# Prevalence of Anxiety and Depression in Patients of End-Stage Renal Disease (ESRD) On Hemodialysis: A Single Centre Study

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## ABSTRACT

**Background:** End-stage renal disease (ESRD) necessitates hemodialysis (HD), a treatment associated with substantial physical and psychological burdens. Anxiety and depression are common in ESRD patients and can adversely impact their quality of life and treatment adherence. This study aimed to evaluate the prevalence of anxiety and depression among patients undergoing chronic HD.

**Methods:** A cross-sectional observational study was conducted at SRMS IMS Bareilly involving 100 ESRD patients on chronic HD. Patients completed the Hospital Anxiety and Depression Scale (HADS) to evaluate symptoms of anxiety and depression.

**Results:** Among the 100 patients, 68% exhibited depressive disorders, and 56% had anxiety disorders, with 24% showing both conditions. Depression was more prevalent among males (62.86%) compared to females (44.7%)-ODDs ratio-1.29. In contrast, anxiety was significantly higher in females (44.3%) compared to males (31.8%)-ODDs ratio-0.69. The prevalence of depression and anxiety varied across age Depression increases with age, being highest in individuals aged ≥60 years and lowest in those aged 18–39 years. Patients undergoing HD three times a week reported more depressive symptoms. Additionally, the use of central venous catheters correlated with increased psychological symptoms.

**Conclusions:** Depression and anxiety are prevalent among ESRD patients on HD, with significant gender disparities and an association with HD frequency. Addressing these psychological aspects through comprehensive care strategies is essential for improving patient outcomes.

**Keywords:** End-stage renal disease, hemodialysis, anxiety, depression, prevalence, Hospital Anxiety and Depression Scale

## INTRODUCTION

End-stage renal disease (ESRD), characterized by irreversible kidney function decline, necessitates life-sustaining treatments like dialysis or transplantation.[1] Hemodialysis (HD) involves frequent, time-consuming

sessions (3-4 hours, 2-3 times weekly), often requiring significant travel, which can disrupt employment and significantly impact patients' lives. This demanding regimen contributes to substantial physical and psychological burdens, with depression and anxiety being prevalent psychiatric comorbidities.[2]

These mental health challenges have profound consequences for dialysis patients, including increased hospitalization rates, higher mortality risk[3,4] diminished quality of life[5,6] and poor adherence to treatment regimens. The field of "psychonephrology" emphasizes the critical importance of addressing the mental health needs of individuals with kidney disease[7], particularly those undergoing dialysis or post-transplant care[8].

While numerous studies have investigated the prevalence of psychiatric conditions in ESRD patients, the true extent of the problem may be underestimated due to underreporting and inadequate mental healthcare access.[9,10] Depression, a well-studied risk factor for mortality, suicide, and hospitalization[11,12] in this population, is influenced by various demographic, socioeconomic, and clinical factors, such as age, gender, education level, employment status, and the presence of comorbidities like hypertension, diabetes, and smoking[13,14].

In contrast, anxiety remains relatively under-researched in ESRD patients, with limited data on its prevalence. Existing estimates suggest a wide range, from 12% to 52% of patients experiencing anxiety.[15] A recent Indian study reported high prevalence rates of both depression (61.3%) and anxiety (28%) among HD patients.[16]

Given the potential for effective management of depression and anxiety through medication and psychotherapy, early detection is crucial. Validated assessment tools, such as the Hospital Anxiety and Depression Scale (HADS), are essential for identifying these conditions in ESRD patients.[17] This study aimed to evaluate the prevalence of anxiety and depression using the HADS and to investigate their associations with demographic, clinical, and laboratory variables in a cohort of chronic hemodialysis patients.

## MATERIALS AND METHODS

It was a cross-sectional, observational study, conducted at Department of Medicine, Unit of Nephrology SRMS IMS BARELLY with an aim to assess the Proportion of anxiety and depression in patients of end-stage renal disease (ESRD) on hemodialysis. Study was conducted from 1st August 2024 to 30th October 2024. The study received prior approval from the Institutional Ethical Committee. A total of 100 patients with end-stage renal disease (ESRD) undergoing hemodialysis were recruited, based on specific inclusion criteria. Eligible participants were adults aged 18 to 83 years, diagnosed with chronic kidney disease (CKD), and receiving hemodialysis for at least three months. Patients with a history of psychiatric illness predating their ESRD diagnosis or those with se-

vere, unstable chronic medical or surgical conditions were excluded.100 cases were selected as a sample size of 100 adequately represent the target population in many studies, ensuring variability and diversity without becoming overwhelming to analyze.

Written informed consent was obtained from all participants before their inclusion in the study. Data collection included sociodemographic details such as age, gender, place of residence, education level, employment status, and socioeconomic background. Additionally, clinical information was gathered, encompassing the duration of hemodialysis, comorbidities, and medication history.

**Assessment methods:** The Hospital Anxiety and Depression Scale (HADS) was utilized to evaluate the severity of anxiety and depression in the participants. Designed to detect potential new cases of these disorders in adults, the HADS comprises 14 items focusing on the emotional and cognitive dimensions of anxiety and depression, with seven items dedicated to each subscale. Each item is scored on a scale from 0 to 3, reflecting the intensity or frequency of symptoms, resulting in a total score range of 0 to 42, or 0 to 21 for each subscale.[18]

Higher scores indicate greater symptom severity, with scores categorized as follows: 0-7 for the absence of significant symptoms, 8-10 for mild symptoms, 11-15 for moderate symptoms, and 16-21 for severe symptoms. Research has demonstrated the utility of HADS as an effective screening tool for detecting anxiety and depression in individuals without pre-existing psychiatric conditions.

**Statistical analysis:** The collected data were analyzed using SPSS version 26.0. Categorical variables were summarized using frequencies and percentages, while quantitative variables were presented as mean and standard deviation. We have calculated Odds ratio with 95% confidence interval to find out an association between outcome variable with socio-demographic profile and clinical history of patients.

Approval of Institutional Ethical Committee: SRMS IMS ECC/2024/140, DATED-25-04-2024

## RESULTS

A total of 100 patients were enrolled in the study. The age range of participants was between 18-83 years, median age 50.5 years. The cohort comprised of 70 males and 30 females. The majority were married (86%), few were unmarried (10%) and 4% were widowed/separated. Almost half of the participants had private job (54%), while among females 86% were housewives. Diabetes was identified as the leading primary cause of ESRD, 46 out of 100, while hypertension remains the 2nd leading cause of ESRD. Co-morbidities along with ESRD most common was diabetes, hypertension and coronary artery disease 46%, 32% and 8% respectively. Around 20% of the male patients were not working after the initiation of hemodialysis and 7% were pensioners. Among the par-

ticipants around 86% had ESRD for 3 years or less. Around 46% of the participants undergoing MHD for 1 year or less, 36% for 1-3 years and 18% having hemodialysis for 3 years or more. **(Table 1).**

### Table 1: Patients' Clinical and Laboratory Profiles (N=100)

| Characteristics | Patients (%) |
|---|---|
| **Primary Cause of ESRD** | |
| Diabetes | 46(46) |
| Vascular/ Hypertension | 34(34) |
| Unknown | 30(30) |
| **Vascular Access** | |
| Arteriovenous Fistula | 76(76) |
| Perm-cather | 18(18) |
| IJV/Femoral Catheter | 06(06) |
| **Comorbidities** | |
| Diabetes | 46(46) |
| Hypertension | 32(32) |
| Heart Disease | 08(8) |
| Others | 14(14) |
| **Urea (mg/dL)** | 90±20 |
| **Creatinine (mg/dL)** | 08±4 |
| **Hemoglobin (g/dl)** | 07±3 |

### Table 2: Sociodemographic and Psychiatric Morbidity in End Stage Renal Disease undergoing Hemodialysis

| Parameters | Observation | Depression (%) | Anxiety (%) |
|---|---|---|---|
| **Gender*** | | | |
| Male | 70 | 44(62.86) | 22(31.43) |
| Female | 30 | 17(56.67) | 13(44.44) |
| **Age#** | | | |
| a)18-39 | 48 | 22(45.83) | 25(52.08) |
| b)40-59 | 36 | 19(52.77) | 15(41.66) |
| c)≥60 | 16 | 9(56.25) | 07(43.70) |
| **Marital Status** | | | |
| Married | 86 | 52(60.46) | 32(37.20) |
| Unmarried | 10 | 5(50.00) | 4(40) |
| Separated | 4 | 2(50.00) | 1(25) |
| **Occupation** | | | |
| Unemployed | 14 | 08(57.14) | 06(42.80) |
| Self Employed | 54 | 29(53.70) | 22(40.70) |
| Retired | 6 | 02(33.33) | 03(50.00) |
| Housewife | 26 | 14(53.84) | 08(30.07) |

*Odds ratio (95% CI) Male vs Female – for Depression-1.29(0.87-1.91); for Anxiety-0.68(0.46-1.01)

# Odds ratio (95% CI) for Depression - a:b-0.756(0.51-1.12); a:c-0.658(0.45-0.96); b:c-0.869(0.59-1.28)

# Odds ratio (95% CI) for Anxiety - a:b-1.52(1.03-2.25); a:c-1.40(0.95-2.07); b:c-0.92(0.63-1.34)

### Table 3: Prevalence and severity of depressive and anxiety disorder in end stage renal disease patients based on HADS-D and HADS-A scores

| Disorder & Severity | Patients (%) |
|---|---|
| **Depressive Disorder** | |
| HADS-D Score ≥8 | 68(68%) |
| Mild | 38(55.88) |
| Moderate | 20(29.41) |
| Severe | 10(14.70) |
| **Anxiety Disorder** | |
| HADS-A Score ≥8 | 56(56%) |
| Mild | 36(64.28) |
| Moderate | 16(28.57) |
| Severe | 04(7) |

In our study of 100 patients, 68(68%) patients had depressive disorder and 56 (56%) patients had anxiety disorder. Both depression and anxiety were found in 24%. Among patient with depressive disorder,55% had mild depression,30 % had moderate depression while 15% had severe depression. Among the group with anxiety disorder 65% had mild anxiety symptoms while moderate and severe anxiety disorder were 27% and 8% respectively.**(Table 2) (Table 3)**

Overall, depressive disorder was higher in males44 (62.86%) vs 17(56.7) % in females; similarly, the anxiety was among females 13 (44.3.7%) as compared to male 22 (31.8%), Odds Ratio for Depression: 1.29 (Males are 1.29 times more likely to have depression than females). Odds Ratio for Anxiety: 0.69 (Males are less likely to have anxiety than females).

The prevalence of depression and anxiety varied across age Depression increases with age, being highest in individuals aged ≥60 years and lowest in those aged 18–39 years. Compared to the 18–39 age group, the odds of depression are 24% higher in the 40–59 group and 34% higher in the ≥60 group. Depression is slightly more prevalent in the elderly compared to the middle-aged group.

Anxiety is more prevalent in younger individuals (18–39 years) and declines with age. Compared to the 40–59 age group, the odds of anxiety are 52% higher in the 18–39 group and 40% higher compared to the ≥60 group. Anxiety is slightly more common in the elderly compared to the middle-aged group.

In our study, 76% of patients underwent dialysis via an arteriovenous fistula, 18% via a perm-catheter, and 6% through an IJV/FEMORAL catheter. We found that patients with a central line (IJV/FEMORAL) exhibited higher levels of anxiety symptoms compared to those with an arteriovenous fistula, and they also demonstrated higher levels of depressive symptoms.

The majority of patients with depression and anxiety had been diagnosed with ESRD for less than three years. However, 46% of those with depression and 50% of those with anxiety had a CKD diagnosis for over three years. Additionally, more than 60% of patients with depression and approximately 30% of those with anxiety had been undergoing hemodialysis for less than three years. The depression ORs range from 0.83 to 2.03, with higher odds in patients with ESRD for 3–5 years compared to shorter durations, and lower odds in those With the Disease for >5 years. While Anxiety ORs range from 0.54 to 1.43, with the highest odds in patients in patient for 1–3 years, <1 year have the lowest odds.

Depression increases with longer durations of hemodialysis, particularly in patients undergoing treatment for 3–

5 years. Anxiety is more common in patients undergoing hemodialysis for shorter durations, particularly less than 1 year, but decreases in those treated for 1–3 years before increasing again in longer durations. **(Table 4)**

**Table 4: Summary of duration of chronic kidney disease and hemodialysis and its relationship with depression and anxiety**

| Parameters | Observation (%) | Depression (%) | OR (95% CI) | Anxiety (%) | OR (95% CI) |
|---|---|---|---|---|---|
| **Duration of CKD (years)** | | | | | |
| a) $\leq$ 1 | 16(16) | 09(56.25) | a:b-1.43(0.97-2.11) | 07(43.75) | a:b-0.54(0.37-0.80) |
| b) >1 - $\leq$ 3 | 34(38) | 18(52.94) | a:c-0.95(0.64-1.41) | 20(58.82%) | a:c-0.70(0.47-1.04) |
| c) >3 - $\leq$ 5 | 40(40) | 23(57.50) | a:d-1.92(1.3-2.84) | 21(52.50%) | a:d-0.72(0.49-1.07) |
| d) >5 | 10(10) | 04(40.00) | b:c-0.832(0.56-1.23) | 05(50.00%) | b:c-1.29(0.87-1.91) |
| | | | b:d-1.68(1.14-2.49) | | b:d-1.68(1.14-2.49) |
| | | | c:d-2.02(1.36-2.99) | | c:d-1.10(0.74-1.63) |
| **Duration of Hemodialysis (years)** | | | | | |
| a) $\leq$ 1 | 22(22.00) | 12(54.54) | a:b-0.84(0.69-1.02) | 13(59.09%) | a:b-1.83(1.51-2.23) |
| b) >1 - $\leq$ 3 | 34(34.00) | 20(58.82) | a:c-0.15(0.12-0.18) | 15(44.11%) | a:c-0.56(0.46-0.68) |
| c) >3 - $\leq$ 5 | 36(36.00) | 32(88.08) | a:d-0.17(0.14-0.21) | 26(72.00%) | a:d-0.87(0.72-1.06) |
| d) >5 | 08(8.00) | 07(87.50) | b:c-0.18(0.15-0.22) | 05(62.50%) | b:c-0.30(0.25-0.37) |
| | | | b:d-0.20(0.16-0.24) | | b:d-0.47(0.39-0.57) |
| | | | c:d-1.14(0.94-1.39) | | c:d-1.56(1.28-1.90) |

OR (95%CI): Odds ratios (95% confidence interval)

dialysis twice a week, while the remaining 25% underwent hemodialysis thrice a week. Our analysis revealed a notable trend: patients undergoing hemodialysis thrice a week exhibited a higher prevalence of depressive disorders compared to those undergoing dialysis twice a week. Specifically, around 90% of patients undergoing hemodialysis thrice weekly scored higher on the Hospital Anxiety and Depression Scale for Depression (HADS-D) compared to the group undergoing dialysis twice a week. Importantly, this discrepancy between the two groups was statistically significant, indicating that the frequency of hemodialysis sessions may play a role in the manifestation of depressive symptoms among patients undergoing dialysis. Other factors contributing to depression and anxiety among hemodialysis patients include frequent blood transfusions, distance from home to the dialysis center, mode of transportation, and financial status. These elements significantly influence the mental well-being of patients undergoing regular dialysis treatment.

## DISCUSSION

Psychiatric disorders often coexist with chronic illnesses, particularly chronic kidney disease (CKD) and end-stage renal disease (ESRD).[19] In our study, the prevalence of depression and anxiety among patients on maintenance hemodialysis (MHD) was 68% and 56%, respectively, with 24% experiencing both conditions. Notably, patients on hemodialysis were found to be more depressed than anxious. Previous research has consistently identified depression as the predominant mental health issue in CKD patients.[20]

For instance, a study by Hou et al. reported that 69.1% of ESRD patients in China experienced depressive disorders, while 36.9% had anxiety disorders.[21] Similarly, Indian studies by Gadia et al[22] and Kumar et al[16] ob-

In our study, approximately 75% of patients underwent

served high rates of depressive and anxiety disorders among dialysis patients. Gadia et al. found depressive disorder in 66% and anxiety disorder in 61% of patients, with varying severity levels. Kumar et al. identified mild, moderate, and severe depression in 33%, 30%, and 16% of patients, respectively. In Saudi Arabia, Alanazi et al. reported that 17.6% of patients had borderline clinical depression, 30.2% had mild depression, 23.9% had moderate depression, and 14.5% experienced severe depression.[23]

The moderate overlap (24%) of depressive and anxiety symptoms observed in our study aligns with the hypothesis of an inflammatory link, as discussed by Camacho, who provided biological evidence for anxious-depression as an inflammatory phenomenon.[24] Our findings, along with those from other Indian studies, indicate that depression is highly prevalent among CKD patients globally. The chronic and progressive nature of kidney disease, along with the perceived fear and uncertainty about the future, may contribute to feelings of depression and anxiety.

In our study, although the prevalence of depression was higher among males than females, the difference was not statistically significant. However, anxiety was significantly more prevalent among female patients. This aligns with previous studies by Sqalli Houssaini et al[25] and Mosleh et al which found higher anxiety levels in females[26]. Conversely, depression was not found to be linked to gender in the study by Sheayria F et al[27] Gadia et al[22] and Kumar et al[16] also reported higher rates of depression in females compared to males, along with a higher prevalence of anxiety disorder among females. Our study's findings corroborate these trends, particularly regarding anxiety disorder in female patients.

In our study there is no significant association was found between anxiety, depression and age, although

depression is seen slightly more in mid age group 40-60, while anxiety is more in younger age. Similar findings were seen in many other studies. A study from Saudi Arabia by Sheayria F et al. in patients on dialysis, also found that depression was not related to age.[28] Gadia et al had similar findings in there study[22] ,while in study by Kumar et al, the relationship between depression and age was significant, but there was no relationship between age and anxiety.

Our investigation into the association between depression, anxiety, and the duration of chronic kidney disease (CKD) revealed no significant relationship between these factors. However, we observed a trend where depression tends to be more prevalent in patients undergoing hemodialysis for longer durations. This finding aligns with the research conducted by Gadia et al[22]. On the other hand, a study by **Kumar et al.** yielded results indicating no significant correlation between the duration of CKD, the duration of hemodialysis, and the occurrence of depression and anxiety.[16] Thus, our findings contribute to the ongoing discourse in this field, indicating detail relationships that warrant further exploration.

The current study findings suggest that a higher frequency of hemodialysis (HD) sessions per week predicts heightened anxiety and depressive symptoms in chronic kidney disease (CKD) patients undergoing HD. However, contrasting results were reported by **Alshogran et al.,** who found that patients undergoing three HD sessions per week had lower anxiety scores compared to those undergoing two HD sessions.[28]

In addition to the frequency of hemodialysis sessions, several other factors contribute to the development of depression and anxiety among patients undergoing regular dialysis. Among these factors, the need for frequent blood transfusions stands out as a significant contributor. Patients who require regular transfusions often experience increased stress and uncertainty about their health status, which can exacerbate feelings of depression and anxiety. Moreover, the distance from home to the dialysis center is another crucial consideration. Patients who live far from the dialysis center may face challenges related to transportation, such as long commute times and difficulties accessing reliable transportation options. Few studies are done previously in regards to the above factors contributing to the depression and anxiety in patients with CKD undergoing regular dialysis.

## CONCLUSION

In conclusion, depression and anxiety are prevalent among CKD patients undergoing hemodialysis, with gender disparities noted in anxiety prevalence. While age shows no significant association, longer hemodialysis durations may correlate with higher depression levels. Hemodialysis frequency predicts heightened anxiety and depression, although findings vary. Factors like blood transfusions and transportation challenges contribute significantly to mental health outcomes. Addressing these complexities requires holistic approaches, emphasizing the need for further research and tailored interventions.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity

**Author Contribution: RKP:** Contributed to study conception, design, data collection, analysis, interpretation, and manuscript preparation, playing an essential role throughout the research process. **SK:** Contributed to study conception, data analysis, interpretation, and manuscript preparation. **VN:** Involved in study conception, design, data analysis, interpretation, and manuscript preparation, but not in data collection.

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