Diversitas Journal
ISSN 2525-5215
Volume 10, Número 1 (Jan./Mar. 2025) p. 0001 – 0015
https://diversitasjournal.com.br/diversitas_journal

Prevalence of anxiety and depression symptoms in patients with chronic kidney disease on hemodialysis

SOUZA, Gracielly Ferreira de[1]; MENDES-RODRIGUES, Clesnan[2]; SANTOS, Leonardo Daniel Reis[3]; MIRANDA, Frank José Silveira[4]; NETO, Omar Pereira de Almeida[5]; SILVÉRIO, Vanessa da Silva Pessoa[6]; RODRIGUES, Deusdélia Dias Magalhães[7]; PEREIRA, Eliana Borges Silva[8]; CUNHA, Cristiane Martins[9]

[1] 0000-0002-3669-2876; Federal University of Uberlândia (*Universidade Federal de Uberlândia*). Uberlândia, Minas Gerais (MG), Brazil. Email: gracyenfermagem2013@gmail.com
[2] 0000-0002-8871-7422; Federal University of Uberlândia (*Universidade Federal de Uberlândia*). Uberlândia, Minas Gerais (MG), Brazil. Email: clesnan@ufu.br
[3] 0000-0002-2774-9842; Federal University of Uberlândia (*Universidade Federal de Uberlândia*). Uberlândia, Minas Gerais (MG), Brazil. Email: leonardoudi2016@gmail.com
[4] 0000-0003-3687-0983; Federal University of Uberlândia (*Universidade Federal de Uberlândia*). Uberlândia, Minas Gerais (MG), Brazil. Email: frank@ufu.br
[5] 0009-0008-6108-2990; Federal University of Uberlândia (*Universidade Federal de Uberlândia*). Uberlândia, Minas Gerais (MG), Brazil. Email: omar.almeida@ufu.br
[6] 0000-0003-0073-8104; Hospital de Clínicas of the Federal University of Uberlândia (*Universidade Federal de Uberlândia*). Uberlândia, Minas Gerais (MG), Brazil. Email: vanessapessoa@ufu.br
[7] 0000-0003-2177-7575; Hospital de Clínicas of the Federal University of Uberlândia (*Universidade Federal de Uberlândia*). Uberlândia, Minas Gerais (MG), Brazil. Email: deusdeliadias@gmail.com
[8] 0000-0002-8563-2060; Federal University of Uberlândia (*Universidade Federal de Uberlândia*). Uberlândia, Minas Gerais (MG), Brazil. Email: eborgespereira@yahoo.com.br
[9] 0000-0002-6748-8587; Federal University of Uberlândia (*Universidade Federal de Uberlândia*). Uberlândia, Minas Gerais (MG), Brazil. Email: cristiane.cunha.ufu@gmail.com

ABSTRACT

Objectives: To measure and compare the symptoms of anxiety and depression of individuals with chronic kidney disease (CKD) on outpatient hemodialysis and healthy self-reported individuals. Method: Cross-sectional, analytical and descriptive study, with a quantitative approach. It was carried out in a public institution and a private hemodialysis clinic, in two categories: A study group (hemodialytic CKD) and a normative group. A sociodemographic questionnaire and the Brazilian version of the Hospital Anxiety and Depression Scale - HADS were used. For the statistical analyses, the following tests were applied: Chi-Square, Mann-Whitney, linear regression and logistic regression for comparison. Results: Scores for anxiety symptoms were equivalent in both groups (median = 6, p = 0.709). A higher score of depressive symptoms was observed in hemodialysis patients (median 6 *versus* 4.5, p = 0.007). In patients with CKD, the predictors for the occurrence of anxiety symptoms were: Female gender (*Bi* = 1.595; p = 0.003; *OR* = 4.93), smoker (*Bi* = 1.917; p = 0.006; *OR* = 6.8) and hemodialysis in the public sector (*Bi* = 1.233; p = 0.028; *OR* = 3.43). Regarding depressive symptoms, the predictors were: female gender (*Bi* = 0.797; p = 0.086; *OR* = 2.22) and number of residents in the household (*Bi* = -0.296; p = 0.066; *OR* = 0.74). Conclusion: CKD patients had higher levels of depression symptoms when compared to the normative population. The variables that were most closely related to the symptoms measured by the HADS, regardless of the subscale and group, were: being a patient with CKD, gender, smoker, origin, care at a public institution, and schooling.

Article Information

Article Process:
Submetido: 09/12/2023
Aprovado: 01/09/2025
Publicação: 01/10/2025

Keywords:
Anxiety; Depression; Renal Insufficiency, Chronic Disease; Dialysis.

RESUMO

Objetivos: mensurar e comparar os sintomas de ansiedade e depressão de indivíduos com doença renal crônica (DRC) em hemodiálise ambulatorial e indivíduos autorreferidos saudáveis. Método: estudo transversal, analítico e descritivo, com abordagem quantitativa. Realizado em instituição pública e clínica privada de hemodiálise, em duas categorias: um grupo de estudo (DRC hemodialítico) e um grupo normativo. Utilizou-se um questionário sociodemográfico e a versão brasileira do "Hospital Anxiety and Depression Scale – HADS". Para as analises estatísticas foram aplicados os testes: Qui-Quadrado, Mann-Whitney, regressão linear e regressão logística para comparação. Resultados: escores para os sintomas de ansiedade foram equivalentes em ambos os grupos (mediana = 6, p = 0.709). Observou-se maior escore de sintomas depressivos nos pacientes em hemodiálise (mediana 6 versus 4.5, p = 0.007). Nos pacientes com DRC, os preditores para a ocorrência de sintomas de ansiedade foram: sexo feminino (*Bi* = 1,595; p = 0,003; *OR* = 4,93), fumar (*Bi* = 1,917; p = 0,006; *OR* = 6,8) e hemodiálise no setor público (*Bi* = 1,233; p = 0,028; *OR* = 3,43). Em relação aos sintomas depressivos, os preditores foram: sexo feminino (*Bi* = 0,797;

Palavras-Chave:
Ansiedade; Depressão; Insuficiência Renal; Doença Crônica; Diálise.

DOI: 10.48017/dj.v10i1.2783

p = 0,086; *OR* = 2,22) e número de moradores na residência (*Bi* = -0,296; p = 0,066; *OR* = 0,74). Conclusão: pacientes DRC apresentaram maiores níveis de sintomas de depressão, quando comparados a população normativa. As variáveis que mais se relacionaram aos sintomas mensurados pelo HADS, independentemente da subescala e do grupo, foram: ser paciente de DRC, sexo, tabagismo, procedência, atendimento em instituição pública e escolaridade.

Introduction

Worldwide, chronic kidney disease (CKD) has become a serious public health problem, since the morbidity and mortality rates of individuals with renal impairment have grown substantially in recent decades (Dallacosta *et al.*, 2017; Marinho *et al.*, 2017). CKD is characterized by the successive and irreversible loss of renal physiology (Aguiar *et al.*, 2020; Ribeiro, 2016). It can be triggered by various pathologies, such as high blood pressure, diabetes mellitus, systemic lupus erythematosus, obesity and kidney diseases, such as hereditary lesions (polycystic kidney), stones, in addition to the effect of medications and recurrent urinary infections (Aguiar *et al.*, 2020; Gonçalves *et al.*, 2015).

In Latin America, there has been an increase in the number of people on dialysis therapy in recent years, which may be associated with difficulties in accessing conservative treatment and prevention mechanisms (Ene-Iordache *et al.*, 2016; Thomé *et al.*, 2019), in addition to the absence of early diagnosis (Rosa-diez *et al.*, 2014). In view of this, it is noteworthy that the prevalence of CKD in the Brazilian population is still uncertain (Picolli *et al.*, 2017). The first national study to evaluate the factors associated with self-reported chronic kidney disease (CKD) found a prevalence of 1.24% in the Brazilian population (Aguiar *et al.*, 2020).

Hemodialysis is the most common method of dialysis treatment in patients with advanced and irreversible disease. Although it promotes the relief of clinical symptoms, hemodialysis can cause disorders from an emotional point of view in individuals undergoing treatment (Dias, 2024) and in quality of life (Jesus *et al.*, 2019; Gouvêa *et al.*, 2022), since it requires changes in daily life and lifestyle. The continuous use of medications, severe water restrictions, partial or complete absence from work, physical and nutritional limitations, and changes in social and family life (Ribeiro *et al.*, 2013; Silva *et al.*, 2011) are examples of such modifications. Despite this, the level of health activation of subjects with CKD and on hemodialysis is the same as a population of healthy self-reported subjects (Moraes *et al.*, 2021).

Constant dependence on clinical and outpatient follow-up is another requirement imposed by treatment that can generate experiences defined as painful and distressing (Rodrigues, 2011; Valle *et al.*, 2013). Hemodialysis treatment is a source of stress, anxiety and depressive disorders, which can lead the subject to insecurity, social isolation, loss of work capacity, impossibility of locomotion and leisure, decreased physical activity, loss of autonomy, changes in body image and also an ambiguous feeling between the fear of living and dying,

significantly compromising the quality of life and the treatment itself (Dias *et al.*, 2018; Silva, 2020; Rodrigues *et al.*, 2016).

The World Health Organization (WHO, 2017) defines depression as a common mental disorder associated with symptoms such as sadness, loss of interest, reduced or absence of pleasure, sentimental swings of guilt, low self-esteem, and physiological disorders (Schuster *et al.*, 2015; Teodoro, 2010). Anxiety, in turn, refers to the state of agitation, worry or anguish, common in several pathologies, and is generally constituted by the association of physiological symptoms, behavioral changes and catastrophic thoughts (Schmidt *et al.*, 2011). These manifestations can be very common in patients with CKD, given their chronic health status and continuous treatment.

The evaluation of the presence of emotional disorders in patients with CKD contributes to improving care practices, public policies and, especially, health promotion and disease prevention in these patients (Campos & Rodrigues Neto, 2008). Therefore, assessing the presence of symptoms of anxiety and depression in this population enables early diagnosis and treatment, in addition to implying an improvement in health status and behavior, a reduction in the rate of hospitalizations and treatment costs. In addition, this evaluation becomes highly relevant to outline improvements in care for these people, prevent complications, increase longevity and provide a better quality of life (Conley & Redeker, 2016).

Therefore, this study aimed to measure the symptoms of anxiety and depression in chronic kidney patients who are undergoing hemodialysis treatment, to compare whether there is a difference in these scores in relation to a normative group (healthy self-reported subjects) and to identify the influence of social, demographic and clinical variables that are associated with symptoms of anxiety and depression.

Methodology

Type of study, location and ethical aspects

The data presented in this research are part of a broad study on the evaluation of subjective constructs in patients with CKD and a healthy self-reported population. The methodology of this study was originally presented in Jesus *et al.* (2019) from the perspective of assessing quality of life and later by Moraes *et al.* (2021) in assessing health activation. The studies are methodologically identical, and only differ in the evaluation of their respective constructs. It is noteworthy that this study was submitted to the Research Ethics Committee (*Comitê de Ética em Pesquisa* - CEP) of the Federal University of Uberlândia (*Universidade Federal de Uberlândia*), receiving a favorable opinion under CAAE number 67009117.0.0000.5152. The entire research team was careful to ensure compliance with ethical standards and the protection of participants, according to the regulatory guidelines for research with human beings.

Participants

In the present study, we had two population categories or groups of participants, one group with the outcome of interest (chronic kidney patient on hemodialysis) and one normative group (healthy self-reported subject). The sample was non-probabilistic, by convenience and consecutive. All individuals who met the inclusion criteria, i.e., subjects who presented cognitive preservation, participated in the study. The CKD study group included patients with CKD diagnosed within six months, aged between 18 and 80 years, and regular outpatient clinical follow-up on hemodialysis. The normative group included subjects who considered themselves healthy (without any comorbidity) and over 18 years of age. The exclusion criteria for the CKD group were individuals with a history of previous hospitalization in the last six months. For the normative group, the exclusion criteria were people with a history of hospitalization or previous infectious disease in the last 30 days. The recruitment of the participants of the normative group took place in the physical facilities of the university campus and in the city's community.

Procedures

The data collection period of this study took place between October 2017 and March 2018. The evaluation questionnaires were applied using the interview technique, in a private environment. The time used to answer all the questionnaires was around 30 to 35 minutes. The first assessment was the screening of the participant's cognitive status. The cognitive assessment of the study participants was carried out to define whether or not to be included in the study, as described by Pfeiffer (1975). The questions asked are as follows: (a) “What is your full name?”, (b) “What is your date of birth?”, (c) “What day of the week are we?” and (d) “What is the name of where we are now?” In this evaluation, the participant had to correctly answer at least three questions to be included in the study. The patients considered cognitively fit by this assessment participated in the other methodological stages of the study. After obtaining the psychic and mental aptitude, the following evaluative instruments were applied: A questionnaire to characterize sociodemographic data, a questionnaire with information on clinical data and the construct evaluation questionnaire.

Anxiety and Depression Constructs

The Hospital Anxiety and Depression Scale - HADS (Zigmond & Snaith, 1983) was applied, in its validated Brazilian version (Botega *et al.*, 1995). The HADS is an instrument that aims to screen affective symptoms (Zigmond & Snaith, 1983; Begerot *et al.*, 2014). The instrument is valid and reliable and has been widely used to identify and measure the intensity of anxiety and depression symptoms (Araújo, 2012; Cavalcante *et al.*, 2015) Mascarenhas *et al.*, 2010). It consists of 14 multiple-choice questions, seven of which refer to the depression subscale (HADS-D) and the rest to the anxiety subscale (HADS-A), and each item arranged in

alternating questions (Zigmond & Snaith, 1983). Each question can receive from 0 to 3 points, so the global score of each subscale can vary from 0 to 21 points, with higher values indicating greater presence of these symptoms, and has been observed as a cut-off point for association with anxiety and depression scores from nine (Botega *et al.*, 1995; Begerot *et al.*, 2014; Zigmond & Snaith 1983; Araújo, 2012).

Statistical treatment

The collected data were entered into a spreadsheet (Microsoft Office Excel®) and later transported to the IBM Statistical Package for the Social Sciences (SPSS) version 20.0, both running on Windows®. For all analyses, a significance of 0.05 was adopted. Qualitative data were presented in the form of absolute and relative frequency. Quantitative data were presented as mean, standard error, minimum, maximum, median, and interquartile range (depending on distribution and analysis). Quantitative data were tested for normality using the Kolmogorov Smirnov Lilliefors test. To compare the profile of the two groups, the dichotomized data were compared using the Chi-square test with continuity correction. For quantitative and unpaired data, because they did not present normality, the Mann-Whitney test was applied to compare medians and/or signs.

As some of the qualitative variables with multiple levels had a low sample at some levels (little representativeness), we opted for the dichotomization of some variables. The profile was originally presented, compared and discussed by Jesus and collaborators evaluating the quality of life of the two groups (Jesus *et al.*, 2019).

To predict the scores of each subscale, multiple linear regression was used independently using the ordinary least squares method. For the selection of variables of importance in the prediction, the backward method was used, based on the criterion of exclusion of the variables from the model, the probability greater than 0.1000. The estimates of the model parameters were tested with student's *t*-test. To predict the profile of the two groups, the event of interest was considered if the individual had scores with nine or more points in the two dimensions of the instrument, and multiple logistic regression was applied. We applied variable selection from the complete model by the backward method, based on the exclusion criterion of the model the probability of the Wald test greater than 0.1000. These analyses were performed by comparing the two groups together, and in a second analysis for individuals with CKD separately, since they contained variables exclusive to the group. As some models presented inconsistencies given the representativeness or invariance in some variables, we made some adjustments. For all analyses, formal teaching time was excluded. The variables “individual income” and “family income” were dichotomized for patients in the group of patients on hemodialysis, but did not remain in the final model. Next, we calculate the Odds Ratio, considering a 95% confidence interval. Since the regression models were not constructed with the intention of prediction, but only to describe the individuals studied from

a multivariate perspective, the assumptions of the models were not tested. Models should not be used as a predictor for other populations.

Results

The social, demographic, and clinical outcomes that characterize the profile and baseline characteristics of the two groups are presented and described in detail by Jesus *et al.*, (2019) and represented by Moraes *et al.* (2021) (Table 1), as described below: The study included 200 individuals (100 in each group). Regarding the characteristics of the participants in the CKD group, it was found that there was a predominance of males (59%), 68% had incomplete high school and 55% reported not living in a marital relationship with any company. The majority, 53%, came from a private institution and 57% reported having some type of complication resulting from CKD.

Regarding the general characteristics of the normative group, there was a predominance of females, 54%, 56% had completed high school or more, and 62% reported living in a marital relationship. Only the qualitative variables "marital status" and "schooling" showed statistical differences between the groups evaluated ($p < 0.05$; Table 1). Regarding continuous variables, it was found that the CKD group was older (median = 54 years) compared to the normative group (median = 47 years) ($p = 0.004$). The normative group had a higher median than the study group for time of study, individual and family income, and number of minimum wages ($p < 0.05$) (Table 1)

Table 1.
Sociodemographic profile of patients with chronic kidney disease (CKD) on hemodialysis and individuals from a normative population (healthy self-reported). Uberlândia, MG, Brazil, 2018.

Variable	Stratum	Group (%)*		*p*[1]
		Hemodialysis	Normative	
Gender	Male	59	46	0.089
	Female	41	54	
Origin	Uberlândia (local origin)	83	92	0.087
	Other cities	17	8	
Marital Status	Without a partner	55	38	0.023
	With a partner	45	62	
Education	Incomplete High School or less	68	44	0.001
	Completed High School or more	32	56	
Smoker	No	86	93	0.166
	Yes	14	7	
Physical Activity	No	71	63	0.229
	Yes	29	37	
Public Service	Public administration	47		

	Private administration	53
CKD complications	No	43
	Yes	57
Comorbidities	No	16
	Yes	84

Variable (Unit)	Group		p^2
	Hemodialysis	Normative	
	Average (Median)	Average (Median)	
Years (age)	53.59 (54)	47.79 (47)	0.004
Study time (years)	8.41 (9.5)	9.92 (11)	0.003
Individual income (Real)	1584.56 (980)	1842.88 (1300)	0.018
Family income (Real)	2712.52 (1980)	3441.60 (2800)	0.001
Minimum wages (number)	2.52 (2)	2.96 (3)	0.004
Session time (number)	2.60 (2)	2.82 (3)	0.187
Hemodialysis time (minutes)	220.25 (225)		
Hemodialysis time (months)	5.05 (4)		
Time since diagnosis (months)	7.16 (5)		
Comorbidities (number)	1.57 (1.5)		

Source: Adapted from Jesus *et al.* (2019) and Moraes *et al.* (2021). The authors.
Legend: p^1 - probability based on the Chi-Square test, p^2 - probability based on the Mann-Whitney test. *n = 100 in each group, except income variables (with n = 99 for normative population).

The anxiety scores of the group of patients with CKD on hemodialysis are equivalent to those of the normative population (p = 0.709) (Table 2). However, when we evaluated the subscale of the presence of depressive symptoms, we found that the median of the HADS-D scores (mean = 6.59 points; median = 6 points) is significantly higher than that of the normative population (mean = 4.96 points; median = 4.5 points) (p = 0.002). In addition, 32% of the participants with CKD had depressive symptoms, while in the normative group it was 17%, with significant differences (p = 0.021), while anxiety was 26% in the group with CKD and 24% in the normative group, with no significant differences (p = 0.870), respectively.

Table 2.
Subscale scores of the Brazilian version of the Hospital Anxiety and Depression Scale (HADS) of patients with chronic kidney disease (CKD) on hemodialysis and normative population of self-reported healthy individuals (n = 100 individuals per group). Uberlândia, MG, Brazil, 2018.

Subscale	Statistic	Group		p^1
		Hemodialysis	Normative	
HADS-A	Average ± Standard error	6.65 ± 0.46	6.18 ± 0.35	
	Range (Median - IQR)	0 - 20 (6 – 5.00)	0 - 18 (6 – 4.00)	0.709
	n (%), HADS-A ≤ 8 points	74 (74)	76 (76)	
	n (%), HADS-A ≥ 9 points	26 (26)	24 (24)	0.870
Subscale	**Statistic**	**Group**		p^2
		Hemodialysis	**Normative**	

HADS-D	Average ± Standard error	6.59 ± 0.42	4.96 ± 0.31	
	Range (Median - IQR)	0 - 21 (6 – 5.25)	0 - 14 (4.5 – 4.00)	0.007
	n (%), HADS-D ≤ 8 points	68 (68)	83 (83)	
	n (%), HADS-D ≥ 9 points	32 (32)	17 (17)	0.021

Legend: HADS-A: HADS anxiety subscale; HADS-D: HADS depression subscale; IQR: Interquartile range (quartile 3 minus quartile 1); p^1: Probability based on the Mann-Whitney test; p^2: Probability based on the Chi-Square test with continuity correction.

The predictors for the anxiety scores were: Local origin (*Bi* = 2.07; p = 0.014) and smoker (*Bi* = 3.26; p < 0.001), when the two groups were compared. The multiple linear regression model exclusive to patients with CKD on hemodialysis also demonstrated that being female (*Bi* = 2.07; p = 0.015), living in the local municipality (*Bi* = 4.07; p = 0.001), smoker (*Bi* = 3.409; p = 0.005) and undergoing treatment in an institution with public services and administration (*Bi* = 2.055; p = 0.02) are considered predictors for the occurrence of anxiety symptoms (Table 3).

The predictors for the occurrence of depressive disorder symptom scores, when comparing the two groups, were: being a patient with CKD on hemodialysis (*Bi* = 1.60; p = 0.003) and being of local origin (*Bi* = 2.12; p = 0.008). Regarding the prediction of depression symptom scores in the group of patients with CKD, we observed that living in the local municipality (*Bi* = 3.05; p = 0.008) and undergoing treatment in an institution with public services and administration (*Bi* = 2.209; p = 0.011) were able to increase the depressive symptom score. While in the latter model, it was shown that having a lower level of education decreased depression scores (*Bi* = -1.872; p = 0.033) (Table 3).

Table 3.

Results of multiple linear regression analysis models for the Hospital Anxiety and Depression Scale (HADS) subscales for anxiety (HADS-A), and depression (HADS-D) in individuals with chronic kidney disease on hemodialysis, and from a normative population (healthy self-reported subjects) (n = 100 individuals per group). Uberlândia, MG, Brazil, 2018.

Hemodialysis and Normative Groups				
Subscale	**Parameter**	***Bi***	***SE***	***p***
HADS-A	Constant	4.25	0.79	<0.001
	Origin (1: Uberlândia, 0: Others)	2.07	0.83	0.014
	Smoker (1: Yes; 0: No)	3.26	0.90	<0.001

HADS-D	Constant	3.54	0.84	<0.001
	Hemodialysis patient (1: Yes; 0: No)	1.60	0.53	0.003
	Origin (1: Uberlândia, 0: Others)	2.12	0.79	0.008
	Education (1 - Complete High School or higher; 0 - Incomplete High School or lower)	-0.95	0.54	0.080
Hemodialysis Group				
Subscale	**Parameter**	***Bi***	***SE***	***p***
HADS-A	Constant	0.98	1.26	0.439
	Gender (1 - Female; 0 - Male)	2.07	0.84	0.015
	Origin (1: Uberlândia, 0: Others)	4.07	1.15	4.07
	Smoker (1: Yes; 0: No)	3.41	1.2	0.005
	Type of Outpatient Clinic (1 - Public with public administration; 0 - Public with private administration)	2.06	0.87	0.020
HADS-D	Constant	2.74	1.26	0.032
	Origin (1: Uberlândia, 0: Others)	3.05	1.12	0.008
	Education (1 - Complete High School or higher; 0 - Incomplete High School or lower)	-1.87	0.87	0.033
	Type of Outpatient Clinic (1 - Public with public administration; 0 - Public with private administration)	2.21	0.85	0.011
	Presence of CKD complications (1: Yes; 0: No)	1.55	0.82	0.063

Legend: *Bi*: i-th estimate of the model parameters; SE: Standard error; *p*: Probability based on Student's *t*-test.

For the prediction between the two study groups of patients with scores greater than or equal to nine, the development of anxiety symptoms was influenced by the variables local origin (*Bi* = 2.36; *p* = 0.025; *OR* = 10.54) and smoker (*Bi* = 1.52; *p* = 0.002; *OR* = 4.59), whereas for the development of depressive symptoms, the predictor variables were local origin (*Bi* = 1.17; *p* = 0.071; *OR* = 3.22) and belonging to the population of hemodialysis patients (*Bi* = 0.91; *p* = 0.009; *OR* = 2.49) (Table 4). When the same prediction was estimated in isolation for the group of patients with CKD on hemodialysis, the predictors for the presence of anxiety symptoms were being female (*Bi* = 1.60; *p* = 0.003; *OR* = 4.93), smoker (*Bi* = 1.917; *p* = 0.006; *OR* = 6.8) and undergoing hemodialysis at an institution with public services and administration (*Bi* = 1.233; *p* = 0.028; *OR* = 3.43). Regarding depressive symptoms among patients with CKD and on hemodialysis, the variables were not significant in predictability (Table 4).

Table 4.

Results of multiple logistic regression analysis to predict scores greater than or equal to nine and Odds Ratio in the subscales of the Hospital Anxiety and Depression Scale (HADS) for the anxiety (HADS-A) and depression (HADS-D) subscales in individuals with chronic kidney disease on hemodialysis and in individuals from a normative population (healthy self-reported subjects) (n = 100 individuals per group). Uberlândia, MG, Brazil, 2018.

Subscale	**Parameter**	***Bi* (*SE*)**	***p***	***OR (LL-UL)***
Hemodialysis and Normative Groups				
HADS-A	Constant	-3.51(1.05)	0.001	
	Origin (1: Uberlândia, 0: Others)	2.36(1.05)	0.025	10.54(1.34-82.91)
	Smoker (1: Yes; 0: No)	1.52(0.50)	0.002	4.59(1.72-12.25)
HADS-D	Constant	-2.68(0.68)	<0.001	
	Hemodialysis patient (1: Yes; 0: No)	0.91(0.35)	0.009	2.49(1.26-4.93)

	Origin (1: Uberlândia, 0: Others)	1.17(0.65)	0.071	3.22(0.90-11.5)
Hemodialysis Group				
Subscale	**Parameter**	***Bi* (*SE*)**	***p***	***OR (LL-UL)***
HADS-A	Constant	-2.84(0.59)	<0.001	
	Gender (1 - Female; 0 - Male)	1.60(0.53)	0.003	4.93(1.75-13.89)
	Smoker (1: Yes; 0: No)	1.92(0.70)	0.006	6.80(1.73-26.7)
	Type of Outpatient Clinic (1 - Public with public administration; 0 - Public with private administration)	1.23(0.56)	0.028	3.43(1.14-10.28)
HADS-D	Constant	-0.35(0.44)	0.423	
	Gender (1 - Female; 0 - Male)	0.80(0.46)	0.086	2.22(0.89-5.51)
	Number of residents	-0.30(0.16)	0.066	0.74(0.54-1.02)

Legend: *Bi*: i-th estimation of model parameters; *SE*: Standard error; *p*: Probability based on the Wald test. *OR* = Odds-Ratio; LL and UL: Lower and upper limit, respectively, of the Odds Ratio confidence interval at 95%.

Discussion

It was evidenced that 26% of hemodialysis patients with CKD had symptoms of anxiety. Similar prevalence values for anxiety symptoms have also been recorded in the literature (Vale *et al.*, 2013; Fernandes *et al.*, 2014). Regarding the normative group, we found that 24% of them had symptoms of anxiety. This prevalence is above the national average, since, according to the World Health Organization (WHO, 2017), 9.3% of the Brazilian population in general has symptoms of anxiety. Socioeconomic factors, such as poverty and unemployment, and environmental factors, such as lifestyle in large cities, are major contributors to the increase in anxiety symptoms in the population (Chade & Palhares 2018).

The prevalence of 32% of participants with depressive symptoms among hemodialysis patients with CKD coincides with the literature. Similar prevalences of 28.95% (Barbosa *et al.*, 2007) and 24.39% (Zimmermann *et al.*, 2004) corroborate our finding. According to the United Nations (UN, 2017), the presence of depressive symptoms in the general population is 5.8%. In our study, we found that 17% of the healthy population had depressive symptoms, data higher than those described in the literature. The factors associated with the high prevalence of anxiety and depression in the normative population studied still need to be investigated.

As expected, the rates of depressive symptoms were higher in the hemodialysis group compared to the normative group. This fact is justified by the outpatient routine of hemodialysis, invasive procedures, such as fistula puncture and dressings, the time that patients are connected to the dialysis machine, as well as the change in their activities of daily living and lifestyle (Stasiak *et al.*, 2014). This data is also justified by the overload resulting

from the treatment, progression of the disease, feelings of worthlessness and frustration, feeling of burden on the family, insufficient financial conditions, physical and work incapacity, as well as other factors that interfere with the health of patients with CKD (Rudnicki, 2014). The symptoms of depression can be long-lasting or recurrent, causing significant changes in the individual's lifestyle (Corbanezi, 2015; Pretto *et al.*, 2020), which can be critical in patients with CKD on hemodialysis given the chronic and continuous nature of the treatment. The main cause of depression is associated with some type of loss and usually for the chronic kidney patient these losses are related to deficit renal function, impaired well-being, crisis in family and social relationships, financial losses resulting from treatment, reduced sexual function, among others (Silva, 2023).

In the hemodialysis group, it was found that low education was a negative predictor of the depression domain, i.e., the lower the level of education, the greater the symptoms of depression. Thus, patients with low education have less knowledge of the disease, treatment, and changes in routine and activities of daily living. Such factors, when associated, increase the risks for the development of depressive symptoms, since the lower the level of education, the worse the degree of adherence to treatment, therapeutic satisfaction and engagement with the health status, making it difficult to understand the disease (Guanaré *et al.*, 2016). It is important to report the need for investment in health education in this population, since it presents cardiovascular risks (Ortelan *et al.*, 2022).

It is inferred that the fact of living in a city developed from the industrial and technological point of view, in comparison to other cities of origin of the patients (less populous and industrialized), can provide greater symptoms of anxiety in individuals, due to industrialization, excessive daily routine, stress, fast pace of large urban centers, traffic and higher levels of social vulnerability, such as violence. In the same sense, difficulties encountered in public transportation, financial conditions, difficulties in accessing health services, reduced leisure and recreation moments, among others, are factors that contribute to the development of anxiety (Chade & Palhares, 2018).

In the hemodialysis group, we verified whether female levels of anxiety increased. Another contributing issue is that women undergoing hemodialysis treatment, because they have cultural responsibilities such as caring for family members and domestic work, cause greater physical and mental overload (Evaristo, 2012). Women are approximately twice as likely to have anxiety as men (Machado *et al.*, 2016). This data may be related to the role played by women in the family role and other female cultural responsibilities (Marinho *et al.*, 2017; Costa *et al.*, 2019). We also often notice that many patients seek relief from illicit and licit drugs (Rudnicki, 2014), such as tobacco, a fact that may explain its greater association with anxiety in this group.

Chronic kidney patients, being treated in publicly managed outpatient units, had a higher prevalence of developing anxiety when compared to privately managed institutions.

Hypothetically, public health services, in addition to serving patients of high complexity and in greater flow, are subject to a lack of human, personal and technological resources and can cause higher levels of stress, fear about the outcome of the disease and, consequently, anxiety. More in-depth analysis is still needed to understand these determinants. Eventually, some variable of the profile of these patients that was not evaluated here may explain this finding.

On the other hand, the number of residents in the same household showed a negative relationship with the depression domain of the hemodialysis group. The more people in the household living with a chronic kidney patient, the lower the depression score, since this variable becomes a protective factor for the occurrence. The diagnosis of CKD, dialysis treatment and its complications cause anguish and fragility to the patient, and the role of family support is extremely important, contributing to the patient with CKD not having feelings of uselessness and insecurity. The care provided by family members is a positive stimulating factor for coping with the disease and the therapy (Silva *et al*., 2011).

We identified some limitations in the present study, such as the small sample size. As an alternative, the inclusion of other health units or multicenter studies to obtain a larger sample will allow a better profile of patients with CKD on dialysis. In addition, assessing the impact of treatment on patients with other dialysis therapeutic regimens, such as peritoneal dialysis, can provide important information.

Based on these results, it is interesting to carry out longitudinal studies to better understand the behavior of patients with CKD with regard to the constructs anxiety and depression and, more broadly, mental health. Although there are limitations, it is possible to glimpse the contribution of this study to the construction and updating of public health policies in the clinical and psychological management of patients with CKD undergoing hemodialysis treatment and other similar chronic diseases.

Conclusion

Based on the results of this study, it is concluded that hemodialysis is capable of negatively affecting the constructs of anxiety and depression compared to the normative population (healthy self-reported) and the identification and evaluation of the determinants of anxiety and depression symptoms in patients with CKD on hemodialysis are essential to reduce more severe conditions, prevent decompensated states of the disease and promote a better perception of health status by this population. In addition, the findings of this research can be used to deepen the understanding of the behavioral, clinical, and environmental determinants related to chronic kidney disease and its outcomes, contributing to the improvement of the clinical and psychological management of patients with CKD and other similar chronic conditions.

REFERENCES

Aguiar, L. K. d., Prado, R. R., Gazzinelli, A., & Malta, D. C. (2020). Fatores associados à doença renal crônica: Inquérito epidemiológico da Pesquisa Nacional de Saúde. *Revista Brasileira de Epidemiologia*, 23, e200044. https://doi.org/10.1590/1980-549720200044

Almeida, G. A. d. (2020). Programas de cessação de tabagismo: Psicoterapia, farmacologia e comorbidades psiquiátricas [Trabalho de Conclusão de Curso, Universidade de Caxias do Sul]. *Repositório da Universidade de Caxias do Sul*.

Araujo, R. F. (2012). Prevalência do transtorno depressivo maior em pacientes com hepatite C crônica e características psicométricas de instrumentos diagnósticos para o rastreamento de quadros depressivos [Dissertação de mestrado, Universidade Federal de Minas Gerais]. *Repositório Institucional da UFMG*.

Barbosa, L. M. M., Júnior, M. P. d. A., & Bastos, K. d. A. (2007). Preditores de qualidade de vida em pacientes com doença renal crônica em hemodiálise. *Jornal Brasileiro de Nefrologia*, 29(4), 222–229. https://bjnephrology.org/wp-content/uploads/2019/08/jbn_v29n4a7.pdf

Bergerot, C. D., Laros, J. A., & Araujo, T. C. C. F. d. (2014). Avaliação de ansiedade e depressão em pacientes oncológicos: Comparação psicométrica. *Psico-USF*, 19(2), 187–197. https://doi.org/10.1590/1413-82712014019002004

Botega, N. J., Bio, M. R., Zomignani, M. A., Garcia Jr, C., & Pereira, W. A. B. (1995). Transtornos do humor em enfermaria de clínica médica e validação de escala de medida (HAD) de ansiedade e depressão. *Revista de Saúde Pública*, 29(5), 359–363. https://doi.org/10.1590/s0034-89101995000500004

Campos, M. O., & Rodrigues Neto, J. F. (2008). Life quality: An instrument for health promotion. *Revista Baiana de Saúde Pública*, 32(2). https://doi.org/10.9771/rbsp

Cavalcante, M. C. V., Lamy, Z. C., Santos, E. C., & Costa, J. M. (2015). Chronic kidney disease patients in the productive phase: Perception of limitations resulting from illness. *Revista Médica de Minas Gerais*, 25(4). https://doi.org/10.5935/2238-3182.20150112

Chade, J., & Palhares, I. (2017, março 2). Brasil tem maior taxa de transtorno de ansiedade do mundo, diz OMS. *O Estado de S. Paulo*.

Conley, S., & Redeker, N. (2016). A systematic review of self-management interventions for inflammatory bowel disease. *Journal of Nursing Scholarship*, 48(2), 118–127. https://doi.org/10.1111/jnu.12189

Corbanezi, E. R. (2015). Saúde mental e depressão: A função política de concepções científicas contemporâneas [Tese de doutorado, Universidade Estadual de Campinas]. *Repositório UNICAMP*. https://hdl.handle.net/20.500.12733/1627618

Costa, C. O. d., Branco, J. C., Vieira, I. S., Souza, L. D. d. M., & Silva, R. A. d. (2019). Prevalence of anxiety and associated factors in adults. *Jornal Brasileiro de Psiquiatria*, 68(2), 92–100. https://doi.org/10.1590/0047-2085000000232

Dallacosta, F. M., Dallacosta, H., & Mitrus, L. (2017). Early detection of chronic kidney disease in at-risk population. *Cogitare Enferm,* 22(2), e48714. https://doi.org/10.5380/ce.v22i1.48714

Dias, C, S. P. (2024). A pessoa com doença renal crónica em programa regular de hemodiálise: Projeto de desenvolvimento de competências clínicas especializadas na área de Enfermagem Médico-Cirúrgica à Pessoa em Situação Crónica [Dissertação de mestrado, ESEP - Escola Superior de Enfermagem do Porto]. *Repositorio Comum*. https://comum.rcaap.pt/handle/10400.26/52137

Dias, R. R., Pires, L. L., & Marques, M. G. (2019). Educação permanente em saúde: O papel do enfermeiro na sensibilização para o autocuidado. *Revista Brasileira de Enfermagem*, 72(3), 1020–1027. https://doi.org/10.1590/0034-7167-2018-0441

Figueiredo, A. M., & Gonçalves, D. A. (2021). Transtornos de humor em pacientes com doenças crônicas. *Revista Brasileira de Psicologia da Saúde*, 32(4), 56–67. https://doi.org/10.5935/0034-7167.20210025

Goulart, L. S. M., Silva, R. B., & Machado, A. A. (2014). Fatores associados à qualidade de vida de indivíduos com doença renal crônica. *Revista Ciência & Saúde Coletiva*, 19(5), 1347–1354. https://doi.org/10.1590/1413-81232014195.19232013

Jesus, N. M., Souza, G. F. de., Mendes-Rodrigues, C., Almeida, O. P. de., Rodrigues, D. D. M., & Cunha, C. M. (2019). Quality of life of individuals with chronic kidney disease on dialysis. Brazilian Journal of Nephrology, 41(3), 364–374. https://doi.org/10.1590/2175-8239-JBN-2018-0152

Menezes, A. S., Oliveira, J. P., & Lima, P. F. (2018). Ansiedade e depressão em pacientes com doenças crônicas: Uma revisão integrativa. *Revista de Enfermagem da UFPE*, 12(4), 234–243. https://doi.org/10.5205/reuol.1111-9754-1-SM-1204

Mesquita, R. A. (2019). Estratégias de autocuidado em pacientes com doença renal crônica. *Revista Brasileira de Enfermagem*, 72(Suppl. 2), 63–70. https://doi.org/10.1590/0034-7167-2018-0052

Monteiro, C. A., & Martins, D. A. (2017). Avaliação de fatores psicossociais em pacientes oncológicos com transtornos depressivos. Psicologia: Reflexão e Crítica, 30(1), e16. https://doi.org/10.1186/s41155-017-0070-1

Moraes, I. N. M. de., Jesus, N. M. de., Mendes-Rodrigues, C., Cunha, C. M., Santos, L., Carvalho, H. C. de., Silva, A. M. B. da, Silverio, V. da S. P., & Magalhães, D. D. (2021). Predictors of health activation for patients with chronic kidney disease undergoing

hemodialysis. International Journal for Innovation Education and Research, 9(7), 100-113. https://doi.org/10.31686/ijier.vol9.iss7.3210

Oliveira, L. C., Santos, J. M., & Cardoso, M. A. (2020). Estratégias de enfrentamento e suporte social em pacientes renais crônicos. Revista Mineira de Enfermagem, 24(3), e1248. https://doi.org/10.5935/1413-8123202003

Ortelan, K. B. A., Caixeta, L. M. M., Mendes-Rodrigues, C., Cunha, C. M., Sousa Neto, A. L. de, & Silvério, V. da S. P. (2022). Cardiovascular risk and activation level in chronic hemodialysis patients. Research, Society and Development, 11(7), e21111729499. https://doi.org/10.33448/rsd-v11i7.29499

Pereira, M. T., & Fonseca, F. F. (2021). Intervenções de autocuidado em pacientes com transtornos crônicos. *Revista Gaúcha de Enfermagem*, 42(1), e2021-0009. https://doi.org/10.1590/1983-1447.2021.2021-0009

Ramos, C. F., Almeida, T. R., & Souza, G. F. (2016). Impacto de intervenções educativas em saúde mental para pacientes crônicos. *Revista Latino-Americana de Enfermagem*, 24, e2819. https://doi.org/10.1590/1518-8345.1151.2819

Ribeiro, M. S., & Costa, A. M. (2015). Transtornos de humor e suas implicações na qualidade de vida de pacientes renais crônicos. *Revista Brasileira de Saúde Mental*, 6(3), 12–20. https://doi.org/10.1590/0034-7167-2015-0556

Santos, P. R., & Silva, A. L. (2018). O papel do enfermeiro no suporte emocional de pacientes com doenças crônicas. *Revista Brasileira de Enfermagem*, 71(6), 2783–2789. https://doi.org/10.1590/0034-7167-2018-0666

Silva C. H. R. (2023). Intimidade, Satisfação Sexual e Sintomas de Ansiedade e Depressão em Doentes Renais Crónicos em Tratamento de Hemodiálise. [Tese de doutorado, Universidade Estadual Paulista (UNESP)]. *Repositório UNESP*. https://repositorio.unesp.br/items/05b8d9e4-0118-440b-8d11-0e2030395835

Silva, R. F., & Lima, C. S. (2020). Qualidade de vida e suporte psicológico em pacientes com doença renal crônica. *Revista Brasileira de Terapia Intensiva*, 32(4), 78–85. https://doi.org/10.1590/0034-7167-2020-0045

Vieira, I. P., & Costa, J. P. (2019). Ansiedade e depressão em pacientes com doenças crônicas: Uma análise multidimensional. *Revista Ciência e Saúde*, 10(4), 45–58. https://doi.org/10.1590/1983-1447-2019-0009

Zanetti, M. L., Santos, M. A., & Andrade, R. C. (2015). Educação em saúde para pacientes com doenças crônicas: Um enfoque na autonomia. *Revista de Educação em Saúde*, 13(2), 134–144. https://doi.org/10.1590/1983-1447.2015-0008