***Original Research Article***

**Prevalence of Anxiety and depression among chronic kidney disease patients in a Nigerian tertiary institution: A comparison of pre- dialysis and hemodialysis patients**

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| **Abstract: Background of the study:** The global burden of chronic kidney disease (CKD) is increasing with estimates suggesting that up to 10% of the world’s population is affected. Anxiety and depression are the most commonly reported mental health conditions associated with CKD especially those on hemodialysis. **Aims:** We aim to study the prevalence of anxiety and depression among chronic kidney disease patient and compare its occurrence between pre-dialysis and hemodialysis patients. **Study design**: This is cross sectional descriptive study of pre-dialysis and hemodialysis patients. **Place and Duration of Study:** This study was conducted at University of Uyo Teaching Hospital from July 2024 to December 2024.**Methodology:** This is a cross sectional descriptive study of CKD patients at University of Uyo, Nigeria. Pre-dialysis subjects were recruited from out-patients department, while hemodialysis subjects were recruited from the dialysis unit. Anxiety and depression were evaluated and recorded using a simple hospital anxiety and depression scale (HADS) screening tool**Results:** A total of 148 participants were recruited for the study consisting of predominantly male 113 (76.4%), with females making up 35(23.6%). 75 (50.7%) were on hemodialysis while 73 (49.3%) were not on dialysis. 77.7% of subjects had depression, while78.4%) had anxiety. Subjects on hemodialysis had 43.5% depression, (15.6% borderline and 27.9% clinical caseness) compared to 34.7% (22.5% borderline and 12.2% clinical caseness) pre-dialysis respondents (p-0.001). Hemodialysis partcipants had a significant anxiety disorder of 43.3% against 36% of pre-dialysis respondents. (P=0.02). Low income and hemodialysis were associated significantly with depression and anxiety, while prolonged duration of dialysis was mainly associated with depression.**Conclusion:** There is a high prevalence of depression and anxiety among CKD patients. This is further made worse by maintenance hemodialysis (MHD). Low income, hemodialysis and prolonged duration of MHD are associated with increased prevalence of depression |

*Keywords:* Prevalence, chronic kidney disease, pre-dialysis, maintenance hemodialysis**.**

1. INTRODUCTION:

Chronic kidney disease (CKD) is defined as kidney damage or a glomerular filtration rate (GFR) <60 mL/min/1.73 m2 for 3 months or more, irrespective of the cause.(Levey et al., 2005) The global burden of CKD is increasing with estimates suggesting that up to 10% of the world’s population is affected.(Kovesdy, 2022) By 2040, CKD is expected to rank as the fifth leading cause of death worldwide.(Foreman et al., 2018)

Like most chronic diseases, managing CKD can be quite challenging, as patients often have to make psychological adjustments to accept the distressing diagnosis. This include: adapting to lifelong dependence on dialysis, coping with treatment failure, mongering accompanying comorbidities, and dealing with complications.(Cukor, Cohen, et al., 2007) Chronic kidney disease is frequently associated with several comorbid conditions, particularly psychiatric issues. Anxiety and depression are the most commonly reported mental health conditions associated with CKD.(Azegbeobor & Lasebikan, 2016; Dziubek et al., 2021)

Depression is an emotional state characterized by somatic and cognitive symptoms, including feelings of sadness, worthlessness, sleeplessness, loss of appetite, reduced sexual desires, and diminished interest in usual activities.(*Davison, G. C., & Neale J. M. (2001). Abnormal Psychology (8th Ed.). New York, NY John Wiley & Sons, Inc. - References - Scientific Research Publishing*, n.d.). It is second only to hypertension as a comorbid condition among patients with end-stage renal disease (ESRD). (Cukor, 2007) Depression is highly prevalent and associated with increased poor quality of life and mortality among adults with CKD and ESRD.(Alshelleh et al., 2022; Rebollo Rubio et al., 2017; Shirazian et al., 2017). Assessment of depression in the CKD population is particularly challenging, partly due to the overlapping physical symptoms of uremia and depression, such as fatigue: loss of appetite, and sleep disturbances.(Goh & Griva, 2018) Studies have shown that depression is more prevalent among CKD/ ERSD patients than individuals with other chronic medical conditions.(Baumeister & Härter, 2007; Kimmel et al., 1998) The prevalence of depression among CKD has been reported to range between 20% and 23% depending on the instrument used for assessment.(Cukor, Coplan, et al., 2007; Hedayati & Finkelstein, 2009) Furthermore, depression is five times more common in ESRD patients than in the general population.(Hedayati et al., 2004)

Anxiety is another common mood disorder among CKD/ESRD patients. It is defined as apprehension, tension or uneasiness that stems from the anticipation of danger, which may be internal or external (Griffin, 1990) A systematic review and meta-analysis reported a prevalence rate of anxiety and depression of 19% across studies with elevated anxiety symptoms of 43%.(Huang et al., 2021) Anxiety disorders have been associated with significant impairments in patients across the entire spectrum of chronic kidney disease, pre-dialysis and ESRD.(Lee et al., 2013; Rebollo Rubio et al., 2017).

Depression and anxiety are reported to be more prevalent in patients on hemodialysis.(Cohen et al., 2016; Cukor et al., 2008) A study conducted in Northern China reported a prevalence rate of 55.1% for depression and 25.1% for anxiety among patients on maintenance hemodialysis. (Meng et al., 2022) Similarly, Wang et al reported a prevalence of 68.93% for depression and 36.89% for anxiety among patients undergoing maintenance hemodialysis(MHD).(Wang et al., 2024)

Several factors have been linked to the high prevalence of depression and anxiety among CKD/ESRD patients. These include, among others, lower educational status, use of multiple oral medications, longer duration on dialysis, employment status, length of hospital stay, decreased perceived quality of life, reduced vitality level and low income(Meng et al., 2022; Rebollo Rubio et al., 2017; Wang et al., 2024)

 Studies have shown that patients on MHD with a clinical diagnosis of depression have worse clinical outcome, including higher hospitalization rate and longer inpatient stays, increased rate of dialysis withdrawal and mortality.(*Dialysis Withdrawal and Symptoms of Anxiety and Depression: A Prospective Cohort Study | BMC Nephrology | Full Text*, n.d.; Hedayati et al., 2008, 2009) It has also been reported that CKD patients not on dialysis have a faster progression to ESRD and higher mortality if they are depressed. (Tsai et al., 2012)

Despite studies identifying an association between depression, anxiety, and poor quality of life among CKD/ESRD patients, particularly those on maintenance hemodialysis, little attention is being paid to the diagnosis and treatment of this cohort (Li et al., 2014; Rebollo Rubio et al., 2017)

Furthermore, there is a paucity of studies on depression and anxiety among CKD and hemodialysis patients in Nigeria. This study therefore aims to reveal the prevalence of depression and anxiety among pre-dialysis and hemodialysis patients and to also identify possible confounders.

**2.0 METHODOLOGY**: This is a cross sectional descriptive study of patients seen in out- patients department and dialysis unit of University of Uyo, Nigeria. Pre-dialysis subjects were recruited from out-patients department, while hemodialysis subjects were recruited from the dialysis unit.

Pre-dialysis consisted of patients with glomerular filtration rate (GFR) of <60mls/min/1.73m2 who were not dialysis. Hemodialysis subjects consisted of patients with ESRD who have been on hemodialysis for at least 3 months.

The socio-demographic of subjects were recorded using a well-structured questionnaire. All subjects had their medical history recorded and examination performed. Blood pressure was measured using Accusson’s sphygmomanometer after 10 minutes of rest. An average of 2 readings were recorded as the subject’s blood pressure.

Anxiety and depression were evaluated and recorded using a simple hospital anxiety and depression scale (HADS) screening tool.(Zigmond & Snaith, 1983) This scale has been well-validated and found useful in the assessment of anxiety and depression (Michopoulos et al., 2008; Zigmond & Snaith, 1983) The scale consist of 7 question each for anxiety and depression . Each question is scored 0-3 with a total score of 21 for each condition. A score of 0-7 is considered normal, 8 – 10 is classified as borderline (moderate), while a score of 11 and above are considered clinical caseness (severe). Clinical caseness is a more severe illness that needs clinical intervention.

Inclusion criteria. All CKD/ESRD aged 18 years and above who met the inclusion criteria were recruited for the study.

Exclusion criteria: Patients on anti -depressants or anti- psychotic medications were excluded from the study. Additionally, those who refused to give consent were also excluded.

**Data handling**; Statistical package for Social Sciences (SPSS) version 23- SPSS Inc. Chicago, IL, U.S.A was used for analysis. Categorical variables were presented as frequencies and percentage, while continuous variables were presented as mean (and standard deviation). Chi-square was used to test the relationship between two variables while multivariate regression analysis was used to determine the association between variables. All P-value <0.05 were consider statistically significant.

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**3. RESULTS:**

 A total of 148 participants were recruited for the study consisting of predominantly 113 (76.4%) males, with 35 (23.6%) females.

 Regarding occupation, the largest proportion of respondents were traders 55 (37.2%) followed by civil servants 51 (34.5%), then artisans 12(8.1%), and retirees 11(7.5%). The income classification indicates that 52(35.1% of respondents belong to the low-income class, 33(22.3%) to the middle-income class, and 29 (19.6%) to the high-income class. Half of the respondents 75 (50.7%) were on hemodialysis while 73 (49.3%) are not on dialysis. Hypertensive nephropathy 61(41.2%) was the leading cause of CKD, followed by diabetic nephropathy 45(30.4%), chronic glomerulonephritis 23 (15.5%), and HIV-related kidney disease 8(5.4%). Others included obstructive nephropathy 4(2.7%), chronic allograft failure 1(0.7%), and CKD of unknown etiology 8(4.1%). Also 45 (60%) of the respondents undergo dialysis once weekly, 26(34.7%) twice weekly and only 4 (5.3%) do so thrice weekly. Only 10(13.3%) were able to sustained hemodialysis for more than 52 weeks, 33(44%) 25 to 52 weeks, 22 (29.4%) 17 to 24weeks and 10 (13.3%) for less than 16 weeks. 75(50.7%) of respondents were on hemodialysis, while 73(49.3%) were pre-dialysis patients (Table1)

**Table 1**. Socio-demographic Characteristic, causes of CKD and hemodialysis characteristics of respondents.

|  |  |  |
| --- | --- | --- |
| **Variables** | **Frequency (n=148)** | **Percentage (%)** |
| **Gender** |  |  |
| Females | 35 | 23.6 |
| Males | 113 | 76.4 |
| **Age range (Mean 51.2±11.5** |  |  |
| Young age  | 21 | 14.2 |
| Middle age  | 111 | 75.0 |
| Elderly  | 16 | 10.8 |
| **Occupation** |  |  |
| Artisan | 12 | 8.1 |
| Banker | 6 | 4.1 |
| Civil servant | 51 | 34.5 |
| Clergy | 6 | 4.1 |
| Retiree | 11 | 7.5 |
| Trader | 55 | 37.2 |
| Unemployed | 7 | 4.7 |
| **Level of education**  |  |  |
| Primary  | 9 | 6.1 |
| Secondary  | 73 | 49.3 |
| Tertiary  | 66 | 44.6 |
| **Monthly income** |  |  |
| Low income class | 52 | 35.1 |
| Middle income class | 33 | 22.3 |
| High income class | 29 | 19.6 |
| **Dialysis** |  |  |
| Yes | 75 | 50.7 |
| No | 73 | 49.3 |
| **Causes of CKD** |  |  |
| DM nephropathy | 45 | 30.4 |
| Hypertensive nephropathy | 61 | 41.2 |
| Chronic glomerulonephritis | 23 | 15.5 |
| Obstructive nephropathy | 4 | 2.7 |
| HIV-related kidney disease | 8 | 5.4 |
| CKDu | 6 | 4.1 |
| Chronic Allograft Failure | 1 | 0.7 |
| **Frequency of dialysis (n=75)** |  |  |
| 1 times weekly | 45 | 60.0 |
| 2 times weekly | 26 | 34.7 |
| 3 times weekly | 4 | 5.3 |
| **Duration of dialysis (n=75)** |  |  |
| < 16 weeks | 10 | 13.3 |
| 17 to 24 weeks | 22 | 29.4 |
| 25 to 52 weeks | 33 | 44.0 |
| > 52weeks | 10 | 13.3 |

Table 2: shows that 115(77.7%) of subjects had depression, 56(37.7%) borderline and 59(39.9%) having clinical caseness. Over half of the participants show clinical levels of anxiety 116 (78.4%), borderline 36 (24.3%) and severe anxiety (clinical caseness) 80(54.1%).

Table 2: Prevalence and severity of Anxiety and depression among Respondents.

|  |  |  |
| --- | --- | --- |
| **Variables** | **Frequency (n=148)** | **Percentage (%)** |
| **Depression** |  |  |
| Normal | 33 | 22.3 |
| Borderline  | 56 | 37.8 |
| Clinical caseness | 59 | 39.9 |
| **Anxiety** |  |  |
| Normal | 32 | 20.9 |
| Borderline | 36 | 24.3 |
| Clinical caseness | 80 | 54.1 |

Table 3 compare respondents on hemodialysis with pre-dialysis. Subjects on hemodialysis had 43.5% depression,(15.6% borderline and 27.9% clinical caseness) compared to 34.7% (22.5% borderline and 12.2% clinical caseness) pre-dialysis respondents , p-0.001. Also hemodialysis respondents had a significant anxiety disorder of 43.3%(10.9% borderline and 32.4% clinical caseness), against 36% ( 13.6% borderline and 22.4% clinical caseness) pre-dialysis respondents. P=0.02.

Table 3. Comparing the prevalence of anxiety and depression between respondents and hemodialysis and pre-dialysis respondents

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| .  |
|  | DIAYSIS n=147 |  |
| YES | NO | p-value  |
|  Depression  | normal |  | 10 (6.8%) |  22(15%) |  |
|  |  |  |  |
| Borderline  |  |  23(15.6%) |  33(22.5%) |  |
| Clinical caseness  |  |  41 (27.9%) |  18 (12.2%) |  |
| Anxiety | normal  |  |  11 (7.5%) |  20 (13.6%) | 0.001  |
|  |  |  |  |
|  | Borderline  |  | 16(10.9%) | 20(13.6%) |  |
|  | Clinical caseness  |  | 47(32.4%) | 33(22.4%) |  0.02  |

Table 4: Univariate analysis of selected variables. The table showed that although younger respondents had higher proportion for clinical caseness , this was not statistically significant. It revealed that low income was associated with statistically depression (p=0.03) and anxiety (P=0.01). Also respondents on longer duration of HD were likely to be depressed (p=0.03). Level of education didn’t show any significant statistically relationship with anxiety or depression. Respondents on hemodialysis were more likely to be depressed (p=0.001).

 Table 4: Univariate analysis of factors associated with depression and anxiety

|  |  |  |
| --- | --- | --- |
| Variables  |  Depression  |  Anxiety  |
|  | Normal  | Borderline  | Clinical caseness  | P value  | Normal  | Borderline  | Clinical caseness  | P value  |
| **Age**  |  |
| Young age  | 5 | 6 | 10 |  0.39  | 4 | 5 | 12 | 0.12 |
| Middle age  | 22 | 42 | 46 | 26 | 23 | 61 |
| Elderly  | 5 | 8 | 3 | 1 | 8 | 7 |
| **Monthly income**  |  |
| Low income  | 13 | 17 | 22 |  0.03 | 16 | 6 | 30 | 0.01 |
| Middle income  | 11 | 18 | 4 | 8 | 9 | 16 |
| High income  | 4 | 13 | 11 | 3 | 13 | 12 |
| **Duration of dialysis**  |  |
| < 16 weeks  | 2 | 5 | 3 |  0.03 | 1 | 1 | 8 | 0.16 |
| 17 -24 weeks  | 2 | 6 | 13 | 1 | 5 | 15 |
| 25 -52 weeks  | 1 | 5 | 22 | 5 | 7 | 20 |
| >52 weeks  | 5 | 7 | 2 | 4 | 3 | 3 |
| **Gender**  |  |
| Female  | 7 | 12 | 16 |  0.74 | 9 | 9 | 18 | 0.74 |
| Male  | 25 | 44 | 43 | 22 | 28 | 62 |
| **Level of education**  |
| Primary  | 2 | 5 | 2 |  0.68 | 2 | 3 | 4 | 0.85 |
| Secondary  | 14 | 26 | 32 | 16 | 19 | 37 |
| Tertiary  | 16 | 25 | 25 | 13 | 14 | 39 |
| **Diabetes**  |  |  |  |  |  |  |  |  |
| Yes  | 7 | 19 | 18 |  0.49 | 11 | 12 | 21 | 0.55 |
| No  | 25 | 37 | 41 | 20 | 24 | 59 |
| **Hemodialysis**  |  |  |  |  |  |  |  |  |
| Yes  | 10 | 23 | 41 |  0.001 | 11 | 16 | 47 | 0.06 |
| No  | 22 | 33 | 73 | 20 | 20 | 33 |

**Table 5:** This is the multivariate logistic regression model of predators of depression.

Age is negatively associated with depression. For each additional year of age, the odds of having moderate to severe depression decrease by about 4.7% (OR < 1). This result is statistically significant (p < 0.05), suggesting that younger patients are more likely to experience depression than older patients. Patients undergoing hemodialysis have significantly higher odds (4.65 times higher), severe depression compared to pre-dialysis patients. This association is highly significant (p = 0.004), indicating that dialysis is a strong predictor of depression in this population. High-income individuals appear to have lower odds of depression, but the result is not significant (p > 0.05). Diabetes has higher odds ratio of having depression (OR>1). This was statistically significant (p-0.005)

 Table 5. Multivariate logistic regression model of predators of depression

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** |  | **β** | **OR** | **95%CL** | **p-value** |
| Age | Age | -0.048 | 0.953 | 0.91-1.00 | 0.04 |
| Gender | FemaleMale | 0.632 | 1.882 | 0.59-5.99 | 0.29 |
| Dialysis | Yes | 1.537 | 4.651 | 1.64-13.21 | 0.004 |
| Monthly income | Low incomeMiddle incomeHigh income | 0.613-1.131 | 1.8450.323 | 0.54-6.340.07-1.52 | 0.070.330.15 |
| Hypertension | Yes | 1.131 | 3.053 | 0.34-27.14 | 0.32 |
| Diabetes  | Yes | 0.042 | 1.043 | 0.311-3.497 | 0.005 |

*OR = Odd ratio; CI = Confidence interval; β = Beta estimate*

discussion:

This study revealed a high prevalence of anxiety and depression among patients with chronic kidney disease patient. Patients undergoing hemodialysis were more likely to experience depression than pre-dialysis patients.

 The overall prevalence of depression among both pre-dialysis and hemodialysis subjects in this study was 77.7 %( 37.8% of borderline and 39.9% of clinical caseness). This prevalence rate was higher than the 28.4% reported in a study conducted at Kenyatta National Hospital in Kenya(Kioko et al., 2022) This disparity may be attributed to differences in assessment tools, as Kenyatta used the Beck Depression Inventory, while we utilized the Hospital Anxiety and Depression Scale.

Similarly, a study by Shafi et al reported a prevalence rate of 72.4% among both ESRD and pre-dialysis patients.(Shafi & Shafi, 2017),while a study in Nepal found a depression rate of 75.5% .(Kunwar et al., 2020) These rates were slightly lower than what we observed in this study. Generally, the prevalence of depression in CKD patients is said to be between 20-80% depending on the assessment tools used. (Cukor, Coplan, et al., 2007; Hedayati & Finkelstein, 2009).

This study also revealed that the prevalence of moderate (Borderline) to severe (Clinical caseness) anxiety among both pre-dialysis and ESRD patients was 78.4. This finding was higher than a systematic meta-analysis, which reported a prevalence of elevated anxiety symptoms of 43%.(Huang et al., 2021). Similarly a study by Shafi et al observed a prevalence rate of 71.2%. These disparities may stem from multiple factors, such as the assessment instrument used, level of income, age, and level of education. Notably, majority of the subjects in this study were of middle age, and many belonged to the low-income class.

When comparing pre-dialysis subjects with the hemodialysis group, depression and anxiety were more prevalent among those on hemodialysis. The prevalence of depression was 43.5% compared to 34.7% for pre-dialysis, while the prevalence of anxiety was 43.3% for hemodialysis subjects compared to 36% for pre-dialysis. These findings align with previous studies which have reported a high prevalence of anxiety and depression among hemodialysis patients. (Shafi & Shafi, 2017; Sharma et al., 2022; Shirazian et al., 2017; Ye et al., 2022) Sharma et al in their study reported a prevalence rate of 68.75% and 77.08% among patients undergoing hemodialysis.(Sharma et al., 2022) A study conducted in Rajasthan, India, reported a prevalence rate of 66% for depression and 61% for anxiety, while another study in Pakistan reported a prevalence of 50.6% and 55.8% for depression and anxiety respectively.(Gadia et al., 2020; Yaseen et al., 2021) The prevalence in these studies was higher than what we found in our studies.

Several factors are responsible for the high prevalence of the high prevalence of depression and anxiety among patients in hemodialysis. Some of these factors include among others, longer duration on dialysis, low level of education, financial status, and source of funding for dialysis.(Rebollo Rubio et al., 2017; Wang et al., 2024)

Studies have reported that patients on long-term hemodialysis are more likely to be depressed than pre-dialysis patients.(Ganu et al., 2018; Nagy et al., 2023) Although patients on long-term hemodialysis in this study were somewhat likely to be depressed than pre-dialysis patients, the differences were not statistically significant. This may be due to the small percentage of patients (13.3%) who were able to sustain dialysis for more than one year; Dialysis sustainability has been reported in previous studies as a major issue especially where there is little or no insurance coverage(Akpan et al., 2020; Baye et al., 2024). Level of education has also been reported as one of the major factors contributing to the high level of anxiety and depression among hemodialysis patients. Studies have shown that a low level of education is associated with depression and anxiety in hemodialysis patients.(Ye et al., 2022) In this study level of education did not play a significant role in the prevalence of depression and anxiety probably because very few of the patients had only primary education.

Other conditions that are associated with increased frequency of depression and anxiety include low levels of income. Studies have shown that lower income is associated with increased frequency of depression and anxiety. (Ganu et al., 2018; Meng et al., 2022) Although a low level of income was associated with an increased likelihood of depression and anxiety in univariate analysis in this study, it was not statistically significant in multivariate analysis. However, patients with higher income had a better hazard ratio (hazard ratio <1) of not having depression, although this was not statistically significant. We also discovered that younger subjects had an increased frequency of depression (p= 0.04). While, studies have reported a high prevalence of depression among the elderly(Mallappallil et al., 2014), few studies have shown depression may be higher in younger patients.(Chen et al., 2019; Nguring’a et al., 2022; Vork et al., 2018). This finding may be due to lifestyle modification including dietary modification as well as a combination of factors such as loss of work time, having to pay hospital bills out of pocket, and time lost due to frequent dialysis sessions.

Diabetes was also associated with an increased likelihood of depression. This aligns with previous studies (Alaoui et al., 2024; Shen et al., 2022)

**4. Conclusion:** Depression and anxiety are common among CKD patients with much higher frequency in hemodialysis patients and they can significantly affect their quality of life. For a better quality of life, all chronic kidney patients especially those on MHD should undergo periodic evaluation for depression and anxiety with treatment provide when clinical caseness is identified.

Consent: Verbal and written consent were obtained from subjects. Those who refused to give consent were excluded from the study

**Ethical approval**: Ethical clearance was sought and obtained from University of Uyo Teaching Hospital ethical Committee.

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 Abbreviations: CKD- Chronic Kidney Disease, MHD- Maintenance Hemodialysis, ESRD- End-Stage Renal Disease