

**Association of co-morbid anxiety and depression among patients of kidney disease requiring dialysis.**

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**Abstract**

**Background:** Psychiatric disorders co-exist with the diagnosis of kidney diseases. Depression and anxiety are commonly co-occurring psycho pathology with kidney diseases especially those on dialysis. Multiple studies have demonstrated that this co-occurring psycho pathology is a robust risk factor for adverse outcomes such as hospitalization and mortality, yet these are often under-diagnosed. However, the links between depression and anxiety with kidney diseases are less studied. So this study aimed to assess the level of anxiety, depression, and clinical correlates amongst dialysis patients reported to the hemodialysis unit.

**Objective:** To explore the level of anxiety, depression, and clinical correlates amongst dialysis patients.

**Method:** It was a cross-sectional descriptive study that was conducted for 2 months at the hemodialysis unit of a tertiary care center in a rural area of Haryana. The participants were 41 patients with end - stage renal disease on maintenance hemo dialysis residents of rural area Haryana. All participants completed the socio-demographic details, assessed for depression and anxiety with Beck Depression Inventory and Beck Anxiety Inventory.

**Results:** The mean age was 47.73±14.63 years. The majority of the patients were males (56.07%), 41-60 years old (51.2%), of normal BMI (56.06%), literate (70.7%), on dialysis for less than 5 years (63.4%), and had serum albumin less than 3.5gm/dl (70.8%). The overall prevalence of depression and anxiety in the sample was

63.4% and 36.5% respectively. The statistically significant association was with duration of dialysis.

**Conclusion:** There is a need for close liaison between Physicians and Psychiatrists for the positive effect on the outcome of kidney diseases.

**Keywords:** Depression, Anxiety, Acute Kidney Injury, Chronic Kidney Disease, Dialysis

### Introduction

Chronic Kidney Disease (CKD) affects 10-15% of adults globally [1]. In stages 1-4 of CKD, treatment (i.e., pharmacotherapy and diet) is focused on slowing the progression of the kidney disease and preventing or treating complications and co-morbid conditions. In the final stage of CKD (i.e., stage 5 or end-stage renal disease [ESRD]), renal replacement therapy [RRT] such as dialysis or kidney transplantation becomes necessary to maintain life. ESRD is a major public health issue in both developed and developing countries [2][3]. With an increasing number of patients developing CKD, the number of patients requiring RRT is set to increase exponentially. This can cause an increased burden on the healthcare system.

Due to lack of accurate national data collection, the incidence of CKD in India is not clear but studies estimate that the number of new patients diagnosed with ESRD who are started on dialysis or transplantation is over 100,000 per year. This number grossly underestimates the true burden of kidney disease in our country given the inequality in access to health care between urban and rural populations, due to disparities in wealth and literacy [4].

Aside from these general population-based issues, there are unique medical and socio-economic challenges faced by women, which are essential to understanding to improve their access to kidney care and therefore their overall physical and psychosocial health. Levin was first

to introduce the term “psycho nephrology”, to highlight that patients undergoing RRT usually encounter multiple stressors thus resulting in psychiatric disturbance [5].

Patients with CKD are required to make ongoing psychological adjustments over the course of their disease, such as accepting the life-threatening diagnosis and need for lifelong treatment, learning dialysis techniques, restrictions in daily life, compliance to a therapeutic regimen including restrictions in diet, fatigue, the fear of death, failure to fulfill prior roles in the family, and dependency upon treatment and health professionals [6].

In light of such a substantial and sustained disease burden; the management of CKD\ ESRD has expanded from strictly clinical endpoints toward maintenance of the quality of life (QoL), from diagnosis through to end-of-life care. Of paramount importance are psychological concerns related to the disease and associated renal treatment [7]. Regarding differences between the main methods of RRT that is Hemodialysis [HD] and Peritoneal dialysis [PD], HD patients have been found to experience more depressive symptoms than PD patients [5].

Depression may be linked to HD treatment modality since the patient has to be continually connected to the HD machine during dialysis and so experience significant restrictions in independent living. Patients on HD face many psychological disturbances due to psychological distress, [8] including depression and anxiety [9][10][11] with increased symptom load and poor QoL [12]. Furthermore, these psychological problems can contribute to conflicts between themselves and their medical caregivers. Such findings are attributed in part to the stressful conditions in the HD treatment modality, including frequent visits and prolonged waiting time in the dialysis unit [5]. When compared with the general population, patients with ESRD showed more than five times the rate of suffering

from depression [13], and older patients who presented with lower levels of physical well-being were found to have higher scores of depressions [7]. Keskin et al, in a study, revealed that depression is a risk factor for suicidal ideation, and the chances of suicide attempts increase with the severity of depression [14]. In studies, an inverse relation was observed between depression and socioeconomic status [7]. In a recent review conducted by Veater and East, kidney transplant patients were noted to experience elevated levels of depression as compared to the general population but generally lower rates of depression compared to patients on other RRTs [15]. Mapes et al demonstrated that among patients on HD, depression was independently associated with increased mortality and hospitalization [16].

Interestingly, health professionals focus on managing the biological dimension of the disease and usually underestimate symptoms from the mental dimension. This effort becomes highly con founded since symptoms of anxiety and depression usually overlap with clinical symptomology of kidney disease, specifically the uremic state. For instance, components of depression such as anorexia, fatigue, sexual and sleep disturbances share common characteristics with the uremic state.

According to estimates, 20-30% of dialysis patients experience depression [17] and 12-52% of patients with ESRD suffer from anxiety [18], thus making an imperative need, for the evaluation of depression and anxiety in clinical routine.

With this background, the present study attempted to assess the level of anxiety and depression among patients with CKD and Acute kidney injury requiring dialysis.

### Materials and methods

It was a cross-sectional descriptive study that was conducted at a hemo dialysis unit of a government Medical college of rural area of Haryana. 41 patients with

ESRD on maintenance HD were recruited. Written informed consent was obtained from all the participants. Inclusion criteria were patients with a diagnosis of CKD/AKI, 18 years and above, and on HD treatment were included. Patients who had any previous psychological disorder or with an intellectual disability or those who had a sensory deficit that prevent them from having the psychiatric interview were excluded. Ethical permission for the study was obtained from the Institutional Ethics committee (IEC) of the hospital. Those patients, who were found to be having symptoms of depression and anxiety, were treated in liaison with

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liaison psychiatry services of PGIMS Rohtak through physical or virtual mode depending on the severity.

The survey questionnaire consisted of 4 parts, a) socio-demographic data, b) clinical and dialysis data, c) Beck Anxiety Inventory (BAI) to measure anxiety, and d) Beck Depression Inventory (BDI) to detect depressive symptoms.

Mean (SD) was calculated for quantitative data. Descriptive statistics, including percentage and proportion, were calculated for qualitative data.

Chi-squared test was used for categorical data using Statistical Package for Social Sciences (SPSS version 20).  $P < 0.05$  was considered statistically significant.

Conflict of interest: This study was a part of ICMR Short Term Studentship (STS) Program with research reference ID: 2019-06059.

### Results

During the study recruitment period, a total of 45 patients were enrolled for the treatment at our dialysis center. Four patients did not meet the eligibility criteria and were excluded. Forty-one patients were judged eligible and agreed to fill out the questionnaire.

Table 1: Socio demo graphic and clinical chara cteristics of patients

Variables	N (%)
Gender	
Male	23(56.07)
Female	18.(43.9)
Age means (SD)	47.73(±14.63)
20-40	12(29.2)
41-60	21(51.2)
61-80	8(19.5)
Employment	
Employed	14(34.1)
Unemployed	27(65.8)
Education	
Illiterate	12(29.2)
literate	29(70.7)
Residence	
Rural	30(75.6)
Urban	11(26.8)
Socio-economic status	
Lower	20(48.8)
Middle	21(51.2)
Marital status	
Married	31(75.6)
Unmarried	6(14.6)
Widowed	4(9.2)
BMI Mean (SD)	19.7(±2.7)
Underweight	17(41.4)
Normal	23(56.06)
Overweight	1(2.4)
SBP	
<120	9(21.9)
120-139	16(39.02)
>140	16(39.02)
DBP	
<80	18(43.9)
80-89	10(24.3)
>90	13(31.17)

Hb	
<7	5(12.1)
7-9	9(21.9)
9.1-10.5	16(39)
Albumin	
<3.5	29(70.8)
>3.5	12(29.2)
DOD	
<5 years	15(36.5)
>5 years	26(63.4)

BMI-Body Mass Index; SBP-Systolic Blood Pressure; DBP- Diastolic Blood Pressure; Hb- Haemoglobin; DOD- Duration of Dialysis.

As shown in Table I, the mean age was 47.73±14.63 years. The majority of the patients were males (56.07%), 41-60 years old (51.2%), of normal BMI (56.06%), literate (70.7%), on dialysis for less than 5 years (63.4%), and had serum albumin less than 3.5gm/dl (70.8%).

Table 2: Depression and Anxiety symptoms in the study sample (N=41)

Variable	Frequency (%)
Depression	26 (63.4%)
Mild	12 (46.1%)
Moderate	4 (15.3%)
Severe	10 (38.4%)
Anxiety	15 (36.5%)
Mild	3 (20%)
Moderate	5 (33.4%)
Severe	7 (46.6%)

As shown in Table II, the overall prevalence of depression in the sample was 63.4%, in which 12 patients had mild depression (46.1%), 4 patients had moderate depression (15.3%), and 10 patients suffered from severe depression (38.4%). The overall prevalence of anxiety was 36.5% out of which majority had severe anxiety (46.6%).

Table 3: Socio-demographic and clinical determinants for depression (N=41)

Characteristics	mild	Moderate Depression	Severe Depression	P value
Gender				NS
Male	5(41.7%)	1(25%)	6(60%)	
female	7(58.3%)	3(75%)	4(40%)	
Age(years)				NS
20-40	8(66.7%)	1(25%)	2(20%)	
41-60	4(33.3%)	1(25%)	3(30%)	
61-80	0	2(50%)	5(50%)	
Employment				NS
employed	9(75%)	2(50%)	4(40%)	
unemployed	3(25%)	2(50%)	6(60%)	
Education				NS
Illiterate	4(33.3%)	4(100%)	4(40%)	
literate	8(66.7%)	(0.0%)	6(60%)	
Residence				NS
Rural	10(83.4%)	2(50%)	8(80%)	
Urban	2(16.6%)	2(50%)	2(20%)	
Socio-economic status				NS
Lower	6(50%)	2(50%)	5(50%)	
	6(50%)	2(50%)	5(50%)	
Marital status				NS
married	7(58.3%)	3(75%)	8(80%)	
unmarried	3(25%)	1(25%)	0	
	2(16.7%)	0	2(20%)	
BMI				NS
Underweight	6(50%)	2(50%)	6(60%)	
normal	4(33.4%)	2(50%)	4(40%)	
overweight	2(16.6%)	0	0	

SBP				NS
<120	6(50%)	1(25%)	2(20%)	
120-139	5(41.7%)	2(50%)	3(30%)	
≥140	1(8.3%)	1(25%)	5(50%)	
DBP				NS
<80	7(58.3%)	2(50%)	2(20%)	
80-89	4(33.3%)	2(50%)	3(30%)	
≥90	1(8.3%)	0	5(50%)	
Hb				0.035*
<7	3(25%)	0	4(40%)	
7-9	5(41.7%)	2(50%)	1(10%)	
9.1-10.5	4(33.3%)	2(50%)	5(50%)	
Albumin				NS
<3.5	10(83.3%)	3(75%)	7(70%)	
≥3.5	2(16.7%)	1(25%)	3(30%)	
DOD				0.002*
<5 years	8(66.7%)	3(75%)	1(10%)	
≥5years	4(33.3%)	1(25%)	9(90%)	*

BMI-Body Mass Index; SBP-Systolic Blood Pressure; DBP- Diastolic Blood Pressure; Hb- Haemoglobin; DOD- Duration of Dialysis, NS-Non-Significant

According to Table III, a significant association ( $P=0.002$ ) was found between duration of dialysis and hemoglobin level ( $p=0.035$ ) with depression. No other significant association was found between any other socio-demographic or clinical variable and depression. Out of those suffering from mild depression, majority (66.7%) had duration of dialysis of less than 5 years. But out of those suffering from major depression 90% had been on dialysis for more than 5 years.

Table-4 Socio-demographic and clinical determinants for anxiety (N=41)

Characteristics	Mild anxiety	Moderate anxiety	Severe anxiety	P-value

Gender				NS
Male	2(66.7%)	3(60%)	4(57.1%)	
female	1(33.3%)	2(40%)	3(42.8%)	
Age(years)				NS
20-40	2(66.7%)	2(40%)	1(14.3%)	
41-60	0(0%)	1(20%)	2(28.6%)	
61-80	1(33.3%)	2(40%)	4(57.1%)	
Employment				NS
employed	2(66.7%)	3(100%)	2(28.6%)	
unemployed	1(33.3%)	0(0%)	5(71.4%)	
Education				NS
Illiterate	1(33.3%)	1(20%)	3(42.8%)	
literate	2(66.7%)	4(80%)	4(57.1%)	
Residence				NS
Rural	2(66.7%)	4(80%)	5(71.4%)	
Urban	1(33.3%)	1(20%)	2(28.6%)	
Socio-economic status				NS
Lower	1(33.3%)	3(60%)	4(57.2%)	
	2(66.7%)	2(40%)	3(42.8%)	
Marital status				NS
married	3(100%)	4(80%)	7(100%)	
unmarried	0	0	0(0%)	
widowed	0	1(20%)	0(0%)	
BMI				NS
Underweight	2(66.7%)	3(60%)	4(23.5)	
normal	0(0%)	2(40%)	3(13.0%)	
overweight	1(33.3%)	0	0	
SBP				NS
<120	2(66.7%)	3(60%)	2(22.2%)	
120-139	0(0%)	1(20%)	1(6.3%)	
≥140	1(33.3%)	1(20%)	4(25.0%)	
DBP				NS
<80	1(33.3%)	4(80%)	3(16.7%)	
80-89	1(33.3%)	0	0	
≥90	1(33.4%)	1(20%)	4(30.8%)	

Hb				NS
<7	3(100%)	1(20%)	2	
7-9	0(0%)	1(20%)	3(22.2%)	
9.1-10.5	0(0%)	3(60%)	2(6.25%)	
Albumin				NS
<3.5	1(33.3%)	3(60%)	5(17.2%)	
≥3.5	2(66.7%)	2(40%)	2(16.7%)	
DOD				0.004**
<5 years	1(33.3%)	2(40%)	1(3.8%)	
≥5years	2(66.7%)	3(60%)	6(40.0%)	

BMI-Body Mass Index; SBP-Systolic Blood Pressure; DBP- Diastolic Blood Pressure; Hb- Haemoglobin; DOD- Duration of Dialysis.

Table IV shows that duration of dialysis had a significant correlation with anxiety levels ( $P=0.004$ ). Other socio-demographic and clinical variables were not found to be significant.

### Discussion

This study sought to determine the prevalence and predictors of anxiety and depression among ESRD patients on maintenance HD.

There is a lack of reliable data on direct comparisons between HD patients and the general population in the prevalence of depression and anxiety. However, when compared with the general population, patients with ESRD show more than five times the rate of suffering from depression [19].

The prevalence of depression in our data was as par with other studies, which have reported depression prevalence among ESRD patients ranging from 25.3% to 60.5% [20] with different scales used across different populations. This wide range in prevalence is likely attributable to two reasons, as reported by Bornivelli et al [21].

First, depressive symptoms overlap with uremia symptoms. Second, different methods are used in different studies. Furthermore, the financial burden associated

with HD therapy in India, loss of the patient's job, and loss of wages and time of the family members due to illness. All of these factors might be contributing to the prevalence of depression in our study population.

The findings of the present study suggest that the depressive symptoms and anxiety scores increased with an increase in the duration of the CKD and maintenance HD. Amira et al and Hedayati et al have reported similar findings [22][23].

The possible reasons for this finding could be lifelong dialysis therapy with at least 2-3 dialysis per week and patients taking too much medicine at once. Keskin et al. revealed that depression is a risk factor for suicidal ideation and the chances of suicide attempts increase with the severity of depression. Therefore, HD patients should be under regular psychiatric evaluation and all risk factors should be properly evaluated [21].

In a study, a significant association of depression with unemployment and hypoalbuminemia was found [24]. However, in our study, no significant correlation was found.

Patient age showed no significant correlation with anxiety scores. Studies show that the older the patient, the higher the prevalence of somatic symptoms, decreased quality of life, restrictions in social life, and higher depression rates [17]. Corroborating this study, Bayat et al [25]. found no correlation between depression and patient age as well as gender.

In our study, patient gender had no significant correlation with the prevalence of anxiety or depression. In contrast to our finding of no significant association among male and female patients, a study conducted at the University of Michigan, female gender was a significant risk factor for depression [26]. On the other hand, in line with our finding, no significant differences were observed in the

prevalence of depression among male and female patients in a study conducted in Turkey [27].

In our study, all the participants belonged either to the middle (51.2%) or low (48.8%) socio-economic status but no significant association was found with socioeconomic status. An inverse relation was observed between depression and socioeconomic status [7]. Similarly in another study depression was reported in study participants with middle and lower socioeconomic status [28].

Of the total 31 married patients, 18(58%) patients had depression. In contradiction to our study findings, authors reported that depression was less common in married people who were undergoing dialysis therapy while widowed/divorced patients were at higher risk of depression [29].

Concerning limitations of the study, it is noted that patients were recruited from a single dialysis center and the sample size was small. Also, the fact that the study was cross-sectional is not allowing the emergence of a causal relationship between levels of anxiety and depression and sociodemographic and clinical variables.

### **Conclusion**

Depression and anxiety are highly prevalent among patients undergoing HD, so they should be properly diagnosed and treated, to improve the quality of life of patients with CKD.

Early pharmacological intervention in the treatment of depression would have a positive effect on the outcome of the disease. Other practical approaches such as stress management training (e.g., mindfulness meditation) and enhancing communication with staff and social support of patients and caregivers may also be important components of mental health services supporting patients with CKD on maintenance HD. Overall, there is a clear

need to provide holistic care for patients with ESRD both physically and psychologically.

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