

Generalised Anxiety Symptoms Among Patients with Chronic Kidney Disease: A Cross-Sectional Study in Northwestern Tanzania

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ABSTRACT

Background: Generalized anxiety disorder is prevalent among patients with chronic diseases such as chronic kidney disease (CKD). It is often not identified but is associated with reduced quality of life in patients with End Stage Renal Disease. This study aimed to determine the prevalence of generalized anxiety symptoms and to identify factors associated with these symptoms among patients with CKD attending Bugando Medical Centre, Mwanza, Northwestern Tanzania.

Methods: This was a cross-sectional study conducted among 376 patients with CKD aged 18 years and above who were recruited and interviewed using the Generalized Anxiety Disorder-7 (GAD-7) scale to screen for symptoms of generalized anxiety disorder. Participants were systematically selected from both inpatient and outpatient units and interviewed by trained research assistants.

Results: The mean age of the participants was 52.78 years (SD=14.23; range 18-85 years). 67.02% were males; 33.24% were more than 60 years of age and 32.45% of the participants were attending haemodialysis at BMC Nephrology unit. The prevalence of generalized anxiety symptoms was 40.96% (n=154, 95% CI: 36.07% - 46.03%). Increased odds of anxiety symptoms were associated with being 41-50 years (AOR 3.6, 95%CI: 1.60-2.19, *P* value=.016); not started dialysis treatment (AOR 2.48, 95% CI: 1.42-4.31, *P* value=.001), not having health insurance coverage (AOR 1.29, 95% CI: 1.16-1.53, *P* value<.001) and inability to perform their personal duties (e.g., bathing, walking, and dressing without assistance) (AOR 1.78, 95% CI: 1.05-3.03, *P* value=.033).

Conclusion: Generalised anxiety symptoms are highly prevalent among patients with CKD at Bugando Medical Center in Mwanza, Northwestern Tanzania. To support their psychosocial health, our findings suggest that patients with CKD should be screened early for anxiety disorders. Early detection and intervention may reduce the burden of morbidity and mortality and improve patients' quality of life.

BACKGROUND

The World Health Organization (WHO) estimated that 3.6% of the global population had anxiety disorders in 2015.¹ It is common among people with chronic diseases such as Chronic Kidney Disease (CKD),^{2,3} but it's poorly studied.⁴ Studies have reported that patients with CKD are subjected to ongoing psychological adjustments over the course of their disease, including accepting the diagnosis, adhering to medications, coping with frequent hospitalizations, managing lifelong treatment, and dealing with its complications.⁵ It has also been reported that patients undergoing haemodialysis experience higher symptoms of anxiety.^{6,7}

The prevalence of anxiety symptoms among CKD patients has been reported to range from 27.6% in Korea,⁸ 20.6% in Taiwan,⁹ 19.7% in Saudi Arabia,¹⁰ while a study from Kenya reported a prevalence of 40.2%.¹¹ Different factors such as age,¹² gender,¹³

income, occupation and education,¹⁴ treatment support¹⁵ and lifestyle modifications such as frequent dialysis and adherence to a special diet^{16,17} have been associated with anxiety symptoms among patients with CKD.

Anxiety disorders among CKD patients have been associated with poor treatment adherence, dialysis withdrawal, suicide and premature death. Evidence suggests that these patients may die 10 to 20 years earlier than those without anxiety disorders.¹⁸⁻²⁰ Early screening and detection of mental health disorders such as anxiety are critical for implementing appropriate interventions to improve outcomes among CKD patients. In Tanzania, data on the burden of anxiety among patients with CKD and its associated factors is likely underestimated due to scarce epidemiological evidence.²¹ Therefore, this study aimed to determine the prevalence of generalized anxiety symptoms and to identify factors associated with these symptoms among patients with CKD at Bugando Medical Centre.

METHODS

Study Design and Settings

An analytical cross-sectional study was conducted among patients with CKD attending Bugando Medical Centre (BMC), a tertiary referral, teaching and research center for the Lake and Western zones of the United Republic of Tanzania. The hospital has 1000 beds and serves a catchment population of approximately 15 million people. The nephrology clinic and dialysis unit manages up to 130 new patients per month.²²

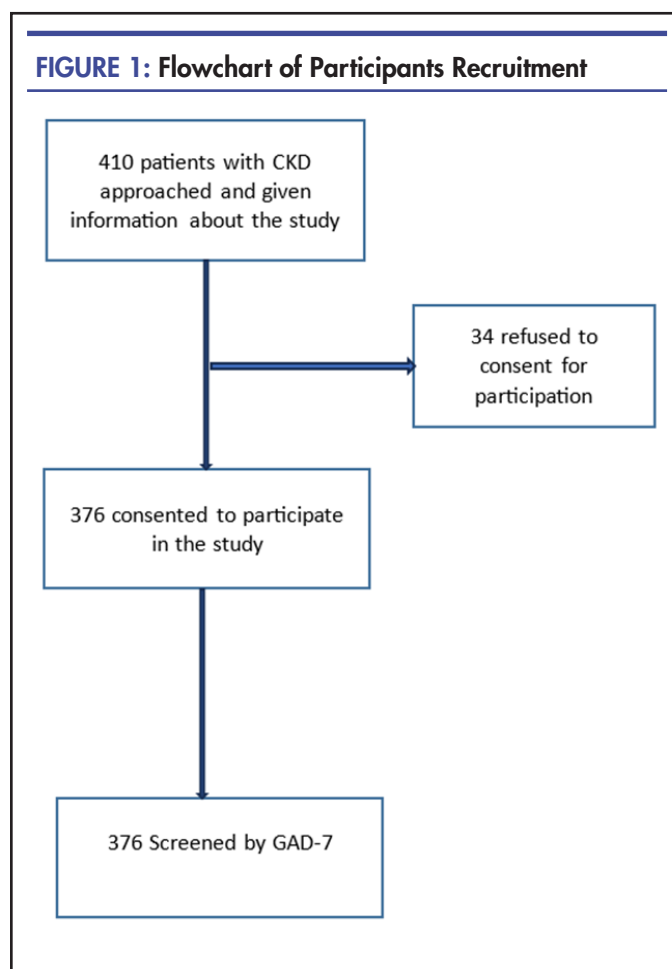
Participants and Recruitment Methods

The study population (N=376) was recruited from inpatient and outpatient units at BMC from August to October 2020 (Figure 1). A systematic sampling approach was used to recruit participants from the nephrology clinic and wards where every 2nd patient was approached. Trained research assistants approached the participants, explained the aim of the study, and obtained their consent to participate. Potential participants who were physically ill (having acute illness or unstable medical condition such as infection, or severe symptoms beyond their underlying CKD) at the time of recruitment were not recruited into the study. Participants who scored in the moderate or high range for anxiety, or who exhibited active suicidal behaviour, were referred or escorted to the psychiatry clinic at BMC for further clinical assessment and follow-up. The research assistants administered the questionnaires by reading each question aloud and recording the participants' responses. No participants who provided consent withdrew from the study, and there were no missing data.

Research Questionnaires

The data collection tools consisted of a sociodemographic questionnaire, a disease-related questionnaire, and the Generalized Anxiety Disorder-7 (GAD-7) scale. The sociodemographic questionnaire captured information such as gender, age, religion, marital status, number of children, level of education, income, presence of a treatment supporter or caregiver, and health insurance status. The disease-related questionnaire included items on whether the participant had initiated haemodialysis, their ability to perform personal activities (e.g., bathing, walking, and dressing) independently, their ability to engage in income-generating activities, the impact of CKD-related lifestyle modifications, and current sexual activity. The GAD-7 is a 7-item self-administered instrument used to assess the frequency of anxiety symptoms over the preceding two weeks. Each item has four possible responses, which are scored from 0 to 3, resulting in a total score between 0 and 21. Scores are categorized as follows: 0–4 (no anxiety symptoms), 5–9 (mild anxiety), 10–14 (moderate anxiety), and 15–21 (severe anxiety). Participants were classified as displaying generalized anxiety symptoms if they scored above four on GAD-7 (23). GAD-7 is a self-report, however, we read all the questions to participants, and it has empirically demonstrated good reliability (Cronbach's $\alpha=0.82$) (24). This scale has been extensively tested and widely accepted globally (25–27). GAD-7 scale has been used and tested in various African countries and translated into many languages including Swahili the national language of Tanzania.^{24,25}

FIGURE 1: Flowchart of Participants Recruitment



Sample Size and Statistical Analysis

The sample size was calculated based on estimating the prevalence of generalized anxiety symptoms among CKD patients, using a prevalence estimate of 40.2% from a previous study in Kenya,¹¹ with a 95% confidence level and a margin of error of 5%. The minimum sample size of 376 participants was estimated from Kish-Lisle formula of cross-sectional studies.²⁸ This sample size was considered adequate to explore factors associated with anxiety symptoms. Data were entered using Epi Info software and analysed with Stata version 15 for Mac. Categorical variables were summarized as frequencies and percentages, while continuous variables were described using means with standard deviations and ranges, or medians with interquartile ranges, as appropriate. Descriptive analyses were performed to characterize the socio-demographic profile of the participants and to determine the prevalence and severity of generalized anxiety symptoms. Logistic regression analysis was then conducted to assess the associations between anxiety symptoms and selected socio-demographic and clinical variables, including gender, age, marital status, number of children, education level, income, duration since diagnosis, dialysis status, availability of a treatment supporter, and health insurance status. Variables included in the analysis were selected based on previous

literature and their known or plausible association with anxiety among CKD patients. Anxiety was categorized using standard GAD-7 cut-off scores (<4 vs. ≥4). Initially, univariable (unadjusted) logistic regression analyses were conducted to assess the association between each independent variable and anxiety symptoms. Variables with a P value <.20 in the univariable analysis were considered for inclusion in the multivariable logistic regression model. A multivariable logistic regression model was then fitted to identify independent predictors of anxiety symptoms while adjusting for potential confounding factors. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported, and statistical significance in the final model was set at $P < .05$.

Ethical Considerations

Ethics approval to conduct and publish the findings from this study was sought from The Catholic University of Health and Allied Sciences/Bugando Medical Centre Joint Ethical Committee with an ethical clearance certificate number CREC/439/2020. Further permission to conduct the study was granted by BMC administrations. Participant identities were not included on the questionnaires or in the analysis, only numbers were used to maintain confidentiality.

RESULTS

Socio-demographic Characteristics

The mean age of the participants was 52.78 years (SD=14.23; range 18-85 years). Approximately, two-thirds of study participants, 67.02% ($n=252$) were male and permanently residing in urban areas (65.43%; $n=246$). Among study participants 33.24% ($n=125$) were more than 60 years of age and more than half of the participants 55.59% ($n=209$) had only primary school education. More than two-third of the participants, 70.74% ($n=266$) had been diagnosed with CKD in the previous year, and only one-third of the participants, 32.45% ($n=122$) were attending haemodialysis. More than two-third of the participants, 77.93% ($n=293$) had their CKD treatment covered by medical insurance.

Table 1 summarises the socio-demographic characteristics of the study participants.

TABLE 1: Characteristics of the Study Participants		
Variable	Frequency (n)	Percentage (%)
Socio-demographic characteristics		
Gender		
Male	252	67.02
Female	124	32.98
Age (Years)		
18-30	21	5.59
31-40	56	14.89
41-50	94	25.00
51-60	80	21.28
61-85	125	33.24
Religion		
Muslim	86	22.87
Christian	290	77.13

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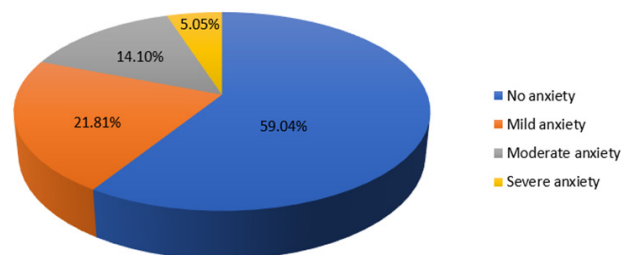
TABLE 1: Continued

Variable	Frequency (n)	Percentage (%)
Marital status		
Married	81	21.54
Not married	295	78.46
Number of children		
No children	16	4.26
1-4	206	54.79
>4	154	40.96
Education level		
No formal education	35	9.31
Primary school level	209	55.59
Secondary school level	104	27.66
College and above	28	7.45
Monthly income (Tshs)		
≤ 300,000	300	79.79
300,001-500,000	41	10.90
500,001-999,999	17	4.52
Above 1,000,000	18	4.79
Permanent residence		
Urban	246	65.43
Rural	130	34.57
Disease related characteristics		
Duration since CKD diagnosis (months)		
3-12	266	70.74
13-36	86	22.87
37-52	17	4.52
53-96	7	1.86
Started Hemodialysis		
No	254	67.55
Yes	122	32.45
Duration of hemodialysis (Months)		
1-12	78	61.42
13-36	36	28.35
37-52	10	7.87
53-96	3	2.36
Hemodialysis sessions per week		
2	11	8.66
3	109	85.83
4	7	5.51
Encountered complications during dialysis		
No	71	55.91
Yes	56	44.09
Number of times experienced complications		
Once	7	12.50
More than once	49	87.50
Health insurance		
No	83	22.07
Yes	293	77.93
Does your Family support you in any way?		
Yes	373	96.63%
No	13	3.37%
If no insurance who is paying medical expenses?		
Family	31	38.75
Loan	1	1.25
Relative	15	18.75
Self	33	41.25
Treatment supporter/caretaker		
No	162	43.09
Yes	214	56.91
Current income generating activity		
Employed	59	15.69
Self employed	76	20.21
Unemployed	201	53.46
Peasants	40	10.64
Can you perform your generating income activity?		
No	238	63.30
Yes	138	36.70
Has modification of lifestyle due to CKD affected you?		
No	276	73.40
Yes	100	26.60
Are you sexually active?		
No	258	68.62
Yes	188	31.38

Prevalence of Generalized Anxiety Symptoms Among CKD Patients at BMC

Prevalence and severity of generalized anxiety symptoms was classified using scores derived from Generalized Anxiety Disorder (GAD-7) scale. Results revealed that out of the possible maximum score of 21, the 367 study participants had an average score of 5.15 (SD=4.53 range = 0 to 19). Prevalence of anxiety symptoms was found to be 40.96% (n = 154, 95% CI: 36.07% - 46.03%), the remaining 59.04% (n=222) of participants were classified as not displaying generalized anxiety symptoms. Of the patients with anxiety symptoms, 21.81% of the participants had mild anxiety symptoms, 14.10% had moderate anxiety symptoms and 5.05% had severe anxiety symptoms (Figure 2).

FIGURE 2: Prevalence of Anxiety Symptoms Among CKD Patients at BMC



Factors Associated With Anxiety Symptoms in CKD Patients

In the univariate analysis, age, number of children, income per month, permanent residence, starting dialysis, medical insurance, treatment supporter/caretaker, performing personal duties such as bathing, walking and dressing without assistance, and sexual activity were significantly associated with anxiety symptoms (Table 2).

In multivariate analysis (Table 2), participants who had not started dialysis were significantly more likely to develop anxiety symptoms (AOR 2.48, 95% CI: 1.42, 4.31, P value=.001) as compared to those who had started dialysis. Those without medical insurance were significantly more likely to develop anxiety symptoms (AOR 1.29, 95% CI: 1.16, 1.53, P value <.001) as compared to those with medical insurance. Table 2 summarizes the multivariate association between socio-demographic characteristics and anxiety symptoms among CKD patients at BMC.

TABLE 2: Association between Socio-demographic Characteristics and Anxiety Symptoms

Variable	Anxiety symptoms		Univariate OR (95% CI)		Multivariate OR (95% CI)	
	No (N %)	Yes (N %)	OR (95% CI)	P value	OR (95%CI)	P value
Gender						
Female	76 (61.29)	48 (38.71)	1.0			
Male	146 (57.94)	106 (42.06)	1.14(0.7-1.8)	0.534	-	-
Age (Years)						
18-30	19 (90.48)	2 (9.52)	1.0		1.0	
31-40	30 (53.57)	26 (46.43)	8.23(1.7-38.7)	0.008	5.7(0.94-34.2)	0.058
41-50	54 (57.45)	40 (42.55)	7.03(1.5-32)	0.012	3.6 (1.60-2.19)	0.016
51-60	42(52.50)	38 (47.50)	8.59 (1.9-39)	0.006	5.2(0.83-32.4)	0.078
61-85	77(61.60)	48(38.40)	5.92(1.3-26.6)	0.020	4.7(0.74-30.2)	0.101
Religion						
Christian	175 (60.34)	115(39.66)	1.0			
Muslim	47 (54.65)	39(45.35)	1.26(0.8-2.1)	0.346	-	-
Marital status						
Married	42 (18.92)	39 (25.32)	1.0			
Not married	180 (81.08)	115 (74.68)	0.7(0.4-1.2)	0.247	-	-
Number of children						
No children	14 (6.31)	2(1.30)	1.0			
1-4	117(52.70)	89(57.79)	5.3(1.2-24.03)	0.030	4.2(0.65-27)	0.132
>4	91(40.99)	63(40.91)	4.9(1.1-22.1)	0.041	3.83(0.6-25.9)	0.17

Continue

TABLE 2: Continued

Variable	Anxiety symptoms		Univariate OR (95% CI)		Multivariate OR (95% CI)	
	No (N %)	Yes (N %)	OR (95% CI)	P value	OR (95%CI)	P value
Education level						
No formal education	20 (57.14)	15 (42.86)	1.0			
Primary school level	136 (65.07)	73 (34.93)	0.9(0.31-2.4)	0.777	-	-
Secondary school level	51(49.04)	53(50.96)	0.6(0.27-1.4)	0.238	-	-
College and above	15 (53.57)	13 (46.43)	1.2(0.51-2.8)	0.670	-	-
Monthly income (Tshs)						
≤ 300,000	185(83.33)	115(74.68)	1.0		1.0	
300,001-500,000	18(8.11)	23(14.94)	2.1(1.1-3.9)	0.032	0.5(0.13-1.6)	0.211
500,001-999,999	11(4.95)	6 (3.90)	0.9(0.32-2.4)	0.802	0.96(0.2-4.9)	0.961
Above 1,000,000	8(3.60)	10(6.49)	2.0(0.77-5.2)	0.153	1.64(0.73-3.7)	0.234
Permanent residence						
Urban	156(63.41)	90(36.59)	1.0		1.0	
Rural	66(50.77)	64(49.23)	0.59 (0.38-0.91)	0.018	0.62 (0.37-1.03)	0.063
Duration since CKD diagnosis (months)						
3-12	166 (62.41)	100 (37.59)	1.0		1.0	
13-36	44 (51.16)	42 (48.84)	1.58 (0.97-2.6)	0.066	1.56(0.87-2.81)	0.131
37-52	9 (52.94)	8 (47.06)	1.47 (0.55-3.9)	0.438	1.71(0.55-5.34)	0.354
53-96	3 (42.86)	4 (57.14)	2.21 (0.48-10.1)	0.305	2.28(0.41-12.61)	0.345
Started Hemodialysis						
Yes	62 (50.82)	60 (49.18)	1.0		1.0	
No	160 (62.99)	94 (37.01)	1.64(1.1-2.5)	0.025	2.48(1.42-4.31)	0.001
Health insurance						
Yes	191(65.19)	102 (34.81)	1.0		1.0	
No	31 (37.35)	52 (62.65)	1.31(1.2-1.5)	<0.001	1.29(1.16-1.53)	<0.001
Treatment supporter/caretaker						
Yes	15 (37.50)	25 (62.50)	1.0		1.0	
No	207 (61.61)	129 (38.39)	0.37 (0.19-0.73)	0.004	0.47(0.22-1.01)	0.053
Can perform personal duties such as bathing, walking and dressing up without assistance						
Yes	109 (50.93)	105 (49.07)	1.0		1.0	
No	113 (69.75)	49 (30.25)	2.22(1.44-3.41)	<0.001	1.78(1.05-3.03)	0.033
Current income generating activity						
Employed	30 (50.85)	29 (49.15)	1.0		1.0	
Peasant	19 (47.50)	21 (52.50)	1.56 (0.87-2.79)	0.138	1.48 (0.62-3.51)	0.366
Self employed	49 (64.47)	27 (35.53)	0.89(0.51-1.54)	0.670	0.75(0.39-1.45)	0.392
Unemployed	124 (61.69)	77 (38.31)	1.78 (0.89-3.52)	0.098	1.15 (0.52-2.52)	0.730
Can you perform your income generating activities?						
Yes	75 (54.35)	63 (45.65)	1.0			
No	147 (61.76)	91(38.24)	1.35(0.91-1.34)	0.308	-	-
Has modification of lifestyle due to CKD affected you?						
Yes	52 (52.00)	48 (48.00)	1.0		1.0	
No	170 (61.59)	106 (38.41)	1.48 (0.93-2.34)	0.095	1.24 (0.71-2.17)	0.443
Are you sexually active?						
Yes	59 (50)	59 (50)	1.0		1.0	
No	163 (63.18)	95 (36.82)	1.75(1.10-2.66)	0.016	1.46(0.80-2.67)	0.213

DISCUSSION

CKD continues to be a disease of males and people with advanced age, as was evidenced in this study. We found that more than a half of the participants were predominantly males, probably due to the fact that males are vulnerable and at more risk of developing CKD as they are more likely to smoke, drink and have less health seeking behavior.²⁹ This observation was also found in other studies conducted in Brazil³⁰ and China.³¹ The majority of the participants were elderly, 50 years and above, which is quite similar to the studies conducted in

China,³² Russia,³³ and Korea.³⁴ Epidemiological evidence suggests that vascular diseases including diabetes, hypertension and obesity may be the leading etiology for CKD in this population since they are prevailing with CKD patients and are associated with albuminuria and decreased glomerular filtration rate (GFR).³⁵

The majority of participants had a primary school education which was similar to other studies conducted in Ethiopia³⁶ and Taiwan.³⁷ Studies have reported that those having lower level of education are more likely to face problems with psychological wellbeing and general

health.³⁸⁻⁴¹

With regard to marital status, more than a half of this study's participants were married which corresponds with a study conducted in Nigeria.⁴² This is because CKD mostly affects the older age groups and many people above the age of 40 years in Tanzania are married.⁴³ But the results are in contrast with studies conducted in China⁴⁴ and Ethiopia³⁶ where more than half of their participants were unmarried.

Anxiety symptoms have been evidenced to be prevalent among patients with chronic diseases as it was found in this population of CKD patients in Tanzania where by 40.96% were having anxiety symptoms. Though this prevalence was lower compared to what was found in other studies where the prevalence of 29.4% was found in Ethiopia,³⁶ 34.8% in Nigeria,⁴⁵ and 24.6% in Saudi Arabia,¹⁰ it was almost the same to what was observed in Singapore, 49.9%.⁴⁶ These variations in results are probably due to differences in sample population and size and methodologies used e.g. differing measures for anxiety symptoms. It might also be attributed by cultural differences among the population the sample was drawn as culture plays a big role in how anxiety symptoms are expressed.⁴⁷

Dialysis has been found to be beneficial not only for life prolongation among patients with CKD but also for prevention of psychological consequences of CKD among this populations.⁴⁸ This was evidenced in this study as not having started dialysis treatment was found to be more significant in developing anxiety symptoms in CKD patients as compared to those who had started dialysis. This is in line to the study conducted in Netherlands whereby patients who had started dialysis were found to be less likely to develop anxiety symptoms.⁴⁹

Not having medical insurance was found to be significantly more likely in developing anxiety symptoms as compared with participants with medical insurance. The results are similar to what was found in other studies conducted in Canada,⁵⁰ India,⁵¹ and USA⁵² which suggest that patients without medical insurance are more likely to develop anxiety symptoms. The findings can be explained by the fact that CKD is not curable and when it progresses into ESRD it requires lifelong dialysis treatment or kidney transplantation which is very expensive hence majority fear coping with medical expenses, and also having low socioeconomic status majority do not follow medical advice.⁵³⁻⁵⁴

Strengths and Limitations

We used valid and reliable questionnaires to collect data on symptoms of anxiety from a large sample of patients undergoing treatment for CKD in a larger tertiary hospital in Tanzania to determine prevalence. We also examined several relevant predictors of symptoms of anxiety. However, the use of cross-sectional study design precludes causal inference. Anxiety symptoms were measured using the self-report GAD-7 scale, which may be subject to recall and social desirability bias. Additionally, the use of GAD-7 as a screening tool without confirmation by a diagnostic clinical interview is a limitation of this study. The findings may have limited generalizability, as the study was conducted at a single tertiary hospital serving the Lake

and Western zones of Tanzania; therefore, the results may not reflect populations in other regions. Furthermore, the "no hemodialysis" group included patients across multiple CKD stages, introducing heterogeneity that may affect interpretation of the findings. Finally, potential unmeasured confounders, including social support, pain, anaemia, and uraemic symptoms, were not assessed and may have influenced the observed associations.

CONCLUSION

This study found that generalized anxiety symptoms are common among patients with chronic kidney disease (CKD). Factors such as access to health insurance (financial support) and timely initiation of CKD management may play an important role in reducing the burden of anxiety in this population. These findings highlight the need to strengthen early intervention strategies in CKD care, including improving access to health insurance coverage and integrating mental health screening and management into routine clinical services. Enhancing access to mental health professionals, such as psychiatrists and counsellors, may further support better psychological outcomes among CKD patients.

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Peer Reviewed

Competing Interests: Authors declare no competing interest.

Funding: The study did not receive any funding.

Received: 01 February 2024 ; **Accepted:** 03 June 2026

Cite this article as Munisi H, Kanenda S, Rudovick L, Nyanza E, Mwita M. Generalised Anxiety Symptoms Among Patients with Chronic Kidney Disease: A Cross-Sectional Study in Northwestern Tanzania. *East Afr Health Res J*. 2026;10(1):114-121. <https://doi.org/10.24248/eahrj.v10i1.876>

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