Major Depression in Chronic Kidney Disease Patients Attending the Renal Clinic in a Teaching Hospital in Port Harcourt Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Background: Depression is the commonest mental disorder associated with chronic disorders such as chronic kidney disease (CKD), cancer, hypertension and diabetes. This study is aimed at analyzing depression, focusing on prevalence, its predictors and associated factors in CKD patients

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Methods: Using a convenient sampling approach, patients attending the renal clinic in a teaching hospital between February and September 2024, who met the inclusion criteria were recruited into the study. Data was collected via interviewer administered approach and examination of the medical records of the 200 participants. Socio-demographic data was obtained and the "Patients Health Questionnaire (PHQ)-9" was used as the instrument for depression related data.

Results: The patients were predominantly males (n=115;57%). Majority of the patients n=82;41% were of low socioeconomic class and 30% had no financial support. Hypertension was the leading comorbidity 62%. The mean depression (PHQ-9) score was 7.10+5.202, with 126(63%) having depressive symptoms out of which 55(43.7%) had major depression (PHQ>10). 71(56.3%) had mild depression, 32(25.4%) had moderate, 21(16.7%) had moderate to severe depression, while 2(1.6%) had severe depression. Nine of the variables showed significant association (p=.05) with depression, out of which, employment OR:8.56 p=.001, financial support p=.001, CKD stages OR: 64,742 p=.003 and medication dependence OR: 3.661 p=0,009 were predictive.

Conclusion: Major depression is of high prevalence in patients with CKD. Low income and lack of financial support play significant role in major depression. Functional social support and routine screening for depression are strongly recommended.

1. INTRODUCTION

Chronic kidney disease (CKD) is an irreversible damage to the kidney that must have existed for over 3 months. It is prevalent all over the world, affecting over 10% of the world population (Kovesdy, 2022). It affects all areas of life, leading to poor health outcome and low quality of life (Staff, 2018). It's effect on physical health accounts for the high frequency in hospital admission, but the relatively high mortality seen in CKD may be due to its effect on the mental health of patients (Hedayati et al., 2004). Depression is the commonest mental disorder associated with chronic disorders, including children, women and the general population (Enyidah et al., 2024). Recent studies have shown that patients with CKD who are not on dialysis have rates of depression up to 3 times higher than those in the general population (Palmer et al., 2013). The directionality of the relationship between depression and CKD is likely bidirectional as in other chronic diseases and more likely so in CKD with the thought of impending dialysis, or transplantation (Shayan et al., 2017).

The global depression levels are in an estimated 3.8% of the population, including 5% of adults and 5.7% of seniors >60years (World Health Organization, 2021). Gureje et al., reported a life time prevalence of 3.1% among people >18years in Nigeria (Oye et al., 2008).

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Depression among CKD patients accounts for 20-25% of the adult population globally (Shirazian, 2019). In Nigeria recent studies have reported prevalence rates of 17% to 34.8% from different regions, institutions and settings (Joachim & Victor, 2016; Osunbor et al., 2024; Amira, 2011; Adesokun et al., 2020). The various prevalence rates could be due to different methods and instruments used. This study is designed to report on the prevalence and associated factors using the PHQ-9 study tool in a teaching hospital setting in Port Harcourt, Nigeria.

2. METHODOLOGY

This is a cross sectional study of patients with CKD, attending the renal out- patient clinic, in the Nephrology unit of the Rivers State University Teaching Hospital Port Harcourt, between February 2024 to September 2024. The nephrology unit serves as a referral center to all the peripheral health facilities within the region, it attends to all kidney diseases including hemodialysis and preparing patients for kidney transplant. CKD is defined as an abnormality in kidney structure or function, present for more than three months with implication for health or an estimated glomerular filtration rate (eGFR) of < 60mls/min/1.73m^2 (Clase, 2011). Estimated glomerular filtration rate is therefore used to determine and categorize CKD. In this study, each patients' eGFR was calculated using the CKD-EPI formula and participants' were categorized into different stages of CKD using KDIGO 2012 guidelines (Stevens, 2024).

Participants were selected by a convenient sampling method from the Nephrology clinic. Registered patients who have been attending the clinic for at least 6 months and who met study

inclusion criteria were invited to participate in the study.

The inclusion criteria required the participants to be at least 18 years old. Uremic or confused patients and those with history of mood disorders were excluded. Approval was obtained from all the relevant authorities and written informed consent received from all the patients. The patients were briefed and educated on the study protocol, and were supervised to fill the two questionnaires.

The first questionnaire contained the socio-demographic characteristics and relevant medical history. The second was the PHQ-9, one of the most commonly used questionnaire for screening for depression in patients with CKD and end stage kidney disease (ESKD) with high validity (Watmck et al., 2005). It has been used across the African continent and it's validity established in Nigerian cohort (Adewuya et al., 2006).

PHQ-9 was used for its brevity and simplicity, it is also a reliable and valid measure of depression severity, with a sensitivity of 54% and specificity of 90% for scores $\geq$10 (Kroenke et al., 2001). Each PHQ questionnaire was scored from 0(not at all) to 3(every day) and individual scores added up to obtain a total PHQ score range (0-27) for each participant. The scores were used to classify the patients according to the level of depression using ranges from the data entry code. A total of 224 patients were selected for participation. 24 (10.7%) were excluded resulting in a convenient sample size of 200. Fig. 1.

2.1 Data Analysis

Microsoft Excel version 10 was used to create a database. Statistical analysis was done using Statistical package for Social Sciences SPSS version 25. Descriptive statistical analysis for collated data was reported either as means or proportions, while associations between means of continuous variables were determined using Student T-test or Chi-square test used as appropriate for discrete variables. Bivariate logistic regression analysis was used to determine predictors significant at a p value <.05.
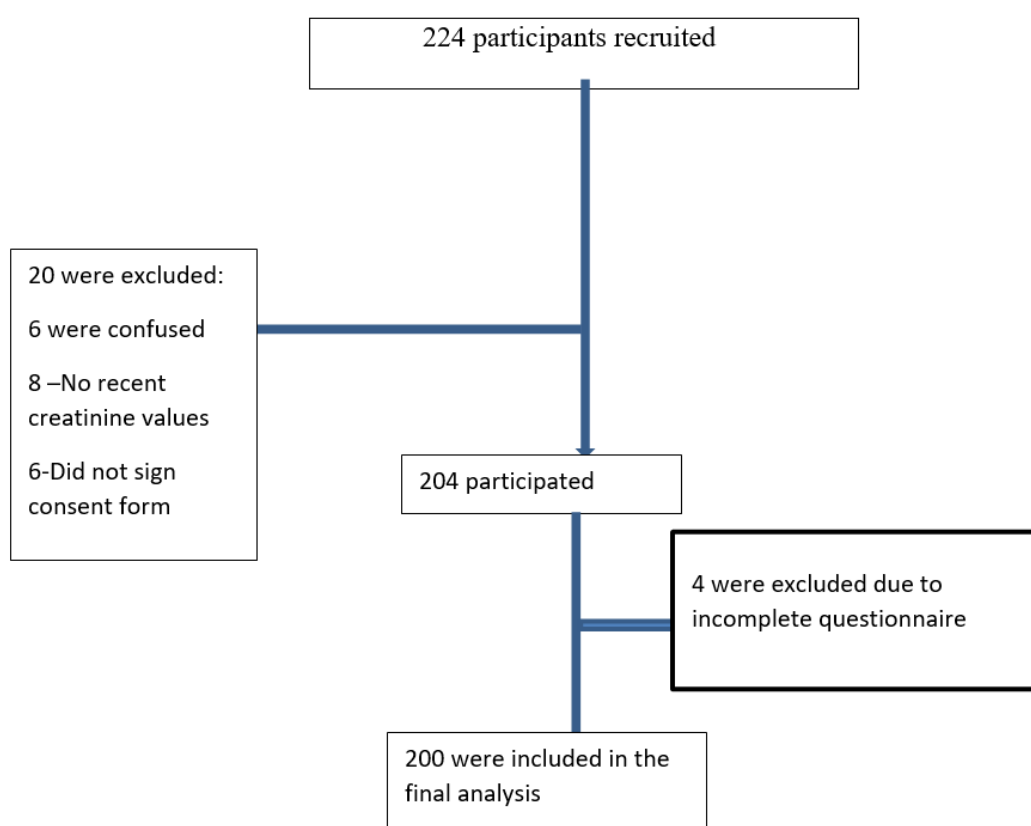

Fig. 1. Flow diagram for participants' selection

3. RESULTS

Two hundred participants were recruited for the study. Table 1 shows the distribution of socio-demographic characteristics, while Table 2 shows relevant medical history of participants. The patients were predominantly males (57.5%).

Majority was married (62%), and hypertension was the commonest comorbidity.

The prevalence of stage 1 CKD was 5% (n=10), stage 5 was 11% (n=22), with stage 2 being the most prevalent at 35% as depicted in Fig. 2.

**Table 1. Baseline characteristics of patients showing socio-demographic variables**

VARIABLE		Frequency (n)	Percentage (%)
Age	≤ 44 years	68	34.0
	45 - 64 years	66	33.0
	≥ 65 years	66	33.0
Gender	Male	115	57.5
	Female	85	42.5
Marital Status	Single	54	27.0
	Married	124	62.0
	Widowed	18	9.0
	Separated	4	2.0
Educational Level	Primary	16	8.0
	Secondary	88	44.0
	Tertiary	96	48.0
Employment Status	Employed	98	49.0
	Unemployed	50	25.0
	Retired	52	26.0
Economic status (Income per month)	<₦30,000	82	41.0
	₦31,000-100,000	88	44.0
	>₦100,000	30	15.0
Financial support	Family/friends	134	67.0
	Community/NGO	2	1.0
	Government/ Insurance	4	2.0
	None	60	30.0

NGO- Non Governmental Organizations

Table 2. Clinical characteristics of participants

VARIABLE		Frequency (n)	Percentage (%)
Duration of CKD	<5years	164	82.0
	6-10 years	32	16.0
	>10 years	4	2.0
CKD Stages	Stage 1	10	5.0
	Stage 2	70	35.0
	Stage 3	50	25.0
	Stage 4	48	24.0
	Stage 5	22	11.0
Comorbidities	Diabetes mellitus	30	15.0
	Hypertension	124	62.0
	CIN	2	1.0
	SCD	10	5.0
	>2 comorbidities	28	14.0
	Others	6	3.0
Medication dependence	Yes	80	40.0
	No	120	60.0
Drug availability	Regularly	124	62.0
	Occasionally	58	29.0
	Rarely	18	9.0

CKD- Chronic kidney disease, CIN- Chronic interstitial nephritis, SCD- Sickle cell disease
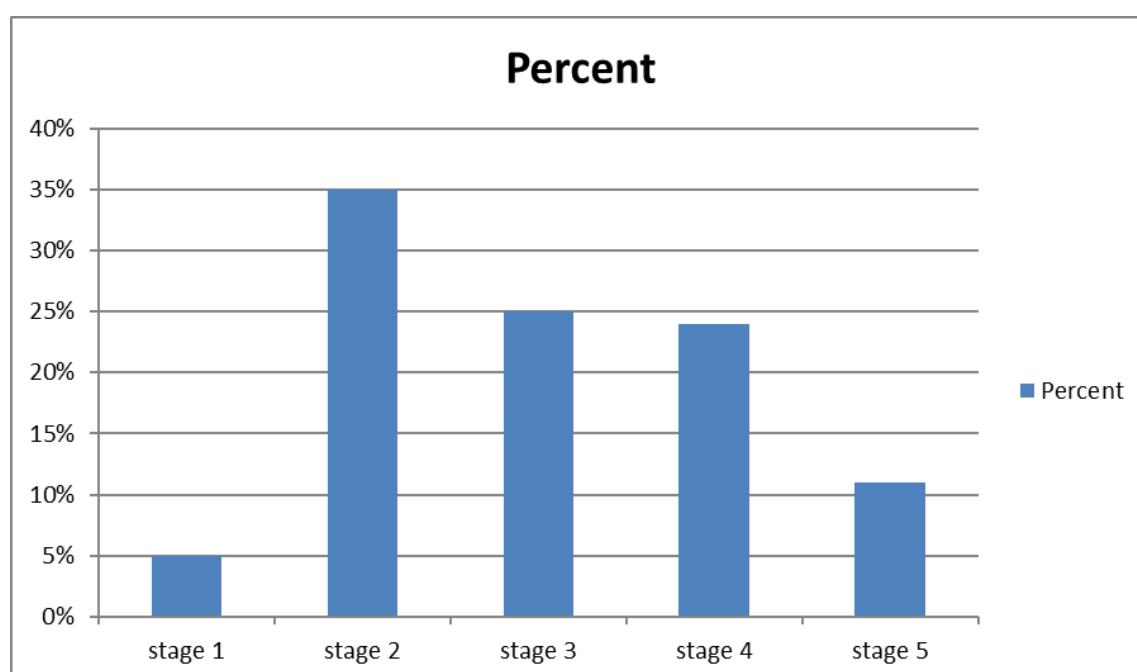
Fig. 2. Percentage distribution of CKD stages (n=200)

Depression was significantly common among those with primary level of education, 12 (75%), among those with secondary level of education, 64 (72.7%) were depressed, while 50 (52.1%) of participants with tertiary level of education had depression. Patients with tertiary level of education had the lowest risk (OR=0.362, p=.01) followed closely by the participants with secondary level of education (OR= 1.091, p=.01). Among the unemployed group, 38 (76%) had depression, while 34(65.4%) of the retirees had some form of depression.

Among the groups that earned monthly wages in view of their economic status, depression was identified in 60(47.6%) of the low income group of ≤ ₦30,000 monthly wage, and this difference was significant (OR=1.364, p=.02). Participants without any form of financial support, 52(41.3%) were observed to have highest risk of depression than others with some sort of financial support and this difference was statistically significant. (OR=24.942, p=.01).

Participants with longer duration of chronic kidney disease were significantly associated with the development of depression (p=.02). In respect of the various CKD stages, participants categorized as stage 2 (OR= 24.704, p=.050), were less likely to develop depression compared

to more advanced stages of CKD e.g. stage 5 (OR= 64.742 p=.003).

Majority of the participants who were observed to be depressed had hypertension as an existing comorbidity (58.7%), all of the participants with sickle cell disease were observed to be depressed accounting for 7.9% of the entire participants in the depressed category. A significant difference (p=.02) was observed among patients with more than one comorbidity compared to participants with only one comorbidity. Similarly, participants who felt they were medication dependent were twice as likely to be depressed as those who do not feel they are medication dependent (OR=2.40, p=.009). Meanwhile, gender, age, marital status, alcohol and cigarette intake, quantity of pills used daily, and availability of medication did not show any significant association with depression as depicted in Table 3.

A total of 126 (63%) showed depressive symptoms, out of which 71 (56.3%) had mild depression, 32 (25.4%) moderate, 21 (16.7%) moderate-severe and 2 (1.6%) had severe depression using the depression severity scale in PHQ-9. Among the 126 with depressive symptoms, 55 (43.7%) had major depression (PHQ score > 10), giving us a prevalence of 43.7% for major depression.

Table 3. Factors associated with depression among Pre-dialysis CKD patients

Variable	Participants with depression (n=126)	Participants without depression n =74	X^2	p –value
Gender				
Female	51(40.5%)	34(45.9%)	0.57	0.45
Male	75(59.5%)	40(54.1%)		
Age				
18-44	40(31.8%)	28(37.9%)	0.90	0.64
45-59	44(34.9%)	22(29.7%)		
>60	42(33.3%)	24(32.4%)		
Marital status				
Married	72(57.1%)	52(70.3%)	5.01	0.17
Single	38(30.2%)	16(21.6%)		
Separated	4(3.2%)	0(0%)		
Widowed	12(9.5%)	6(8.1%)		
Educational status				
Primary	12(9.5%)	4(5.4%)	9.67	0.01*
Secondary	64(50.8%)	24(32.4%)		
Tertiary	50(39.7%)	46(62.2%)		
Employment				
Employed	54(42.8%)	44(59.5%)	6.37	0.041*
Unemployed	38(30.2%)	12(16.2%)		
Retired	34(27.0%)	18(24.3%)		
Economic status				
$\leq$ N30000	60(47.6%)	22(29.7%)	8.16	0.02*
31-N100000	46(36.5%)	42(56.8%)		
>N100000	20(15.9%)	10(13.5%)		
Financial support				
Family /friend	70(55.5%)	64(86.5%)	22.5	0.01*
Community/NGO	2(1.6%)	0(0%)		
Govt./insurance	2(1.6%)	2(2.7%)		
None	52(41.3%)	8(10.8%)		
Drink alcohol				
Yes	16(12.7%)	8(10.8%)	0.16	0.69
No	110(87.3%)	66(89.2%)		
Smoke cigarette				
Yes	4(3.2%)	2(2.7%)	0.36	0.85
No	122(96.8%)	72(97.3%)		
Duration of CKD				
<5yr	96(76.2%)	68(91.9%)	8.32	0.02*
6-10yr	26(20.6%)	6(8.1%)		
>10yr	4(3.2%)	0(0%)		
CKD stages				
Stage 1	2(1.6%)	8(10.8%)	21.38	0.00*
Stage 2	36(28.6%)	34(46.0%)		
Stage 3	32(25.4%)	18(24.3%)		
Stage 4	40(31.7%)	8(10.8%)		
Stage 5	16(12.7%)	6(8.1%)		
Comorbidity				
Hypertension	74(58.7%)	50(67.6%)	13.15	0.02*
Diabetes mellitus	20(15.9%)	10(13.5%)		
CIN	0(0%)	2(2.7%)		
SCD	10(7.9%)	0(0%)		
>2 comorbidities	22(17.5%)	12(16.2%)		

Variable	Participants with depression (n=126)	Participants without depression n =74)	X^2	p –value
Medication dependence				
Yes	60(47.6%)	20(27%)	8.23	0.004*
No	66(52.4%)	54(73%)		

*CKD- Chronic kidney disease, CIN- Chronic interstitial nephritis, SCD- Sickle cell disease, * Significant.*

4. DISCUSSION

This study examined the prevalence and socio-demographic characteristics related to major depression among patients with CKD in a teaching hospital setting. Participants were predominantly male (57.5%), hypertension was the highest comorbid factor (62%), followed by diabetes (15%). The minimum depression score was 0, the maximum was 22 with mean score of 7.30 SD$\pm$ 5.202. More than half of the patients, 63% had depressive symptoms and 43.7% had major depression (PHQ score $\geq$ 10). Out of the 126 with major depression, 71(56.3%) had mild depression, 32(25.4%) moderate, 21(16.7%) moderate to severe and 2(1.6%) severe depression.

These findings are similar to those of Bahall et al. (2023), who reported 62.1% of the patients as having clinical depression with 45.1%, 12.4%, and 4.6% as having moderate, moderate to severe and severe depression respectively. The difference being that their sample comprised of patients with stages 3 to 5 CKD only.

Our study revealed that education level, employment status, economic status, financial support, duration of CKD, CKD stages, comorbidity, medication dependence, and availability of drugs were significantly associated with depression. These findings are in agreement with other studies that showed association between depression and socio-demographic variables such as educational level, (Kroenke et al., 2001), employment status (Kutner et al., 2010), economic status (Gadia et al., 2020), and financial support (Mistik et al., 2017). Our study showed a strong association between low education and depression p=.01, similar to findings by Bahall et.al., (2001).

Patients of low economic status who earned a monthly income $\leq$ N30,000.00 which is the minimum monthly wage in Nigeria, were observed to have high depression scores including those with no employment.

An earlier study in Nigeria by Adesokun et al., (2011) reported low income as predictive of major depressive illness but did not find any significant association with unemployment. We report a strong association between unemployment and depression OR=8.566, p=.001. A good and effective support system especially financial support is a major contributor to patients' security, quality of life, and prognosis (Zhang & Liu, 2001). The lack of patients' support obviously affects the patients adversely including the availability of drugs and other services. We report that patients who had no financial support were more likely to develop depression p=.001 and that majority of patients who rarely could afford the drugs were likely to be depressed p=.046.

Our study did not reveal any significant difference in the prevalence of depression among males and females p=.45, contrary to the report by Chiang et. al., (2013) which demonstrated a significant association. We also found no significant association between the various age groups p=.64, marital status p= .17 and depression. This is in keeping with an earlier report by Kimmel et al. (2002), but at variance with the study by Osunbor et al., (2011) who reported being unmarried as predictive p=.002. Contrary to our findings, Mosleh et al., (2020) reported age groups as the only predictive variable associated with depression. This view was supported by Shayan et. al (Shayan et al., 2017), who reported that the younger age group was more likely to develop depression.

We report that the longer the duration of CKD, the stronger the association with depression (p=.02), in keeping with Osunbor et al., (2024) and Hulder et al., (2022). We assessed all stages of CKD and report a strong association with depression. CKD stages 1 and 2 were less likely to be depressed, while stages 3-5 had higher risk of depression. This is in keeping with other related studies by Osunbor et al., (2024) and Heffiarachi et al. (2018). Bahall et.al (2023) also reported that severe depression increased with worsening CKD stages 3-5 which is in keeping with our finding, however in their study, advanced CKD stages were not observed to be an independent predictor of depression in these cohorts of patients.

In this report, CKD stage 5 displayed the highest prevalence of clinical depression; all patients in this group had clinical depression just as reported by Mosleh et al., (2020) in Saudi Arabia. CKD stages were observed to be associated with depression in our study, which seems to be at variance with other related studies which reported no significant association (Shirazian, ,2019; Osunbor et al., 2024; Amira, 2011). This study records a high level of depression 63% PHQ score $\geq$ 5 and 43.7% major depression, PHQ score $\geq$ 10. A prevalence of 43.7% of major depression as a comorbidity to CKD pre dialysis patient is deleterious and grave to this patients confirming the finding by Hedayati et. al. This is not surprising considering the low level of education, high unemployment rate and very poor standard of living shown by the very poor salary. Lack of financial support and absence of health insurance coverage compounds the problems and leads to a grave outcome. These poor prognostic features worsen CKD and it's comorbidities Palmer et al., (2013), leading to daily use of more pills making patients believe their lives depend on pills as reported by this study (OR; 3.661, p=.009).

5. CONCLUSION

Depressive symptoms and depression are very evident as comorbidities in patients with CKD. The high prevalence of major depression reported in this study portends a grave danger to CKD patients in Nigeria. Low income, unemployment, absence of functional and effective health insurance scheme and lack of social support worsen CKD and predispose patients to depression accounting for the high mortality earlier reported. Patients with CKD must be screened for depression as a routine check and a functional social support system is strongly suggested.

6. STUDY LIMITATION

Clinical evaluation of depression based on PHQ-9 scores is subjective and may alter the expected outcome. Screening instruments may never be as accurate as structured instruments.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

ETHIC APPROVAL AND CONSENT

Approval was obtained from all the relevant authorities and written informed consent received from all the patients.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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