REV SEN
rev-sen.ec

OPEN ACCESS

Frailty of the elderly with chronic kidney disease. A single-center observational study.

Jonnathan Paul Maldonado Quezada [ID] [1], Johanna Lisseth Morquecho Andrade [ID] [1], Diana Esther Sánchez Campeverde [ID] [1]

1. Nursing career, Faculty of Medical Sciences, Universidad de Cuenca, Cuenca, Ecuador.

Abstract

Introduction: Frailty in older people increases morbidity and mortality. This condition is highly prevalent in chronic kidney disease (CKD) and, together with frailty, strongly affects physical, cognitive, and emotional capacity. This study aimed to determine frailty in older adults with CKD in a reference center in Cuenca, Ecuador.

Methods: This observational study, conducted at the "José Carrasco Arteaga" Hospital from September 2020 to April 2021, aimed to determine the prevalence of frailty in older adults with CKD. The study included older adults with a diagnosis of CKD, excluding those with disabilities, severe cognitive impairment, and those receiving palliative care. The study utilized a range of direct source variables, including demographic, clinical, physical activity, functional capacity, mood, mental state, and frailty. The sample was probabilistic, and the chi-square test was used to compare percentages, ensuring a robust and reliable research process.

Results: Seventy-nine cases were analyzed. A total of 38% of the MA participants were frail, 36.7% were prefrail, and 25.3% were robust. A more significant proportion of 'young' AMs was observed in patients classified as strong. A substantial proportion of robust patients were receiving clinical treatment, while patients in the hemodialysis program were classified as frail. The most significant proportion of robust patients had mild degrees of renal failure, whereas frail patients were classified as CKD grades 4 and 5. Physical activity was active primarily in robust patients and mostly passive in patients with frailty.

Conclusion: The high prevalence of frailty in this population group, especially among women and those aged 75-85, underscores the urgent need for targeted interventions. The association between CKD and frailty, dependence, and comorbidities highlights the potential benefits of implementing multidisciplinary and personalized interventions. These findings have significant implications for healthcare professionals, researchers, and policymakers, emphasizing the importance of improving these vulnerable patients' quality of life and prognosis. It is crucial that we, as a healthcare community, show empathy and compassion towards these patients, striving to improve their lives and prognosis.

Palabras clave:

Chronic kidney disease, Frailty, Older adults, Physical activity.

Received: May 3, 2024.
Accepted: August 26, 2024.
Published: August 29, 2024.
Editor: Dr. Juan Santacruz Mancheno.

Cite:
Maldonado J, Morquecho J, Sánchez D. Frailty of the elderly with chronic kidney disease. A single-center observational study. REV SEN 2024;12(2):144-152.

DOI: http://doi.org/10.56867/83
Sociedad Ecuatoriana de Nefrología, Diálisis y Trasplantes.

ISSN-L: 2953-6448

* Corresponding author

Email: Jonnathan Paul Maldonado Quezada <jpaul_maldonado@hotmail.com >/Address: 32R5 + 5Q6, Pje. del Paraíso, Cuenca. Escuela de Enfermería, Campus Paraíso. Cuenca, Ecuador. Tel [593] 07-405 1005.

Aging constitutes an essential stage in an individual's life since it involves numerous morphophysiological changes that, in addition to different factors, determine the quality of life of this population. At present, Ecuador is experiencing a phase of demographic transition caused by the considerable increase in the elderly population due to life expectancy, health service improvements, and decreases in birth rate. In 2017, the population of older adults was 7%, and it is estimated that by 2050, it will be approximately 18% [1].

Socially, elderly adults are considered one of the priority groups. They are vulnerable to conditions attributable to unhealthy aging or the development of a medical syndrome known as frailty. Frailty is characterized by decreased adaptation and resistance to adverse or stressful situations due to involuntary weight loss, decreased muscle strength, reduced walking speed, and a loss of physiological reserves.

Different studies have suggested that age is the leading cause of the increase in frailty rates in elderly individuals; however, various comorbidities, such as chronic kidney disease (CKD), encourage the development of symptoms. Since it generates a proinflammatory state and oxidative stress associated with the loss of nephrons and a decrease in erythropoietin, it gives rise to anemia accompanied by malnutrition due to the loss of nutrients. This triggers the loss of muscle tone and strength and functional, cognitive, and emotional deterioration, which increases the risk of falls, dependency, hospitalizations, and mortality rates in elderly individuals.

CKD is a serious public health problem because of the tremendous social impact of this catastrophic disease, its high economic demands, and the increase in the rates of morbidity and mortality [2]. According to previous studies, the average age for this pathology is approximately 57 years, with an approximate prevalence of 67% in those aged 45--65 years and 23% in those over 65 years. Considering these data, the effects directly involve the middle adult population and older adults, which are related to the increase in life expectancy and consequently to the aging of the population as a result of improvements in living and health conditions [3].

Kidney disease involves numerous health service expenses, especially in patients who require renal replacement treatment, generating a significant impact not only on the user and family but also on an entire society. The economic prospects for the next few years are even more problematic for the health system [4]. It is estimated that by 2030, approximately 4.9 million people will require dialysis and transplants worldwide, in addition to increasing the costs of drug therapy and care services [5].

Significantly, the incidence and prevalence of CKD are increasing due to the increase in the population with type 2 diabetes mellitus and arterial hypertension, problems that are primary triggers of CKD. On the other hand, the most affected population is the elderly and the female sex; since the third decade of life, glomerular filtration has begun to decrease by 8 ml/min/1.73 m^2 per decade [6].

Therefore, one of the difficulties of the health system is identifying when it is part of the physiological changes that occur as time passes and when a decrease in nonphysiological glomerular filtration indicates kidney damage, which is usually identified, for the most part, together with the diagnosis of other diseases. In this way, it is essential to address the needs and characteristics of elderly individuals, particularly in the usual evolution of kidney disease [7].

When CKD is related to other concomitant diseases, or there is no healthy aging process, elderly individuals can be subjected to adverse situations that translate into fragility. Over half of the older adult population has at least three associated diseases. In kidney patients, 74% of those with kidney disease suffer from up to 4 chronic diseases related to it or are the result of complications [8].

CKD is a fragile state in older people due to its implications for the quality of life of those who suffer from it; among the effects of CKD is a decrease in energy and physical performance, a situation that can be worsened by protein restriction and submission to a low-sodium diet, which can lead to malnutrition and a loss of strength and body mass [9].

On the other hand, the psychological impact on elderly individuals must also be considered, which depends strongly on the degree of severity and limitations associated with the disease. The ability to assume a new lifestyle will depend to a large extent on how the patient manages their emotions and on the personal skills to acquire the challenge of living to a certain degree of dependence since many times, treatment is required with hemodialysis or peritoneal dialysis, which demands a great deal of responsibility and adherence to it, and being a case in elderly individuals, one will need an even greater support network constituted mainly by one's family. Some studies have shown that there is great potential to decrease the quality of life of these patients since they are a vulnerable population that must undergo new diets and change their social role, generating high levels of stress, which increases the possibility of developing depressive and anxiety disorders, leading to adverse events that give rise to frail elderly individuals [10].

A significant percentage of patients with chronic kidney disease maintain a perception or feeling of burden for their family, which can be interpreted as a specific restriction and withdrawal in the family group, which means less participation and decreased functionality of elderly individuals. A situation that translates into a risk for the elderly to lose their emotional well-being and, therefore, hurt their physical condition is even more expensive due to kidney disease [11].

This study aimed to determine frailty in older adults with chronic kidney disease at a regional referral hospital in Cuenca, Ecuador.

Materials and methods

Research type

The present study is observational, analytical, and cross-sectional.

Stage

This study was conducted in the nephrology service of the "José Carrasco Arteaga" Specialty Hospital of the Ecuadorian Institute of Social Security in Cuenca, Ecuador. The study period was from September 1, 2020, to April 30, 2021.

Universe and sample

The study population corresponds to the anonymized documentary records of primary care patients with chronic kidney disease from the nephrology clinic. The sampling was simple and random.

Inclusion criteria

Older adult patients of both sexes, aged over 65 years, with a diagnosis of chronic kidney disease were included.

Exclusion criteria

Patients with physical, mental, or sensory disabilities were excluded. Patients with severe cognitive impairment who did not have a family member or caregiver to answer the questionnaire were excluded. End-stage renal patients requiring palliative care were also excluded. Records with incomplete data were removed from the inclusion analysis.

Variables

The variables used were age, sex, marital status, occupation, education, renal replacement therapy, glomerular filtration rate, physical activity, functional capacity, mood, mental status, and frailty.

Data sources/measurements

The source was direct; the institutional file and the registry of nephrology consultation services were reviewed. Laboratory results were obtained from the laboratory records. The data of the sociodemographic variables were obtained via direct questioning. The patient's clinical history was examined to determine the type of renal replacement treatment. The Cockcroft-Gault equation was used to calculate the glomerular filtration rate, which requires data on the serum creatinine concentration, weight, age, and sex of the patient. The glomerular filtration rate results were classified according to the 2012 Kidney Disease: Improving Global Outcomes (KDIGO) guidelines, which include the following categories: G1 normal or elevated ≥ 90 ml/min/1.73 m², G2 slightly decreased 60–89 ml/min/1.73 m², G3a mild–moderate decrease 45–59 ml/min/1.73 m², G3b moderate–severe decrease 30–40 ml/min/1.73 m², G4 severe decrease 15–29 ml/min/1.73 m², and G5 renal failure <15 ml/min/1.73 m² [12].

To determine the degree of frailty in kidney patients, the validated criteria of the Fried phenotype were applied, where five parameters were evaluated: 1. Unintentional weight loss was assessed through the item of the Mini Nutritional Assessment, recent weight loss of weight (<3 months), where 0 = weight loss greater than > 3 kg, 1 = do not know, 2 = recent weight loss between 1 and 3 kg, and 3 = no weight loss [13].

2. Muscle weakness: This was assessed by the question: Do you have difficulty sitting/getting up from the chair? The affirmative answer was considered a criterion of fragility, a criterion modified by Ávila-Funes [14].

3. Low energy or fatigue: Self-reported by the participants, low energy or fatigue was assessed via the following question on the CES-D scale. Did you feel like doing nothing? 0 = never, 1 = sometimes (1–2 days), 2 = frequently (3–4 days), 3 = always (5–7 days) [15].

4.- Slowness of the march: Slowness of the march was evaluated by drawing lines that indicate the departure point, the point of arrival, and the time in seconds the patient took to travel a distance of 6 meters. An indicator of brittleness is considered a time> 20 seconds, embrittlement between 10 and 20 seconds, and nonbrittleness <10 seconds.

5.-Low physical activity: Low physical activity was assessed through the validated Physical Activity Scale for the Elderly (PASE) [16], which serves to evaluate the level of physical activity in older people through investigations of occupational activities at home and free time carried out in the last seven days. It is considered never, rarely (1–2 days/week), sometimes (3–4 days/week), or frequently (5–7 days/week), and active participants are those who perform light activities and activities; otherwise, they are classified as inactive. Fragile users are defined as those who meet three or more brittleness criteria, are brittle if they meet 1 or 2 components, and are nonbrittle when they do not have any.

In the measurement of functional capacity, the Lawton and Brody Scale of Instrumental Activities of Daily Living was applied, which assesses eight items, such as the ability to use the telephone, make purchases, prepare food, take care of the house, wash clothing, use transportation, take responsibility for medication and manage money. The maximum final score is 8 points, considered autonomous, with a slight dependence score of 6–7 points, moderate dependence score of 4–5 points, severe dependence score of 2–3 points, and total dependence score of 0–1 points.

For cognitive ability, the Mini-Mental State Examination (Folstein) was used [17], which consists of a questionnaire of 11 items that assess orientation in time and space, memory, attention and calculation, deferred memory, naming, repetition of a sentence, comprehension-execution of order, reading, writing and copying of a drawing, where the maximum total score is 30 points, 27 points indicate normality, 24–26 points indicate pathological suspicion, 12–23 points indicate cognitive deterioration, and 9–11 points indicate dementia.

For the state of mind, the Yesavage scale of geriatric depression was applied [18], which consists of 15 questions regarding how the patient has experienced depression in the past week. Positive responses are indicators of depression, with scores ranging from 0--5 points for nondepression, 6--9 points for probable depression, and 10--15 points for established depression.

Biases

To avoid possible interview, information, and memory biases, the principal investigator kept the data with a guide and records approved by the research protocol. Observation and selection biases were avoided by applying the participant selection criteria. All the clinical and paraclinical variables from the previous period were recorded. Two researchers independently analyzed each record in duplicate, and the variables were recorded in the database once their agreement was verified.

Study size

The sample was probabilistic. Access to the institution's database identified 105 older adults who suffer from the disease, with a prevalence of 29.2% [19], an error of 5%, and a confidence interval of 95%. The formula n = N* p* q* z2/(N-1)* e^2 + p* q* z^2 was used. The calculation was performed for 79 cases.

Quantitative variables

Descriptive statistics were used. The scaled results are expressed as the means and standard deviations. Categorical data, such as sex, are presented as proportions.

Statistical analysis

Noninferential statistics are used. The $^{chi\text{-}square}$ test was used to compare the proportions between the groups, with values of P <0.05 assumed to be significant. The categorical variables are expressed as absolute and relative frequencies. The data were analyzed via the statistical program SPSS 22 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp).

Subanalysis

In a subanalysis, patients with chronic kidney disease were compared by age, sex, marital status, occupation, and education status according to their degree of frailty.

Results

Study participants

A total of 79 patients were included in the study.

Characteristics of the study groups

The largest age group was the 75-85, accounting for 46.8% (n = 37) of the sample. They were 64.6% women and 35.4% men. Regarding marital status, 49.4% were married, and 30.4% were widowed. For the occupation variable, 26.6% of household chores and agriculture and 25.3% of household chores and agriculture were retired, with the most significant results. In addition, in schooling, 45.6% of the respondents were primary, 22.8% were secondary, 19% had higher education, and 12.7% could not read or write (Table 1). In the present study, there were no kidney transplant patients.

The largest group of patients received hemodialysis treatment (44.3%), corresponding to the most advanced stages of chronic kidney disease: 38 patients (48.1%) were treated from Grade 3 b to Grade 5.

Physical activity, state of mind, cognitive functional capacity, and weakness.

Most of the patients had moderate activity (40.5%), that is, they carried out activities such as walking in a park, performing recreational activities such as dance therapy, playing chess, and playing soccer, among others, from four days a week; and being regularly active in 25.3% of the patients. In total, 16.5% of those who rarely or never carry out activities that require psychomotor movement and are active, and 17.7% of those who carry out activities very frequently and stay in motion were passive.

A large percentage of the participants had probable or established depression (73.4%). We found that 43% of the older adult patients had probable depression, and 30.4% had established depression. A total of 26.6% of the participants were patients without depression.

In total, 54 patients (68.3%) had severe or moderate dependence. The cognitive capacity was average in 21 patients (26.6%), whereas deterioration, dementia, or pathological suspicion occurred in the remaining patients. The prevalence of frailty in the study group was 30 patients (38.0%), and 29 patients were in a state of prefrailty (36.7%) (Table 2).

Subanalysis

The subanalysis classified more 'young' older adults as robust. A more significant proportion of robust patients were clinically treated, while patients in the hemodialysis program were classified as frail. According to the degree of kidney failure, the highest proportion of robust patients had mild degrees of kidney failure, whereas frail patients were classified as having grade 4 or 5 advanced chronic kidney disease. Owing to physical activity, it was primarily active in robust patients and mostly passive in frail patients.

Table 1. Distribution of older adults with chronic kidney disease.

Sociodemographic variables		Frequency n = 79	Percentage
Age	Adulto mayor joven (65-74)	22	27.8%
	Adulto mayor medio(75-84)	37	46.8%
	Late older adult (> 85)	20	25.3%
Sex	Female	51	64.6%
	Man	28	35.4%
Marital status	Single	3	3.8%
	Married	39	49.4%
	Widower	24	30.4%
	Free Union	13	16.5%
Occupation	Housework	21	26.6%
	Agriculture	21	26.6%
	Manual labor	8	10.1%
	Professional activity	6	7.6%
	Retired	20	25.3%
	Other	3	3.8%

Schooling	Illiterate	10	12.7
	Primary	36	45.6
	Secondary	18	22.8%
	Superior	15	19.0%
Treatment type	Clinical treatment	28	35.4%
	Peritoneal dialysis	16	20.3%
	Hemodialysis	35	44.3%
Stadium	G2	16	20.3%
	G3a	25	31.6%
	G3b-5	38	48.1%

Functional capacity was the highest percentage of autonomy for the group of robust older adults, whereas it strongly depended on the group of frail older adults. Concerning the state of mind, the majority of robust patients (95%) did not have depression, whereas 70% of the frail patients presented with depression. Cognitive ability was average in robust patients and impaired in 76.7% of frail patients. These data are shown in Table 3. There were no significant differences in frailty or robustness due to the variables of marital status, occupation, or education (data not shown).

Table 2. Physical activity, mood, functional and cognitive capacity and frailty of the study group.

Variable		Frequency	Percentage
Physical activity	Passive	13	16.5%
	Regularly active	20	25.3%
	Moderately active	32	40.5%
	Active	14	17.7%
Mood	No depression	21	26.6%
	Probable depression	34	43.0%
	Established depression	24	30.4%
Functional ability	Total dependency	3	3.8%
	Severe dependency	26	32.9%
	Moderate dependency	25	31.6%
	Light dependency	12	15.2%
	Autonomy	13	16.5%
Cognitive ability	Normal	21	26.6%
	Pathological suspicion	28	35.4%
	Deterioration	27	34.2%
	Dementia	3	3.8%
Brittleness	Brittleness	30	38.0%
	Prebrittle	29	36.7%
	Not Fragile	20	25.3%

Discussion

The present study aimed to determine the frailty in older adults with chronic kidney disease (CKD) treated at the Ecuadorian Institute of Social Security in Cuenca. From a sample of 79 individuals, a predominance of the female sex (64.6%) was found over the male sex (35.4%). These results are consistent with previous research at the Latin American level, such as the study by Guzmán-Guillén et al. [7], who reported a similar prevalence in a population of 500 patients with an average age of 57.9 years. Advanced age is a determining factor in the development of frailty. In the present cohort, individuals aged 75–85 years had the highest prevalence of frailty (46.8%; P <0.001). The incidence of CKD has been shown to increase with age from 24.8% in individuals ≥ 65 years [20] to 43.4% in individuals > 84 years [21]. Age is a determining factor in glomerular filtration. Until the age of 30, the maximum filtration capacity is reached; from then on, there is a progressive decrease of 8 ml/min/1.73 m per decade, and the juxtamedullary nephrons also develop a thickening of the intima, an increase in the areas of atrophy and decreased sodium absorption [8].

The present study found no associations between frailty, socioeconomic factors, marital status, or education. Contrary results were reported in a study in Chile in which the degree of education was shown to influence the frailty of older adults [22].

In the present study, Grade 3B CKD was present in 32.9% of the patients, and Grade 3a CKD was present in 31.6%, significantly associated with frailty in elderly patients. A previous study reported that 38% of 70-year-old patients had eGFRs <60 ml/min/1.73 m2, and the vast majority had eGFRs ranging from 30 to 59 ml/min/1.73 m2 [23], which is attributed to aging to a low nephron dose, glomerulosclerosis, tubular atrophy and fibrosis in the intima.

The impact of having kidney failure and receiving replacement therapy on kidney function is essential in terms of the development of frailty. Among the patients who were in clinical treatment (34.5%), 10% were frail; on the other hand, the patients in the hemodialysis programs (44.3%) were frail, with 20% being in the peritoneal dialysis treatment group (P <0.001). Frailty has an impact on the mortality of elderly individuals. In a study of hemodialysis patients, the 5-year survival of older adults was 26% worse than that of young and middle-aged adults [24]. This is because chronic kidney disease is associated with malnutrition, loss of energy, dietary restrictions, and the presence of a proinflammatory state, resulting in physical and functional exhaustion with consequent emotional repercussions [25].

The frailty of elderly individuals is associated with the deterioration of cognitive functions. In the present study, 35.4% of patients had a pathological suspicion, and 34.2% had an established deterioration related to age and the degree of frailty. In a study of the cognitive and functional state as a determining factor of nutritional deficit in a senile population on chronic hemodialysis, the Mini-Mental Questionnaire was applied, reporting a mild mental impairment of 20.6 ± 5.2 points in 29.9% of the patients (P <0.01) [26].

Regarding functional status, 32.9% of patients had severe dependence, and 31.6% had moderate dependence in frail patients, which was significantly related to the reliance developed by an older adult suffering from chronic kidney disease (P <0.001). In this regard, a study that assessed functional capacity in patients with chronic kidney disease, the population aged 70.6 ± 5.2 years, reported low functionality in 61.7% of the respondents (P <0.01) [27]; this state is explained as an inflammatory state that results in neuronal hyperfunction as a result of changes in the sympathetic system and functional deterioration, potentiating the loss of muscle mass [28].

Table 3. Physical activity, state of mind, functional and cognitive capacity and frailty of the study group.

Variables	*Answer options*	*Frailty n = 30*	*Pre-Frailty n = 29*	*Robusto n=20*	*Chi²*	*gl*	*P*
Age	Young older adult	0 (0%)	7 (24.1%)	15 (75.0%)	40.455	4	<0.0001
	Middle older adult	15 (50.0%)	17 (58.6%)	5 (25%)			
	Late older adult	15 (50.0%)	5 (17.2%)	0 (0%)			
Sex	Female	22 (73.3%)	18 (62.7%)	11 (55.0%)	1.887	2	0.389
	Man	8 (26.7%)	11 (37.9%)	9 (45.0%)			
Treatment	Clinical	3 (10.0%)	10 (34.5%)	15 (75.0%)	28.573	4	<0.0001
	Peritoneal dialysis	6 (20.0%)	10 (34.5%)	0 (0%)			
	Hemodialysis	21 (70.0%)	9 (31.0%)	5 (25.0%)			
Stadium	G2	0 (0%)	3 (10.3%)	13 (65.0%)	57.766	6	<0.0001
	G3a	3 (10.0%)	16 (55.2%)	6 (30.0%)			
	G3b	17 (56.7%)	8 (27.6%)	1 (5.0%)			
	G4	10 (33.3%)	2 (6.9%)	0 (0%)			
Activity (edit)	Passive	12 (40.0%)	1 (3.4%)	0 (0%)	60.417	6	<0.0001
	Regularly active	7 (23.3%)	13 (44.8%)	0 (0%)			
	Moderately active	11 (36.7%)	14 (48.3%)	7 (35%)			
	Active	0 (0%)	1 (3.4%)	13 (65.0%)			
Functional ability	Total dependency	2 (6.7%)	1 (3.4%)	0 (0%)	70.370	8	<0.0001
	Severe dependency	20 (66.7%)	6 (20.7%)	0 (0%)			
	Moderate dependency	8 (26.7%)	14 (48.3%)	3 (15.0%)			
	Light dependency	0 (0%)	8 (27.6%)	4 (20.0%)			
	Autonomy	0 (0%)	0 (0%)	13 (65.0%)			
Mood	No depression	0 (0%)	2 (6.9%)	19 (95.0%)	91.370	4	<0.0001
	Probable depression	9 (30.0%)	24 (82.8%)	34 (43.0%)			
	Established depression	21 (70.0%)	3 (10.3%)	0 (0%)			
Cognitive ability	Normal	0 (0%)	1 (3.4%)	20 (100%)	115.02	6	<0.0001
	Pathological suspicion	4 (13.3%)	24 (82.8%)	0 (0%)			
	Deterioration	23 (76.7%)	4 (13.8%)	0 (0%)			
	Dementia	3 (10%)	0 (0%)	0 (0%)			

Regarding physical activity, 40% of the elderly patients with passive activity were frail. However, 65% of the active patients were robust (P <0.001). The loss of physical activity is not only due to the loss of muscle mass. Additionally, bone structure is altered by osteopenia and osteoporosis. Additionally, there is a low spinal response with a lack of reconversion of the bone marrow due to age and uremia, which is associated with anemia due to erythropoietin deficiency [29]. A decrease in erythropoietin and musculoskeletal factors generates low energy and fatigue, which is reflected in passive and discouraged elderly adults from efficiently carrying out basic activities in daily life [9]. His study, "Impact of Physical Exercise on Variables Related to Emotional and Functional Well-being in Older Adults," determined the positive impact of exercise in older adults. Gait speed has a strong effect on the functional and emotional state of patients (P <0.001) [30]. Another 1-year follow-up study of older adults with advanced chronic kidney disease included a sample of one hundred respondents who obtained a walking speed of ≥ 8 seconds in 40.7% of the patients, a situation that is a direct risk for the presence of falls that cause dependency [31].

The present study has limitations, such as the sample size and selection, which may differ from the general population of older adults with chronic kidney disease, limiting the generalizability of the results. The study's cross-sectional design allows us to establish associations only between the variables at a given moment, not causal relationships. The definition of frailty used in the study could vary from that used in other studies, making it difficult to compare the results.

Future investigations could evaluate in a multicenter way the factors associated with the progression of frailty in older adults in dialysis programs over time in the same cohort of patients, increasing the representativeness of the sample and improving the statistical power of the analyses, which should include additional variables such as body composition (bioimpedance), using different definitions of frailty.

Conclusions

A study carried out in adults over 65 years of age with chronic kidney disease (CKD) at the José Carrasco Arteaga Hospital in Cuenca, Ecuador, revealed a high prevalence of frailty in this population group, especially in women and those aged between 75 and 85 years. Sociodemographic factors, such as marital status, educational level, and occupation, did not significantly influence the conditions of frailty and dependency. Furthermore, a high prevalence of depression and cognitive impairment was observed in these patients. The results suggest that CKD in older adults is associated with an increased risk of frailty, dependence, and comorbidities, which underscores the importance of implementing multidisciplinary and personalized interventions to improve the quality of life and prognosis of these patients.

Abbreviations

CKD: chronic kidney disease.

Supplementary information

The supplementary materials have not been declared.

Acknowledgments

Does not apply.

Authors' contributions

Jonnathan Paul Maldonado Quezada: Conceptualization, methodology, research, Writing - Original draft.
Johanna Lisseth Morquecho Andrade: Conceptualization, research, acquisition of funds, data curation, software, and resources.
Diana Esther Sánchez Campeverde: Conceptualization, Project management, Supervision, validation, visualization, Writing - review and edition.
All the authors read and approved the final version of the manuscript.

Financing

The study was self-financed by the authors.

Availability of data or materials

Does not apply.

Declarations

Ethics committee approval and consent to participate

The research protocol was approved by the Ethics Committee (COBIAS) of the Faculty of Medical Sciences of the University of Cuenca, Ecuador.

Consent for publication

It does not apply when no specific patient images, X-rays, or images are published.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Author information

Jonnathan Paul Maldonado Quezada, Bachelor of Nursing from the University of Cuenca (Cuenca, 2021).

ORCID https://orcid.org/0009-0005-4535-5360

Johanna Lisseth Morquecho Andrade, Bachelor of Nursing from the University of Cuenca (Cuenca, 2021).

ORCID https://orcid.org/0009-0003-7499-5573

Diana Esther Sánchez Campeverde, Graduated in Nursing from the University of Cuenca (Cuenca, 2013). Master of Gender, Development, Sexual Health and Reproduction from the University of Cuenca (Cuenca, 2019).

ORCID https://orcid.org/0009-0006-0863-8916

References

1. Vinueza D, Guerrero J, Aguirre R, Carrasco J. Procesos a nivel regional. INEC. 2019;12(4):32.

2. Torres I, Sippy R, Bardosh KL, Bhargava R, Lotto-Batista M, Bideaux AE, Garcia-Trabanino R, Goldsmith A, Narsipur SS, Stewart-Ibarra AM. Chronic kidney disease in Ecuador: An epidemiological and health system analysis of an emerging public health crisis. PLoS One. 2022 Mar 16;17(3):e0265395. doi: 10.1371/journal.pone.0265395. PMID: 35294504; PMCID: PMC8926192.

3. Santacruz Mancheno J, Santacruz AC. Global Dialysis Perspectives: Ecuador. Kidney360. 2022 Oct 16;3(12):2131-2135. doi: 10.34067/KID.0003762022. PMID: 36591349; PMCID: PMC9802541.

4. Jha V, Al-Ghamdi SMG, Li G, Wu MS, Stafylas P, Retat L, Card-Gowers J, Barone S, Cabrera C, Garcia Sanchez JJ. Global Economic Burden Associated with Chronic Kidney Disease: A Pragmatic Review of Medical Costs for the Inside CKD Research Programme. Adv Ther. 2023 Oct;40(10):4405-4420. doi: 10.1007/s12325-023-02608-9. Epub 2023 Jul 26. PMID: 37493856; PMCID: PMC10499937.

5. Liyanage T, Ninomiya T, Jha V, Neal B, Patrice HM, Okpechi I, Zhao MH, Lv J, Garg AX, Knight J, Rodgers A, Gallagher M, Kotwal S, Cass A, Perkovic V. Worldwide access to treatment for end-stage kidney disease: a systematic review. Lancet. 2015 May 16;385(9981):1975-82. doi: 10.1016/S0140-6736(14)61601-9. Epub 2015 Mar 13. PMID: 25777665.

6. Ma Y, Zhan J, Xu G. Reference values of glomerular filtration rate for healthy adults in southern China: a cross-sectional survey. Ther Adv Chronic Dis. 2021 Jul 31;12:20406223211035287. doi:

10.1177/20406223211035287. PMID: 34377388; PMCID: PMC8326817.

7. Guzmán-Guillén KA, Fernández de Córdova-Aguirre JC, Mora-Bravo F, Vintimilla- Maldonado J. Prevalencia y factores asociados a enfermedad renal crónica. Revista Médica Del Hospital General De México. 1 de julio de 2014;77(3):108-13. doi: 10.1016/j.hgmx.2014.06.001

8. Rex N, Melk A, Schmitt R. Cellular senescence and kidney aging. Clin Sci (Lond). 2023 Dec 22;137(24):1805-1821. doi: 10.1042/CS20230140. PMID: 38126209; PMCID: PMC10739085.

9. Piccoli GB, Cederholm T, Avesani CM, Bakker SJL, Bellizzi V, Cuerda C, Cupisti A, Sabatino A, Schneider S, Torreggiani M, Fouque D, Carrero JJ, Barazzoni R. Nutritional status and the risk of malnutrition in older adults with chronic kidney disease - implications for low protein intake and nutritional care: A critical review endorsed by ERN-ERA and ESPEN. Clin Nutr. 2023 Apr;42(4):443-457. doi: 10.1016/j.clnu.2023.01.018. Epub 2023 Feb 2. PMID: 36857954.

10. Billon R, Thomas P. Le sujet âgé polymorbide et fragile : quelle qualité de vie? [Elderly and frail patients with polymorbidities: what quality of life?]. Soins Gerontol. 2019 Sep-Oct;24(139):22-24. French. doi: 10.1016/j.sger.2019.07.005. PMID: 31540717.

11. Aldana EA, Barrera SY, Rodríguez KA, Gómez OJ, Carrillo GM. Competencia para el cuidado (CUIDAR) en el hogar de personas con enfermedad renal crónica en hemodiálisis. Enfermería Nefrológica. 2016;19(3):265-73. Scielo: 28842016000300009

12. Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Kidney Int. 2024 Apr;105(4S):S117-S314. doi: 10.1016/j.kint.2023.10.018. PMID: 38490803.

13. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, Seeman T, Tracy R, Kop WJ, Burke G, McBurnie MA; Cardiovascular Health Study Collaborative Research Group. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci. 2001 Mar;56(3):M146-56. doi: 10.1093/gerona/56.3.m146. PMID: 11253156.

14. Aguilar-Navarro SG, Amieva H, Gutiérrez-Robledo LM, Avila-Funes JA. Frailty among Mexican community-dwelling elderly: a story told 11 years later. The Mexican Health and Aging Study. Salud Publica Mex. 2015;57 Suppl 1(0 1):S62-9. doi: 10.21149/spm.v57s1.7591. PMID: 26172236; PMCID: PMC4689198.

15. Brown PJ, Badreddine D, Roose SP, Rutherford B, Ayonayon HN, Yaffe K, Simonsick EM, Goodpaster B; Health ABC Study. Muscle fatigability and depressive symptoms in later life. Int J Geriatr Psychiatry. 2017 Dec;32(12):e166-e172. doi: 10.1002/gps.4678. Epub 2017 Feb 15. PMID: 28198046.

16. Curcio F, Liguori I, Cellulare M, Sasso G, Della-Morte D, Gargiulo G, Testa G, Cacciatore F, Bonaduce D, Abete P. Physical Activity Scale for the Elderly (PASE) Score Is Related to Sarcopenia in Noninstitutionalized Older Adults. J Geriatr Phys Ther. 2019 Jul/Sep;42(3):130-135. doi: 10.1519/JPT.0000000000000139. PMID: 28786911.

17. Gallegos M, Morgan ML, Cervigni M, Martino P, Murray J, Calandra M, Razumovskiy A, Caycho-Rodríguez T, Gallegos WLA. 45 Years of the mini-mental state examination (MMSE): A perspective from ibero-america. Dement Neuropsychol. 2022 Jul 29;16(4):384-387. doi: 10.1590/1980-5764-DN-2021-0097. PMID: 36530763; PMCID: PMC9745978.

18. Erazo M, Fors M, Mullo S, González P, Viada C. Internal Consistency of Yesavage Geriatric Depression Scale (GDS 15-Item Version) in Ecuadorian Older Adults. Inquiry. 2020 Jan-Dec;57:46958020971184. doi: 10.1177/0046958020971184. PMID: 33174502; PMCID: PMC7673046.

19. García-Cantón C, Ródenas Gálvez A, Lopez Aperador C, Rivero Y, Diaz N, Antón G, et al. Prevalencia de fragilidad y factores asociados en pacientes en programa de hemodiálisis. Nefrología 2019;39(2):204-6. Doi: 10.1016/j.nefro.2018.07.012.

20. Llisterri JL, Micó-Pérez RM, Velilla-Zancada S, Rodríguez-Roca GC, Prieto-Díaz MÁ, Martín-Sánchez V, et al. Prevalencia de la enfermedad renal crónica y factores asociados en la población asistida en atención primaria de España: resultados del estudio IBERICAN. Medicina Clínica. 26 de febrero de 2021;156(4):157-65. 7761740

21. Salvador González B, Rodríguez Pascual M, Ruipérez Guijarro L, Ferré González A, Cunillera Puertolas O, Rodríguez Latre LM. Enfermedad renal crónica en Atención Primaria: prevalencia y factores de riesgo asociados [Chronic kidney disease in Primary Health Care: prevalence and associated risk factors]. Aten Primaria. 2015 Apr;47(4):236-45. Spanish. doi: 10.1016/j.aprim.2014.06.003. Epub 2014 Sep 9. PMID: 25212720; PMCID: PMC6985625.

22. Troncoso-Pantoja C, Concha-Cisternas Y, Leiva-Ordoñez AM, Martínez-Sanguinetti MA, Petermann-Rocha F, Díaz-Martínez X, et al. Prevalencia de fragilidad en personas mayores de Chile: resultados de la Encuesta Nacional de Salud 2016-2017. Revista médica de Chile. octubre de 2020;148(10):1418-26. Scielo: 98872020001001418

23. Triana Cuervo PA, Ocampo-Chaparro JM, Reyes-Ortiz CA, Casanova ME. Tasa de filtración glomerular estimada y mortalidad posterior al alta en una unidad geriátrica de

agudos. Revista Española de Geriatría y Gerontología. 1 de septiembre de 2019;54(5):265-71. 7929448

24. Perez-Garcia R, Alcazar-Arroyo R, de Sequera-Ortiz P. What is the role of expanded hemodialysis in renal replacement therapy in 2020? Nefrologia (Engl Ed). 2021 May-Jun;41(3):227-236. English, Spanish. doi: 10.1016/j.nefro.2020.11.007. Epub 2021 Mar 5. PMID: 33685663.

25. Wang C, Guo X, Xu X, Liang S, Wang W, Zhu F, Wang S, Wu J, Zhang L, Sun X, Chen X, Cai G; Chinese observational prospective study of aging population with chronic kidney disease (C-OPTION). Association between sarcopenia and frailty in elderly patients with chronic kidney disease. J Cachexia Sarcopenia Muscle. 2023 Aug;14(4):1855-1864. doi: 10.1002/jcsm.13275. Epub 2023 Jun 9. PMID: 37300354; PMCID: PMC10401549.

26. Polanco A-N, López-Castillo E, Meltiz-Aguado B, Peña-Rodríguez J, Ramos-Gordillo J. El estado cognitivo y funcional como factor determinante del déficit nutricional en una población senil en hemodiálisis crónica. Diálisis y Trasplante. 1 de octubre de 2014;35(4):124-30. Doi: 10.1016/j.dialis.2014.06.001.

27. Pérez ÁN. Valoración de la Capacidad Funcional de los pacientes con Enfermedad Renal Crónica. Revista Española de Nutrición Humana y Dietética. 17 de septiembre de 2018;22:13-4. 662

28. Guerrero MT, Heras M, Muñoz A, Ridruejo E, Centeno C, Macías MC, et al. Situación funcional y mental en ancianos con diferentes grados de filtrado glomerular. Diálisis y Trasplante. 1 de enero de 2014;35(1):15-9. 4680339

29. Mora-Bravo F, Muñoz J. Impaired Reconversion of Bone Marrow in Nuclear Magnetic Resonance in Patients with Chronic Renal Disease. Curr Med Imaging. 2021;17(10):1256-1261. doi: 10.2174/1573405616999201118140832. PMID: 33213332.

30. Belmonte Darraz S, González-Roldán AM, de María Arrebola J, Montoro-Aguilar CI. Impacto del ejercicio físico en variables relacionadas con el bienestar emocional y funcional en adultos mayores. Revista Española de Geriatría y Gerontología. 1 de mayo de 2021;56(3):136-43. Doi: 10.1016/j.regg.2021.01.006.

31. Portilla Franco ME, Gómez Armas L, Sosa Suárez R, Tornero Molina F, Herrero Calvo JA, Gil Gregorio P. El adulto mayor con enfermedad renal crónica avanzada. ¿Qué ocurre al año de seguimiento? Revista Española de Geriatría y Gerontología. 1 de junio de 2018;53:109. X0211139X15316119

DOI: Digital Object Identifier. **PMID**: PubMed Identifier.

Editor's Note

REV SEN remains neutral regarding jurisdictional claims on published maps and institutional affiliations.