



Assessment of the quality of life of patients with chronic kidney disease: a prospective observational crosssectional cohort study

Yasser Nader Abed¹, Caio Vinicius Vieira Alves², Laura Moschetta Orlando¹, Carolina de Paula Andrade¹, Jordana Rodrigues de Barros³, Monayra Amaral Medeiros¹, Isabela Alonso Pereira⁴, Gabriel Antunes Sousa Silva¹, Igor Leão Martins⁵, Barbara Correia Neves Sabino^{1*}

¹ FAMERV-UNIRV - Faculty of Medicine of the University of Rio Verde, Rio Verde, Goiás, Brazil.

² UNIUBE - Faculty of Medicine of the University of Uberaba, Uberaba, Minas Gerais, Brazil.

³ UNAERP - Faculty of Medicine of the University of Ribeirão Preto, Ribeirão Preto, São Paulo, Brazil.

⁴ UNIEVANGELICA - Faculty of Medicine of the Evangelical University of Goiás, Brazil.

⁵ UNIVERSIDADE BRASIL- Brazil University – Medical Course, Fernandópolis, São Paulo, Brazil.

*Corresponding Author: Dr. Barbara Correia Neves Sabino.
FAMERV-UNIRV - Faculty of Medicine of the University of Rio Verde, Rio Verde, Goiás, Brazil.

E-mail: nevesbarbara@hotmail.com

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Abstract

Chronic kidney disease (CKD) is defined as changes in glomerular filtration rate and/or the presence of parenchymal damage, which are maintained for at least three months. When in advanced stages of evolution, renal replacement therapies are necessary, and the most widespread is hemodialysis, indispensable for the stability of the patient. However, such a therapeutic measure has a great influence on the patient's quality of life, interfering with their habits, as well as their physical conditions and social and occupational functioning. Thus, when evaluating the quality of care provided to 204 participants with CKD attending the nephrology and hemodialysis clinic, aimed at recognizing the quality of life, through the validated WHOQOL-BREF questionnaire, a causal relationship between the data obtained from each domain addressed in the questionnaire (physical, environmental, psychological and social relationships) and their quality of life profile. Those younger, males, with higher socioeconomic and educational levels, showed a significant increase in their quality of life. In addition, among the analyzed domains, the physical one, which deals with conditions such as pain, sleep quality, and physical and psychological capacity to perform functions showed to have the greatest impact, unfavorably. The opposite was observed in the environmental domain, which stood out positively among the others, allowing us to conclude

that even though the participants had ideal conditions to carry out the procedure, the effects generated by this in the body, contribute to the reduction of significantly on the quality of life.

Keywords: Chronic kidney disease. Disease impact profile. Therapies. Quality of life.

Introduction

Chronic kidney disease (CKD) is considered a serious public health problem in the world [1,2], due to its wide incidence, the high costs for its treatment, and the influences it has on the quality of life of affected individuals [3,4]. In Brazil, according to the World Health Organization (WHO), it is considered a pandemic [5].

Also, CKD can be defined as a kidney injury that occurs in a progressive and irreversible way, affecting the efficiency of kidney function. This can occur for different causes, such as uncontrolled systemic arterial hypertension, diabetes mellitus, and glomerulonephritis. It can be classified into 5 different stages, with stage 1 corresponding to a mild loss, which does not directly affect the filtration rate, and stage 5 corresponding to a severe deficit, in which the glomerular filtration rate is below 15 mL/min, in this case, renal replacement therapy is used, which includes hemodialysis, peritoneal dialysis, or kidney transplantation [6].

Besides, hemodialysis is based on extracorporeal blood filtration and clearance, which the body of the CKD carrier is not able to perform. This method aims to eliminate toxic substances such as urea and creatinine through a machine that contains a capillary filter. The treatment requires the patient to make strict changes in their lifestyle, such as dietary and water restrictions, in addition to acquiring the habit of constantly living in a hospital and outpatient environment, which is considered by many to be stressful and full of complications. The consequences of such a procedure on the individual's quality of life are remarkable, since they lead to psychological and social conflicts (the patient's and his own family), and change the patient's body image, causing dependence and increasing the perspective of the patient. of a potential death [7].

Moreover, CKD changes the participants' quality of life, causing osteoarticular manifestations, arterial hypotension, cramps, edema, restlessness, allergic reactions, and psycho-emotional changes, among others. Hemodialysis is the most used method of renal replacement therapy (RRT) and, like the disease itself, its treatment also has negative repercussions on the patient's well-being, including the continuous use of medication, water, and nutritional restrictions, withdrawal from the work, physical limitations, dependence on constant outpatient clinical follow-up and the worsening of psychoemotional symptoms [6,8].

In this sense, the World Health Organization Quality of Life Group (WHOQOL-Group) defines the quality of life (QOL) as: "An individual's perception of their position in life in the context of the culture and value system in which he lives and in relation to his goals, expectations, standards, and concerns", in this way, it is understood that this is closely related to the individual's own routine, in all its aspects. and in a multidimensional way [9].

Also, with the inversion of the age pyramid, as a result of population aging and the increase in life expectancy accompanied by the prevalence of chronic diseases in the Brazilian population, it is estimated that a greater number of elderly people will have to undergo dialysis therapy in the future. A descriptive and exploratory study carried out in a specialized hemodialysis service in Guarapuava, Paraná, showed that the social domain is the most affected in the QOL of the elderly population, followed by the physical, therefore, the early approach to influencing factors in the quality of life. life of these individuals, and that of their families, is important for the prevention of psychosocial misfortunes arising from CKD and dialysis treatment, in addition to adapting to the number of transformations with these [7].

Further, depression is the most frequent psychiatric condition in participants with chronic kidney disease, with a prevalence of around 20 to 30% in those undergoing hemodialysis treatment. This is deeply related to cases of difficult adherence to treatment, increased morbidity, and mortality, in addition to a significant worsening of the nutritional status of such participants [10].

Besides, dialysis treatment encompasses several changes in the patient's daily life, from their routine to dietary changes and greater family distance. In addition, the hospitalization rate of these participants is around 15 days a year, which culminates in an average health-related quality of life (QOL) lower than that of the general population. It is common to find pictures of muscle weakness, lack of energy, feeling of discouragement, fatigue, and cramps, which cause an important limitation of daily activities, especially work, which can lead to greater disappointment [9].

In this context, participants undergoing therapy must go in search of overcoming the adversities arising from it, using methods of coping with possible demands, through the development of behavioral and cognitive skills. Such skills include greater family support, attachment to a belief or hobby, and especially acquiring the power of resilience. With this, it would be possible to manage the stressor event, as well as the control, reduction, or elimination of emotional responses to the new lifestyle [11].

Therefore, the objective of this study was to evaluate the quality of life of participants with chronic kidney disease in a nephrology and dialysis clinic Rio Verde, analyzing which domains of quality of life were most affected by the participants of the clinic studied, as well as how to weigh the impact profile of therapy on participants' quality of life, and correlate participants' quality of life with adherence or not to dialysis treatment.

Methods

Study Design

The present clinical study followed a cross-sectional, population-based, prospective observational model with a quantitative approach, carried out in a kidney disease clinic located in the city of Rio Verde, Goiás. The STROBE clinical research rules (STrengthening the Reporting of OBservational studies in Epidemiology, available at: <https://www.strobe-statement.org/>) were used.

Ethical Approval

The study followed all the ethical procedures

proposed by the resolution of the national health council nº 466, of December 12, 2012, and was approved by the Research Ethics Committee – CEP of FAMERV-UNIRV - Faculty of Medicine of the University of Rio Verde, Rio Verde, Goiás, Brazil, with approval number: 3.834.213. Data were collected between August 2020 and June 2021, interviewing participants present at the clinic on the day of the visits, preserving their right to choose to participate.

Settings

Renal disease clinic located in the city of Rio Verde, Goiás, which is fully open from Monday to Friday, from 7 am to 6 pm. Provides both public care through the Unified Health System (UHS) and the private network. It has 54 hemodialysis equipment and 60 professionals, including nurses, vascular surgeons, clinicians, nephrologists, pharmacists, nursing assistants, nursing technicians, clinical pathology technicians, nutritionists, psychologists, social workers, and administrative assistants, among others.

Eligibility Criteria

For sample selection, the inclusion criteria were age greater than 18 years, undergoing hemodialysis treatment at the nephrology clinic in Rio Verde for more than 6 months, being available to respond to the interview, and signing the informed consent form (ICF). The exclusion criteria were participants without adequate communication skills and cognition to answer the questionnaires, and not answer the questionnaires completely.

Data Collection and Evaluation

Data were collected between February and June 2020 by interviewing participants present at the clinic on the day of the visits. The right to choose participation was preserved, only being interviewed and data collected from those participants who consent to participate and sign the ICF. The name of the participants was protected, and the questionnaires only included the initials of each name. Confidentiality and confidentiality were guaranteed. Each participant was interviewed individually, in a place chosen by him and made available by the institution, always seeking to deprive them of their privacy and comfort. Only those who read and signed the ICF were interviewed and included in the survey.

The work team to carry out this research was composed of a nurse professor and researcher at Faculty of Medicine of the University of Rio Verde, Rio Verde, Goiás, Brazil, and an academic researcher, from the undergraduate course in medicine at FAMERV-UNIRV

Questionnaire

A questionnaire developed by the researchers was applied, which deals with sociodemographic aspects such as age, sex, education, family income, the intensity of the bond with the dialysis clinic, and adherence to treatment. Furthermore, to assess Quality of Life (QOL) the WHOQOL-BREF will be used, which contains 26 items related to the quality of life (which takes the last two weeks as a reference), produced by The WHOQOL Group (The World Health Organization). Quality of Life Assessment) and adapted to the Brazilian reality by Fleck, et al. (2000) [12]. The instrument consists of two initial questions, related to self-perception of quality of life and satisfaction with one's own health, and is also divided into 4 domains, namely physical, psychological, social relationships, and the environment. The answers for each item vary on a Likert-type scale: 1 (not at all), 2 (very little), 3 (average), 4 (a lot), and 5 (completely). Regarding the scale used, the following classification is considered: needs improvement (when it is 1 to 2.9); regular (3 to 3.9); good (4 to 4.9), and very good (5). To obtain the average response for each item, it is necessary to add up all the scores obtained (from 1 to 5) and divide by the number of participants.

The Physical Domain corresponding to questions 3, 4, 10, 15, 16, 17, 18; Psychological Domain corresponding to questions 5, 6, 7, 11, 19, 26; the Social Relations corresponding to questions 20, 21, 22; and the Environment corresponding to questions 8, 9, 12, 13, 14, 23, 24, 25. In order to validate the correlation structure between the questions proposed by the questionnaire domains for the responses obtained from the participants, an analysis was carried out by Confirmatory Factor (CFA) and, to assess the influence of the four domains on the participants' Quality of Life, a Structural Equation Model (SEM) was adjusted, in which the domains were used as predictors of Quality of Life, evaluated as the sum of the scores of each question answered by the patient, with the exception of the first two questions.

Care For Participants And Benefits of Research

The risks of a physical, psychological, social, moral, intellectual, cultural, and spiritual nature are minimal and transitory, including the possibility of embarrassment when answering the questions in the questionnaire, discomfort, stress, and embarrassment in the presence of the researcher and fatigue when answering the questions. The precautions that have been taken to prevent these risks include reading the ICF, confidential responses, the questionnaire was not identified by name to maintain anonymity (only acronyms and identification numbers), all doubts about

the search; data collection took place individually.

On the other hand, the research can benefit the services specialized in assisting people with CKD by seeking to know and analyze the reality and behavior of the participants, in order to offer a service that satisfies them according to their needs. The research made it possible to analyze which points of care and quality of life should be improved to better solve the health problems of chronic kidney patients, both individually and collectively, and consequently increase adherence to treatment.

Statistical Analysis

Data were entered into Excel spreadsheets and then exported to the statistical program Statistical Package for Social Science (SPSS) version 22.0.0.0. It will use descriptive statistics (mean, standard deviation, and percentage). To prove the reliability of the questionnaires used, the Cronbach index was calculated. To establish the correlations between the items of the questionnaires, Pearson's chi-square and Student's t-tests were used. All analyzes assumed a significance level of less than or equal to 0.05 as necessary to indicate a statistically significant difference.

The quality of the proposed Structural Equations Model was analyzed using the Omnibus Chi-Square (χ^2) Statistics, the Square Root of the Mean Approximation Error (RMSEA) and the Goodness of Fit Index (GFI), the Fit Index Comparison (FIC), the Normalized Fit Index (NFI) and the Non-Normalized Fit Index (NNFI). A non-significant χ^2 ($p > 0.05$) or a ratio of the χ^2 value to the degrees of freedom (χ^2/GL) less than 3, and RMSEA less than 5 and not significant, a GFI closer to 1 and a CFI, NFI, and NNFI greater than 0.90 as needed to produce a robust and well-structured model. In addition, Cronbach's α and McDonald's ω reliability coefficients were calculated for each domain in order to assess its internal structure, while the structure of the Structural Equations Model was redefined according to the Modification Indices (MI) of the correlations between the questions that made up the same domain, and an MI > 10 was considered necessary to justify the adoption of a correlation.

To analyze the influence of socioeconomic variables on the participants' Quality of Life, a Multinomial Logistic Regression was adjusted, adopting the Gender, Age, Average Family Income, and Education of the participants as predictors of Quality of Life, which was categorized according to with the average of the scores of the questionnaire questions, with the exception of the first two, in which a final score between 1 and 2.9 was classified as a Quality of Life that "Needs Improvement", between 3 and 3.9 as "Fair", between 4 and 4.9 as

"Good" and equal to 5 as "Very Good". A Tolerance test and the Variance Inflation Factor (VIF) were used to test the multicollinearity of the model, in which a Tolerance greater than 0.80 and a VIF less than 10 were adopted as necessary to indicate the absence of multicollinearity.

Results

The results of 204 questionnaires answered by the participants who participated in the research were evaluated, being 44% female (F) and 56% male (M), in which 1% of the participants were between 18 and 20 years old, 20% between 21 and 40, 44% between 41 and 60, 33% between 61 and 80 and 2% over 80 years old. As for schooling, 45% of the participants had incomplete elementary school (IES), 12% completed elementary school (CES), 3% incomplete high school (IHS), 27% completed high school (CHS), and 13% completed higher education (CHE), while in terms of income, 41% had an income of less than or equal to 1 minimum wage (≤ 1), 16% between 1 and 2 minimum wages (1-2) and 43% had an income greater than 2 minimum wages (> 2).

Table 1 presents the absolute frequency and relative percentage of socioeconomic questions and the first two questions of the questionnaire, while table two shows the mean and standard deviation of the scores obtained for each of the 26 questions that made up the questionnaire. **Table 2** presents the mean and standard deviation values of the scores for each question in the questionnaire answered by the 204 participants.

Table 1. Absolute frequency and percentage of participants are classified according to the Quality of Life for each variable.

Variables	Absolute Frequency			Percentage		
	Good	Needs Improvement	Regular	Good	Needs Improvement	Regular
Age						
0 - 20	3	0	0	100%	0%	0%
21 - 40	27	4	9	68%	10%	23%
41 - 60	50	10	30	56%	11%	33%
61 - 80	31	7	28	47%	11%	42%
80+	3	0	2	60%	0%	40%
Gender						
F	41	14	30	48%	16%	35%
M	73	7	39	61%	6%	33%
Education						
IES	43	8	32	52%	10%	39%
CES	11	1	11	48%	4%	48%
IHS	5	2	0	71%	29%	0%
CHS	31	6	11	65%	13%	23%
CHE	15	2	7	63%	8%	29%
Mean family income						
≤ 1 salary	35	13	34	43%	16%	41%
1-2 salaries	21	1	10	66%	3%	31%
> 2 salaries	56	7	24	64%	8%	28%
How often do you perform the treatment?						
1-3 days/week	114	21	69	56%	10%	34%
What is your frequency of absences?						
1 - 2 absences	5	1	2	63%	13%	25%
No absence	108	20	67	55%	10%	34%

Do you get the support you need from others?						
Anything	1	2	0	33%	67%	0%
Very little	0	2	3	0%	40%	60%
Medium	9	4	6	47%	21%	32%
Very	14	3	14	45%	10%	45%
Completely	90	10	46	62%	7%	32%
How would you rate your quality of life?						
Too bad	0	2	0	0%	100%	0%
Bad	4	4	9	24%	24%	53%
Neither bad nor good	22	9	26	39%	16%	46%
Good	32	4	22	55%	7%	38%
Very good	56	2	12	80%	3%	17%
How satisfied are you with your health?						
Very unsatisfied	2	6	3	18%	55%	27%
Dissatisfied	12	9	18	31%	23%	46%
Neither Satisfied Nor Dissatisfied	18	6	22	39%	13%	48%
Satisfied	33	0	19	63%	0%	37%
Very satisfied	49	0	7	88%	0%	13%

Table 2. Mean and standard deviation values of the scores for each question of the questionnaire answered by the 204 participants.

Domains	Questions	Mean	Standard Deviation (SD)
Physical Domain	1	3.87	1.02
	2	3.5	1.23
	3	3.98	1.38
	4	2.37	1.15
	10	3.32	1.33
	15	4.12	1.41
	16	3.94	1.34
Psychological Domain	17	3.71	1.32
	18	3.27	1.16
	5	3.46	1.41
	6	4.47	0.99
	7	4.23	1.13
	11	4.35	1.15
	19	4.13	1.13
Social relationships	26	3.98	1.35
	20	4.58	0.90
	21	3.39	1.39
Environment	22	4.64	0.82
	8	4.26	1.13
	9	4.59	0.87
	12	3.12	1.46
	13	4.28	1.06
	14	3.12	1.52
	23	4.63	0.84
	24	4.33	1.05
25	4.74	0.67	

Table 3 presents the result of the confirmatory factor analysis (CFA) of the WHOQOL-brief questionnaire for the sample of participants collected. The resulting ChiSquare (χ^2) was 434.90, with 231 degrees of freedom (DF), resulting in a significant pvalue ($p < 0.05$) and a χ^2/DF ratio of 1.88. The RMSEA obtained was 0.06 (with a 90% confidence interval ranging from 0.05–0.07) and a significant p-value, while both the CFA and NNFA obtained were 0.90, while both GFI and NFI of 0.85. These indicators point to a robust model, with only the RMSEA value above the expected, but still within the confidence interval. Through the evaluation of the modification indices (MI) a correlation was found between the errors of some questions, which can be found in **Table 4**, in addition, a great correlation was observed for question 14 (To what extent do you have opportunities for the activity of leisure?), which

would initially be part of the "Environment" factor, with the other domains, which greatly affected the structure of the model, and its removal from the analysis was justified by significantly and significantly increasing the robustness of the model.

Table 5 presents the result of the evaluation of the influence of each domain on the participants' Quality of Life, together with the reliability coefficients of each factor (Cronbach's α and McDonald's ω). The results of both coefficients indicate substantial reliability for the "Physical Domain", "Social Relations" and "Environment" domains, and optimal reliability for the "Psychological Domain" factor. The result of the model indicates a significantly positive influence of the factors "Physical Domain" ($\beta = 0.59$; $p < 0.001$) and "Environment" ($\beta = 0.29$; $p < 0.001$) in improving the participants' Quality of Life, and the "Physical Domain" presented a standardized coefficient value greater than the domain "Environment", which indicates that this factor exerts a greater influence than the second in increasing the participants' Quality of Life. The domains "Psychological Domain" ($\beta = 0.07$; $p = 0.52$) and "Social Relationships" ($\beta = 0.28$; $p = 0.06$), in turn, did not exert a significant influence on the Quality of Participants' lives. **Tables 6, 7, and 8** show the results of the Multinomial Logistic Regression in the evaluation of the influence of socioeconomic variables on the participants' Quality of Life, with a Tolerance greater than 0.80 and a VIF between 1.04 and 1.22 being obtained for all predictor variables (**Table 9**), which indicates a model without multicollinearity.

The results of the logistic regression indicate that, for the comparison between the participants classified as "Needs Improvement" and "Regular" (**Table 6**), male participants have a 3.07-fold increase (207%) in the chance of belonging to the "Regular" Quality of Life group to female participants. Age, Average Family Income, and Education did not generate any significant influence in this comparison of Quality of Life.

Comparing participants with quality of life classified as "Good" and "Regular" (**Table 7**) it was found that participants with an Average Family Income of up to 1 minimum wage have a 2.24-fold increase (124%) in the chance of belonging to the "Regular" quality of life group to participants with an average income greater than 2 minimum wages, while no other comparison between incomes generated a significant influence. In addition, a 3.94-fold increase (294%) was observed in the chance of participants aged between 61 and 80 years of belonging to the "Regular" quality of life group to participants aged between 21 and 40 years, while no other age comparison was generated a significant influence, as did the variables of Sex and Education.

Comparing participants with Quality of Life classified as "Good" and "Needs Improvement" (Table 8), female participants have a 4.95-fold increase (395%) in the chance of belonging to the Quality of Life group "Needs Improvement" over male participants. In addition, it was observed that participants with an Average Family Income less than or equal to one minimum wage have an 8.86-fold increase (786%) in the chance of belonging to the Quality of Life group "Necessita Melhor" to participants with Income between 1 and 2 minimum wages, while no other comparison between incomes generated a significant influence, as did the variables Education and Age.

Table 3. Result of Confirmatory Factor Analysis (CFA) showing the standardized values of the coefficients, Wald's Z statistic, and the p-value for the questions that make up each factor.

	Standardized Coefficients	Z	p-value
Physical Domain Questions			
3	0.57		
4	0.46	7.91	< 0.001
10	0.63	9.32	< 0.001
15	0.64	11.17	< 0.001
16	0.53	8.57	< 0.001
17	0.68	9.69	< 0.001
18	0.57	8.85	< 0.001
Psychological Domain Questions			
5	0.70		
6	0.71	10.80	< 0.001
7	0.61	8.72	< 0.001
11	0.67	10.34	< 0.001
19	0.73	11.14	< 0.001
26	0.63	8.43	< 0.001
Social relationships Questions			
20	0.56		
21	0.56	8.25	< 0.001
22	0.55	15.46	< 0.001
Environment Questions			
8	0.61		
9	0.58	8.13	< 0.001
12	0.54	6.90	< 0.001
13	0.59	8.15	< 0.001
23	0.57	8.21	< 0.001
24	0.60	8.46	< 0.001
25	0.43	6.38	< 0.001

Table 4. Correlation between the errors of the questions within each domain.

Domains	Questions in Correlation	Standardized Coefficients	Z	p-value
Physical Domain Questions				
	10 ~ 17	0.31	5.15	< 0.001
	17 ~ 18	0.28	4.62	< 0.001
	3 ~ 15	0.20	3.20	0.001
Psychological Domain Questions				
	5 ~ 26	-0.31	4.44	< 0.001
	5 ~ 7	-0.18	-2.80	0.005
Social relationships Questions				
	20 ~ 22	0.69	6.49	< 0.001
	20 ~ 21	-0.11	-2.14	0.032

Environment	Questions			
	9 ~ 13	0.23	3.38	< 0.001
	8 ~ 12	-0.26	-3.88	< 0.001
	12 ~ 13	-0.27	-4.04	< 0.001
	12 ~ 25	-0.21	-3.53	< 0.001
	9 ~ 12	-0.20	-3.07	0.002

Table 5. Regression model of factors as predictors of Quality of Life, presenting the standardized coefficients, Wald's Z, p-value, in addition to the reliability measures of each domain, Cronbach's alpha and McDonald's omega.

Variables	Standardized Coefficients	Z	p-value	(α) Cronbach	(ω) McDonald
Physical Domain	0.59	7.27	< 0.001	0.79	0.80
Psychological Domain	0.07	0.64	0.52	0.81	0.82
Social relationships	0.28	1.88	0.06	0.63	0.77
Environment	0.29	4.32	< 0.001	0.71	0.75

Table 6. Result of the Multinomial Logistic Regression for the dependent variable Quality of Life, comparing the categories "Needs Improvement" with "Regular" and adopting the category "Regular" as a reference. In the "Variables" column the reference group is shown on the right. SE: Standard error; Z: Result of Wald statistic; 95% CI: Confidence Interval 95% of the rate ratio.

Variables	Coefficients	SE	Z	p-value	Ratio	CI 95%
Gender						
F - M	1.12	0.59	1.90	< 0.05	3.07	1.01 - 9.77
Education						
CES - IES	0.07	0.78	0.09	0.92	1.07	0.23 - 5.05
CHS - IES	0.67	0.70	0.96	0.33	1.97	0.49 - 7.80
CHE - IES	0.03	0.95	0.03	0.96	1.03	0.16 - 6.72
CHS - CES	0.60	0.86	0.69	0.48	1.82	0.33 - 9.89
CHE - CES	-0.03	1.07	-0.03	0.97	0.96	0.11 - 7.85
CHE - CHS	-0.64	0.98	-0.65	0.51	0.52	0.07 - 3.59
Mean Family income						
1-2 - <= 1	-1.63	1.12	-1.45	0.14	0.19	0.02 - 1.76
>2 - <= 1	-0.18	0.61	-0.30	0.76	0.83	0.07 - 3.59
>2 - 1-2	1.44	1.16	1.23	0.21	4.25	0.43 - 42
Age						
41-60 - 21-40	-0.51	0.77	-0.66	0.50	0.59	0.13 - 2.71
61-80 - 21-40	-0.57	0.84	-0.68	0.49	0.56	0.10 - 2.96
61-80 - 41-60	-0.06	0.66	-0.09	0.92	0.93	0.25 - 3.45

Table 7. Result of the Multinomial Logistic Regression for the dependent variable Quality of Life, comparing the categories "Good" with "Regular" and adopting the category "Regular" as a reference. In the "Variables" column the reference group is shown on the right. SE: Standard error; Z: Result of Wald statistic; 95% CI: Confidence Interval 95% of the rate ratio

Variables	Coefficients	EP	Z	p-value	Ratio	CI 95%
Gender						
F - M	0.47	0.36	1.31	0.19	1.61	0.78 - 3.29
Education						
CES - IES	-0.33	0.49	-0.67	0.50	0.71	0.27 - 1.89
CHS - IES	0.16	0.46	0.35	0.72	1.17	0.47 - 2.95
CHE - IES	-0.16	0.57	-0.28	0.77	0.84	0.27 - 2.63
CHS - CES	0.49	0.49	0.88	0.37	1.64	0.54 - 4.96
CHE - CES	0.16	0.56	0.25	0.79	1.18	0.33 - 4.21
CHE - CHS	-0.33	0.61	-0.54	0.58	0.71	0.21 - 2.37
Mean Family income						
1-2 - <= 1	0.54	0.49	1.00	0.26	1.72	0.65 - 4.56
>2 - <= 1	0.80	0.41	1.96	< 0.05	2.24	1.01 - 5.00
>2 - 1-2	0.25	0.50	0.50	0.61	1.29	0.47 - 3.51
Age						
41-60 - 21-40	-0.67	0.51	-1.32	0.18	0.50	0.18 - 1.38
61-80 - 21-40	1.37	0.55	2.46	< 0.05	3.94	1.32 - 11.72
61-80 - 41-60	-0.69	0.40	-1.73	0.08	0.50	0.22 - 1.10

Table 8. Result of the Multinomial Logistic Regression for the dependent variable Quality of Life, comparing the categories “Good” with “Needs to Improve” and adopting the category “Needs to Improve” as a reference. In the “Variables” column the reference group is shown on the right. SE: Standard error; Z: Result of Wald statistic; 95% CI: Confidence Interval 95% of the rate ratio.

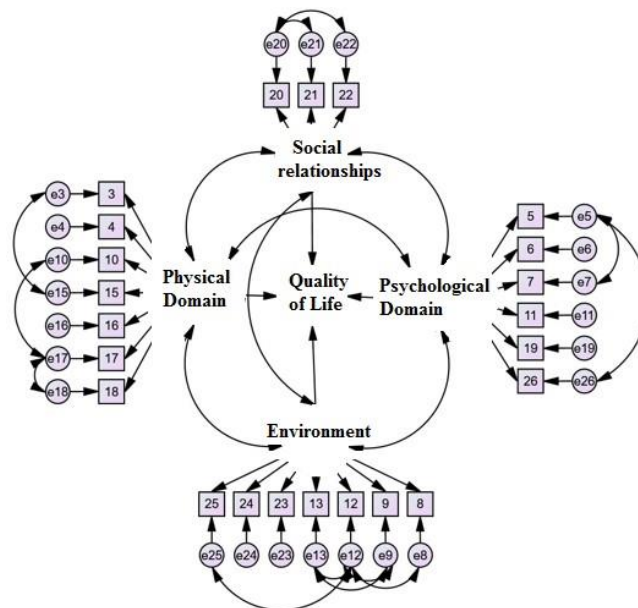
Variables	Coefficients	EP	Z	p-value	Ratio	CI 95%
Gender						
F – M	1.60	0.57	2.78	< 0.05	4.95	1.60 – 15.28
Education						
CES – IES	-0.41	0.79	-0.51	0.60	0.66	0.14 – 3.13
CHS – IES	-0.51	0.67	-0.76	0.44	0.59	0.16 – 2.22
CHE – IES	-0.20	0.93	-0.21	0.82	0.81	0.13 – 5.05
CHS – CES	-0.10	0.84	-0.12	0.90	0.90	0.17 – 4.68
CHE – CES	0.20	1.05	0.19	0.84	1.23	0.15 – 9.69
CHE – CHS	0.31	0.93	0.33	0.73	1.36	0.21 – 8.52
Mean Family income						
1-2 – <= 1	2.18	1.10	1.97	< 0.05	8.86	1.01 – 77.38
>2 – <= 1	0.99	0.59	1.66	0.09	2.70	0.83 – 8.72
>2 – 1-2	-1.18	1.13	-1.04	0.29	0.30	0.03 – 2.83
Age						
41-60 – 21-40	-0.16	0.70	-0.23	0.81	0.84	0.21 – 3.36
61-80 – 21-40	-0.79	0.79	-0.99	0.31	0.45	0.95 – 2.14
61-80 – 41-60	-0.62	0.66	-0.94	0.34	0.53	0.47 – 53.43

Table 9. Tolerance and VIF values for each predictor variable were used in logistic regression.

Variable	Tolerance	VIF
Age	0.87	1.14
Gender	0.95	1.04
Education	0.81	1.22
Income	0.87	1.14

Figure 1 presents a path diagram (Path Diagram) of the Structural Equations Model built in the analysis and indicates the existence of a correlation between the errors of some questions belonging to the same domain. Figure 1 shows the squares that represent the observed variables, the questionnaire questions, and the quality of life evaluated as the sum of the scores of the answers to the questions. The circles represent the latent variables (or factors or domains) and the errors associated with each of the questions. The arrows represent the direction of the relationship. Each question has an arrow of its error, while each domain points to all the questions that make it up. In addition, the domains point to Quality of Life, indicating that its influence on the quality of life was tested. The double arrows indicate correlation, both between errors and between domains, which indicates that there is a certain overlap between what is being evaluated in each domain.

Figure 1. Path diagram of the constructed model, indicating the questions that constitute each domain and their respective errors, in addition to the correlation between the errors of some questions that constitute the same factor



Discussion

Based the objective of the present study, was to evaluate the quality of life of participants with chronic kidney disease in the State of Brazil, analyzing which domains of quality of life were most affected by the participants, and the impact of therapy on the participants' quality of life, as well as correlated the participants' quality of life with adherence or not to dialysis treatment. Thus, a quality of life classified as intermediate to low was observed in the participants of this study, given that CKD, as well as the hemodialysis therapy adopted, are factors that impact the social, psychological and physical life of patients.

Still, the present research benefited the services specialized in assisting people with CKD by seeking to know and analyze the reality and behavior of patients, and thus offer a service that satisfies them according to their needs. It also made it possible to analyze which points of care and quality of life should be improved to better solve the health problems of chronic kidney patients.

In this scenario, renal replacement therapies, such as hemodialysis, have a great influence on the patient's quality of life, interfering with their habits, as well as their physical conditions and social and occupational functioning [13,14]. In the present study, when evaluating the quality of care of the 204 participants with CKD, it can be inferred that those younger, male, with higher socioeconomic and educational levels, showed a significant increase in their quality of life. Also, the physical domain that deals with conditions such as pain, sleep quality, and physical and psychological capacity to perform functions had the greatest negative impact. However, the environmental domain stood out positively among the others.

In this context, the world literature confirms the findings of the present study through a meta-analysis study that showed based on 100 studies, comprising 6,908,440 patients that chronic kidney disease (CKD) is a global health burden with a high economic cost to health systems. As in the present study, this meta-analysis showed that CKD was more prevalent in women than in men. Two-thirds of the studies - which reported a gender-specific prevalence of CKD - found a higher prevalence in women. All stages of CKD are associated with decreased quality of life [15].

In this sense, QOL has become an important measure to assess patient outcomes. However, evidence on QOL and its determinants among patients at different stages of CKD is lacking. Thus, a cross-sectional observational study compared QOL between nondialysis patients and those who started dialysis treatment and determined the predictors of QOL. A sample of 436 patients with CKD was recruited from three hospitals. The Kidney Disease Quality of Life short version-36™ was used to assess QOL in patients with CKD. The overall mean QOL was 58.08 ± 20.04 . The QOL score was worse in the dialysis group than in the non-dialysis group (53.47 ± 18.66 vs. 72.28 ± 17.35). The results show significant differences between the two groups for each QOL domain. The most affected domain was physical function, which confirmed the finding in the present study, as well as predictors such as older age, male gender, and lower education, which were independently associated with lower QOL scores [16].

Yet another observational cross-sectional study analyzed chronic illness care and QOL levels in adults with CKD on hemodialysis and revealed the relationship between chronic illness care assessment and QOL. Data were collected from 105 adults with CKD undergoing hemodialysis. Mean PACIC scale scores were low (2.66 ± 0.891). Although participants achieved high QOL scores on the symptoms sub-dimension of the KDQoL36 scale, they scored low on the mental health, physical health, and burden of disease sub-dimensions. Therefore, participants' QOL is significantly affected by gender, age, education, work status, income, presence of comorbidity (especially diabetes), time since diagnosis of CKD, and time on hemodialysis in the hospital [17].

In this scenario, the patient experience is largely captured by the concept of QOL, which is increasingly evaluated in research and used to guide clinical and policy decisionmaking. Thus, it is imperative to select and apply appropriate QOL assessment tools for high-quality research and patient care, requiring QOL instruments developed and validated with significant

input from CKD stakeholders [18], as has been carried out in the present study with a questionnaire validated by the statistical tool α of Cronbach and ω of McDonald shown in Table 5.

Besides, a quantitative, cross-sectional, and descriptive study analyzed the QOL in elderly patients with CKD in conservative treatment, correlating it with sociodemographic and health aspects. Thirty-five elderly people participated (54.30% women) with a mean age of 68.26 years. They reported an average of 3.70 comorbidities and 5.60 complications related to CKD. In the QOL, the "psychological" domain (54.40 ± 16.29) and the "death and dying" facet (37.32 ± 23.79) were more impaired; and the "social relationships" domain (70.36 ± 18.32) and the "intimacy" facet (66.61 ± 16.80) were stronger. An inverse correlation was observed between the number of complications and QOL [19].

Finally, CKD is a progressive disease with high morbidity and mortality in the general adult population, especially in people with diabetes and hypertension. With the spotlight on improving the QOL of these patients, preservation of renal function can improve outcomes and can be achieved through non-pharmacological strategies such as dietary and lifestyle adjustments and pharmacological interventions targeting CKD. Thus, a plant-based, low-protein, low-salt diet may help mitigate glomerular hyperfiltration and preserve kidney function for longer, possibly also leading to favorable changes in acidbase homeostasis and gut microbiota. Furthermore, modulators of the renin-angiotensinaldosterone pathway and inhibitors of SGLT2 [SLC5A2]) can preserve renal function by reducing intraglomerular pressure. Also, the non-steroidal mineralocorticoid receptor antagonist may protect the kidney through anti-inflammatory or antifibrotic mechanisms [20].

Conclusion

Based on the data obtained, it can be concluded that factors such as older age, low socioeconomic status, being a female, and low level of education are more significant predictors of lower quality of life for individuals with chronic kidney disease and undergoing hemodialysis treatment. In addition, elements belonging to physical factors, such as pain, sleep quality, disposition/energy, and ability to get around and perform day-to-day activities or work, were more expressive in the score attributed to the quality of life of the patient. Furthermore, it can also be observed that the participants were in better conditions with regard to social relationships, psychological factors, and environmental factors, highlighting the latter, which in

fact contributed to a higher level of their wellbeing, calling our attention to that, despite the ideal conditions, the factors inherent to the procedure itself, together with its side effects, by themselves, are already capable of generating a significant impact on quality of life.

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Ethical Approval

This study was analyzed and approved by the Research Ethics Committee (CEP) according to a substantiated opinion **number 3.834.213**, and obtaining the patient's consent through the Informed Consent Form (TCLE) according to CNS/CONEP Resolution 466/12.

Informed consent

The participants signed the consent form.

Data sharing statement

No additional data are available.

Conflict of interest

The authors declare no conflict of interest.

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