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Original Research Article

Prevalence and risk factors associated with depressive symptoms among end-stage renal disease patients undergoing hemodialysis in Indian setting

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ABSTRACT

Background: This study aimed to evaluate the prevalence of depressive symptoms among the patients with end-stage renal disease (ESRD) on hemodialysis and to explore associated risk factors.
Methods: A prospective observational study of patients with ESRD undergoing hemodialysis were included in the study. Data was collected based on questionnaire created by the study team, and by verbal interviews with patients. The questionnaire consisted of two parts, which included demographic data (gender, age, sleep quality, duration of sleep, appetite pattern, and duration of dialysis) and evaluation of the severity of depressive symptoms by using the depression, anxiety and stress scale-21.
Results: Out of total 93 patients with ESRD on hemodialysis majority of patients belonged to the age group of >60 to ≤80 years (47.8%) and age group >40 to ≤60 years (40.0%). Patients had a higher incidence of severe anxiety (38.7%) than depression (34.4%), and stress (22.6%). The proportion of patients diagnosed with depression (50.0%) and stress (57.1%) was higher in the older age group (>60 to ≤80 years); while the proportion of patients having severe anxiety was similar in both adult (>40 to ≤60 years) and older (>60 to ≤80 years) age group (38.9%). More than 50% of patients with depressive, anxiety, and stress symptoms had insufficient sleep (≤1 to ≤4 h). The present study could not predict the risk factors of depressive symptoms in patients with ESRD on hemodialysis.
Conclusions: Depression and anxiety symptoms were more frequent among patients with ESRD undergoing hemodialysis in Indian settings.

Keywords: Anxiety, Anxiety and stress scale-21, Depression, Quality of life.

INTRODUCTION

End-stage renal disease is a chronic irreversible renal failure or chronic kidney disease (CKD).[1] With progression of kidney failure, patients may experience a various symptom such as acid-base imbalance, failure to excrete waste products, and/ or electrolyte imbalance.[2] The global burden of disease, injuries, and risk factors study (GBD) 2017 reported the global health burden of CKD with a prevalence of 9.1% (around 700 million cases) of the global population with CKD.[3] India being home to 115.1 million patients with CKD, comes in the top two countries that contributes to the one third of global disease burden.[4] For the management of patients with ESRD various approaches can be used such as kidney transplantation, peritoneal dialysis, or hemodialysis.[2] According to estimates, nearly one million patients are undergoing dialysis treatment and it has been predicted that this number will increase up to 5.5 million by 2030.[5,6]

Dialysis treatment is considered to be a long-term treatment and it leads to significant physical and psychological side effects. The stress, anxiety, and depression are the usually reported psychosomatic concerns in patients on hemodialysis.[7] Depression is characterized by fatigue, anorexia, sleep disorder, gastrointestinal problems, weakening of fluctuations in blood pressure, and pain.[8,9] Literatures reported that the patients with advanced CKD (stage III-V CKD) are further susceptible to depression.[11,12] Several studies reported that because of increased depressive symptoms and worse physical aspects, the patients undergoing dialysis have a poor quality of life compared to the healthy individuals.[6,8-10] Despite of the high prevalence and damaging consequences of psychological disorders, these disorders often remain undiagnosed because of superimposed symptoms such as fatigue, sleep disorders, and/or anorexia related to uremia.[13] Approximately more than 70% of patients with depression and anxiety are not aware of their depressive symptoms.[7]

Most patients treated with hemodialysis are deprived of systemic psychiatric assessment and are unaware of appropriate treatment for depressive symptoms.[7,13] Untreated psychological disorders are often associated with increased rate of mortality, decreased quality of life, and increased risk of suicide.[14] To study problems associated with depressive disorders frequently found in patients with ESRD, diverse authorized questionnaires have been collected and tested. These include Hospital anxiety and depression scale, depression anxiety stress-21 scale (DASS-21), and Beck's depression inventory (BDI).[15] The DASS-21 is widely used to assess the core symptoms of anxiety and depression.[16] The DASS-21 has a strong interior reliability, convergent sustainability particularly for the depression scale.[17]

Literatures showed that the prevalence of kidney disease may also indicate high prevalence of depression associated with renal disease; however, a large number of the studies are mostly focused on prevalence of kidney disease and their management rather than inspecting other associated risk factors.[18] The study was aimed to assess the prevalence of symptoms of depression in patients with ESRD undergoing hemodialysis and to determine the risk factors that may be associated with depressive symptoms.

METHODS

This was a prospective observational study conducted at the Shrimann Superspeciality Hospital, Jalandhar, Punjab, India, during 1 January 2020 to 31 March 2020. The inclusion criteria were patients with a confirmed diagnosis of ESRD, hemodialysis patients who were consecutively enrolled for treatment at the study site were included in the study. The patients who were unable to understand the questionnaire due to their cognitive limitations were excluded. The study protocol was approved by the Institutional Ethics Committee and the study was conducted in accordance with the principles of Declaration of Helsinki. Written informed consent for this study was obtained from the patients prior to the surveys.

The questionnaire consisted of two parts, first part contained demographic data that included gender, age, sleep quality, duration of sleep, appetite pattern, and duration of dialysis. The second part was for evaluation of the depression by using the DASS-21 scale.[19] This tool was used to measure the severity of symptoms associated with depression, anxiety, and stress.

The DASS-21 scale consists of 21 items that evaluate depressive symptoms, with each question being scored from 1 to 4. Data was collected using a structured and pilot-tested questionnaire created by the study team, and by verbal interviews with patients. Interviews were conducted by the investigators.

The following guidelines are recommended for the interpretation of scores: In the depression section, score 0-9 shows normal or no depression, 10-13 shows mild depression, 14-20 shows moderate depression, 21-27 shows severe depression, and>27 indicates very severe depression. In the anxiety section, score 0–7 shows normal or no anxiety, 8-9 shows mild anxiety, 10-14 shows moderate anxiety, 15-19 shows severe anxiety, and>19 shows very severe anxiety. In the stress section, score 0-14 indicates normal or no anxiety, 15-18 indicates mild stress, 19-25 indicates moderate stress, 26-33 indicates severe stress, and>33 indicates very severe stress.[20]

Statistical analysis

Data were analyzed using Statistical Package for The Social Sciences (SPSS) software, version 23.0. The qualitative data were presented as number and percentages, while quantitative data were presented as mean (standard deviation [SD]) or median (range), depending on the normal distribution of data. Normal distribution of quantitative data was assessed by Shapiro-Wilk test. The regression model was used to assess the relationship of depressive symptoms with sleep pattern, diet pattern, duration of sleep, or duration of dialysis. A $P<0.05$ was considered statistically significant.

RESULTS

A total of 93 patients with ESRD undergoing hemodialysis were included in this study. The proportion of men (63.4%) was higher than women (36.6%). The mean age of the patients was 57.5 years. The majority of patients belonged to the age group of>60 to≤80 years (47.8%) and age group>40 to≤60 years (40.0%). Among the 68 study patients, 34 (50.0%) patients had poor sleep quality (Table 1).

Table 1: Demographic characteristics in patients with chronic kidney disease undergoing hemodialysis.

Parameter	Total (N=93)*
Sex	
Men	59 (63.4)
Women	34 (36.6)
Age (years), mean (SD)	57.5 (12.7)
Age group (years) [n=90]	
≥18 - ≤40	11 (12.2)
>40 - ≤60	36 (40.0)
>60 - ≤80	43 (47.8)
Sleep pattern [n=68]	
Good	32 (47.1)
Average	2 (2.9)
Poor	34 (50.0)
Duration of sleep (h) [n=68]	
≤1-≤4	27 (39.7)
>4-≤6	19 (27.9)
>6-≤10	22 (32.4)
Diet pattern [n=66]	
Normal	44 (66.7)
Average	14 (21.2)
Poor	8 (12.1)
Duration of dialysis (months), mean (SD)	24.6 (31.3)
Duration of dialysis (months) [n=65]	
≤12	41 (63.1)
>12-≤36	12 (18.5)
>36-≤60	6 (9.2)
>60	6 (9.2)

Data shown as n (%), unless otherwise specified. *N=93 unless otherwise specified.

Table 2: Distribution of severity of depression, anxiety, and stress.

Parameter	Depression (N=93)	Anxiety (N=93)	Stress (N=93)
Score range	(0-9)	(0-7)	(0-14)
Normal	33 (35.5)	21 (22.6)	49 (52.7)
Score range	(10-13)	(8-9)	(15-18)
Mild	9 (9.7)	12 (12.9)	10 (10.8)
Score range	(14-20)	(10-14)	(19-25)
Moderate	19 (20.4)	24 (25.8)	13 (14.0)
Score range	(21-27)	(15-19)	(26-33)
Severe	13 (14.0)	11 (11.8)	16 (17.2)
Score range	(>28)	(>20)	(>34)
Extremely severe	19 (20.4)	25 (26.9)	5 (5.4)

Data shown as n (%).

The overall severity of depression, anxiety, and stress is presented in Table 2. Around 9.7% had mild depression, 20.4% had moderate, 14.0% had severe, and 20.4% had very severe depression. Nearly 12.9% had mild anxiety, 25.8% had moderate, 11.8% had severe, 26.9% had very severe anxiety. Mild to moderate levels of stress were observed among 10.8% and 14.0% of patients, respectively and severe to extremely severe levels were observed among 17.2%, and 5.4% of patients, respectively.

The key observation was the higher incidence of severe anxiety as compared to depression and stress in this study population.

Table 3: Demographic and clinical characteristics of patients undergoing hemodialysis according to severe depressive symptoms.

Parameter	Depression (n=32)*	Anxiety (n=36)**	Stress (n=21)#
Sex			
Women	14 (43.8)	17 (47.2)	11 (52.4)
Men	18 (56.3)	19 (52.8)	10 (47.6)
Age (years), median (range)	60.5 (18.0-74.0)	58.0 (18.0-74.0)	63.0 (21.0-73.0)
Age group (years)			
≥18 - ≤40	5 (15.6)	8 (22.2)	3 (14.3)
>40 - ≤60	11 (34.4)	14 (38.9)	6 (28.6)
>60 - ≤80	16 (50.0)	14 (38.9)	12 (57.1)
Sleep pattern	[n=25]	[n=29]	[n=15]
Good	7 (28.0)	7 (24.1)	3 (20.0)
Average	1 (4.0)	1 (3.4)	1 (6.7)
Poor	17 (68.0)	21 (72.4)	11 (73.3)
Duration of sleep (h)	[n=25]	[n=29]	[n=15]
≤1 - ≤4	13 (52.0)	18 (62.1)	8 (53.3)
>4 - ≤6	8 (32.0)	8 (27.6)	6 (40.0)
>6 - ≤10	4 (16.0)	3 (10.3)	1 (6.7)
Diet pattern	[n=23]	[n=27]	[n=15]
Normal	16 (69.6)	18 (67.7)	8 (53.3)
Average	5 (21.7)	5 (18.5)	6 (40.0)

Continued.

Parameter	Depression (n=32)*	Anxiety (n=36)**	Stress (n=21)#
Poor	2 (8.7)	4 (14.8)	1 (6.7)
Duration of dialysis (months), median (range)	6.0 (0.2-48.0)	10.0 (0.2-60.0)	9.0 (0.2-48.0)
Duration of dialysis (months)	[n=23]	[n=27]	[n=14]
≤12	17 (73.9)	17 (63.0)	9 (64.3)
>12 - ≤36	5 (21.7)	7 (25.9)	4 (28.6)
>36 - ≤60	1 (4.3)	3 (11.1)	1 (7.1)

Data shown as n (%), unless otherwise specified. *n=32; **n=36; #n=21, unless otherwise specified.

Table 4: Multivariate regression analysis of risk factors for depressive symptoms.

Parameter	Symptoms	Unstandardized coefficients (B)	Standardized coefficients (β)	95% CI; P value
Sex	Depression	-0.093	-0.053	(-0.569, 0.383); 0.697
	Anxiety	0.202	0.126	(-0.195, 0.599); 0.312
	Stress	0.049	0.029	(-0.418, 0.516); 0.834
Age	Depression	-0.017	-0.245	(-0.056, 0.022); 0.391
	Anxiety	-0.019	-0.294	(-0.051, 0.014); 0.254
	Stress	-0.016	-0.241	(-0.054, 0.022); 0.406
Sleep pattern	Depression	0.265	0.309	(-0.062, 0.591); 0.110
	Anxiety	0.249	0.314	(-0.023, 0.521); 0.072
	Stress	0.160	0.194	(-0.159, 0.480); 0.319
Duration of sleep	Depression	0.036	0.035	(-0.328, 0.400); 0.844
	Anxiety	0.105	0.112	(-0.199, 0.409); 0.491
	Stress	0.095	0.096	(-0.262, 0.452); 0.597
Diet pattern	Depression	-0.121	-0.095	(-0.463, 0.221); 0.481
	Anxiety	-0.129	-0.109	(-0.414, 0.156); 0.368
	Stress	-0.106	-0.085	(-0.441, 0.230); 0.530
Duration of dialysis	Depression	-0.007	-0.255	(-0.023, 0.008); 0.352
	Anxiety	-0.009	-0.349	(-0.022, 0.004); 0.159
	Stress	-0.008	-0.307	(-0.024, 0.007); 0.269

Demographic and clinical characteristics of patients undergoing hemodialysis according to severe depressive symptoms is shown in Table 3. The incidence of severe depression (56.3% vs. 43.8%) and anxiety (52.8% vs. 47.2%) were slightly higher in men than in women, whereas the incidence of severe anxiety symptoms was higher in women than in men (52.4% vs. 47.6%). The proportion of patients diagnosed with depression (50.0%) and stress (57.1%) was higher in the older age group (>60 to ≤80 years); while the proportion of patients having severe anxiety was similar in both adult (>40 to ≤60 years) and older (>60 to ≤80 years) age group (38.9%). More than 50% of patients with depressive (52.0%), anxiety (57.9), and stress (53.3%) symptoms had insufficient sleep (≤1 to ≤4 h). This study revealed that the mean of the duration of dialysis for the patients with depression was 6 months, for patients with anxiety disorder was 10 months, and for patients with stress was 9 months.

The multiple regression analysis was performed to determine the predictors of depressive symptoms in patients with ESRD undergoing hemodialysis (Table 4). However, the observation did not reveal any association of depressive symptoms with sleep pattern, diet pattern, duration of sleep, or duration of dialysis.

DISCUSSION

The present study was conducted on patients diagnosed with ESRD in Shrimann Superspeciality Hospital, Jalandhar, Punjab, India to assess the prevalence and risk factors associated with symptoms of depression in patients undergoing hemodialysis. The key findings of these study suggest that the majority of the population were men presenting with depressive disorders. The proportion of patients diagnosed with depression and stress was higher in the older age group (>60 to ≤80 years); while the proportion of patients having anxiety was higher in the adult age group (>40 to ≤60 years). More than half of the population with depression and anxiety disorder had insufficient sleep (≤1 to ≤4 h).

Age-wise distribution shows that 47.8% of patients belonged to the older age group (>60 to ≤80 years). The results are consistent with the study done by Sharma et al wherein a significant correlation was observed between geriatric population and depression.[2] A study by Hedayati

et al found that in CKD patients of age above 65 years are more susceptible to depression as compared to young patients of age less than 25 years.[22] However, previous literature on the prevalence of depression among different age groups has shown contradictory patterns. The cross-sectional study by Terzi et al reported the highest prevalence of depression in patients aged 41 to 70 years with CKD.[23] A study by Goyal et al conducted in India reported the predominant psychiatric comorbidity in older individuals aged within 41 to 60 years (55.1%). The reason for the progression of renal failure with age may be due to the delay in detecting the renal disease, late referral, and delayed implementation of the therapeutic intervention.[24]

A previous cross-sectional study has shown that female gender was significantly associated with anxiety ($P<0.05$).[25] This finding is consistent with the findings of several studies of patients with ESRD that have shown that women were usually more prone to anxiety than men.[26,27] Kim et al found that in older women the prevalence of severe symptoms of depression is more than in men regardless of CKD stage.[28] In contrast to these, the present study reported higher prevalence of men over women. Using the DASS-21 scale questionnaires, the results showed that men patients were more likely to develop severe depressive symptoms (depression, anxiety, and stress) than women. This can be attributable to the overall preponderance of male patients in the present study.

It was found that the sleep disorders are major concerns in patients with ESRD undergoing dialysis. Unrecognized and untreated depression may have a profound impact on the quality of life and it may cause insomnia and/ or higher mortality risk among patients undergoing haemodialysis.[29] The stressful conditions are responsible for major incidences of insomnia in patients undergoing dialysis as compared to the overall population.[30] This is in accordance with the results of the present study which showed an increased prevalence of sleep disorders in patients with severe depression and anxiety. Previous study has shown that sleep disorders are commonly observed in the older age group, possibly because of longer dialysis periods.[30]

Evidence-based study alluded that patients who remained depressed for more than 16 months showed a decrease in quality of life and increased levels of depressive symptoms.[31] Additionally, there was a higher prevalence of anxiety associated with depression. Evidence from previous study showed that reduction of psychological health, social relationships, and quality of life was more common in patients undergoing hemodialysis for more than four years.[8] In the present study, there were no significant association observed between the duration of dialysis and prevalence rates of anxiety and depression.

The assessment of stressful life events in a study by Griya et al concluded that anxiety was more prevalent among patients with ESRD undergoing hemodialysis.[32] In parallel to this study, the present study also revealed that a majority of patients showed symptoms of intense anxiety (n=25) according to the DASS-21 scale. A cross-sectional multicentre study by Bujang et al reported that in patients undergoing hemodialysis, the prevalence of symptoms of depression was significantly higher for depression as well as for anxiety.[33] Another noteworthy evidence from systematic review reported that the prevalence of depression and anxiety was 59.6% and 23.1%, respectively.[34] With the growing evidence indicating the relationship between depressive symptoms and hemodialysis, clinicians may consider screening of depressive symptoms and subsequent referral to the psychologist if necessary.

The present study could not predict the risk factors of depressive symptoms based on sleep quality, duration of sleep, appetite pattern, and duration of dialysis in patients with ESRD on hemodialysis. However, literatures reported the correlation between sexual activity, sleep pattern, social functioning, and psychological health with depressive symptoms. Hamzi et al conducted a multicenter study on 125 patients with ESRD on hemodialysis and presented a significant correlation between insomnia and a longer duration (65.96 months) of dialysis ($P=0.023$).[35] In patients with CKD undergoing hemodialysis, Keskin et al found a significant association in sexual activities such as avoidance, non-sensuality, anorgasmia, psychological symptoms, and communication.[36] Furthermore, Einollahi B et al found a significant association between sleep quality and physical fitness, body pain, general health, fatigue, social functioning, and psychological health.[37]

Limitations

The study was conducted only for a short period and the sample size was limited. Additionally, the present study did not record the type of socioeconomic and educational constraints and its relation to stress, depression and anxiety symptoms among dialysis patients, which could have given different characteristic observations.

CONCLUSION

In conclusion this study showed that depression and anxiety were more prevalent in patients with ESRD undergoing hemodialysis and the incidence of sleep complaints was higher in these patients. Therefore, evaluation of depressive symptoms and sleep patterns among Indian patients with ESRD undergoing hemodialysis might be helpful for better management of these patients.

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