Original Article

Risk of sarcopenia, body composition and functionality in older adults with chronic kidney disease: relationships with glomerular filtration rate

Risco de sarcopenia, composição corporal e funcionalidade em idosos com doença renal crônica: relações com a taxa de filtração glomerular

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ABSTRACT

Introduction: Population aging has increased concern regarding muscle degradation, especially in older adults with chronic kidney disease (CKD), who may develop sarcopenia. The objective was to identify the prevalence of sarcopenia risk, alterations in body composition, and functional status in older adults with CKD, as well as their correlations with glomerular filtration rate (GFR). **Methods:** This was a cross-sectional study containing older adults with CKD. Socioeconomic, demographic, clinical, anthropometric, and laboratory data was collected. The criteria of the European Working Group on Sarcopenia in Older People (EWGSOP) were used, and GFR was estimated using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation. **Results:** Sarcopenia risk was identified in 44.61% of participants. Low handgrip strength was observed in 53.83%, low appendicular lean soft tissue mass in 30.80%, and impaired performance on the Timed Up and Go (TUG) test in 78.5% of participants. Sarcopenia risk was significantly associated with depleted calf circumference, low muscle strength, and TUG performance ($p<0.05$). GFR correlated with muscle strength, appendicular lean soft tissue mass, serum hemoglobin, waist circumference, and body mass index (BMI) ($p<0.05$). **Conclusion:** A high prevalence of sarcopenia risk, body composition alterations, and functional impairment was observed. Correlations with GFR highlight a cycle between renal function and muscle health. These findings reinforce the need for early diagnosis and multidimensional assessment.

RESUMO

Introdução: O envelhecimento populacional tem aumentado a preocupação com a degradação muscular, especialmente em idosos com doença renal crônica (DRC), que podem desenvolver sarcopenia. O objetivo foi identificar a prevalência de risco de sarcopenia, alterações na composição corporal e estado funcional em idosos com DRC, bem como suas correlações com a taxa de filtração glomerular (TFG). **Método:** Esse foi um estudo transversal, realizado com idosos portadores de DRC. Foram coletados dados socioeconômicos, demográficos, clínicos, antropométricos e laboratoriais e utilizados os critérios do *European Working Group on Sarcopenia in Older People* (EWGSOP) para classificar os parâmetros de risco de sarcopenia, composição corporal e funcionalidade muscular. A TFG foi estimada pela equação *Chronic Kidney Disease Epidemiology Collaboration* (CKD-EPI). **Resultados:** O risco de sarcopenia foi identificado em 44,61% dos participantes. Observou-se baixa força de preensão manual em 53,83%, baixa massa mole magra apendicular em 30,80% e desempenho prejudicado no teste Timed Up and Go (TUG) em 78,5% dos indivíduos. O risco de sarcopenia associou-se significativamente à redução da circunferência da panturrilha, baixa força muscular e pior desempenho no TUG ($p<0,05$). A TFG correlacionou-se com a força muscular, massa mole magra apendicular, hemoglobina sérica, circunferência da cintura e índice de massa corporal (IMC) ($p<0,05$). **Conclusão:** Foi observada alta prevalência de risco de sarcopenia, alterações de composição corporal e comprometimento funcional. As correlações com a TFG evidenciam um ciclo entre função renal e saúde muscular. Esses achados reforçam a importância do diagnóstico precoce e da avaliação multidimensional.

Keywords:
Chronic kidney disease. Sarcopenia. Renal function. Elderly.

Unitermos:
Doença renal crônica. Sarcopenia. Função renal. Idosos.

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INTRODUCTION

The number of older adults is increasing worldwide, with a prevalence of around 8% in 2020 and an estimated rate exceeding 30% of the global population by 2099[1]. Brazil, although still considered a "young country," is currently experiencing the effects of the epidemiological transition, with increased life expectancy and a reduction in infectious diseases, and the number of older adults in the country continues to grow each decade. In 2022, approximately 15.8% of the population was over 60 years old[2].

The senescence process acts directly on skeletal muscle and involves a reduction in the size of fibers responsible for rapid contraction, as well as an imbalance between protein synthesis and degradation in skeletal muscle, culminating in a progressive loss of autonomy in older adults[3]. When this reduction in physical capacity is associated with pathological loss of muscle mass and strength/function, sarcopenia occurs, which may be exacerbated in the presence of chronic diseases common in aging, such as type 2 diabetes mellitus (T2DM), systemic arterial hypertension (SAH), obesity, chronic kidney disease (CKD), cancer, among others[4-7].

According to Cruz-Jentoft et al.[8], loss of muscle strength, compared with the reduction in muscle mass, is considered the most important factor for the diagnosis of sarcopenia. In addition, it is important to highlight that this condition may be associated with several pathological conditions[4]. However, according to the current concept of sarcopenia proposed by the *Conceptual Definition of Sarcopenia: Delphi Conseus of the Global Leadership Initiative on Sarcopenia* (GLIS - 20)[24], the definition should combine reductions in muscle mass and muscle strength. Furthermore, sarcopenia is characterized as a generalized disease of skeletal muscle, whose prevalence increases with aging. It is also emphasized that the definition of sarcopenia should not vary according to the care setting, age, clinical condition, or purpose of use (clinical or research), and that it is a potentially reversible condition. Moreover, muscle-specific strength should be considered part of the conceptual definition of sarcopenia.

In CKD, there is an increase in inflammatory status together with a reduction in physical activity levels and a negative protein balance, which together contribute to muscle catabolism, resulting in sarcopenia, a condition directly associated with higher hospitalization and mortality rates[9].

In this context, it is evident that older adults with CKD face a dual risk of reduced muscle strength/function and protein depletion, which increases the likelihood of sarcopenia and generally worsens all health-related quality indicators[9,10].

Given the diagnostic relevance of sarcopenia, various approaches have been proposed by the scientific community, and although there is a continuous effort toward standardization, the European guideline remains one of the most widely used[8]. Screening for sarcopenia represents a brief, direct, and objective tool that, when positive, indicates the need for subsequent diagnostic investigation, allowing for early identification and appropriate care management.

Recognizing the importance of screening and diagnostic tools for this population, the primary objective of this study was to assess the prevalence of sarcopenia risk, changes in body composition, and functional status in older adults with CKD, as well as their correlations with estimated glomerular filtration rate. Secondarily, the study aimed to evaluate the association between the presence of sarcopenia risk and the clinical, body composition and sociodemographic profile of the studied population.

METHODS

This was a cross-sectional study conducted with older adults treated at a public university hospital in Northeastern Brazil, from December 2022 to May 2023.

Eligibility criteria

Patients of both sexes, aged over 60 years, with a diagnosis of CKD under conservative treatment were eligible. Individuals with a diagnosis of neoplasms in the past five years (except non-melanoma skin cancer), chronic renal patients on dialysis, patients with acute kidney injury were excluded, patients with a history of hospital admission due to sepsis, major surgeries in the past six months, or high viral load of human immunodeficiency virus (HIV) were excluded. All participants signed the Informed Consent Form.

Sample size

The sample size was calculated using an online calculator based on the total number of patients over 60 years effectively attended between October and December 2022 in the nephrology outpatient clinics of the study site, applying a prevalence of 21.4% of CKD in older adults[11], which resulted in a total of 199 and a population of 42.5. After adjusting for six months of data collection, the population used for sample calculation was 85. Assuming a sampling error of 5% and a confidence level of 95%, the sample size was 64 participants.

Participants were evaluated following the flow and cutoff points of the European Working Group on Sarcopenia in Older People (EWGSOP2) guideline[8], including the application of sarcopenia risk screening, muscle strength/function assessment, appendicular lean soft tissue mass quantification, functional capacity evaluation, and glomerular filtration rate (GFR) estimation using the CKD-EPI equation[12].

Data collection

Socioeconomic, demographic, and clinical data were collected, including age, sex, race, marital status, education, religion, origin (capital or countryside), as well as clinical data such as the presence of diabetes, hypertension, heart disease, alcohol consumption, and smoking.

Nutritional and functional assessment

Body composition was estimated using weight, height, waist (WC) and calf (CC) circumferences, and tetrapolar bioelectrical impedance. Participants were classified according to body mass index (BMI) into two groups: underweight and eutrophic/overweight[13]. For cardiovascular risk assessment, WC was used, with individuals classified as not at risk when WC was below 96 cm for men and 88 cm for women[14]. Waist-to-height ratio (WHR) was also calculated, considered elevated when >0.6[15]. Similarly, the waist-to-hip ratio, considered elevated when >0.90 for men and >0.85 for women, according to World Health Organization (WHO) criteria. Through CC, participants were categorized as having "preserved muscle mass" when >33 cm for women and >34 cm for men[16].

Bioimpedance assessment was performed according to the equipment manual (Sanny® Model BIA1010), using resistance, reactance, and total muscle mass percentage. Participants were instructed to fast for four hours, urinate 30 minutes prior, avoid alcohol for 24 hours, abstain from caffeine on the day of the exam, refrain from physical activity in the preceding 24 hours, and not use lotions or creams on hands and feet on the day of the exam.

Appendicular skeletal muscle mass (ASM) was estimated from resistance and reactance using the Sergi equation, with low values defined as <20 kg for men and <15 kg for women[8,17]. Resistance and reactance were also used to calculate the phase angle (phase angle (°) = arctangent $(Xc/R) \times (180/\pi)$)[8,18].

Sarcopenia risk, handgrip strength, and Timed Up and Go (TUG) test:

The assessment of sarcopenia followed the EWGSOP2 consensus[8]:

- Sarcopenia risk: assessed using the SARC-F questionnaire and SARC-CalF, which includes calf circumference. A positive score indicates the need for further diagnostic evaluation.
- Muscle strength: handgrip strength (HGS) was measured using a Saehan® hydraulic dynamometer. Strength was considered reduced if <27 kg for men and <16 kg for women. Measurements were performed with participants seated, back fully supported, knees flexed at 90°, feet flat on the floor, upper limbs parallel to the trunk, elbows flexed at 90°, and wrist in neutral position with 0°–30° extension and 0°–15° adduction[17]. Participants exerted maximal force with the dominant hand. Each participant performed three trials with 30-second intervals, and the highest value was recorded.
- Functional performance: assessed using the TUG test. Participants were instructed to rise from a chair, walk three meters, turn, walk back, and sit down. Time was measured in seconds with a stopwatch. A TUG result of ≥ 10 s was considered indicative of impaired functional capacity.

Laboratory assessment

Hemoglobin and serum creatinine levels were obtained from medical records (up to three months before collection). Anemia was defined as hemoglobin <12 mg/dl for women and <13 mg/dl for men. Creatinine levels were classified according to KDIGO guidelines, considering impaired renal function ≥ 1.5 mg/dl. Estimated GFR was calculated using the CKD-EPI formula in ml/min/1.73 m^2[12,19,20].

Ethical aspects:

This study was approved by the Research Ethics Committee of the Federal University of Alagoas (UFAL), CAEE 58523122.5.0000.0155, approval number: 5.454.387.

Statistical analysis

Categorical variables are presented as absolute and relative frequencies (n/%), and continuous variables as mean ± standard deviation. Group comparisons (with vs. without sarcopenia risk) were performed using independent samples t-test after verifying homogeneity of variance with Levene's test. Categorical variables were compared using chi-square or Fisher's exact tests. Simple linear regressions were performed and adjusted for sex (female and male). Analyses were conducted using IBM SPSS Statistics version 21, adopting a significance level of $\alpha=0.05$.

RESULTS

The study included 65 patients, with a mean age of 69.85 ± 7.09 years and majorly male (55.4%; n=36), as shown in Table 1. Regarding estimated GFR, 3.08% of participants were in CKD stage 1, 16.92% in stage 2, 44.61% in stage 3, 26.15% in stage 4, and 9.24% in stage 5. Sarcopenia risk was present in 44.61% of the sample (n=29).

Although not the primary aim of the study, the collected socio-epidemiological data, despite showing no significant differences between groups, provide important insights into the profile of the evaluated population. These data can directly influence the care provided to participants and, indirectly, contribute to the development of conditions associated with

Table 1 – Sociodemographic and clinical characteristics of older adults with chronic kidney disease according to the presence or absence of risk of sarcopenia assessed by the SARC-F/SARC-CalF.

Characteristics	Total sample (n=65)	With risk of sarcopenia (n=29)	Without risk of sarcopenia (n=36)	p-value[a]
	Mean±SD n (%)	Mean±SD n (%)	Mean±SD n (%)	
Age (years)	69.85±7.09	71.03±7.9	68.89±6.4	0.23
Sex				0.59
Male	36 (55.4)	15 (51.7)	21 (58.3)	
Female	29 (44.6)	14 (48.3)	15 (41.7)	
Race/skin color				0.62
White	16 (24.6)	8 (27.6)	8 (22.2)	
Non-white	49 (75.4)	21 (72.4)	28 (77.8)	
Marital status				0.96
Without partner	20 (30.8)	9 (31.0)	11 (30.6)	
With partner	45 (69.2)	20 (69.0)	25 (69.4)	
Education				0.56
No schooling and incomplete elementary	45 (69.2)	19 (65.5)	26 (72.2)	
Complete elementary or higher	20 (30.8)	10 (34.5)	10 (27.8)	
Religion				0.41
No religion	4 (6.2)	1 (3.4)	3 (8.3)	
With religion	61 (93.8)	28 (96.6)	33 (91.7)	
Plane of residence				0.34
Capital	22 (33.8)	8 (27.6)	14 (38.9)	
Countryside	43 (66.2)	21 (72.4)	22 (61.1)	
Income				0.24
≥3 minimum wages	23 (35.4)	8 (27.6)	15 (41.7)	
<3 minimum wages	42 (64.6)	21 (72.4)	21 (58.3)	
Alcohol consumption				0.42
No	61 (93.8)	28 (96.6)	33 (91.7)	
Yes	4 (6.2)	1 (3.4)	3 (8.3)	
Smoking				0.78
No	59 (90.8)	26 (89.7)	33 (91.7)	
Yes	6 (9.2)	3 (10.3)	3 (8.3)	

n = sample size

sarcopenia risk. The majority of participants were from the countryside; 64.6% (n=42) had an income below three minimum wages, and 69.2% (n=45) had not completed primary education (Table 1).

Hypertension (HTN) and diabetes mellitus (DM) were prevalent in the study sample, affecting 89.2% (n=58) and 61.5% (n=40) of participants, respectively. Cardiopathy was present in 38.5% of participants (n=25). The mean weight of the population was 74.45±15.44 kg, and with a mean height of 159±9.37 cm, this resulted in an overweight profile (mean BMI=29.18±6.04). WC showed a high prevalence of inadequacy, with values above the recommended thresholds for cardiovascular risk assessment in both sexes. In contrast, the mean CC was above the cutoff for muscle depletion, with only 18.46% of the population below the threshold (Table 2). Notably, for

Table 2 – Anthropometric characteristics, body composition, muscle strength, and renal function of older adults with chronic kidney disease according to the presence or absence of risk of sarcopenia assessed by the SARC-F/SARC-CalF.

Characteristics	Total sample (n=65)	With risk of sarcopenia (n=29)	Without risk of sarcopenia (n=36)	p-value[a]
	Mean±SD n (%)	Mean±SD n (%)	Mean±SD n (%)	
Weight (kg)	74.45±15.44	72.2±17.67	76.3±13.36	0.29
Height (cm)	159.81±9.37	158.2±9.81	161.1±8.92	0.21
BMI (kg/m2)				0.47
Underweight	5 (7.7)	3 (10.34)	2 (5.56)	
Normal weight/Overweight	60 (92.3)	26 (89.66)	34 (94.44)	
WC (cm)				0.81
High	48 (73.85)	21 (72.41)	27 (75)	
WHR				0.21
High	49 (24.62)	24 (82.76)	25 (69.44)	
CC				0.019
Depleted	12 (18.46)	9 (31.03)	3 (8.33)	0.021
Phase angle (º)				0.92
Low	7 (10.8%)	3 (10.3)	4 (11.1)	1.0
LM (%)	32.22±7.72	32.45±8.15	32.04±7.48	0.83
ALM (kg)				0.26
Low	20 (30.8)	11 (37.9)	9 (25)	
Muscle strength (kg)				<0.01
Low	35 (53.8)	21 (72.4)	14 (38.9)	
Timed Up and Go test				0.049
Some impairment	51 (78.5)	26 (89.7)	25 (69.4)	
Serum creatinine				0.99
High	47 (72.3)	21 (72.4)	26 (72.2)	
Diabetes mellitus				0.94
Yes	40 (61.5)	18 (62.1)	22 (61.1)	
Hypertension				0.92
Yes	58 (89.2)	26 (89.7)	32 (88.9)	
Heart disease				0.34
Yes	25 (38.5)	13 (44.8)	12 (33.3)	
Hyperglycemia				0.31
Yes	35 (60.3)	15 (53.6)	20 (66.7)	
Anemia				0.15
Yes	26 (40.6)	9 (31.0)	17 (48.6)	

ALM = appendicular lean soft tissue mass; BMI = body mass index; CC = calf circumference; LM = lean mass; WC = waist circumference; WHR = waist-to-hip ratio.

these variables, participants with sarcopenia had higher WHtR and preserved calf circumference compared to those without sarcopenia ($p<0.05$).

The prevalence of low appendicular lean mass, reduced muscle strength, and impaired TUG performance was 30.80% (n=20), 53.80% (n=35), and 78.5% (n=51), respectively. Muscle strength and TUG performance differed significantly between groups, with participants at risk of sarcopenia showing poorer outcomes for both tests compared to the non-risk group (Table 2).

Additionally, a correlation analysis was performed between estimated glomerular filtration rate and study variables in order to explore associations with factors commonly used in the assessment of sarcopenia. Positive correlations were observed between GFR and measures of muscle strength/function ($p=0.01$), appendicular lean soft tissue mass ($p=0.01$), and hemoglobin levels ($p<0.01$), as well as negative correlations between GFR, body mass index, and waist circumference.

In comparative analyses, individuals with low muscle strength, low appendicular lean soft tissue mass, and reduced hemoglobin levels exhibited lower mean GFR values compared with their respective reference groups. Similarly, differences in GFR values were observed across categories of BMI and WC. These findings should be interpreted with caution, as they are based on exploratory and unadjusted analyses and are therefore subject to the influence of multiple confounding factors (data not shown in tables).

DISCUSSION

In the present study, although the investigated population consisted of individuals over 60 years of age, the screening instruments used, The SARC-F and SARC-CalF were not sufficient to identify the risk of sarcopenia, which may compromise the adequate identification of individuals with probable sarcopenia. This is evident from the fact that the variables assessed in subsequent stages of the screening showed more significant alterations than those indicated by the initial screening. One hypothesis for this limitation of the screening scales may be the self-report bias inherent to SARC-F and SARC-CF or, alternatively, that autonomy declines more slowly than strength/physical performance.

It is important to highlight that the sarcopenia diagnostic results proposed by the EWGSOP2 guideline follow a flowchart that begins with sarcopenia risk screening using SARC-F and SARC-CF. Only after a positive screening are the subsequent steps initiated, including muscle function assessment (identifying probable sarcopenia if positive) and, following positive responses, muscle mass evaluation, leading to a sarcopenia diagnosis[8,17].

Gulcicek and Seyahi[21] performed sarcopenia screening without using SARC-F, classifying patients directly by muscle strength. This approach led to a higher number of patients with probable sarcopenia, and sarcopenia confirmation was subsequently performed through muscle mass assessment. If this classification method were applied in the present study, the number of participants with probable sarcopenia would increase to approximately 53.84% (n=35), sarcopenia would be confirmed in 23.07% (n=15), and 18.46% (n=12) would be classified as having severe sarcopenia. Similarly, another study[22] that also did not apply sarcopenia risk screening suggested that the EWGSOP2 criteria are inadequate for identifying high-risk sarcopenia and dynapenia in CKD patients.

Du et al.[23] investigated the validity of the SARC-F questionnaire for assessing sarcopenia in CKD patients, finding that the instrument had low to moderate sensitivity but high specificity for sarcopenia screening, both in hemodialysis and conservatively treated patients.

Our results align with the GLIS report, which considers muscle mass and strength as key conceptual criteria for sarcopenia, additionally including specific muscle strength (e.g., muscle strength/muscle size). This work established the first global conceptual definition of sarcopenia to support the development of an operational definition for clinical and research settings[24].

The authors acknowledge that the EWGSOP2 criteria were developed for the general older adult population and do not specifically address conditions such as CKD. At the time of this research, there were no instruments validated or recommended by international institutions for specific sarcopenia assessment in CKD patients. While adapted tools for populations at higher risk of sarcopenia may be useful in clinical practice and research, this approach has not yet been addressed by GLIS-2024[24]. One general principle of the new recommendations is that the conceptual definition of sarcopenia should not vary according to age or clinical condition, such as heart failure, kidney disease, or cancer.

In the GLIS report on sarcopenia health outcomes, one highlighted gap concerns muscle strength. Although sufficient evidence suggests that muscle strength is the main determinant of the association between sarcopenia and mortality, the relative contributions of muscle mass and physical performance remain unclear and require further investigation. Therefore, GLIS emphasizes that new longitudinal studies using GLIS criteria should separately include assessments of muscle mass and muscle strength to better understand their respective contributions to outcomes[25].

Although our study design differs from that recommended by GLIS-2025, it was conducted prior to the publication of these guidelines. Nevertheless, we evaluated muscle strength, muscle mass, and functional performance (TUG) both in combination with the diagnostic criterion and individually. Regarding muscle strength, lower values were observed in participants at risk of sarcopenia, corroborating previous studies that indicate an association between dynapenia and sarcopenia development[8,26,27].

Physical performance, assessed by the TUG test, was also more impaired in participants at risk of sarcopenia compared to those without sarcopenia. This finding deserves attention, as the EWGSOP2 guideline associates low performance in this test with higher mortality[8]. It is worth noting that physical performance, as evaluated by the TUG test in this study, is

an objective measure of overall body function related to mobility, encompassing multiple systems including skeletal, neurological, pulmonary, and cardiovascular[28].

Beyond sarcopenia screening and diagnosis, it is important to highlight that aging is associated with increased body fat accumulation. Adipose tissue is strongly related to systemic inflammation in older adults, as fat infiltration into skeletal muscle can precede muscle atrophy and contribute to chronic inflammatory processes, culminating in sarcopenia[4,6,9,28]. These findings align with the present study, which identified a substantial proportion of individuals with overweight associated with reduced functional capacity.

Regarding anthropometric profile, the literature presents diverse findings. Some studies indicate low BMI as a risk factor for sarcopenia, while others emphasize the prevalence of sarcopenic obesity among older adults with CKD[4,6,29-31]. Despite the mean weight suggesting adequate muscle reserves, body composition assessment revealed the opposite, with a considerable number of individuals exhibiting low muscle mass, indicating a concerning impairment of lean body mass.

Muscle mass reduction is a common age-related condition, associated with decreased appetite, lower protein intake, and reduced physical activity. Several studies report limitations in using serum creatinine to estimate GFR, as it is linked to muscle metabolism and affected by serum depletion, as occurs in sarcopenia[30-33].

Using serum creatinine to estimate GFR in older adults may result in overestimation of renal function, explaining the negative association between muscle mass and GFR observed in our study[32]. This limitation may also account for the lack of association between sarcopenia risk and GFR. Nonetheless, we identified correlations between multiple sarcopenia-related variables and CKD progression, suggesting a relationship between renal function decline and sarcopenia development, consistent with previous studies[9,19,33]. Our findings show that muscle strength and appendicular lean soft tissue mass directly correlate with GFR, exacerbating CKD and reinforcing evidence of sarcopenia in older adults with this condition.

Another relevant finding was the positive association between hemoglobin levels and GFR, consistent with observations in CKD patients. Anemia is a frequent complication in this population, resulting from progressive renal function loss. This condition may be explained by reduced erythropoietin production, malnutrition leading to lower serum iron, or inadequate dietary intake[34,35]. These factors justify the simultaneous decline of hemoglobin and GFR, representing worsening renal function and potentially contributing to reduced muscle strength and mass.

In older adults, in addition to erythropoietin deficiency caused by CKD, comorbidities and chronic inflammation complicate the diagnosis of absolute iron deficiency (iron depletion without other associated causes), as serum iron levels may remain chronically elevated. This condition, known as anemia of chronic disease, when combined with renal dysfunction and reduced erythropoietin, could be considered anemia of chronic kidney disease.

Although sarcopenia risk was identified in 44.61% of the sample (n=29), which was the main focus of this study, the researchers had previously conducted sarcopenia diagnoses. Probable sarcopenia was observed in 30.76% of participants (n=20), and confirmed sarcopenia in only 13.84% (n=9). When analyzing individual parameters separately, mean muscle mass was inadequate in 30.80% (n=20), muscle strength in 53.80% (n=35), and TUG performance in 78.5% (n=51) of participants. These findings indicate that confirmatory parameters, which reflect the severity of the condition, were more frequently altered in the population than the screening instruments. This discrepancy may have hindered accurate diagnosis and constitutes a limitation of the study, possibly related to methodological challenges or to the cut-off points adopted.

CONCLUSIONS

Based on the findings of the present study, it is possible to state that further research is needed to evaluate the applicability of the EWGSOP2 guideline in the CKD population, as the screening instruments proposed in the guideline's flowchart proved to be insufficiently sensitive in the studied sample, hindering the accurate assessment of sarcopenia using the analyzed variables. Despite the absence of an association between sarcopenia risk and eGFR in older adults, the correlation analysis between sarcopenia-related variables and CKD allowed us to identify the negative outcomes resulting from reduced eGFR, which adversely impact strength, muscle mass, and functional capacity, in addition to lowering hemoglobin levels. These findings reinforce the need for stricter monitoring of sarcopenia development, enabling early interventions to prevent functional decline in this population.

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