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Research Article

Associations of Depressive Symptoms and Functional Dependence with Sarcopenia Risk in Turkish Older Adults

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Abstract

Objectives: Depressive symptoms and functional dependence may exacerbate sarcopenia risk, yet data from Turkish populations remain limited. This study aims to examine the associations between depressive symptoms, functional independence, and sarcopenia risk among community-dwelling Turkish older adults.

Methods: This retrospective cross-sectional study included 366 adults aged ≥60 years. Sarcopenia risk was evaluated using the SARC-F questionnaire (≥4 indicating probable risk). Functional independence and depressive symptoms were assessed with the Instrumental Activities of Daily Living (IADL) and Geriatric Depression Scale–Short Form (GDS-SF), respectively.

Results: Participants had a mean age of 73.2±7.7 years; 71.7% were women. Those at risk of sarcopenia (SARC-F ≥4) were significantly older (p<0.001), had lower IADL scores (p<0.001), and higher GDS-SF scores (p<0.001). After adjustment, age (OR 1.09; 95% CI 1.03–1.16), depressive symptoms (OR 1.24; 95% CI 1.09–1.41), and lower functional independence (OR 0.20; 95% CI 0.08–0.52) remained independently associated with sarcopenia risk.

Conclusion: Sarcopenia risk in Turkish older adults is independently associated with advancing age, depressive symptoms, and lower functional independence. These findings underscore the multidimensional nature of sarcopenia and highlight the importance of incorporating psychosocial and functional evaluations into geriatric screening to enable early detection and targeted interventions.

Keywords: Sarcopenia risk, Functional capacity, Instrumental Activities of Daily Living (IADL), Geriatric Depression Scale (GDS), SARC-F questionnaire

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Sarcopenia is characterized by a progressive loss of skeletal muscle mass and strength, which leads to reduced mobility, independence, and quality of life in older adults.[1] It has become one of the most important determinants of frailty and disability among community-dwelling older individuals.[2] As populations age, identifying clinical and psychosocial predictors of sarcopenia risk is crucial for early detection and prevention.

Depressive symptoms and functional decline have emerged as key factors influencing the onset and progression of sarcopenia in older adults.[3,4] Understanding how mood disturbances and loss of daily functional capacity contribute to sarcopenia risk may help identify vulnerable individuals before irreversible muscle deterioration occurs.[5,6]

The SARC-F questionnaire is a practical and valid self-report tool for screening sarcopenia in clinical and community set-

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tings.[7] It consists of five items that assess strength, walking assistance, chair rise, stair climbing, and falls, with a total score of 4 or greater indicating probable sarcopenia. Studies have shown that higher SARC-F scores predict reduced physical performance, hospitalization, and mortality.[8,9]

Sarcopenia is increasingly recognized as a multidimensional condition that interacts with psychological, cognitive, and functional factors.[10] Depression is one of the most common comorbidities in older adults and has been consistently linked to muscle loss, weakness, and decreased physical activity.[11,12] Biological mechanisms underlying this association include inflammation, neuroendocrine dysregulation, malnutrition, and reduced exercise tolerance.[13] In contrast, physical frailty and functional limitations may trigger or exacerbate depressive symptoms, creating a bidirectional cycle that accelerates both conditions.[14]

Functional capacity is another key predictor of sarcopenia risk. The activities of daily living (ADL) and instrumental activities of daily living (IADL) scales are standard measures of independence and daily performance in older adults.[15]

While ADL evaluates basic self-care abilities such as bathing, dressing, or feeding, IADL reflects more complex cognitive and physical skills, including managing finances, using transportation, or preparing meals. Because IADL captures higher-order functional tasks that decline earlier in the aging process, it is considered a more sensitive indicator of early sarcopenia-related vulnerability.[16] Therefore, this study focused on IADL as a more discriminative measure of functional capacity in identifying individuals at increased risk for sarcopenia.

While functionality, depression, and sarcopenia are frequently studied as separate entities, the Turkish literature lacks studies that simultaneously assess these domains using the SARC-F, IADL, and GDS-F scales. Understanding the interplay between depression, functional independence, and sarcopenia is critical for comprehensive geriatric assessment. Therefore, this study aims to explore the relationship between these three constructs by using validated scales, with the goal of identifying how depressive symptoms and functional capacity are associated with sarcopenia risk in community-dwelling older adults. Revealing these associations may contribute to the development of more integrated screening and intervention strategies to prevent sarcopenia and support healthy aging.

METHODS

Study Design and Participants

A total of 366 community-dwelling older adults aged 60 years and above participated in this retrospective cross-sectional study. We obtained comprehensive geriatric assessment data from the records of patients who presented to the geriatric outpatient clinic. The same researcher conducted and documented all evaluations to maintain consistency and ensure data reliability. We retrospectively reviewed all available records and included only those with complete data sets and fully documented assessment forms. Records with missing or incomplete information were excluded to ensure the accuracy and consistency of the analysis. We included participants who demonstrated sufficient cognitive ability to complete the comprehensive geriatric assessment accurately. We obtained informed consent from each participant for the use of their medical information in this study.

Exclusion criteria included advanced dementia, severe psychiatric illness, terminal disease, total dependence in daily activities, and acute medical conditions or exacerbations of chronic illnesses that could interfere with functional assessment.

Common chronic diseases such as hypertension, diabetes mellitus, hyperlipidemia, coronary artery disease, atrial fibrillation, osteoporosis, and other geriatric comorbidities were recorded because they are frequently observed in older adults and may influence sarcopenia risk. These variables were considered potential confounders in the multivariable model.

Ethics Approval

This study was approved by the Clinical Research Ethics Committee of İstanbul Training and Research Hospital, University of Health Sciences, with the decision number 111 dated 08.11.2024.

Measurements

We extracted clinical and functional data from medical records and standardized geriatric assessment forms. The same geriatrician conducted all assessments face-to-face during routine evaluations. We collected laboratory and questionnaire data from the same clinical visit or within a two-month interval.

Sarcopenia Risk Assessment

We assessed sarcopenia risk using the SARC-F questionnaire, which evaluates five functional domains: muscle strength, walking assistance, chair rise, stair climbing, and falls.

Participants with a total score of four or higher were classified as being at high risk for sarcopenia.[7,8]

Functional Assessment

We assessed functional capacity starting with the Activities of Daily Living (ADL) scale, which measures basic self-

care abilities such as bathing, dressing, and toileting.[6] After completing the ADL assessment, we evaluated higher-level daily functions using the Instrumental Activities of Daily Living (IADL) scale. This scale examines more complex tasks, including meal preparation, housekeeping, managing finances, and using transportation.[16] We chose the IADL scale as the main functional indicator because it detects early declines linked to sarcopenia and cognitive impairment more effectively than the ADL scale.

Cognitive, Mood, and Nutritional Assessment

We assessed cognitive function using the Mini-Mental State Examination (MMSE). We evaluated nutritional status with the Mini Nutritional Assessment–Short Form (MNA-SF).[12,13] We screened depressive symptoms using the Geriatric Depression Scale–Short Form (GDS-SF).[15] We determined frailty status with the FRAIL scale, which examines fatigue, resistance, ambulation, illness, and weight loss domains.

Physical Performance and Anthropometric Assessment

We measured lower extremity strength and functional mobility with the Chair Sit-to-Stand Test (CSST). This test records the time needed to complete five consecutive sit-to-stand movements.[1,3] We also measured calf circumference (cm) and calculated body mass index (BMI, kg/m^2) as indicators of nutritional and muscle status.

Laboratory Parameters (Active Version)

We collected laboratory data from the same clinical visit for all participants. These parameters included hemoglobin (g/dL), creatinine (mg/dL), vitamin D (25-OH D3, ng/mL), vitamin B12 (pg/mL), glycated hemoglobin (HbA1c, %), and thyroid-stimulating hormone (TSH, µIU/mL). We used these laboratory indicators to examine metabolic, endocrine, and nutritional factors that may influence sarcopenia risk. These biomarkers were selected because previous studies identified them as relevant to muscle health, oxidative stress, and age-related decline.[9,11,13]

Statistical Analysis

We analyzed all data using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA).[17] We summarized continuous variables as mean ± standard deviation (SD) or median (minimum–maximum), depending on their distribution. We checked normality using the Kolmogorov–Smirnov test. We compared continuous variables between groups (SARC-F <4 vs. ≥4) using independent samples t-tests or Mann–Whitney U tests, and categorical variables using chi-square tests. We examined correlations between continuous variables using Pearson or Spearman correlation coefficients, depending on data normality.

We identified independent predictors of sarcopenia risk with a multivariable logistic regression model that included age, gender, BMI, IADL, GDS-SF, MMSE, MNA-SF, and serum creatinine as covariates.

We expressed the results as odds ratios (OR) with 95% confidence intervals (CI) and considered $p<0.05$ statistically significant.

We confirmed the adequacy of our sample size with a post-hoc power analysis performed using G-Power.[18] Using an α of 0.05, an observed OR of 1.095 for age, four predictors (age, MMSE, GDS-SF, IADL), and a total sample size of 366, we achieved a statistical power (1–β) of 0.87, demonstrating sufficient sensitivity to detect small-to-moderate effects.

Results

We analyzed data from 366 community-dwelling older adults with a mean age of 73.2±7.7 years, of whom 71.7% were women. Most participants were overweight, with a mean BMI of 29.5±4.5 kg/m^2. The majority were functionally independent, as shown by median ADL and IADL scores of 6.0 and 8.0. Cognitive performance was generally normal (median MMSE = 30), and depressive symptoms were mild (median GDS-SF=4.0). Nutritional status was adequate, with a median MNA-SF score of 12.0.

Common chronic conditions included hypertension (19.9%), diabetes mellitus (11.3%), and hyperlipidemia (4.5%). Vision and hearing problems were reported by 15.8% and 27.7% of participants, respectively (Table 1).

We compared participants according to SARC-F scores. Individuals with sarcopenia risk (SARC-F ≥4) were significantly older than those without (77.1±7.6 vs. 71.1±7.0 years, $p<0.001$). They demonstrated poorer performance in both ADL and IADL assessments ($p<0.001$ for both) and higher depressive symptom scores ($p<0.001$). Cognitive performance (MMSE) and nutritional status (MNA-SF) were lower in the sarcopenia risk group ($p<0.001$). FRAIL and CSST results also indicated greater frailty and slower lower-extremity strength ($p<0.001$). Laboratory comparisons revealed that the SARC-F positive group had lower hemoglobin (12.3±1.8 vs. 13.2±1.6 g/dL, $p<0.001$), higher creatinine (0.99 vs. 0.86 mg/dL, $p=0.001$), and higher HbA1c values ($p=0.030$). Vitamin D, vitamin B12, and TSH levels did not differ significantly ($p>0.05$). Vision problems ($p=0.007$), hearing loss ($p<0.001$), urinary incontinence ($p=0.007$), and constipation ($p=0.005$) were more frequent in the SARC-F positive group (Table 2).

We performed a multivariable logistic regression to identify independent relationships of sarcopenia risk. Age, GDS-SF, and IADL remained significant after adjustment for covariates (Table 3). Older participants showed higher odds

Table 1. Demographic and clinical characteristics of the participants (n=366)

Variable	Mean ± SD / Median (Min–Max) or n (%)	Variable	Mean ± SD / Median (Min–Max) or n (%)
Age (years)	73.2±7.7	BMI (kg/m^2)	29.5±4.5
Gender		SARC-F status	
Female	214 (71.7)	Negative (< 4)	218 (64.9)
Male	95 (28.3)	Positive (≥ 4)	118 (35.1)
ADL	6.0 (0–6)	IADL	8.0 (0–8)
MMSE	30.0 (4–30)	GDS-SF	4.0 (1–14)
MNA-SF	12.0 (4–14)	FRAIL score	2.0 (0–5)
CSST (sec)	15.1 (7.1–41.1)	Calf circumference (cm)	36.0 (19–47)
Hemoglobin (g/dL)	12.9±1.1	Creatinine (mg/dL)	0.90 (0.46–5.48)
Vitamin D (25-OH D, ng/mL)	29.0 (4.7–89.5)	Vitamin B12 (pg/mL)	254 (71–1421)
HbA1c (%)	5.9 (3.7–13.6)	TSH (µIU/mL)	2.01 (0.1–8.5)
Vision problem	53 (15.8)	Hearing problem	93 (27.7)
RLS	128 (38.1)	Falling history	85 (25.3)
Urinary incontinence	64 (19.0)	Constipation	61 (18.2)
Hypothyroidism	7 (2.1)	BPH	3 (0.9)
Hyperlipidemia (HL)	15 (4.5)	Hypertension (HT)	67 (19.9)
Diabetes mellitus (DM)	38 (11.3)	Coronary artery disease (CAD)	5 (1.5)
Atrial fibrillation (AF)	6 (1.8)	Osteoporosis (OP)	14 (4.2)
Rheumatoid arthritis (RA)	7 (2.1)	Dementia	6 (1.8)

Numeric variables are presented as median (min–max) or mean ± SD. ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living; MMSE: Mini-Mental State Examination; GDS-SF: Geriatric Depression Scale – Short Form; MNA-SF: Mini Nutritional Assessment – Short Form; FRAIL: Frailty Index; SARC-F: Sarcopenia Assessment Questionnaire; CSST: Chair Sit-to-Stand Test; Hgb: Hemoglobin; Creatinine: Serum Creatinine; TSH: Thyroid-Stimulating Hormone; RLS: Restless Leg Syndrome; BPH: Benign Prostatic Hyperplasia; HL: Hyperlipidemia; HT: Hypertension; DM: Diabetes Mellitus; CAD: Coronary Artery Disease; AF: Atrial Fibrillation; OP: Osteoporosis; RA: Rheumatoid Arthritis.

of sarcopenia risk (OR 1.09, 95% CI 1.03–1.16, p=0.002). Greater depressive symptom severity increased the likelihood of SARC-F positivity (OR 1.24, 95% CI 1.09–1.41, p = 0.001). In contrast, higher IADL scores were associated with lower sarcopenia risk (OR 0.20, 95% CI 0.08–0.52, p=0.001).

Discussion

This study examined the relationships between depressive symptoms, functional independence, and sarcopenia risk status in community-dwelling older adults. Advanced age, higher GDS-SF scores, and lower IADL scores were significantly associated with sarcopenia risk, as determined by the SARC-F questionnaire. These findings suggest that the risk of sarcopenia is a multidimensional geriatric condition that goes beyond the loss of muscle mass and strength. It also reflects declines in functional ability and emotional well-being.[1,2,10]

The demographic and clinical characteristics of the participants revealed that sarcopenia risk was more pronounced among older individuals, consistent with the progressive muscle and functional decline associated with aging.[1,2] Participants with higher SARC-F scores were significantly older and demonstrated greater impairment in activities of daily living, reflecting the interaction between physical frailty and loss of independence.[4,6] Although the overall nutritional and cognitive profiles were preserved in most participants, subtle reductions in MNA-SF and MMSE scores among those with sarcopenia risk indicate that even mild cognitive and nutritional changes may contribute to functional decline.[12,13] The relatively high prevalence of comorbidities such as hypertension and diabetes mirrors the multimorbid pattern typical of geriatric populations and reinforces the complex metabolic background of sarcopenia risk.[14,15]

Functional dependence emerged as a central factor associated with sarcopenia and sarcopenia risk. Participants at risk for sarcopenia had lower ADL and IADL scores, indicating that functional dependence plays a key role in sarcopenia risk.[5,16] Lower IADL performance indicates early problems in managing daily activities such as taking medicine, using transportation, and preparing meals.

Table 2. Comparison of participants according to SARC-F groups

Variable	SARC-F <4 (n = 218)	SARC-F ≥4 (n = 118)	*p*
Age (years)	71.1±7.0	77.1±7.6	<0.001
BMI (kg/m²)	29.1±4.3	30.2±4.8	0.062
Gender, n (%)			0.001
Female	143 (65.6)	98 (83.1)	
Male	75 (34.4)	20 (16.9)	
ADL	6.0 (4–6)	6.0 (0–6)	<0.001
IADL	8.0 (1–8)	7.0 (0–8)	<0.001
MMSE	30 (4–30)	30 (11–30)	<0.001
GDS-SF	3 (1–11)	5 (1–14)	<0.001
MNA-SF	12 (6–14)	11 (4–14)	<0.001
FRAIL score	1 (0–3)	3 (1–5)	<0.001
CSST (sec)	14.8 (7.3–41.1)	17.0 (7.1–35.0)	<0.001
Calf circumference (cm)	36 (19–47)	35 (26–47)	0.078
Hemoglobin (g/dL)	13.2±1.6	12.3±1.8	<0.001
Creatinine (mg/dL)	0.86 (0.46–1.97)	0.99 (0.49–5.48)	0.001
Vitamin D (25-OH D, ng/mL)	29.6 (6.3–84.2)	28.5 (0.7–86.5)	0.190
Vitamin B12 (pg/mL)	256 (71–1421)	252 (80–1262)	0.250
HbA1c (%)	5.9 (3.7–12.5)	6.0 (4.3–13.6)	0.030
TSH (μIU/mL)	2.06 (0.2–33.5)	1.87 (0.1–21.4)	0.248
Vision problem, n (%)	26 (11.9)	27 (23.7)	0.007
Hearing problem, n (%)	47 (21.6)	46 (40.4)	<0.001
RLS, n (%)	79 (40.5)	49 (51.0)	0.089
Falling history, n (%)	85 (25.3)	112 (46.1)	<0.001
Urinary incontinence, n (%)	31 (30.4)	33 (51.6)	0.007
Constipation, n (%)	29 (28.4)	32 (50.0)	0.005
Hypothyroidism, n (%)	3 (4.5)	4 (8.9)	0.377
BPH, n (%)	2 (3.1)	1 (2.2)	0.784
Hyperlipidemia (HL)	10 (15.4)	5 (11.1)	0.517
Hypertension (HT)	36 (55.4)	31 (67.4)	0.201
Diabetes mellitus (DM)	21 (32.3)	17 (37.8)	0.554
Coronary artery disease (CAD)	2 (3.1)	3 (6.7)	0.389
Atrial fibrillation (AF)	3 (4.6)	3 (6.8)	0.624
Osteoporosis (OP)	8 (12.3)	6 (13.3)	0.874
Rheumatoid arthritis (RA)	3 (4.6)	4 (8.9)	0.372
Dementia	2 (3.1)	4 (9.1)	0.643

Numeric variables are presented as median (min–max) or mean ± SD. ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living; MMSE: Mini-Mental State Examination; GDS-SF: Geriatric Depression Scale – Short Form; MNA-SF: Mini Nutritional Assessment – Short Form; FRAIL: Frailty Index; CSST: Chair Sit-to-Stand Test; Hgb: Hemoglobin; Creatinine: Serum Creatinine; TSH: Thyroid-Stimulating Hormone; RLS: Restless Leg Syndrome; BPH: Benign Prostatic Hyperplasia; HL: Hyperlipidemia; HT: Hypertension; DM: Diabetes Mellitus; CAD: Coronary Artery Disease; AF: Atrial Fibrillation; OP: Osteoporosis; RA: Rheumatoid Arthritis.

These difficulties usually appear before declines in basic self-care abilities.[4,16] Earlier studies also demonstrated that impaired IADL performance is a sensitive early marker of frailty and mobility loss.[4, 5] Thus, assessing IADL may help clinicians detect functional vulnerability before overt physical weakness appears.

Table 3. Multivariable logistic regression analysis of depression and functional capacity as predictors of sarcopenia risk (SARC-F≥4)

Variable	OR	95% CI	p
Age (years)	**1.09**	1.03–1.16	**0.002**
Female (vs male)	1.32	0.65–2.68	0.44
BMI (kg/m²)	1.05	0.97–1.14	0.23
IADL (per point)	**0.20**	0.08–0.52	**0.001**
GDS-SF (per point)	**1.24**	1.09–1.41	**0.001**
MMSE (per point)	0.93	0.84–1.03	0.17
MNA-SF (per point)	0.92	0.80–1.06	0.27
Creatinine (mg/dL)	1.41	0.85–2.36	0.18

Model information: Dependent variable: SARC-F ≥4 (presence of sarcopenia risk). Nagelkerke R^2= 0.39; Hosmer–Lemeshow p=0.62; overall model p<0.001. IADL: Instrumental Activities of Daily Living; GDS-SF: Geriatric Depression Scale – Short Form; MMSE: Mini-Mental State Examination; MNA-SF: Mini Nutritional Assessment – Short Form; BMI: Body Mass Index; OR: Odds Ratio; CI: Confidence Interval.

Depressive symptoms were another strong correlate of sarcopenia risk. Individuals with higher depressive symptom scores (GDS-SF) showed increased functional limitation, suggesting an interdependent relationship between mood and physical performance.[3,10] Elevated depressive symptoms may reduce motivation and activity levels, which can accelerate functional loss, while restricted independence may in turn exacerbate emotional distress.[11,13] These results indicate that functional and psychological factors are closely linked in the development of sarcopenia risk and emphasize the bidirectional relationship between depressive symptoms and functional decline.

Together, these findings support a multidimensional approach to sarcopenia management in geriatric practice. Participants with sarcopenia risk also exhibited greater frailty, poorer lower-extremity performance, and mild metabolic alterations. Elevated FRAIL scores and prolonged CSST times indicate early physical decline consistent with sarcopenia-related vulnerability.[1,2] Lower hemoglobin and higher creatinine and HbA1c values suggest underlying anemia, renal strain, and glucose dysregulation, all of which have been linked to impaired muscle metabolism and reduced strength.[11,13,17,19] In addition, geriatric syndromes such as sensory impairment, urinary incontinence, and falls were more frequent among those at risk, reinforcing the view that sarcopenia often coexists with multisystem decline rather than presenting as an isolated muscular disorder.[10,14]

We selected the variables for the multivariate regression model based on their clinical relevance and statistical significance in the univariate analysis. We also checked for multicollinearity to ensure the independence of relationships. In the multivariable model, advanced age, higher depressive symptom severity, and lower IADL scores remained independently associated with sarcopenia risk. Age was a consistent determinant, reflecting cumulative biological deterioration with aging.[1,2,20] Functional dependence, captured by IADL, showed the strongest association, supporting its role as a practical marker of early vulnerability.[5,21] Depressive symptoms also retained statistical significance, underlining the psychological component of sarcopenia and the need to integrate mental health into routine assessments.[3,10,20] Chronic depressive states can activate inflammatory and hormonal pathways that accelerate muscle catabolism and fatigue, further worsening physical performance.[11,13] Moreover, individuals with depressive symptoms are often less engaged in rehabilitation and physical activity programs, which may hinder recovery and contribute to a cycle of inactivity and frailty.

Although cognitive and nutritional measures (MMSE, MNA-SF) were not independently associated in the final model, their mild decline suggests indirect roles through behavioral and metabolic pathways.[9,12,22] Recent evidence shows that modified versions of SARC-F, including calf circumference or body composition measures, improve its diagnostic accuracy in older adults.[23,24] Together with our findings, these studies confirm that SARC-F captures multiple dimensions of geriatric vulnerability, including physical, functional, and psychological components.

Overall, these findings suggest that the risk of sarcopenia in older adults is a multifactorial condition shaped not only by muscle health but also by functional ability and psychological well-being. Including evaluations of daily living activities and depressive symptoms in sarcopenia screening can offer a more complete view of vulnerability in later life. This study provides new evidence from community-dwelling older adults in Türkiye. It shows that both functional and emotional factors play a key role in sarcopenia risk. The results highlight the importance of culturally adapted and multidimensional geriatric assessment models to support early detection and intervention in Türkiye and similar contexts.

This study has several limitations. Its retrospective and cross-sectional design limits causal interpretation. Because the study was conducted in a single tertiary geriatric outpatient clinic, the results may not represent broader community populations. Objective physical performance measures such as gait speed or handgrip strength were unavailable in the medical records, restricting the ability to compare self-reported and measured data. Finally, potential confounders such as medication use and nutritional interventions were not controlled. Despite these limitations,

the study contributes valuable insight into the multidimensional correlates of sarcopenia in routine geriatric practice.

Conclusion

In community-dwelling older adults, a higher risk of sarcopenia was associated with advanced age, depressive symptoms, and reduced functional independence. These findings suggest that sarcopenia risk reflects overall geriatric vulnerability rather than muscle health alone. Evaluating sarcopenia risk as part of comprehensive geriatric assessments may support early identification of individuals who need closer monitoring and multidisciplinary care to maintain independence and prevent disability. Importantly, this study is among the few to holistically evaluate the combined relationship between depressive symptoms, functional capacity, and sarcopenia risk in Turkish older adults. By capturing population-specific characteristics, it provides valuable local evidence. This evidence contributes to the growing international understanding of multidimensional approaches to sarcopenia.

Disclosure

Ethics Committee Approval: This study was approved by the Clinical Research Ethics Committee of İstanbul Training and Research Hospital, University of Health Sciences, with the decision number 111 dated 08.11.2024.

Informed Consent: Informed consent was obtained from all individual participants included in the study.

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