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Presumptive chronic kidney disease in elderly adults

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Abstract: Introduction: Chronic kidney disease (CKD) in older adults is highly prevalent and is associated with multiple risk factors. Objective: To identify elderly patients with CKD who attend the nephrology outpatient clinic at the Comprehensive Community Health Center (CSIC) Chacaltaya, El Alto, Bolivia, in the period between September and December 2018. Materials and methods: Observational, descriptive and cross-sectional study performed in an outpatient nephrology clinic in CISC Chacaltaya, El Alto, Bolivia. The universe was 203 patients. The following variables were analyzed: age, sex, marital status, occupation, personal pathological background, classification of CKD. The formula Modification of Diet in Renal Disease was abbreviated to determine the degree of the disease. To give an exit, descriptive statistics were used (absolute and relative frequencies, chi-square test). Informed consent was taken into account. Results: Stage 2 of the disease prevails, with 44.3%,followed by stage 3a, with 21.7%; it was more prevalent in the age group of 70-79 years and more in women than in men. The risk factors that are related to chronic kidney disease in our study were age, female gender, diabetes mellitus and malnutrition by excess, proteinuria and anemia. Conclusions: CKD presents a high prevalence in the population over 60 years of age; its early diagnosis plays an important role in its integral approach at the primary health level.

Key words: renal insufficiency; chronic; aged; glomerular filtration; morbidity; epidemiology; primary health care

1 Introduction

Chronic kidney disease (CKD) is a well-defined clinical condition resulting from multiple causes with risk factors common to other non-communicable chronic diseases (NCDs)—an aging population that is constantly growing, with chronic diseases on the rise, particularly diabetes mellitus (DM) and hypertension (HTN), and the presence of multiple conditions in a single patient—which, if not identified in time, inexorably lead to end-stage renal disease (ESRD), requiring renal replacement therapy (RRT) via dialysis or kidney transplantation in the face of irreversible renal functional damage.

CKD is defined as structural or functional kidney damage, evidenced by markers of kidney damage (urine, blood, or imaging) for a period of 3 months or longer, or by an estimated glomerular filtration rate (eGFR) of less than 60 ml/min, regardless of the underlying cause. It is stratified into five stages [1]. The purpose of this classification is to identify patients with CKD from its earliest stages, implement measures to slow its progression, reduce morbidity and mortality, and, where appropriate, prepare patients for dialysis [2]. The global burden of kidney disease varies substantially across the

planet, as do its detection and treatment. Although the magnitude and impact of kidney disease are better defined in developed countries, recent evidence suggests that developing countries have a similar or even greater disease burden than the former [3]. In many settings, rates of kidney disease and the provision of care are shaped by socioeconomic, cultural, and political factors, leading to significant disparities in the burden of disease, even in developed countries [4]. These disparities exist across the entire spectrum of kidney disease—from preventive efforts to limit the development of acute kidney injury or chronic kidney disease, to screening for kidney disease among people at high risk of developing it , to access to subspecialized care and treatment of kidney failure with renal replacement therapy [5].

In the general adult population, it is estimated that approximately 8%-10% (1 in 10 people) have some degree of kidney damage, evidenced by the presence of proteinuria or microalbuminuria; if hematuria is included as a marker of kidney damage, this figure rises to 18% [2,6]. In those over 60 years of age, the estimate is 20% [7]. Therefore, kidney disease constitutes a global health problem affecting more than 750 million people worldwide [5,8]. According to data from the 2015 Global Burden of Kidney Disease Study, approximately 1.2 million people died from CKD [9], and more than 2 million people died in 2010 because they did not have access to dialysis. It is estimated that another 1.7 million die from acute kidney injury annually [10,11]. It is therefore possible that chronic kidney disease contributes to the increased mortality from the major chronic non-communicable diseases targeted by the current NCD Action Plan [12].

In Latin America, as in most of the world, the availability of information reflecting the total burden of kidney disease varies substantially due to limited or inconsistent data. While several countries have data collection systems, particularly for end-stage kidney disease, information on pre-dialysis chronic kidney disease is very limited, and the quality of such data often varies considerably across settings.

According to data from the 2017 Latin American Dialysis and Kidney Transplant Registry [13], in the region, the number of patients on renal replacement therapy stood at 147,771, with an annual incidence rate of 149 per million people (pmp) and a prevalence rate of 669 pmp. Panama, Puerto Rico, and the state of Jalisco in Mexico had the highest incidence rates, exceeding 400 patients per million people, while the highest prevalence rates of patients on renal replacement therapy (RRT) were found in Puerto Rico, the state of Jalisco, and Chile, exceeding 1,000 pmp.

In Bolivia, according to the report from the Latin American Dialysis and Transplant Registry [13],as of the end of 2017, there were 2,220 patients on renal replacement therapy, with an incidence rate of 94.8 per 100,000 population and a prevalence of 245.1 per 100,000 population. This is one of the lowest rates in the region, which, in the authors' opinion, is due to underreporting of patients, since only data on patients with health insurance are included.

In summary, the incidence and prevalence of patients on renal replacement therapy continue to rise. Although kidney transplantation is a feasible, available, and increasingly used modality for renal replacement therapy in all Latin American countries.

This exponential increase is associated with advanced age, which leads to physiological deterioration of renal function, as well as with risk factors such as diabetes, hypertension, smoking, and obesity [14].

Various clinical and postmortem studies have shown that the kidney undergoes a series of histological and functional changes with aging.

Starting in the fourth decade of life, there is a decline in GFR of 1 ml/min/year; in most elderly individuals, this leads to a decrease in renal mass, and a higher percentage of sclerosed glomeruli is observed in direct relation to advancing age, to which could be added the presence of diseases that are capable of damaging the functional structures of the kidney on their own [15]. After age 70, the average percentage of sclerosed glomeruli is 10%-20%, but it is not uncommon to observe percentages >30% in individuals over 80 years of age without known kidney disease [16].

CKD generates significant healthcare costs, and it is difficult to estimate these costs in the early stages, as the vast majority of studies focus on renal replacement therapy or transplantation. Furthermore, this condition has a major impact on individuals, their families, and society, associated with high cardiovascular morbidity and mortality, which increases healthcare costs and raises the healthcare system spending [17].

In Bolivia, economic constraints have been the main barrier to the management of these patients, since a month of treatment costs around 600 U.S. dollars. However, the amendment of Law 475 and the enactment of Supreme Decree 1870 have led to a 40% increase in kidney transplant surgeries and enabled 2,800 patients to receive free hemodialysis since 2014 [18,19].

Based on the above, this study was designed to identify the morbidity and risk factors leading to the progression of chronic kidney disease, differentiating them by age and sex in older adults seen at the nephrology consultation of the Comprehensive Community Health Center (CISC) Chacaltaya in the city of El Alto, La Paz, Bolivia, during the period from September to December 2018.

2 Materials and methods

A cross-sectional, descriptive observational study was conducted in patients over 60 years of age who attended the outpatient nephrology clinic at the Chacaltaya Comprehensive Community Health Center in the city of El Alto, Department of La Paz, Bolivia, during the months of September to December 2018.

2.1 Inclusion criteria

a. Patients over 60 years of age who attended the nephrology outpatient clinic at the Chacaltaya Comprehensive Community Health Center.
b. Who had clinical laboratory tests for serum creatinine.
c. With and without risk factors for reduced glomerular filtration rate.
d. Adequate mental and cognitive status.
e. Patients who gave their consent to participate in the study.

2.2 Exclusion criteria

a. Patients who are not in the reference age group.
b. Who do not have clinical laboratory results.
c. Patients who did not give their consent to participate in the study.

Taking into account the inclusion and exclusion criteria, a total of 203 patients were included, comprising men and women over 60 years of age.

A single assessment was conducted in older adults, coinciding with a visit to the nephrology outpatient clinic. All patients were evaluated clinically and through laboratory tests. Data were collected on age, sex, marital status, occupation, personal medical history (diabetes mellitus, hypertension, obstructive nephropathy), and physical examination (blood pressure, weight, and height). Venous blood tests included serum creatinine, hemoglobin, hematocrit, fasting blood glucose, and a general urinalysis (proteinuria).

Subsequently, body mass index (BMI) was calculated, and glomerular filtration rate was estimated using three formulas established by the K/DOQI Guidelines [20]: the Cockcroft-Gault formula, MDRD-4 (abbreviated), and CKD-Epi. Once the glomerular filtration rate results were obtained, CKD was staged based on the criteria of the Kidney Disease Outcomes Quality Initiative Guidelines [20] and the KDIGO Guidelines [21].

2.3 Statistical analysis

A computerized database was created in Microsoft Excel. Statistical analysis was performed using SPSS 11.0 and

EpiCal. Data were expressed as summary measures (percentages, means, standard deviation), and the chi- square test was used to verify whether there was a significant association between the variables involved, and the relative risk (RR) to measure the strength of association between exposure and the disease, which indicates the probability of developing that disease among those exposed to a risk factor compared to the unexposed group. If this risk includes the value one, it is concluded that the risk is statistically significant, with $p < 0.05$ and a 95% confidence interval. The results are presented in tables.

2.4 Ethical considerations

Patient identification data were protected. After assuring each participant of the study's confidentiality, voluntary participation and informed consent to be included in the study were obtained. Upon completion of the study, each patient was informed of the results, and appropriate recommendations were provided in each case.

3 Results

Table 1 presents information on the sociodemographic characteristics, risk factors, and renal function of the 203 study participants; the mean age was 68.8 years, with a standard deviation of ±6.8 years. Of the participants, 117 were male (57.6%) and 86 were female (42.4%). Regarding personal medical history, 53 patients had a history of hypertension (26.1%) and 35 patients had a diagnosis of diabetes mellitus (17.2%). The mean serum creatinine was 1.4 mg/dl (SD ± 0.8). The mean estimated glomerular filtration rate (eGFR) calculated using each of the formulas employed (Cockcroft-Gault, MDRD-4 (abbreviated), and CKD-Epi) was 65 mL/min (SD ± 25.8), 66 ml/min (SD ± 26.5), and 68 ml/min (SD ± 22.3), respectively.

The classification of CKD in the older adult population studied is presented in Table 2, which shows a predominance of stages 2 and 3a, respectively, across all formulas used: Cockcroft-Gault (stage 2: 36.0%; stage 3a: 28.1%), MDRD-4 (stage 2: 44.3%; stage 3a: 21.7%) and CKD-Epi (stage 2: 41.9%; stage 3a: 26.6%).

To correlate CKD classification with sociodemographic characteristics, risk factors, and personal medical history, we used the results obtained from the MDRD-4 formula (Table 3). Regarding age, the greatest contributions were observed in the 70–79 years, with 45% of patients in stage 2 of the disease, followed by stage 3a with 29.4%. However, the chi-square test was not significant ($p > 0.05$), so there is insufficient evidence to suggest an association between age and disease progression. Regarding sex, although in the sample showed a predominance of men (57.4%) over women (42.4%), kidney disease was more prevalent in women, with the highest proportions in stage 2 (45.3%), followed by stage 3a (29.1%). However, the chi-squaretest did not reveal a significant difference ($p=0.536$).

Table 1. Sociodemographic characteristics, risk factors, and renal function by study group. El Alto, Bolivia. September–December, 2018

Age (years) (mean, SD)	68.8	± 6.8
Gender (male/female) (n, %)	117/86	57.6/42.4
Marital status (married/single/widowed) (n, %)	112/67/24	55.2/33.0/11.2
Employment status (employed/unemployed) (n, %)	93/110	45.8/54.2
Body weight (kg) (mean, SD)	67.1	±11.3
Height (cm) (mean, SD)	153	± 9.2
Hypertension (n, %)	53	26.1
Blood pressure (mmHg) (mean, SD)	128/77	± 19.3/10.3
Diabetes mellitus (n, %)	35	17.2
Fasting blood glucose (mg/dL) (mean, SD)	5.9	± 2.6
Hemoglobin (g/L) (mean, SD)	15.8	± 2.0
Creatinine (mg/dl) (mean, SD)	1.4	± 0.8
Glomerular filtration rate – Cockcroft-Gault (ml/min) (mean, SD)	65	± 25.8
Glomerular filtration rate – MDRD-4 (ml/min) (mean, SD)	66	± 26.5
Glomerular filtration rate – CKD-EPI (ml/min) (mean, SD)	68	± 22.3
Proteinuria (mg/g) (n, %)	51	25.1

Table 2. Stratification of patients with presumptive chronic kidney disease using a mathematical formula. El Alto, Bolivia. September–December, 2018

Mathematical equations for estimating glomerular filtration rate			
Stages of CKD	Cockcroft-Gault (%)	MDRD-4 (abbreviated) (%)	CKD-EPI (%)
1	16.7	17.7	20.7
2	36	44.3	41.9
3 a	28.1	21.7	26.6
3b	13.8	5.5	5.5
4	3.4	3.4	3.4
5	2	2	2

Table 3. Percentage distribution of the patients studied according to sociodemographic variables and risk factors. El Alto, Bolivia. September–December, 2018

Variables	Categories	Stages of Renal Function						p<0.05 CI (95%)
		1 (%)	2 (%)	3 a (%)	3b (%)	4 (%)	5 (%)	
Age (years)	60–69	18.4	44.7	26.3	4.4	3.5	2.6	0.897
	70–79	16.6	45.6	29.4	4.4	2.9	1.5	(0.866–0.946)
	= 80	19	31.8	23.8	14.3	4.8	0	
Gender	Female	12.8	45.3	29.1	7	4.7	1.2	0.536
	Male	21.4	43.6	25.6	4.3	2.6	2.6	(0.483–0.620)
Marital status	Married	17	44.6	26.8	5.4	3.6	2.7	0.863
	Single	14.9	47.8	28.4	6	3	0	(0.872–0.950)
	Widowed	29.2	33.3	25	4.2	4.2	4.2	
Employment labor	Employed	18.2	45.5	26.4	3.6	4.5	1.8	0.789
	Unemployed	17.2	43	28	7.5	2.2	2.2	(0.765–0.871)
Nutritional status	Underweight	0	0	0	0	0	0	
	Normal weight	19	47.6	19	7.1	2.4	4.8	0.691
	Overweight	13.7	43.2	31.6	5.3	4.2	2.1	(0.636–0.763)
	Obese	22.7	43.9	25.8	4.5	3	0	
Hypertension	Yes	13.2	39.6	26.4	7.5	7.5	5.7	0.068
	No	19.3	46	27.3	4.7	2	0.7	(0.190–0.790)
Diabetes Mellitus	Yes	34.3	20	17.1	11.4	11.4	5.7	0
	No	14.3	49.4	29.2	4.2	1.8	1.2	(0.000–0.015)

With regard to the marital status of the patients studied, stage 2 was more common among single individuals than among married and widowed individuals (47.8%), followed by stage 3a at 28.4%. No significant association was found between these variables (p=0.863). Regarding employment status, employed patients predominated in stages 2 and 3a of the disease, while unemployed patients were more prevalent in stages 3a and 3b. Similar results were observed when relating kidney disease to nutritional status, where stage 2 predominated, followed by stage 3a, in overweight and obese patients; no evidence was found in evidence linking nutritional status to kidney disease (p>0.05).

The distribution of older adults according to personal medical history showed that CKD was more prevalent in stages 2 and 3a, both for patients with a history of hypertension and for those without this condition. However, for stages 3b, 4, and 5, the percentages of kidney disease were higher in hypertensive patients (7.5%; 7.5%; 5.7%), respectively, showed no significant association (p>0.05) in our study.

Regarding a history of diabetes mellitus, similar results were observed, with the highest percentages of patients with chronic kidney disease found in those with a prior diagnosis of diabetes mellitus in the most advanced stages, 3b (11.4%), 4 (11.4%), and 5 (5.7%). The statistical significance test revealed a strong association (p=0.000) between a history of diabetes mellitus and kidney disease.

When analyzing the distribution of risk factors among patients exposed and unexposed to CKD (Table 4), we can see that all risk factors were associated with the presence of kidney disease with a relative risk (RR > 1), noting that only marital status and the presence of obstructive nephropathy had a relative risk less than one (RR < 1).

Table 5 shows the risk stratification of developing CKD according to the simplified classification proposed by the 2012 KDIGO Guidelines (20), where the largest percentage of patients had a low risk of kidney disease (50.7%), while 9.5% had a very high risk of the disease.

Table 4. Risk factors for chronic kidney disease and relative risk

Risk factors for chronic kidney disease	Exposed patients	Unexposed patients	Relative risk	CI-95%
Age (over 80 years)	9	12	1.15	0.38–3.44
Gender (female)	36	50	1.19	0.79–1.79
Marital status (single and/or widowed)	34	57	0.99	0.89–1.10
Employment status (unemployed)	37	56	1.09	0.64–1.74
Hypertension	32	53	1.04	0.52–2.09
Diabetes mellitus	18	21	1.26	0.74–2.15
Overnutrition	51	83	1.17	0.64–2.14
Obstructive nephropathy	3	12	0.54	0.16–1.79
Anemia	4	1	2.17	0.79–5.97
Proteinuria	29	22	1.8	1.23–2.63

Table 5. Stratification of the risk of chronic kidney disease according to glomerular filtration rate and albuminuria. El Alto, Bolivia. September–December, 2018

Stages of CKD	GFR Value (ml/min/1.73 m²)	Albuminuria			Risk Assessment	
		< 30 mg/g	30–299 mg/g	= 300 mg/g	Classification	%
1	= 90	12.3	3.4	2	Low	50.7
2	60–89	38.4	4.4	1.5		
3a	45–59	19.2	5.4	2.5	Moderate	27
3b	30–44	3.9	1	0.5	High	12.8
4	15–29	0.5	1	2	Very high	9.5
5	= 15	0	0.5	1.5		

4 Discussion

Chronic kidney disease is a major public health problem worldwide due to associated comorbidities and the high cost of renal replacement therapies when end-stage renal failure occurs. Furthermore, it constitutes a significant risk factor for cardiovascular disease and mortality.

The prevalence and incidence of CKD have increased worldwide in recent years, in part due to the rising prevalence of conditions such as diabetes, hypertension, and obesity in the general population, where the risk increases with age [20,21]. It is estimated that 10% of the general population is at risk of developing this disease at some point in their lives, although up to three-quarters of those affected are unaware that they are experiencing this gradual loss of kidney function [22,23].

In the city of El Alto, Department of La Paz, Bolivia, it was observed that patients over 60 years of age who attended the outpatient nephrology clinic at the CISC Chacaltaya presented with some degree of reduced kidney function, with the highest percentages found in stages 2 and 3a of the staging proposed by the K/DOQI 2002 [1] and KDIGO 2012 [21].

The results of this series are consistent with those reported by Candelaria-Brito et al.[17], Martínez-Pérez et al.[24], Terazón-Miclín et al.[25], and Calvo- Vázquez et al.[26], in identifying stage 2 as the predominant stage of CKD.

Contrary to the findings of the present study, the CKD framework document within the strategy for addressing chronicity in the Spanish National Health System [27] finds a higher prevalence in stages 3b, 4, and 5 of this condition. On the other hand, in Cuba, Regueira-Betancourt et al.[28] found results that exceeded those of the present series in stages 3a, 3b, and 4, but were consistent with them in stages 1 and 2. Other studies find a higher prevalence in stage 1 [29].

Many international studies observe a clear trend toward an increased risk of CKD with age [30,31]. They show an increase in the prevalence of the disease as patients' age [1], mostly beginning at age 70 in all populations, due to a higher prevalence of chronic non-communicable diseases, especially cardiovascular conditions.

In the present study, the highest percentages of kidney disease were identified in the 70–79 age group, followed by the 60–69 age group, with a clear predominance of cases in stages 2 and 3a.

These results are similar to those reported in the international literature, which states that in individuals over 60 years of age, the risk of CKD is two to three times higher than in those younger than this age [32].

A study conducted in the city of Camagüey, Cuba, found a higher prevalence of patients with kidney disease in the 61–70 age group [33]; similar results were reported by Gutiérrez-Rufín et al.[34]. Other studies conducted in Asturias, Spain [35], and in Chile [36], reported high prevalence rates in this population group.

For their part, Albuquerque et al.[37] note that age is directly correlated with the risk and stage of CKD, indicating that the duration of the disease in patients is related to the risk of developing it.

Regarding gender, the observed frequency showed more men than women; however, a higher prevalence of kidney disease was observed in women compared to men, with a higher percentage in stages 2 and 3a. Although this did not reach statistical significance.

These results are consistent with other studies [34,35,38], which report a slight prevalence of kidney disease in women compared to men. Unlike what was reported by Sosa Barberena [39] and Silveira [33], where men predominate, Candelaria-Brito et al.[17] found similar results.

Pérez-Oliva et al.[40] reported an association between CKD prevalence and gender, generally with a higher prevalence in women, and noted that stage 3b was more prevalent in women, which does not align with the findings of the present study.

Gender is a factor to consider when assessing the presence of chronic kidney disease in the elderly [41].

Other sociodemographic risk factors, such as patients' marital status and occupation—which are associated with low income and a poorer quality of life—constitute risk factors for developing chronic kidney disease [20,21].

In our study, we found that patients whose marital status was single or widowed had the highest rates of kidney disease, although this relationship was not sufficiently evident to conclude that there is a statistical association between this condition and the onset of CKD; however, it is clear that it is a factor to consider due to the loss of family ties and the abandonment of many appropriate social and dietary environments. On the other hand, employment is a key factor for personal and family livelihood. In our series, we observed that in the more advanced stages of kidney disease (stages 3b, 4, 5), unemployed patients predominate compared to those with stable employment.

In the case of patients with CKD, family studies are scarce, so there are very few bibliographic references regarding their impact on the health status of these patients and vice versa [42]. In this regard, the authors agree with Domínguez-Ardila et al. [43] that an important consideration is the assessment of the patient's family environment, support networks, and external resources, which can play a significant role in the process of geriatric patient care. Family support takes various forms, ranging from direct financial assistance to the personal care of a sick family member, including emotional support from relatives [17].

On the other hand, coverage by retirement and pension systems in Latin America is very low and varies significantly depending on the area of residence. Less than half of the urban population aged 60 and older receives social security benefits, compared to one-third in rural areas [17]. In many Latin American countries, retirement coverage serves less than one-quarter of the older adult population [44].

In Bolivia, financial constraints have been the main barrier to the care of these patients; however, the amendment of Law 475 and the enactment of Supreme Decree 1870 have made it possible, since 2014, for more than 2,000 patients to receive hemodialysis free of charge and for kidney transplant surgeries to increase by 40% [18,19], although coverage for

early diagnosis and patient follow-up remains insufficient.

There are other well-documented classic risk factors that contribute to declining kidney function, such as metabolic syndrome, smoking, dyslipidemia, a sedentary lifestyle, and the one of interest to us at this time, obesity. Obese individuals have a higher predisposition to glomerulomegaly and focal and segmental glomerulosclerosis; it has also been observed that obesity is associated with a faster rate of renal function loss. An elevated BMI is a risk factor for the development of kidney disease [45].

The results regarding the distribution of patients by stage of kidney disease and nutritional status in our series show that normal-weight patients have the highest percentages of stage 2 kidney disease; however, these percentages increase in stages 3a, 3b, and 4 among patients classified as overweight or obese, indicating an increased risk of developing kidney disease compared to patients classified as normal weight, with a relative risk greater than one (RR=1.17).

These results are consistent with findings in the international literature, which indicate that an elevated BMI is a risk factor for the development of kidney disease (OR: 1.23, 95% CI, 1.08–1.41) with an RR of 1.87 in overweight or obese individuals [18,20,21].

The findings reported by Castillo Parodi et al.[46] are consistent with the results of this series, highlighting that a high percentage of patients with different stages of CKD have a nutritional diagnosis of overweight or obesity based on BMI.

Other studies [47,48], report that being overweight and obese in older adults modestly increases the risk of CKD, and these associations are primarily driven by confounding effects of hypertension and diabetes mellitus, in contrast to what occurs in adolescence and young adulthood, where obesity leads to prolonged exposure to various comorbidities that increase the risk of chronic kidney disease. This prolonged effect of obesity, along with other independent factors, acts on various renal functional parameters that determine the development and progression of kidney disease in obese individuals.

Diabetes mellitus and hypertension are the two leading causes of CKD, with diabetic nephropathy (a renal complication of diabetes) being the primary cause, followed by hypertensive nephropathy (a renal complication of hypertension) as the second leading cause worldwide. This was demonstrated in the analysis of risk factors from the Framingham Heart Study [21,49].

The percentages of hypertension and diabetes mellitus identified in our series are comparable to those reported by the Bolivian Dialysis and Transplant Registry [19]. In our study, we observe that hypertensive patients predominate in the more advanced stages of kidney disease, while non-hypertensive patients predominate in stages 2 and 3a; similar results are observed in patients with a history of diabetes mellitus, the latter showing a strong statistical association (p=0.000) with the onset of kidney disease.

These results are consistent with those reported by other authors [50], who note that in the pre-dialysis stages, kidney disease caused by hypertension is more prevalent than that caused by diabetes mellitus; however, more patients enter renal replacement therapy due to diabetes than due to hypertension.

Finally, in our case series, individuals seen in outpatient nephrology clinics show a low risk of developing kidney disease. Furthermore, the identification of risk factors in this older adult population allows us to implement more appropriate prevention and control measures to prevent the progression of kidney disease to more advanced stages.

5 Conclusion

Chronic kidney disease has a high prevalence among people over the age of 60 seen in nephrology outpatient clinics. This prevalence is higher in women than in men and increases with age, with anemia, proteinuria, and diabetes mellitus being the main risk factors present. Early detection of this disease is important to improve control of risk factors with the aim of preventing progression to end-stage renal disease. Follow-up of this cohort of older adults will provide further data

on the progression of CKD in our setting.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

Ethical responsibilities

Protection of humans and animals: The authors declare that no experiments were conducted on humans or animals for this research.

Data confidentiality: The authors declare that they have followed their institution's protocols regarding the publication of patient data.

Right to privacy and informed consent: The authors declare that no patient data appear in this article.

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