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QUALITY OF LIFE AND ANXIETY IN PATIENTS WITH CHRONIC KIDNEY DISEASE UNDERGOING HEMODIALYSIS: A CROSS-SECTIONAL STUDY IN NORTHEASTERN BRAZIL

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ABSTRACT

This investigation assessed the prevalence of anxiety disorder associated with quality of life in patients with chronic kidney disease undergoing hemodialysis. This is a cross-sectional study, carried out in the state of Ceará, northeastern Brazil, with a sample of 192 participants. The following instruments were used in the interviews: sociodemographic and clinical questionnaire, Kidney Disease and Quality of Life Short-Form (KDQOL-SF™) and Beck Anxiety Inventory (BAI). Data collection took place in 2019. All analyses were performed using the SPSS software. The results showed that patients with anxiety were males, most of them married, with low level of schooling and family income. Nevertheless, they lived with two or three people in their households. Hypertension stood out among patients with anxiety (17.9%). The participants had been undergoing hemodialysis for 1 to 5 years (43.3%) and had a fistula as the vascular access to mediate the procedure ($p < 0.05$). A total of 44.8% classified their health as regular; 77.6% had difficulty performing their work activities; 67.2% stated they had great difficulty performing activities with physical effort; 55.2% confirmed that the physical and emotional limitations they felt did not interfere in their social relationships with family, friends, neighbors or groups. Increased anxiety was associated with the male gender (OR= 2.056, 95% CI: 1.027 - 4.116) and a fistula as the vascular access (OR= 2.637, 95% CI: 1.343 - 5.177). It was verified that anxiety interferes with the quality of life in patients with chronic kidney disease.

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INTRODUCTION

Chronic kidney disease (CKD) is a worldwide public health problem, with hemodialysis being one of its treatment modalities in the advanced stage of the disease (SILVA *et al.*, 2020). There are an estimated 600 million patients with CKD on the five continents of the world, with an annual growth rate of 5 to 6%. Of these diagnosed patients, 2.5 million require renal replacement therapy to treat the

disease, which may increase to 4.5 million by 2030 (CARNEY, 2020; GHAFORIFARD *et al.*, 2021). In Brazil, approximately 12 million people have some degree of Kidney Disease (KD) and about 140,000 chronic kidney disease patients depend on dialysis to survive. Epidemiological data estimate that this dependence increases by 9% a year due to the lack of diagnosis in the initial phase of the disease (SILVA *et al.*, 2016). Upon receiving a diagnosis of CKD with the need for hemodialysis, the patients undergo sudden changes in their

lifestyle, as there are negative impacts on their everyday life. Thus, abandonment of work and social activities, loss of employment, reduction of recreational activities such as traveling or parties may occur, predisposing patients to behavioral changes such as anxiety and depression. The psychosocial consequences of the disease can trigger stressful factors that can cause multiple symptoms, such as fatigue, pain, nausea, sexual dysfunction, muscle weakness, directly affecting the quality of life (POERSCH *et al.*, 2015; LAGES, *et al.* 2016; OLIVEIRA *et al.*, 2016; CARSWELL *et al.*, 2019). The quality of life of patients with end-stage kidney disease is negatively affected, as hemodialysis sessions limit these individuals' independence when performing activities of daily living (ASEEL *et al.*, 2021). It is understood that quality of life (QoL) is a subjective condition, which expresses how satisfied people are with their life and the degree of well-being and happiness they feel. It is associated with events related to physical, psychological, social and spiritual health (ARTZI-MEDVEDIK, 2020). Over the last 20 years, nephrology and psychology have sought to understand the prevalence of affective disorders in patients with CKD treated in hemodialysis units and how these problems affect patient treatment (DELGADO-DOMÍNGUEZ *et al.*, 2021). The patient with CKD is under permanent stress, feeling their life is constantly threatened by the chronicity of kidney disease, in addition to the hemodialysis treatment, resulting in an ambiguous feeling between the fear of living and the fear of dying (DIAS *et al.* 2015). From this perspective, psychological problems such as anxiety have been less studied in patients with kidney disease, even though it is known that this disorder impacts on the health status and quality of life, significantly increasing mortality rates (DELGADO-DOMÍNGUEZ *et al.*, 2021). Anxiety is considered one of the main disorders, with unpleasant mental feelings, concerns and tension, associated with physical symptoms such as restlessness, headaches and palpitations. Compared to stress and depression, anxiety has received little clinical attention in CKD (RAJAN; SUBRAMANIAN, 2016). The aim of this investigation is to assess the prevalence of anxiety disorder in patients with CKD undergoing hemodialysis, and its association with these patients' quality of life.

METHODS

This is a cross-sectional study carried out in the state of Ceará, northeastern Brazil, that assessed patients with CKD undergoing hemodialysis, from September to November 2019. The research was carried out in the two largest dialysis centers in the northwestern macro-region of the state: Santa Casa de Misericórdia of Sobral and at the Nephrology Center of Itapipoca (CENIT). The sample consisted of 192 participants, considering a sampling error of 5%, with a 95% confidence interval. The following inclusion criteria were established: patients with CKD, undergoing hemodialysis, over 18 years of age and of both genders. Patients who were hospitalized at the time of the data collection, who died during this period and who had started hemodialysis up to three months before the study was performed were excluded. CKD was defined based on the "Kidney Disease Improving Global Outcomes" (KDIGO) criteria, as "abnormalities of renal structure or function, present for more than three months", and these abnormalities are expressed by the presence of albuminuria ($\geq 30\text{mg} / 24\text{h}$ or albumin / creatinine ratio $\geq 30\text{mg} / \text{g}$) or glomerular filtration rate $<60 \text{ mL} / \text{min} / 1.73\text{m}^2$. CKD was considered based on information from official patient notification reports, as well as clinical manifestations and results (SILVA JÚNIOR *et al.*, 2018). Data collection took place through individual interviews with patients during hemodialysis visits, applied by the researchers. The following instruments were used to carry out the interviews: sociodemographic and clinical questionnaire, the Kidney Disease and Quality of Life Short-Form (KDQOL-SFTM) and Beck Anxiety Inventory (BAI). The sociodemographic and clinical questionnaire included the following variables: age, gender, marital status, family income, level of schooling, occupation, time on dialysis, comorbidities, type of vascular access used. The Beck Anxiety Inventory, adapted and validated for Brazil, which was developed to measure anxiety in adult patients, has 21 items that assess the intensity of anxiety symptoms in the previous week, with the day of information collection also being

included. The total score is the sum of the individual scores of each item, allowing the classification of levels of anxiety intensity (CUNHA, 2001). The KDQOL-SFTM, an instrument validated in Brazil to measure the quality of life of individuals with CKD, has 80 items, the Short Form Health Survey (SF-36) and another 43 items on CKD. The SF-36 is fragmented into eight dimensions: physical function (ten items); limitations caused by physical health problems (four items); limitations caused by emotional health problems (three items); social function (two items); mental health (five items); pain (two items); vitality (four items); overall health perceptions (five items) and current health status compared to a year ago (one item). The items related to kidney disease are divided into 11 dimensions: symptoms / problems (12 items); effects of kidney disease on daily life (eight items); overload caused by kidney disease (four items); employment condition (two items); cognitive function (three items); quality of social interactions (three items); sexual function (two items); sleep (four items); social support scale (two items); dialysis team stimulation scale (two items) and patient satisfaction scale (one item) (DOAN *et al.*, 2020). For this investigation, only eight items that interfere the most with the activities of daily living of patients with CKD were chosen. Data from the KDQOL-SFTM instrument were transferred to an Excel for Windows spreadsheet, available online by RAND Health Care (https://www.rand.org/health-care/surveys_tools/kdqol.html), which automatically measures the scores per item and the dimensions of the entire instrument. As there is no cutoff point in this instrument, the mean of the answers given by the patients was used to compare with the results of other studies on the subject, which have been previously published. Categorical data were expressed as absolute counts and relative frequencies as percentages. The chi-square test or Fisher's exact test was appropriately used to assess associations between categorical variables. Quantitative data were assessed for distribution of normality using the Kolmogorov-Smirnov test and histograms. Normal data were expressed as mean \pm standard deviation. The Student's *t* test was used to compare quantitative data between two groups, as appropriate. Moreover, logistic regression was performed to assess associations of characteristics with anxiety. The univariate analysis and the construction of multivariate models were performed using the stepwise method with a conditional approach. The odds ratio (OR) was estimated with a 95% confidence interval. All analyses were performed using the SPSS software for Macintosh (version 23.0; IBM, Armonk, NY, USA) and the significance level was set at $p < 0.05$. The study protocol was analyzed and approved by the Ethics Committee, as recommended by Resolution N. 466/12 of the Ministry of Health in Brazil (Protocol N. 3.375.367/ UNINTA).

RESULTS

This investigation identified the sociodemographic characteristics of patients treated at hemodialysis centers in the state of Ceará, northeastern Brazil (Table 1). It was shown that, among patients with anxiety undergoing hemodialysis, 79.1% were males, 55.2% were married, 67.2% had a family income of 1 to 2 minimum wages, 44.8% had finished Elementary School 32.8% worked in agriculture, 91% lived with someone, and 61.2% shared a household with 2 to 3 people. Table 2 shows the main comorbidities in CKD and their relationship with the onset of anxiety during treatment, where arterial hypertension stood out among patients with anxiety (17.9%). It was also shown that the highest number of patients with anxiety had between 1 to 5 years of hemodialysis treatment (43.3%) and had a fistula as the vascular access type mediating the procedure ($p < 0.05$). Table 3 When verifying the existing association between quality of life and anxiety in patients with CKD undergoing hemodialysis, it was observed that 44.8% of the participants classified their health status as regular; 77.6% had difficulty performing their work activities; 67.2% stated that they had great difficulty performing activities with physical effort; 55.2% confirmed that the physical and emotional limitations they felt did not interfere in their social relationships with family, friends, neighbors or groups; 34.3% said they did not feel pain during the last four weeks; 50.7% declared that the chronic kidney disease undeniably interfered very much with their

life; 55.2% answered that much of their time is spent in self-care due to chronic kidney disease; 91% did not need to isolate themselves despite having an anxiety disorder; and 29.9% did not have insomnia. To assess the relationship between different patient characteristics and the presence of anxiety, a logistic regression analysis was performed, using anxiety as the dependent variable.

Table 1. Sociodemographic characteristics of patients with chronic kidney disease undergoing hemodialysis and their relationship with the presence of anxiety. Ceará, Brazil, 2019

	Anxiety		p
	No	Yes	
Age	11 ± 3	11 ± 3	0.684
Gender (male)	81 (64.8)	53 (79.1)	0.040
Marital status			0.874
Married	68 (54.4)	37 (55.2)	
Common-law marriage	11 (8.8)	4 (6)	
Widowed	7 (5.6)	5 (7.5)	
Single	39 (31.2)	21 (31.3)	
Family Income			0.778
1 to 2 wages	84 (67.2)	45 (67.2)	
2 to 4 wages	6 (4.8)	2 (3)	
4 to 6 wages	5 (4)	1 (1.5)	
On sick leave	2 (1.6)	1 (1.5)	
Retired	4 (3.2)	1 (1.5)	
No regular income	24 (19.2)	17 (25.4)	
Level of Schooling			0.302
Incomplete Elementary School	62 (49.6)	30 (44.8)	
Complete Elementary School	11 (8.8)	7 (10.4)	
High school	34 (27.2)	13 (19.4)	
Higher education	5 (4)	3 (4.5)	
Illiterate	13 (10.4)	14 (20.9)	
Occupation			0.094
Homemaker	23 (18.4)	7 (10.4)	
Farmer	26 (20.8)	22 (32.8)	
Self-employed	34 (27.2)	12 (17.9)	
Shopkeeper	10 (8)	4 (6)	
Civil Servant	12 (9.6)	4 (6)	
Unemployed	20 (16)	18 (26.9)	
Lives with someone?			0.378
Yes	118 (94.4)	61 (91)	
No	7 (5.6)	6 (9)	
Number of people living with you?			0.165
1 to 2 people	24 (19.2)	20 (29.9)	
2 to 3 people	82 (65.6)	41 (61.2)	
4 or more	19 (15.2)	6 (9)	

Quantitative data expressed as mean and standard deviation. Categorical data expressed as absolute count and percentages in parentheses. *Student's *t* test was used for age, and the chi-square or Fisher's exact test was used for categorical data.

Table 2. Onset of anxiety and comorbidities during the clinical course of chronic kidney disease treatment in patients undergoing hemodialysis. Ceará, Brazil, 2019

	Anxiety		p
	No	Yes	
Underlying Etiology of End-Stage Renal Disease			0.465
Nephrotic syndrome	6 (4.8)	4 (6)	
Arterial hypertension	11 (8.8)	12 (17.9)	
Neurogenic bladder	2 (1.6)	1 (1.5)	
Polycystic kidney	2 (1.6)	0 (0)	
Diabetes Mellitus	6 (4.8)	3 (4.5)	
Indeterminate	98 (78.4)	47 (70.1)	
Type of Vascular Access			0.004
Catheter	54 (43.2)	15 (22.4)	
Fistula	71 (56.8)	52 (77.6)	
Time of Dialysis			0.272
Less than one year	45 (36)	15 (22.4)	
1 to 5 years	47 (37.6)	29 (43.3)	
5 to 10 years	15 (12)	13 (19.4)	
10 to 15 years	12 (9.6)	7 (10.4)	
15 to 20 years	4 (3.2)	2 (3)	
20 to 25 years	2 (1.6)	0 (0)	
25 to 30 years	0 (0)	1 (1.5)	

Categorical data expressed as absolute count and percentages in parentheses. *Chi-square test or Fisher's exact test was used.

The univariate analysis showed an association with the male gender (OR= 2.056, 95%CI: 1.027 - 4.116) and fistula-type vascular access (OR= 2.637, 95% CI: 1.343 - 5.177) with increased anxiety in the patients (Table 4). Regarding quality of life parameters, only two questions were related to the presence of anxiety in patients at the univariate analysis. The first one was that patients who were aware that kidney disease "generally" interfered with their life had about 77% less anxiety (OR=0.233, 95% CI: 0.085 - 0.639), when compared to those who considered that it "did not interfere". The second was that patients who admitted they "generally" spent a lot of time with self-care due to the chronic kidney disease had approximately 77% less anxiety compared to patients who reported "it is undeniably false" (OR=0.226, 95% CI: 0.075 - 0.684) (Table 4). In the multivariate models, three variables were the most important to explain the presence of anxiety. The variables that best fit the models were gender, type of vascular access, and the quality of life parameter related to the fact that the chronic kidney disease interfered with the patient's life.

DISCUSSION

There are still few studies on the psychological aspects of patients with CKD. This is one of the few investigations on the subject in our country (SILVA JÚNIOR *et al.*, 2017). The present study showed that anxious patients were males, most of them married, with low level of schooling and family income. However, they lived with two or three people in the household. Considering these facts, it can be reported that depression and anxiety are mental disorders associated with advanced CKD. Some previous studies showed that women are more likely to develop anxiety and men to develop depression (HAO, 2021). In other investigations, women developed depression as a psycho-affective disorder (DELGADO-DOMÍNGUEZ *et al.*, 2021). It has been emphasized that patients with kidney disease who live alone have more difficulty in taking care of their health, as the people who live with the patients can play the role of caregiver, helping them to rehabilitate their health status (JESUS *et al.*, 2019). As for the participants' level of schooling, associated with quality of life, there is scientific evidence that shows a higher level of schooling as a relevant factor to have a better quality of life (DOAN *et al.*, 2020). This fact is related to the self-care performed by the patient to facilitate treatment, aiming to obtain a better disease prognosis and delay complications, because they have greater access to information and better economic conditions (JESUS *et al.*, 2019). Most patients with anxiety had arterial hypertension as a comorbidity and had been undergoing hemodialysis for 1 to 5 years, in addition to having a fistula as the venous access type during the procedure.

The onset of complications in patients with CKD undergoing hemodialysis occurs mainly in older patients with kidney disease, those with preexisting diseases, such as diabetes mellitus, hypertension, cardiovascular disease, hypoalbuminemia and substance abuse. Therefore, the presence of comorbidities also lead to the onset of anxiety and depression in these patients (SOUZA *et al.*, 2017; HAO *et al.*, 2021). Previous studies in Brazil with hemodialysis patients show that there are higher levels of anxiety in these patients due to the fact that they are connected to dialysis machines for several hours. Another fact that can also cause the psychological disorder is related to the patient's self-image, which causes mental imbalance of great impact with the appearance of negative feelings, starting with the need to install a vascular access for the dialysis (arteriovenous fistula or catheter) and the concern related to the care required for its maintenance (JESUS *et al.*, 2019). Patients with diabetes mellitus are at greater risk of developing complications from CKD, which can lead to a poor prognosis of the disease and reduced life expectancy (SALMI *et al.*, 2021). Studies carried out in Korea in 2018 showed that diabetic nephropathy is responsible for 48.8% and hypertensive nephropathy for 19.8% of newly diagnosed patients. Moreover, cardiovascular complications, such as arrhythmia and myocardial infarction, are the main causes of death among patients undergoing hemodialysis, demonstrating that they need to maintain greater self-care, controlling the diet and blood pressure, practicing regular

Table 3. Analysis of the quality of life of patients with CKD undergoing hemodialysis and the presence of anxiety. Ceará, Brazil, 2019

	Anxiety		p
	No	Yes	
QoL-Would you say that your health is currently...?			0.395
Excellent	4 (3.2)	7 (10.4)	
Very good	11 (8.8)	5 (7.5)	
Good	44 (35.2)	21 (31.3)	
Regular	63 (50.4)	30 (44.8)	
Poor	3 (2.4)	4 (6)	
QoL-Do you find it difficult to work?	92 (73.6)	52 (77.6)	0.541
QoL- Does your health condition make it difficult for you to perform activities that require an effort?			0.787
Yes, it makes it very difficult	87 (69.6)	45 (67.2)	
Yes, it makes it a little difficult	23 (18.4)	15 (22.4)	
No, it doesn't make it difficult at all	15 (12)	7 (10.4)	
QoL-During the last four weeks, to what extent have the problems with your physical or emotional health interfered with normal social activities with family, friends, neighbors or groups?			0.197
Not at all	73 (58.4)	37 (55.2)	
A little	23 (18.4)	9 (13.4)	
Moderately	18 (14.4)	9 (13.4)	
Quite a lot	8 (6.4)	9 (13.4)	
Extremely	3 (2.4)	3 (4.5)	
QoL-How much body pain have you felt during the last four weeks?			0.967
None	43 (34.4)	23 (34.3)	
Very mild	17 (13.6)	9 (13.4)	
Mild	18 (14.4)	10 (14.9)	
Moderate	21 (16.8)	10 (14.9)	
Intense	16 (12.8)	10 (14.9)	
Very intense	10 (8)	5 (7.5)	
QoL- Does the kidney disease interfere very much with your life?			0.033
It undeniably interferes	52 (41.6)	34 (50.7)	
It usually interferes	43 (34.4)	10 (14.9)	
I do not know	2 (1.6)	2 (3)	
Not usually	14 (11.2)	7 (10.4)	
It does not interfere	14 (11.2)	14 (20.9)	
QoL-Is much of your time spent with self-care due to kidney disease?			0.048
It is undeniably true	61 (48.8)	37 (55.2)	
It is usually true	45 (36)	16 (23.9)	
I do not know	2 (1.6)	1 (1.5)	
It is usually false	10 (8)	2 (3)	
It is undeniably false	7 (5.6)	11 (16.4)	
QoL-Have you isolated (kept your distance) from the people around you?			0.414
Not at all	110 (88)	61 (91)	
A small part of the time	7 (5.6)	3 (4.5)	
Some of the time	3 (2.4)	0 (0)	
A lot of the time	1 (0.8)	0 (0)	
Most of the time	1 (0.8)	2 (3)	
All the time	3 (2.4)	1 (1.5)	
QoL- Do you find it difficult to sleep at night?			0.653
Not at all	47 (37.6)	20 (29.9)	
A small part of the time	17 (13.6)	12 (17.9)	
Some of the time	5 (4)	6 (9)	
A lot of the time	10 (8)	6 (9)	
Most of the time	25 (20)	12 (17.9)	
All the time	21 (16.8)	11 (16.4)	

Categorical data expressed as absolute count and percentages in parentheses. *Chi-square test or Fisher's exact test was used.

Table 4. Logistic regression analysis with the characteristics of patients with CKD and the presence of anxiety. Ceará, Brazil, 2019

Variables without adjustment	Anxiety		
	OR	*95%CI	p
Gender (male)	2.056	1.027 - 4.116	0.042
Unemployed (yes)	1.929	0.937 - 3.968	0.074
Lives with 1 to 2 people (compared to 4 or more)	2.639	0.885 - 7.872	0.082
Type of Vascular Access (fistula)	2.637	1.343 - 5.177	0.005
Problems with physical/emotional health interfered a lot (compared to "not at all")	2.22	0.791 - 6.225	0.13
Does the kidney disease interfere with your life: generally (compared to "it does not interfere")	0.233	0.085 - 0.639	0.005
Is much of your time spent with self-care due to chronic kidney disease: it is usually true (compared to "it is undeniably false")	0.226	0.075 - 0.684	0.008
Multivariate model			
Gender (male)	2.527	1.178 - 5.42	0.017
Type of Vascular Access (fistula)	0.345	0.166 - 0.718	0.004
Does the chronic kidney disease interfere with your life: generally (compared to "it does not interfere")	0.189	0.065 - 0.551	0.002

*CI: confidence interval.

physical activity, i.e., adhering to healthy life behaviors (CHA; HAN, 2020). When asked about their quality of life, the participants considered their health status as regular, as they had difficulties to work and perform work activities that required physical effort. However, their physical limitations did not interfere with their social relationships (SALMI *et al.*, 2021). All previous studies carried out on the quality of life in CKD show that this pathological condition has a negative impact on patient life. Factors such as facing the impact of the diagnosis of an incurable disease, the need to carry out the therapeutic regimen, knowing the disease, learning to deal with unpleasant symptoms, understanding that losses happen in their social life, leisure, work and living with other people are aspects that physically and emotionally destabilize patients with kidney disease (MACHADO *et al.*, 2014; JESUS *et al.*, 2019; DOAN *et al.*, 2020). It is important to highlight that greater adherence to the hemodialysis treatment and prescribed medication are important to delay mortality and increase the quality of life of patients with CKD (CARSWELL *et al.*, 2019).

However, many limitations can promote a poor quality of life in kidney disease, resulting from the procedure itself, such as: anemia, decreased aerobic capacity, body homeostasis imbalance, decreased muscle strength and function, in addition to some infections and malignant neoplasms. All of them can lead to reduced physical activity, increase in the duration and number of hospitalizations and impose high costs on patients and health systems (GHAFOURIFARD *et al.*, 2021). Therefore, quality of life is reduced at any stage of chronic kidney disease, including its early stages, when several scales are compared to assess this item (KEFALE *et al.*, 2019; BUDHRAM *et al.*, 2020). The investigation showed that kidney disease interfered with patients' lives, as they spent much of their time in activities aimed at treating the pathological condition. However, they did not need to isolate themselves, despite the diagnosis of anxiety, and they did not have sleep disorders. Body alterations caused by anxiety and stress affect an active participation in lifestyle changes, adherence to diet, recommended therapies, decrease self-esteem and worsen the performance status. Problems in physical and emotional health can exist at different intensities in CKD (MELO *et al.*, 2018). Behavioral changes that put them in conflict with the professional team and even with family members can occur in chronic kidney disease (COHEN; CUKOR; KIMMEL, 2016). Contrary to what was found in this study, insomnia in patients with anxiety and CKD is a common finding. Stress levels and disease coping mechanisms may appear during the course of treatment (ATAS; SUNBUL, 2021).

CONCLUSION

Most patients with CKD undergoing hemodialysis included in this study have low level of schooling and family income, associated with anxiety. All participants had comorbidities, including arterial hypertension. It was also possible to verify that anxiety results in poor quality of life, interfering with the patients' activities of daily living, causing physical dependence and intensifying the morbidity and mortality of these patients. It is essential to guarantee psychosocial support to this group of patients, aiming to contribute to an improvement in the quality of life of these individuals and, possibly, to improve prognosis.

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