0.452					

Table 7 Association between depression and education of ESRD patients. No 290

Education	Beck Depression Inventory				Total
	No depression	Mild depression	Moderate depression	Severe depression	
Illiterate	51	4	0	0	55
Primary school	83	3	2	1	89
Secondary school	87	6	2	1	96
University or above	45	3	1	1	50
Total	266	16	5	3	290
P-value = 0.945					

Table 8 Association between depression and occupation of ESRD patients. No 290

Occupation	Beck Depression Inventory				Total
	No depression	Mild depression	Moderate depression	Severe depression	
Employer	33	2	1	0	36
Free worker	34	3	2	2	41
Not employed	198	10	2	1	211
Teacher	1	1	0	0	2
Total	266	16	5	3	290
P-value = 0.028					

Table 9 Association between depression and residence of ESRD patients. No 290

Residence	Beck Depression Inventory				Total
	No depression	Mild depression	Moderate depression	Severe depression	
Rural	64	10	3	2	79
Urban	202	6	2	1	211
Total	266	16	5	3	290
P-value = 0.001					

Table 10 Association between depression and disease duration of ESRD patients. No 290

Duration of HD	Beck Depression Inventory				Total
	No depression	Mild depression	Moderate depression	Severe depression	
< 1 years	54	1	1	0	56
1-3 years	147	7	3	3	160
4-6 years	44	4	1	0	49
7-9 years	13	3	0	0	16
10-13 years	8	1	0	0	9
Total	266	16	5	3	290
P-value = 0.505					

4. Discussion

Patients with ESRD have risk factors that make them vulnerable to increased depressive effects [10]. Increased depressive affect has been associated with signs of impaired compliance in hemodialysis patients [11]. Depression has also been associated with altered immune system function, particularly decreased cellular immunity [12]. Furthermore, depression is associated with poor nutritional status, and has been shown to precede decreased serum albumin levels in patients with end-stage renal disease [13].

The present study of 290 ESRD patients undergoing hemodialysis, revealed a mean age of 46.7 years with a male predominance (74.8%), this contrasts with findings in which a mean age of 60 years and a more balanced gender distribution was documented [14][15]. The younger age and greater male predominance in our study may reflect

regional or sociocultural factors specific to Gedarif, underscoring the need for targeted interventions that consider these demographic characteristics.

This study recorded high frequency of ESRD from urban residence suggesting a higher number of cases in need of hemodialysis, also there was a statistically significant association between the depression among ESRD patients and residence (P-value = 0.001). This difference may highlight regional healthcare access disparities or sociodemographic factors affecting ESRD prevalence and treatment access in urban versus rural populations.

The current study observed variable distribution of educational status levels among studied ESRD cases with the majority being in primary and secondary levels, these differences may reflect varying educational access and literacy rates across regions, potentially impacting patient awareness and management of ESRD.

From the results, the frequency of depression in ESRD subject with symptoms was accounted to 8.3% (24/290). Decreased physical function emerged as the leading risk factor for depression among ESRD patients was reported with rate of 74.8% followed by loss of work. In contrast, other study [16] highlighted social and lifestyle impacts among patients. These findings underscore the multifaceted nature of depression risk in ESRD patients, linked to both physical and social factors.

The beck depression inventory analysis of ESRD of this study revealed that, the majority of participants (91.7%) were in the normal range. Higher rates of depression were concluded in other similar studies [17][15]. These findings highlight notable variability in depression rates among ESRD patients across different population, which may stem from differences in assessment tools, cultural factors, and healthcare support structures. The low prevalence of severe depression in the current study suggests that, despite the challenges of ESRD, most patients may have coping mechanisms or support that mitigate severe depressive symptoms.

The findings from this study underscore the multifaceted nature of depression in patients with end-stage renal disease (ESRD) undergoing hemodialysis. While certain demographic factors like age and gender did not show a significant correlation with depression levels, the associations found with occupation and residence highlight the importance of socio-economic factors in mental health outcomes. Additionally, the significant influence of social support on reducing depression risk emphasizes the need for holistic care approaches that incorporate psychological support alongside medical treatment for ESRD patients. This highlights the critical role healthcare providers can play in fostering supportive environments that promote mental well-being [18]

5. Conclusion

The study detected a relatively low frequency of depression among studied ESRD cases. Decreased physical function and loss of work were identified as prevalent risk factors; however, only a small percentage of cases reported declines in sexual function or cognitive skills.

Implications for intervention

The findings underscore the need for targeted mental health support and interventions, particularly for non-employed individuals and those living in rural areas, to enhance the psychological well-being of patients on hemodialysis.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethics of this study was obtained from the Ministry of Health, Gadarif State, Sudan.

Statement of informed consent

Verbal consent was obtained from all individual participants included in the study.

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