



FREQUENCY OF RISK FACTORS FOR DEPRESSION IN HEMODIALYSIS PATIENTS

Raja Muhammad Umer Farooq¹, Sohaib Ahmed^{2*}, Marzia Shaher Bano³,
Muhammad Farhan ul Haq⁴, Aysha Rani⁵, Saadia Fatima⁶

^{1,3}Senior Registrar Medicine, Wah Medical College, Wah Cantt, Pakistan

^{2,4,5,6}Assistant Professor Medicine, Wah Medical College, Wah Cantt, Pakistan

***Corresponding Author:** Sohaib Ahmed,

Assistant Professor Medicine, Wah Medical College, Wah Cantt, Pakistan

Email: Sohaib_ahmed87@hotmail.com

ABSTRACT

Objectives: To determine the frequency of risk factors involved in the pathogenesis of depression in patients while undergoing continuous hemodialysis.

Methodology: Depression is considered as the most common psychological illness among hemodialysis patients. Prevalence among ESRD patients ranged between 20% to 30%. The risk factors for dialysis-related depression are multifactorial, related to psychological, social, and biological mechanisms (which include roles of neurotransmitters, inflammation, nutritional status and genetic predisposition in the pathogenesis). The cross-sectional study was carried out in the department of General Medicine, Pakistan Ordnance Factories Hospital, Wah Cantt during November 2020 to April 2021. A total of 85 patients were enrolled in the study. All patients then underwent evaluation for depression using Beck's Depression Inventory (BDI) questionnaire and depression severity was noted. Blood samples were then drawn and sent to the Chemical Pathology Department, POF Hospital Wah, for measurements of serum hemoglobin levels and serum phosphate levels, via a Roche Cobas C311 Analyzer and XN 1000 Sysmex Analyzer, respectively, which were then recorded on the mentioned proforma.

Results: Mean age of the patients was 49.6 ± 10.7 years. Male gender was found to be dominant in this study. Various factors like lower age, marital status (unmarried), minimal and middle education levels, low socioeconomic status, infrequent weekly hemodialysis, low levels of hemoglobin, lower BMI and variable degree of serum phosphate levels were significantly ($p < 0.05$ or $p < 0.001$) allied with depression.

Conclusion: In the current study it is concluded that depression is highly prevalent among continuous hemodialysis patients. Various factors like lower age, marital status (unmarried), minimal and middle education levels, low socioeconomic status, infrequent weekly hemodialysis, low levels of hemoglobin, lower BMI and variable degree of serum phosphate levels are significantly ($p < 0.05$ or $p < 0.001$) linked with depression.

Keywords: Hemodialysis, ESRD, Depression, Risk factors, Beck's Depression Inventory

INTRODUCTION

Depression ranks fourth on the World Health Organization (WHO) global disease burden list, with a lifetime risk of development between 15% to 18%, worldwide (1). Researchers around the world are actively investigating the causes of depression, suggesting that it arises from a complex interplay of

Vol. 33 No.02 (2026): JPTCP (982 - 994)

genetic, biological, environmental, and psychological influences. Depression is often found alongside other chronic illnesses such as diabetes, cancer, cardiovascular disease, and Parkinson's disease. These medical conditions can exacerbate depression, just as depression can negatively affect the cause of these diseases. Common symptoms of depression include a persistent feeling of sadness, anxiety, or emptiness; hopelessness or pessimism; feelings of guilt, worthlessness, or helplessness; loss of interest or enjoyment in hobbies and daily activities; low energy or fatigue; difficulty concentrating, remembering, or making decisions; sleep disturbances such as insomnia or excessive sleeping; changes in appetite or weight; thoughts of death or suicide; irritability or restlessness; and unexplained physical symptoms like headaches, cramps, or digestive issues that do not improve with treatment or lack a clear medical cause (2, 3).

WHO reported that over 264 million people suffer from depression. Depression is distinct from normal changes in mood and transient emotional reactions to problems encountered in daily living. Particularly if persistent and moderate or severe, depression can turn into a debilitating health disorder. Depression can lead the

affected individual to suffer greatly and perform badly at work, at school, and in the family. Depression can, at its worst, result in suicide. Nearly 800,000 people die from suicide each year. Suicide ranks as the second most common cause of death among 15-29-year-olds (4, 5).

While there are known, effective treatments for mental disorders, 76% to 85% of individuals with mental disorders in low- and middle-income countries go untreated (6). Barriers to active treatment include inadequate resources, insufficient trained health-care professionals and social stigma related to mental disorders. Inaccurate assessment is also a barrier to effective care. Across the income levels in countries everywhere, depressed individuals frequently are not diagnosed appropriately, and others without the disorder are repeatedly misdiagnosed and prescribed antidepressants. The WHO held a survey of COVID-19 and found that an increase in the burden of depression and other mental health illnesses is on an increase of 22% internationally (7).

The most recent Global Burden of disease, injury, and risk factor study 2016 (GBD 2016) aimed to describe the burden of disease attributable to depressive disorders in terms of prevalence and disability-adjusted life years (DALYs) in South Asia countries (namely India, Pakistan, Bangladesh, Nepal and Bhutan). According to the study, in 2016, the age-standardized prevalence of depressive disorders in South Asia was 3.9% (95% UI: 3.6–4.2%). Within the region, the rates were 4.4% (95% UI: 4.4–4.8%) in Bangladesh, 3.9% (95% UI:

3.6–4.2%) in India, 3.0% (95% UI: 2.8–3.3%) in Pakistan, 4.0% (95% UI: 3.7–4.3%) in Nepal, and 3.7% (95% UI: 3.4–4.1%) in Bhutan. Depressive disorders in South Asia accounted for 9.8 million disability-adjusted life years (DALYs) (95% UI: 6.8–13.2 million), equivalent to 577.8 DALYs per 100,000 population (95% UI: 399.9–778.9). Of these, major depressive disorder (MDD) alone contributed 7.8 million DALYs (95% UI: 5.3–10.5 million). India reported the highest number of DALYs from both depressive disorders and MDD, followed by Bangladesh and Pakistan. Across all countries, DALYs were most pronounced among women and individuals aged 75–79 years (8).

However, among patients with end-stage renal disease (ESRD), prevalence is believed to be three times higher than the common population. Some studies estimate that around 28% of individuals with chronic kidney disease approaching dialysis experience major depression, while an even greater proportion of those already undergoing dialysis report symptoms of minor depression (9). In addition, mortality is 2.7 times higher in those patients who are under hemodialysis and suffering from concurrent depression. Hemodialysis (HD) is a lifelong treatment that frequently leads to adverse effects on patients' mental health (10).

Depression in individuals undergoing dialysis arises from a combination of psychological, social, and biological influences. Biological contributors may include neurotransmitter imbalances, inflammation, poor nutritional status, and genetic factors. These patients often face a demanding treatment schedule, which includes strict dietary limitations, a large number of medications, and hemodialysis sessions lasting 3 to 4 hours, typically three times per week. Consequently, their quality

of life tends to be lower compared to individuals with other chronic illnesses such as heart failure, chronic respiratory conditions, angina, arthritis, or even cancer

(11). Another common misconception among ESRD patients is that they are viewed as being too ill to perform any physical activity, in addition they lack the motivation to do so, and such activities are perceived as a health risk. Furthermore, decreased hemoglobin levels are also thought to be correlated with better rate of depression in these patients (12).

Saeed et al. (13, 14) conducted a study for risk factors for depression in HD patients and found that unmarried marital status ($n=23$, 12.8%, $p<0.001$), low education levels ($n=52$, 28.9%, $p=0.037$) and unemployment status ($n=157$, 87.2%, $p<0.001$) had positive relations with the development of depression, while age (mean=48 years, $p=0.27$), male sex ($n=99$, 55.0%, $p=0.750$) and low degree of income ($n=115$, 63.9%, $p=0.195$) had no significant impact. Hawamdeh et al. (15) also concluded that unmarried marital status ($n=32$, 84.2%, $p=0.003$) was contributory while unemployment ($n=31$, 50.7%, $p=0.14$) did not have a significant relationship with the development of depression in these patients. The research also revealed that 31.4% patients were normal and rest 68.6% had depression, 28.3%, 25.6%, 7.96% had mild, moderate and severe depression respectively.

The results of Teles et al. (16) were somewhat at odds with those studies mentioned previously, which concluded that age was in fact a significant risk factor (mean=50.5±14, $p=0.03$) while unemployment ($n=38$, 92%, $p=0.33$) was not. Moreover, it was seen that low hemoglobin levels were a strong risk factor for the development of depression in hemodialysis patients, where a mean level of 9.4±1.4 g/dL was seen in depressed patients and 10.3±1.6 g/dL was seen in non-depressed ones, ($p=0.01$). In addition, low serum phosphate levels were also associated with depression, a lower level of 5.2±1.3 mg/dL was seen in depressed patients versus 6.1±1.6 mg/dL in non-depressed ones, ($p=0.011$).

Conversely, Traisathit et al. (17) concluded that unmarried marital status ($n=3$, 25%, $p=0.608$), low education levels ($n=9$, 75%, $p=0.872$), unemployment status ($n=7$, 58%, $p=0.889$) advancing age (51.2±13.8 years in depressed patients, $p=0.379$), male sex ($n=9$, 75%, $p=0.102$), low degree of income ($n=10$, 83%, $p=0.797$), or even low hemoglobin levels (mean=11.0±1.4 g/dL, $p=0.38$) had no significant association with the development of depression in patients on hemodialysis, in complete contrast to previous referenced studies, which were at least partially in accordance with each other.

It has been cleared from the literature that depression is extremely common and is linked with low quality of life and elevated mortality in adults with CKD, including ESRD. Yet there are several significant differences in the diagnosis, epidemiology, and treatment of depression in patients with non-dialysis-dependent CKD and ESRD. Firstly, the use of self-reported questionnaires to diagnose depression can be less valid in patients with ESRD than CKD. Second, even though the incidence of interview-based depression is about 20% in both groups, risk factors for depression could differ. Third, the mechanisms of depression could also be different in CKD compared to ESRD. Finally, issues surrounding the choice of type and the dose of antidepressant drugs differ between CKD and ESRD. Additional future research should more critically study the mechanisms of depression in both groups, and test prevention and treatment interventions for depression in these groups.

Depression in patients with end-stage renal disease (ESRD) has been widely studied and is linked to reduced quality of life (QOL), poor adherence to dialysis treatment, increased medical comorbidities, and lower survival rates. The combination is debilitating and results in significant long-term morbidity and mortality, an unnecessary financial burden, both on the patient and the healthcare facilities. Early identification of risk factors and prompt removal/treatment, as well as management of depression will result in greatly improved outcomes. The literature available on the subject of risk factors for this potentially easily treatable disease combination is extremely conflicted. The current study is aimed at possibly reducing the conflict around the causality of various risk factors for depression in patients on HD so that prompt identification and treatment may be affected in the initial stages.

METHODOLOGY

The descriptive cross-sectional study was carried out in the department of General Medicine, Pakistan Ordnance Factories Hospital, Wah Cantt during November 2020 to April 2021 to determine the frequency of risk factors involved in the pathogenesis of depression in patients while undergoing continuous hemodialysis at a fixed schedule for at least 3 months. Depression was diagnosed and scored according to the Beck's Depression Inventory and a patient with a score of 21 or above were considered suffering from clinical depression. The following factors were considered the primary risk factors for the current study:

Serum hemoglobin levels: Serum hemoglobin levels were measured in g/dL and grouped as follows: Very low = < 8.5 g/dL, Low = 8.6-12.4 g/d, Normal = 12.4-17.4 g/dL, High = > 17.4 g/dL. Very low and low hemoglobin levels were considered as risk factors for depression.

Serum phosphate levels: Serum phosphate levels were measured in mmol/L and grouped as follows: Low = <1.12 mmol/L, Normal = 1.12-1.45 mmol/L, High = > 1.45 mmol/L. Low serum phosphate was considered a risk factor for depression.

Marital status: This was defined as follows: Single: if a patient has never married. Married: if a patient is currently married, irrespective of whether he/she was previously divorced or widowed. Divorced: if a patient is divorced and has not re-married. Widowed: if a patient is widowed and has not re-married. Divorced and widowed status was considered a risk factor for depression.

Socioeconomic status: This was defined according to monthly income and was done as follows: Low: < PKR 30,000/- per month., Medium: PKR 30,000/- PKR 50,000/- per month., High: > PKR 50,000/- per month. Low socioeconomic status was considered a risk factor for depression.

Employment status: This was defined as follows: Employed: engaged in a job or studies, for at least two weeks, that take up 6 hours or more per day for 5 days a week, Unemployed: not engaged in a job or studies, for at least two weeks, that take up 6 hours or more per day for 5 days a week. Unemployed status was considered a risk factor for depression.

Education level: This was defined according to years spent in an education institution and defined as follows: Illiterate: Not received any formal education, Minimal: Received education in an institution for up to 5 years, Medium: Received education in an institution between > 5 years and up to 12 years, Well-educated: Received education in an institution > 12 years. Illiteracy was considered a risk factor for depression.

The sample size was calculated by Consecutive non-probability as $n = 85$ at a confidence level of 95%, anticipated population proportion of 68.6% (15), and absolute precision required is 10%.

Ethical clearance was taken from the hospital ethical committee before starting the study. Informed consent was obtained, as per consent form, from a total of 85 patients who were presented to the General Medicine Department, POF Hospital Wah Cantt. These patients were undergoing hemodialysis and fulfilled the complete requirements of the inclusion (patients of both genders, 18 to 60 years, patients with hemodialysis for at least 3 months) and exclusion criteria, which was severely tailed to control confounders and bias.

Data is collected and all participants were evaluated with a thorough medical history and clinical examination. Age, sex, weight (via N&M Weighing Scale), height (via standard measuring tape), body mass index, marital status, socioeconomic status, employment status, education level, duration of hemodialysis and frequency of hemodialysis were recorded. All patients then underwent evaluation for depression using the Beck's Depression Inventory (BDI) questionnaire and depression severity was noted. Blood samples were then drawn and sent to the Chemical Pathology Department, POF Hospital Wah, for measurements of serum hemoglobin levels and serum phosphate levels, via a Roche Cobas C311 Analyzer and XN 1000 Sysmex Analyser, respectively, which were then recorded on the mentioned proforma.

RESULTS

SPSS Version 25 was used for data analysis. Descriptive statistics were calculated for all variables. Data were presented as tables. Quantitative variables specifically age, weight, height, body mass index,

duration of hemodialysis, frequency of hemodialysis, serum hemoglobin levels and serum phosphate levels were measured by mean and standard deviation. Qualitative variables specifically sex, marital status, socioeconomic status, employment status, depression severity and education level were measured as frequency and percentage. Effect modifiers specifically age (young 18-35 years, middle-aged = 36-50 years, old = 51-60 years), body mass index (underweight = < 18.5 kg/m², normal = 18.5-24.9 kg/m², overweight = 25-29.9 kg/m², obese = 30 kg/m² or $>$), duration of hemodialysis (short = > 3 months - 1 year, medium

= > 1 year - 3 years, prolonged = > 3 years), frequency of hemodialysis (Infrequent = once weekly or $<$, frequent = twice weekly, very frequent = thrice weekly or $>$), serum hemoglobin levels, serum phosphate levels, sex (male, female), marital status, socioeconomic status, employment status, depression severity and education level were controlled by stratification. Post-stratification Chi square test was applied. P value of ≤ 0.05 was considered significant.

Male gender was found to be dominant in this study and gender distribution showed an inclusion of higher number of male (54.1%) as compared to females (45.9%) in this study as shown in table 2. Mean BMI of the patients remained to be 27.9 ± 3.2 and further distribution of BMI as underweight, normal, overweight, and obese patients is presented in table. Results showed that most of the patients (67.1%) were overweight and 21.1% were obese in present study as shown in Table 3. Marital status of the patients was also observed and revealed that 63 (74.1%) of the patients were married in this study while 8.2% were widow/widower, 7.1% were divorced and 10.6% were unmarried in this study as presented in table 4. Table 5 shows the employment status of the study subjects. Only 42.4% were employed while rest were unemployed. Level of education of continuous hemodialysis patients was also assessed and revealed that only 5.9% were illiterate whereas most of the patients (48.2%) had medium level of education and only 20% were recorded as well educated as shown in table 6. Socioeconomic status of the patients was also assessed, and it was found that only 12.9% had high socioeconomic status whereas 25.9% had low and highest number of continuous hemodialysis patients (61.2%) had medium socioeconomic status as shown in table 7.

Frequency of hemodialysis among continuous hemodialysis patients on a weekly basis was also observed in present study which showed that most of the patients (73%) had frequent hemodialysis while 12.9% had infrequent hemodialysis and 14.1% had very frequent hemodialysis as depicted in table 8. Beck's depression inventory was used to assess the level of depression among continuous hemodialysis patients, and it was found that 30.6% of the patients had no depression, 23.5%, 28.2%, 9.4%, and 8.2% had mild, moderate, severe, and extreme depression respectively as presented in table 9. Lifetime duration of dialysis was also assessed and showed that 31.8% had a short span of duration ranging from > 3 months or < 1 year while rest of 68.2% had medium span of duration ranging 1-3 years however mean duration of dialysis among all the patients remained to be 16.4 ± 6.7 months as shown in table

10. A low level of hemoglobin was observed among all continuous hemodialysis patients with a mean hemoglobin level 9.4 ± 1.0 g/dL, of which 17.6% had very low levels of hemoglobin as < 8.5 g/dL while rest of 82.4% had low levels of hemoglobin in the range of 8.6-12.4 g/dL of hemoglobin as shown in table 11. Mean serum phosphate level of the patients remained to be 1.25 ± 0.31 mmol/L in this study. Data showed that 34.1% patients had normal levels of serum phosphate while 30.6% had low (≤ 1.11 mmol/L) levels and 35.3% had high (> 1.45 mmol/L) levels of serum phosphate as shown in table 12.

Severity of depression was stratified with reference to age groups in present study and revealed that level of depression is higher in lower age groups and lower amongst higher age groups patients, further a chi square test presented a significant difference with p-value < 0.05 as presented in table 13. Severity of depression was also stratified regarding gender and revealed that female gender showed a higher frequency of being normal with hemodialysis as compared to male gender however the difference was insignificant with p value > 0.05 as presented in table 14. Severity of depression was also stratified with reference to the marital status of the patients where unmarried showed a higher frequency of being extremely depressed as compared to other groups and a significant difference (p value < 0.05)

was observed as presented in table 15. Severity of depression was also stratified with status of employment and an insignificant difference was observed with p value of 0.227. Apparently more of the unemployed patients were normal as presented in table 16. Severity of depression was also stratified with reference to the educational level of the patients and a significant difference with p value of 0.007 was observed as presented in table 17. Socioeconomic status was also plotted against severity of depression and showed that the normal continuous hemodialysis patients were from medium and higher socioeconomic status only while all the low socioeconomic patients had mild to severe depression and difference remained significant ($P<0.001$) as shown in table 18. Severity of depression was also plotted against rate of hemodialysis among patients and revealed that most of the patients with infrequent dialysis were normal or had mild depression while significant depression ($P<0.001$) was present among the patients receiving frequent and very frequent hemodialysis as presented in Table 19. An insignificant difference ($p = 0.442$) was observed among the patients having short or medium duration of lifetime dialysis as presented in table 20. The patients having very low hemoglobin levels were more prone to the higher levels of depression as compared to the patients having low level of hemoglobin and difference was significant ($P<0.001$) as presented in table 21. Serum phosphate level also showed to be a risk factor for occurrence of depression and a significant difference ($P<0.001$) among groups was observed as shown in table 22. Stratification of BMI with depression severity also showed that obese patients were more prone to be normal and a significant difference with p value 0.017 was observed as shown in table 23.

Table-1. Distribution of the patients by age

Age (Years)	Number	Percentage
18-35	9	10.6
36-50	27	31.8
51-60	49	57.6
Total	85	100.0
Mean±SD	49.6±10.7	

Table-2. Distribution of the patients by gender

Gender	Number	Percentage
Male	46	54.1
Female	39	45.9
Total	85	100.0

Table-3. Distribution of the patients by BMI (kg/m²)

BMI	Number	Percentage
< 18.5	4	4.7
18.5-24.9	6	7.1
25-29.9	57	67.1
≥ 30	18	21.1
Total	85	100.0
Mean±SD	27.9±3.2	

Table-4. Distribution of the patients by marital status

Marital status	Number	Percentage
Unmarried	9	10.6
Married	63	74.1
Widowed	7	8.2
Divorced	6	7.1
Total	85	100.0

Table-5. Distribution of the patients by employment status

Employment	Number	Percentage
Employed	36	42.4
Unemployed	49	57.6
Total	85	100.0

Table-6. Distribution of the patients by education level

Education	Number	Percentage
Illiterate	5	5.9
Minimal (up to 5 years)	22	25.9
Medium (6-12 years)	41	48.2
Well-educated (> 12 years)	17	20.0
Total	85	100.0

Table-7. Distribution of the patients by socioeconomic status

Socioeconomic status (PKR)	Number	Percentage
Low ($\leq 30,000$)	22	25.9
Medium (30,000 to 50,000)	52	61.2
High ($> 50,000$)	11	12.9
Total	85	100.0

Table-8. Distribution of the patients by Hemodialysis rate (weekly)

Hemodialysis rate	Number	Percentage
Infrequent	11	12.9
Frequent	62	73.0
Very frequent	12	14.1
Total	85	100.0

Table-9. Severity of depression

Severity	Number	Percentage
Normal	26	30.6
Mild	20	23.5
Moderate	24	28.2
Severe	8	9.4
Extreme	7	8.2
Total	85	100.0

Table-10. Dialysis lifetime duration

Duration	Number	Percentage
Short (> 3 months to 1 year)	27	31.8
Medium ($> 1-3$ years)	58	68.2
Total	85	100.0
Mean $\pm$ SD	16.4 $\pm$ 6.7 (months)	

Table-11. Hemoglobin level (g/dL)

Hemoglobin level	Number	Percentage
Very low (< 8.5 g/dL)	15	17.6
Low (8.6-12.4 g/dL)	70	82.4

Total	85	100.0
Mean±SD	9.4±1.0	

Table-12. Serum phosphate level (mmol/L)

Phosphate level	Number	Percentage
Low (≤ 1.11 mmol/L)	26	30.6
Normal (1.12-1.45 mmol/L)	29	34.1
High (> 1.45 mmol/L)	30	35.3
Total	85	100.0
Mean±SD	1.25±0.31	

Table-13. Stratification for age

Severity of Depression	Age (Years)			Total	Chi square/ p value
	18-35	36-50	51-60		
Normal	1	7	18	26	$\chi^2=14.137$ P=0.078
Mild	1	6	13	20	
Moderate	4	10	10	24	
Severe	0	3	5	8	
Extreme	3	1	3	7	
Total	9	27	49	85	

Table-14. Stratification for gender

Severity of Depression	Gender		Total	Chi square/ p value
	Male	Female		
Normal	11	15	26	$\chi^2=2.710$ P=0.608
Mild	11	9	20	
Moderate	14	10	24	
Severe	5	3	8	
Extreme	5	2	7	
Total	46	39	85	

Table-15. Stratification for marital status

Severity of Depression	Marital status				Total	Chi square/ p value
	Unmarried	Married	Widowed	Divorced		
Normal	2	22	2	0	26	$\chi^2=26.390$ P=0.009
Mild	1	18	0	1	20	
Moderate	3	17	3	1	24	
Severe	0	5	1	2	8	
Extreme	3	1	1	2	7	
Total	9	63	7	6	85	

Table-16. Stratification for employment status

Severity of Depression	Employment		Total	Chi square/ p value
	Employed	Unemployed		
Normal	9	17	26	$\chi^2=5.643$ P=0.227
Mild	12	8	20	
Moderate	10	14	24	
Severe	4	4	8	

Extreme	1	6	7	
Total	36	49	85	

Table-17. Stratification for education level

Severity of Depression	Education level				Total	Chi square/ p value
	Illiterate	Minimal	Medium	Well educated		
Normal	2	4	11	9	26	$\chi^2=27.135$ $P=0.007$
Mild	0	2	13	5	20	
Moderate	1	7	15	1	24	
Severe	1	4	1	2	8	
Extreme	1	5	1	0	7	
Total	5	22	41	17	85	

Table-18. Stratification for socioeconomic status

Severity of Depression	Socioeconomic status			Total	Chi square/ p value
	Low	Medium	High		
Normal	0	15	11	26	$\chi^2=67.793$ $P<0.001$
Mild	1	19	0	20	
Moderate	8	16	0	24	
Severe	6	2	0	8	
Extreme	7	0	0	7	
Total	22	52	11	85	

Table-19. Stratification for HD rate weekly

Severity of Depression	HD rate weekly			Total	Chi square/ p value
	Infrequent	Frequent	Very frequent		
Normal	7	19	0	26	$\chi^2=43.166$ $P<0.001$
Mild	4	16	0	20	
Moderate	0	21	3	24	
Severe	0	4	4	8	
Extreme	0	2	5	7	
Total	11	62	12	85	

Table-20. Stratification for dialysis life time duration

Severity of Depression	Dialysis lift time duration		Total	Chi square/ p value
	Short	Medium		
Normal	7	19	26	$\chi^2=3.739$ $P=0.442$
Mild	9	11	20	
Moderate	5	19	24	
Severe	3	5	8	
Extreme	3	4	7	
Total	27	58	85	

Table-21. Stratification for hemoglobin level (Hb g/dL)

Severity of Depression	Hemoglobin level		Total	Chi square/ p value
	Very low	Low		
Normal	0	26	26	$\chi^2=50.718$
Mild	0	20	20	

Moderate	3	21	24	P<0.001
Severe	6	2	8	
Extreme	6	1	7	
Total	15	70	85	

Table-22. Stratification for serum phosphate level (mmol/L)

Severity of Depression	Serum phosphate level			Total	Chi square/ p value
	Low	Normal	High		
Normal	0	1	25	26	$\chi^2=99.017$ P<0.001
Mild	5	10	5	20	
Moderate	6	18	0	24	
Severe	8	0	0	8	
Extreme	7	0	0	7	
Total	26	29	30	85	

Table-23. Stratification for BMI (kg/m²)

Severity of Depression	BMI				Total	Chi square/ p value
	< 18.5	15.5- 24.9	25-29.9	≥ 30		
Normal	1	0	14	11	26	$\chi^2=24.545$ P=0.017
Mild	0	1	16	3	20	
Moderate	1	3	17	3	24	
Severe	0	1	7	0	8	
Extreme	2	1	3	1	7	
Total	4	6	57	18	85	

DISCUSSION

A higher (69.4%) rate of depression was noticed in this study comprising of categories mild, moderate, severe, and extreme depression as 23.5%, 28.2%, 9.4%, and 8.2% in the patients on continuous hemodialysis. The findings of this study do not align with a recent study conducted in the Kingdom of Saudi Arabia, which reported an overall prevalence of depression among hemodialysis patients at 43.6%. In that study, 12.8% of patients were mildly depressed, 15.6% were moderately depressed, and 15.1% experienced severe or extremely severe depression. Conversely, the results are consistent with an earlier study by Saeed and colleagues, which used the Beck Depression Inventory (BDI-II) and found a higher depression rate of 75% among patients undergoing continuous hemodialysis. Globally, the prevalence of depression in hemodialysis patients has been reported to range between 20% and 60.5% (18). The study in (19) found that approximately 51% of patients exhibited varying degrees of depression—30% with mild, 8.5% with moderate, and 12.5% with severe depression. As anticipated, somatic symptoms were the most prominent features of depression. Around 55.5% of patients have shown that quality of life is lower than average.

A recent study aimed at examining the prevalence and associated factors of anxiety and depression among Saudi patients with chronic kidney disease (CKD) undergoing hemodialysis found that 24.6% of the 122 participants exhibited symptoms of depression, while 19.7% showed signs of anxiety. Anxiety symptoms were significantly more common in female patients than in males ($P = 0.04$), and older age was notably linked to higher rates of depression ($P = 0.003$). However, the study found no significant links between symptoms of depression or anxiety and patients' educational attainment, employment status, duration of illness, or length of time undergoing hemodialysis. It concluded that anxiety and depression are common among individuals with chronic kidney disease

(CKD), particularly among women and older individuals. It recommended the implementation of a screening program to identify at-risk patients, as well as the development of management strategies to prevent these mental health conditions and enhance patients' quality of life (20). Findings of these studies are comparable with present findings.

A cross-sectional study aimed to compute the frequency of depressive symptoms and to explore related factors of depressive symptoms in hemodialysis patients in northern China reported that the prevalence of depressive symptoms among hemodialysis patients was 29.1%. Patients with a lower mood have worse activities of daily living and quality of life than patients with better mood. Patients with a lower mood have got less social support than patients with better mood, including both family support and outside family support. Regarding coping styles, patients with lower mood were more likely to adopt an 'acceptance-resignation' coping style compared to those with better mood, whereas the opposite trend was observed for the 'avoidance' coping style. The study also found that patients with a more positive mood exhibited higher levels of self-efficacy and ego resiliency compared to those with a lower mood. Multivariate logistic regression analyses showed that activities of daily living (OR = 1.124, $p = 0.002$), family support (OR = 0.867, $p = 0.021$), the "acceptance-resignation" coping style (OR = 1.228, $p = 0.022$), and ego resiliency (OR = 0.944, $p = 0.021$) were independently associated with low mood (21). Findings are not in agreement, in the sense of occurrence of depression among hemodialysis patients, with current analysis.

A Turkish study was conducted to identify the levels of depression and factors that affect them in the patients undergoing ongoing hemodialysis treatment indicated that 70.6% of the patients with severe depression lack social security ($p < 0.05$). There is a statistically significant difference in the relationship between social security and depression scale scores among female and male patients. Additionally, 78.6% of female patients with severe depression and 72.7% of those with moderate depression were found to lack social security ($p < 0.05$). Though the Turkish study has focused on the social security issue which was beyond the mandate of present study even then the results of depression are concomitant with present findings (22).

Different factors involved in the pathogenesis of depression were also studied in present study and it was found that lower age groups of hemodialysis patients show significantly higher level of depression ($p < 0.05$) as compared to old age groups. Similarly marital status showed higher depression among unmarried subjects. Minimal and middle education levels, low socioeconomic status, infrequent weekly hemodialysis, low levels of hemoglobin, lower BMI, and variable degree of serum phosphate levels are significantly ($p < 0.05$ or $p < 0.001$) associated with higher rates of depression in this study. On the other hand, gender, employment status and duration of lifetime dialysis showed no impact on occurrence of depression and an insignificant ($p > 0.05$) relation was observed in this study.

Khan et.al. (23) intended to study the frequency and forecasters of depression amongst hemodialysis patients in Hospital Universiti Sains Malaysia and presented that 71.3% patients suffered from depression at baseline, 78.2% on 2nd evaluation and 84.9% on the final visit respectively. In contrast the already published data showed a comparatively low rate of depression among hemodialysis patients, ranging from 23.3 to 60.5%. Though these findings are in concomitant with present study, factors involved in occurrence of depression showed variable findings. The investigations showed that running HD centers (OR = 0.347, $p\text{-value} = 0.039$) had a statistically significant association with prevalence of depression at final visit while all the other afore mentioned variables showed insignificant difference thus not in agreement with present study.

The authors reported that anxiety symptoms were more prevalent among females than males ($P = 0.04$). Older age was significantly associated with depression ($P = 0.003$). It has also been observed in a comparable Brazilian study which reported that the sample was characterized by 55.2% being elderly, 66.4% men, 90.7% retired, and 60.3% who had depressive symptoms. A link was established among symptoms of depression and female gender, higher rate of comorbidities and post-hemodialysis occurrences,

emotional and physical symptoms, inactivity, inability to undertake daily activities and the requirement of assistance in day-to-day (24).

Even though the control of the serum level of phosphate is crucial in order to prevent unwanted health results, hyper-phosphataemia is a very common mineral derangement among dialysis patients. The aim of this research was to identify predictors related to hyper-phosphatemia among hemodialysis patients in Malaysia. There were 217 hemodialysis patients enrolled. Hyper-phosphatemia was common. Less than 25% of the patients knew that the best control of hyper-phosphatemia involves the collaborative efforts of phosphate binder drug treatment, dietary limitation, and dialysis regimen. Mean serum phosphate level of patients remained to be 1.25 ± 0.31 mmol/L in this study. Data presented that 34.1% patients had normal levels of serum phosphate while 30.6% had low (≤ 1.11 mmol/L) levels and 35.3% had high (> 1.45 mmol/L) levels of serum phosphate and findings are comparable to the above study (25).

CONCLUSIONS

The researcher in this study concludes that depression is highly prevalent among continuous hemodialysis patients. Various factors like lower age, marital status (unmarried), minimal and middle education levels, low socioeconomic status, infrequent weekly hemodialysis, low levels of hemoglobin, lower BMI and variable degree of serum phosphate levels are significantly ($p < 0.05$ or $p < 0.001$) associated with depression whereas gender, employment status and duration of life time dialysis are not associated with depression being insignificant ($p > 0.05$).

REFERENCES

1. Steffen A, Nübel J, Jacobi F, Bätzing J, Holstiege J. Mental and somatic comorbidity of depression: a comprehensive cross-sectional analysis of 202 diagnosis groups using German nationwide ambulatory claims data. *BMC psychiatry*. 2020;20:1-15.
2. Association AP. The practice of electroconvulsive therapy: recommendations for treatment, training, and privileging (A task force report of the American Psychiatric Association): American Psychiatric Pub; 2024.
3. Sobin C, Sackeim H. The psychomotor symptoms of depression. *American Journal of Psychiatry*. 2025.
4. James SL, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The lancet*. 2018;392(10159):1789-858.
5. Kalin NH. Insights into suicide and depression. American Psychiatric Association Washington, DC; 2020. p. 877-80.
6. Wang PS, Aguilar-Gaxiola S, Alonso J, Angermeyer MC, Borges G, Bromet EJ, et al. Use of mental health services for anxiety, mood, and substance disorders in 17 countries in the WHO world mental health surveys. *The Lancet*. 2007;370(9590):841-50.
7. Espinoza-Turcios E, Gonzales-Romero RM, Sosa-Mendoza C, Sierra-Santos M, Castro-Ramos HN, Zambrano LI, et al. Factors associated with hopelessness, depression and anxiety in the Honduran-Central America population during the COVID-19 pandemic. *Frontiers in Psychiatry*. 2023;14:1116881.
8. Ogbo FA, Mathsyaraja S, Koti RK, Perz J, Page A. The burden of depressive disorders in South Asia, 1990–2016: findings from the global burden of disease study. *BMC psychiatry*. 2018;18:1-11.
9. Pisano A, Zoccali C, Bolignano D, D'Arrigo G, Mallamaci F. Sleep apnoea syndrome prevalence in chronic kidney disease and end-stage kidney disease patients: a systematic review and meta-analysis. *Clinical Kidney Journal*. 2024;17(1):sfad179.
10. Zhang J, Zhang P, Ni X, Bao B, Huang C, Wu Y, et al. Vitamin D status in chronic dialysis patients with depression: a prospective study. *BMC psychiatry*. 2014;14:1-7.

11. Sahu S, Modi N. Long-Term Dialysis: Physiological Impact and Links with Depression. *Handbook of the Behavior and Psychology of Disease*: Springer; 2024. p. 1-23.
12. Vulser H, Lemogne C, Boutouyrie P, Côté F, Perier M-C, Van Sloten T, et al. Depression, antidepressants and low hemoglobin level in the Paris Prospective Study III: A cross-sectional analysis. *Preventive medicine*. 2020;135:106050.
13. Al-Jabi SW, Sous A, Jorf F, Taqatqa M, Allan M, Sawalha L, et al. Depression among end-stage renal disease patients undergoing hemodialysis: a cross-sectional study from Palestine. *Renal Replacement Therapy*. 2021;7:1-11.
14. Saeed Z, Ahmad AM, Shakoor A, Ghafoor F, Kanwal S. Depression in patients on hemodialysis and their caregivers. *Saudi Journal of Kidney Diseases and Transplantation*. 2012;23(5):946-52.
15. Hawamdeh S, Almari AM, Almutairi AS, Dator WLT. Determinants and prevalence of depression in patients with chronic renal disease, and their caregivers. *International journal of nephrology and renovascular disease*. 2017:183-9.
16. Teles F, de Azevedo VFD, de Miranda CT, de Melo Miranda MP, do Carmo Teixeira M, Elias RM. Depression in hemodialysis patients: the role of dialysis shift. *Clinics*. 2014;69(3):198-202.
17. Traisathit P, Moolkham K, Maneeton N, Thongsak N, Maneeton B. Associated factors for depressive disorder in patients with end-stage renal disease treated with continuous ambulatory peritoneal dialysis. *Therapeutics and Clinical Risk Management*. 2019:541-8.
18. Othayq A, Aqeeli A. Prevalence of depression and associated factors among hemodialyzed patients in Jazan area, Saudi Arabia: a cross-sectional study. *Mental Illness*. 2020;12(1):1-5.
19. Čengić B, Resić H. Depression in hemodialysis patients. *Bosnian Journal of Basic medical sciences*. 2010;10(Suppl 1):S73.
20. Mosleh H, Alenezi M, Alsani A, Fairaq G, Bedaiwi R. Prevalence and factors of anxiety and depression in chronic kidney disease patients undergoing hemodialysis: a cross-sectional single-center study in Saudi Arabia. *Cureus*. 2020;12(1).
21. Liu X, Yang X, Yao L, Zhang Q, Sun D, Zhu X, et al. Prevalence and related factors of depressive symptoms in hemodialysis patients in northern China. *BMC psychiatry*. 2017;17:1-7.
22. Bulut A. Depression levels of the hemodialysis patients living in Bingöl city center. *Int J Caring Sci*. 2017;10(3):1248-54.
23. Khan A, Khan AH, Adnan AS, Sulaiman SAS, Mushtaq S. Prevalence and predictors of depression among hemodialysis patients: a prospective follow-up study. *BMC public health*. 2019;19:1-13.
24. Pretto CR, Rosa MBCd, Dezordi CM, Benetti SAW, Colet CdF, Stumm EMF. Depression and chronic renal patients on hemodialysis: associated factors. *Revista brasileira de enfermagem*. 2020;73(Suppl 1):e20190167.
25. Ng ESY, Wong PY, Kamaruddin ATH, Lim CTS, Chan YM. Poor sleep quality, depression and social support are determinants of serum phosphate level among hemodialysis patients in Malaysia. *International Journal of Environmental Research and Public Health*. 2020;17(14):5144.