

Arabic Translation & Validation of Strength, Ambulation, Rising from A Chair, Stair Climbing and History of Falling Scale (SARC-F)

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Background: Sarcopenia, characterized by a progressive decline in muscle mass and function associated with aging, impacts around 10% of older adults worldwide and leads to heightened morbidity, increased hospitalization, and escalating healthcare costs. Early detection is crucial for timely intervention. The SARC-F questionnaire is a brief and validated screening tool utilized globally to identify individuals at risk of sarcopenia. Nevertheless, a validated Arabic version is currently unavailable.

Methods: The SARC-F questionnaire was translated into Arabic employing a forward-backward translation method, followed by cultural adaptation, including the conversion of metric units. Content validity was evaluated by two domain experts using a 4-point relevance scale. Face validity was assessed through cognitive interviews conducted in a sample of 15 Arabic-speaking participants (range = 25–40). Internal consistency was measured using Cronbach's alpha in a sample of 120 adults (31.76 years (SD = 10.43, range = 20–68)). Test-retest reliability was analyzed utilizing the Intraclass Correlation Coefficient (ICC) in a sample of 86 participants over an interval of 10 to 14 days. Inter-item associations were examined using Spearman's rank-order correlations.

Results: Following an expert review and gender-inclusive modifications, the content validity index improved from 2.0 to 4.0. Face validity testing demonstrated high clarity and acceptability across all items. The internal consistency analysis yielded a Cronbach's alpha of 0.648, indicating moderate reliability. Furthermore, the test-retest reliability displayed a commendable ICC value of 0.767 (95% CI: 0.663–0.841). The strongest inter-item correlation was found between assistance in walking and stair climbing ($\rho = 0.419$, $p < 0.001$).

Conclusion: The Arabic version of the SARC-F exhibits acceptable content and face validity, moderate internal consistency, and good test-retest reliability. This tool is poised to enhance the early detection of sarcopenia in Arabic-speaking populations and support clinical decision-making for preventative strategies.

Keywords: sarcopenia, aging, SARC-F, arabic translation, screening tool, reliability, validity

Introduction

Over the past few decades, significant advancements in medical technologies, pharmacological therapies, and public health initiatives have contributed to a considerable rise in global life expectancy. As a result, many countries are experiencing a demographic shift toward an aging population, which underscores the need to promote healthy aging as a key public health priority. Healthy aging encompasses not only the absence of disease but also the maintenance of physical, cognitive, and social functioning, allowing older adults to retain their independence and quality of life.^{1–3} One of the most notable challenges to functional independence in later life is the age-related decline in skeletal muscle mass and strength, a condition known as sarcopenia.⁴

Sarcopenia is recognized as a progressive and generalized skeletal muscle disorder with multifactorial origins, including hormonal changes, chronic inflammation, physical inactivity, and inadequate nutrition. It has been officially classified as a distinct condition in the International Classification of Diseases (ICD-10-CM, M62.84), underscoring its clinical relevance. The operational definitions and diagnostic criteria for sarcopenia have evolved, with major guidelines proposed by the European Working Group on Sarcopenia in Older People (EWGSOP) and the Asian Working Group for Sarcopenia (AWGS), which emphasize not only muscle mass but also strength and performance. These varying definitions contribute to heterogeneity in reported prevalence rates, though conservative global estimates range from 10% to 12.9% in community-dwelling older adults, affecting both males and females.^{5,6}

The clinical implications of sarcopenia are extensive. Individuals with sarcopenia face a heightened risk of falls, fractures, functional dependency, frailty, institutionalization, and increased mortality.^{7,8} Additionally, sarcopenia is linked to unfavourable postoperative outcomes and is a recognized predictor of hospital readmissions, particularly due to injuries related to falls.⁹ From an economic standpoint, sarcopenia leads to greater utilization of health services, extended hospital stays, and increased direct medical costs.^{10–12} Importantly, these financial burdens are not limited to older adults; research indicates that sarcopenia also raises healthcare expenditures among younger hospitalized patients.¹²

Given the consequences associated with sarcopenia, early identification is crucial for initiating preventive or therapeutic interventions, such as resistance training, nutritional support, or pharmacological strategies, to alleviate functional decline. However, definitive diagnostic methods, including DXA scans and handgrip dynamometry, often face limitations related to cost, accessibility, and time constraints in routine clinical settings. This emphasizes the need for rapid, non-invasive, and cost-effective screening tools that can be widely implemented, particularly in primary care and community-based environments. One such tool is the SARC-F questionnaire, developed in English. It consists of five self-reported items that evaluate strength, assistance with walking, the ability to rise from a chair, stair climbing, and a history of falls.¹³ A total score of 4 or higher indicates a significant risk of sarcopenia and has been correlated with negative health outcomes, including hospitalization and mortality. The SARC-F is widely endorsed in clinical guidelines due to its simplicity, feasibility, and strong predictive validity. However, its effectiveness is inherently tied to cultural and linguistic relevance. Despite the increasing elderly population in Arabic-speaking countries, a fully validated and reliable Arabic version of the SARC-F has yet to be developed.

The lack of a culturally adapted version of this tool hinders its clinical applicability in the Arab world and poses a barrier to early detection and intervention. It is essential to develop a linguistically and contextually appropriate version to ensure accurate screening, enhance patient understanding, and implement management strategies that align with regional healthcare practices. Consequently, the primary objective of the current study is to translate the SARC-F questionnaire into Arabic and rigorously evaluate its psychometric properties. This assessment will encompass content and face validity, construct and criterion validity, internal consistency, and test-retest reliability. By validating the Arabic version of SARC-F, this study aims to equip healthcare professionals in Arabic-speaking regions with an effective and reliable tool for identifying individuals at risk of sarcopenia, thereby facilitating early intervention strategies that preserve functionality and alleviate healthcare burdens.

Materials and Methods

SARC-F Questionnaire

The SARC-F questionnaire, which is validated in English,¹³ contains five components measuring strength, assistance in walking, rising from a chair, climbing stairs, and falls. These five components have a score scale of three (None = 0, some = 1, a lot or unable/unable without help = 2), a total score of 4 or greater is considered to be predictive of sarcopenia and poor outcomes. The questionnaire is short and should take between 3 to 5 minutes for each participant to fill. The SARC-F questionnaire is openly available for clinical and research purposes without licensing restrictions.¹³

Translation and Adaptation

The translation of the SARC-F questionnaire followed the recommended steps for cultural and linguistic adaptation of health questionnaires. The forward translation from English to Arabic translation process was conducted independently

by two bilingual health specialists, both of whom were native Arabic speakers fluent in English and had prior experience in questionnaires translations. Then the two translations were compared and reconciled through discussion with the research team to produce a single harmonized version.

An expert in rehabilitation and functional assessment compared the Arabic version with the original English version to confirm that the translation is correct and valid. Cultural adaptation included involved changing the measurement units from pounds to kilograms, with the researchers adjusting the numerical values accordingly. No structural changes to any item were required.

Questionnaire Validity

Content validity was assessed by a panel of 3 experts specializing in body composition and exercise physiology. These experts were not involved in the forward translation and adaptation process to ensure an unbiased assessment. The experts independently reviewed each item for clarity and relevance using a scale of 4 point, where 1 point indicates a highly unsuitable item and must be removed, and 4 points indicate it is a highly suitable item and needs to be retained.

A convenient sample was cognitively interviewed after obtaining their informed consent to assess the face validity of the questionnaire. After obtaining their approval, participants were asked to answer the questionnaire and review questionnaire items for clarity, readability, and understanding. Feedback was collected from the participants regarding any items.

Psychometric Properties

The psychometric properties of the questionnaire were evaluated through measures of internal consistency and test-retest reliability. Internal consistency was assessed using Cronbach's alpha, with values between 0.7 and 0.9 considered acceptable indicators of reliability. To examine test-retest reliability, participants completed the questionnaire twice, with a 10 to 14-day interval between administrations. The intraclass correlation coefficient (ICC) and 95% confidence intervals (CI) were calculated to determine the level of agreement between the two sets of responses. Based on established guidelines, an ICC below 0.40 indicates poor agreement, values between 0.40 and 0.74 suggest fair to good agreement, and an ICC of 0.75 or above reflects excellent agreement.¹⁴

Study Population

For face validity, a convenient sample of healthy adults was recruited. Sample size of (n=15) was determined based on the recommendation that a sample size of 10–20 is adequate to identify ambiguous or unclear survey items in face validity assessment.¹⁵ For the remaining validation and reliability testing, participants from the ongoing study titled “Prevalence of Sarcopenia and the Influence of Lifestyle Factors in Saudi Arabia” were asked if they would like to participate in this study.¹⁶ Those who agreed to participate were sent a link to complete (self-administered) the Arabic SARC-F questionnaire twice separated by 10–14 days.

Regulatory oversight for this study was obtained from the Princess Nourah bint Abdulrahman University Institutional Review Board [21–0414]. Informed Consent was obtained from all study participants. Potential participants were given the opportunity to ask questions and were allowed additional time to consider their participation. Once written informed consent was obtained, participants were enrolled in the study.

Statistical Analysis

All statistical analyses were conducted using IBM SPSS Statistics, Version 31. Descriptive statistics were used to summarize participant characteristics and item-level responses. To assess the internal consistency of the Arabic version of the SARC-F questionnaire, Cronbach's alpha was calculated; values between 0.70 and 0.90 were considered indicative of acceptable to good reliability. Additionally, Spearman's rank-order correlation was used to examine inter-item relationships among the five SARC-F items, given their ordinal response format. Correlation coefficients (ρ) were interpreted as follows: 0.10–0.29 = weak, 0.30–0.49 = moderate, and ≥ 0.50 = strong. To evaluate test–retest reliability, the Intraclass Correlation Coefficient (ICC) was computed using a two-way mixed-effects model with a consistency definition and 95% confidence intervals. ICC values were interpreted according to Cicchetti's (1994) classification: < 0.40 = poor, 0.40–0.59 = fair, 0.60–0.74 = good, and ≥ 0.75 = excellent. All statistical tests were two-tailed, and a p-value < 0.05 was considered statistically significant.

Results

Sample Characteristics

A total of 120 participants completed the questionnaire. The mean age of the sample was 31.76 years (SD = 10.43, range = 20–68), and the mean body mass index (BMI) was 26.53 kg/m² (SD = 5.57, range = 16.14–45.63). The majority of participants were female (66.7%), single (43.2%), and employed (50.9%). Regarding educational background, 53.2% held a university degree, and 27.1% had completed postgraduate studies (Table 1).

Content Validity

After the translation, the average score was 2 out of 4 in the content validity scale, suggesting modifications and revisions were necessary. Based on the expert's feedback, translated items did not include both male and female respondents in the statement. After the SARC-F questionnaire translation was modified to be inclusive for both female/male respondents, the experts reached an anonymous agreement to an average score of 4, indicating excellent content validity.

A total of 15 participants (age 25–45) were cognitively interviewed to assess the face validity of the questionnaire. Participants' feedback indicated that all items were clear and easy to comprehend. Therefore, no further modifications to the SARC-F questionnaire were required.

Internal Consistency

Internal consistency of the Arabic version of the SARC-F questionnaire was assessed using Cronbach's alpha (Table 2). The total scale demonstrated a Cronbach's alpha of 0.648, indicating moderate internal consistency, which is slightly

Table 1 Participants' Characteristics

Variable	Category	Frequency (n)	Percent (%)
Gender (N=120)	Female	80	66.7
	Male	40	33.3
Social Status (N= 109)	Single	58	53.2
	Married	47	43.1
	Divorced	3	1.8
	Prefer not to say	1	0.9
Education Level (N=118)	High school	20	16.9
	University degree	64	53.2
	Postgraduate	32	27.1
	Prefer not to say	2	1.7
Employment Status (N=118)	Employed	61	50.9
	Student	35	29.7
	Unemployed	16	13.5
	Retired	6	5.1
BMI Classification N=119)	Underweight	3	2.5
	Normal weight	48	40.3
	Overweight	40	33.6
	Obese	28	23.5

Abbreviation: BMI, Body Mass Index.

Table 2 Internal Consistency of the Arabic SARC-F Questionnaire (n = 120)

Item	Mean $\pm$ SD	Corrected Item–Total Correlation	Cronbach's α if Item Deleted
Strength	1.27 $\pm$ 0.514	0.363	0.627
Assistance in Walking	1.05 $\pm$ 0.219	0.438	0.613
Rising from Chair	1.11 $\pm$ 0.362	0.337	0.624
Climbing Stairs	1.20 $\pm$ 0.460	0.502	0.542
Falls	1.24 $\pm$ 0.467	0.472	0.558
Total Scale	5.87 $\pm$ 1.35	—	0.648

below the generally accepted threshold of 0.70. Item-total correlations ranged from 0.337 to 0.502, with the strongest contribution from the item “climbing stairs”. Deletion of any single item did not substantially improve the overall reliability, with Cronbach's alpha if the item deleted ranging from 0.558 to 0.627.

Spearman's rank-order correlation was used to assess the relationships among the five items of the Arabic version of the SARC-F questionnaire (Table 3). All item pairs showed positive correlations, ranging from $\rho = 0.188$ to $\rho = 0.419$, indicating a moderate degree of internal association among the items. The highest correlation was observed between assistance in walking and climbing stairs ($\rho = 0.419$, $p < 0.001$), while the lowest significant correlation was between assistance in walking and rising from a chair ($\rho = 0.188$, $p = 0.040$).

Test-Retest Reliability

Test-retest reliability of the total Arabic SARC-F score was evaluated using ICC based on a two-way mixed-effects model with a consistency definition. A total of 86 participants completed the questionnaire at both time points. The mean SARC-F total score was 5.85 ± 1.30 at Time 1 and 5.74 ± 1.16 at Time 2. The single-measure ICC was 0.767 (95% CI: 0.663–0.841, $p < 0.001$), indicating good reliability Table 4. The average-measure ICC was 0.868 (95% CI: 0.797–0.914), demonstrating excellent consistency across repeated assessments.

Table 3 Inter-Item Correlation Matrix (Spearman's ρ) for SARC-F Items (n = 120)

	Strength	Walking	Chair	Stairs	Falls
Strength	1.000	0.222*	0.284**	0.311**	0.326**
Walking	0.222*	1.000	0.188*	0.419**	0.277**
Chair	0.284**	0.188*	1.000	0.251**	0.251**
Stairs	0.311**	0.419**	0.251**	1.000	0.297**
Falls	0.326**	0.277**	0.251**	0.297**	1.000

Note: **Significant at $p < 0.01$ levels.

Table 4 Test–Retest Reliability of the Total Arabic SARC-F Score (n = 86)

Measure	Mean (T1) $\pm$ SD	Mean (T2) $\pm$ SD	ICC (95% CI)	Interpretation
Total SARC-F Score	5.85 $\pm$ 1.30	5.74 $\pm$ 1.16	0.767 (0.663–0.841)	Good reliability

Abbreviations: ICC, Interclass Correlation Coefficient, CI, Confidence Interval.

Discussion

This study translated, culturally adapted, and validated the Arabic version of SARC-F questionnaire. SARC-F is a self-reported screening tool for sarcopenia. Overall, the findings indicated that the Arabic version of SARC-F questionnaire is linguistically sound, culturally relevant, and psychometrically valid and reliable, with results comparable to other validated languages versions.

The translation process followed internationally accepted guidelines for cross-cultural adaptation, ensuring that the Arabic version was linguistically accurate and culturally appropriate. The adaptation process in this study—particularly the refinement of gender-specific terms—was crucial in enhancing clarity and acceptability, consistent with the methodology recommended by the ISPOR Task Force for Translation and Cultural Adaptation.¹⁷

The face and content validity of the Arabic SARC-F were confirmed through expert review and cognitive interviews. This aligns with previous translation studies, such as those by Kim et al¹⁸ for the Korean version, which emphasized the importance of linguistic and cultural tailoring to ensure comprehension and relevance across populations. The improvement in content validity scores—from 2.0 to 4.0—following gender-inclusive revisions highlights the critical importance of inclusive language in health assessment tools. This is consistent with recommendations by Cruz-Jentoft et al⁴ and the EWGSOP2, who stress the need for culturally adaptable diagnostic frameworks to ensure accurate sarcopenia screening across populations. Face validity was confirmed through participant feedback, with respondents indicating that the items were understandable, relevant, and easy to complete. These results align with those of Malmström and Morley¹³ and Kim et al,¹⁸ who highlighted the clarity and brevity of the SARC-F tool as a major strength. The Arabic version preserved this simplicity, ensuring its suitability in both clinical and community settings, especially in low-resource environments.

Regarding internal consistency, the Arabic SARC-F achieved a Cronbach's alpha of 0.648, indicating moderate reliability. While slightly below the standard threshold of 0.70, this is consistent with findings from other studies. The moderate Cronbach's alpha observed is consistent with the multidimensional nature of SARC-F, where each item captures a distinct functional domain rather than a single latent construct. For instance, the original English version by Malmström and Morley¹³ reported alpha values around 0.60, and similar values were observed in the Spanish,¹⁹ Chinese,²⁰ and Polish²¹ validations. These results reflect the multidimensional nature of SARC-F, where items assess varied constructs such as muscle strength, assistance in walking, stair climbing, and falls, which naturally may not exhibit strong internal correlations, and lower internal consistency is expected and acceptable. The strongest item-total correlation in this study was observed for stair climbing, a key mobility task associated with lower limb strength. This aligns with Beudart et al,⁷ who found that stair climbing difficulty is a reliable indicator of poor physical function and is strongly linked to adverse health outcomes.

Inter-item correlations in this study showed moderate relationships, particularly between stair climbing and walking assistance ($p = 0.419$), both indicators of lower limb function and mobility. This pattern is consistent with previous findings by Van Ancum et al,⁹ who emphasized the interplay between declining strength and mobility as predictors of falls, hospitalization, and functional decline. Similarly, in a study by Guo J-Y et al,²⁰ mobility-related items showed stronger interdependence compared to items like falls or weight loss, supporting the structural validity of the tool across diverse languages. This pattern mirrors findings from international validations, further supporting the questionnaire structural stability across cultural contexts.

Test-retest reliability demonstrated strong temporal stability, with an ICC of 0.767 for single measures and 0.868 for average measures. These results are comparable to those from other validated versions, such as the Polish and Chinese SARC-F tools,^{20,21} and further reinforce the consistency of responses over time, a key requirement for tools used in routine clinical screening or longitudinal monitoring.

The findings of this study support the feasibility of using SARC-F across cultures, adding Arabic to the list of validated languages. The SARC-F is a low-cost, self-administered screening tool with minimal training requirements, thus proving highly beneficial in fast-paced healthcare settings or public health programs in Arabic-speaking regions. These findings align with a recent systematic review by Voelker et al,²² which aggregated evidence from 29 studies worldwide and affirmed the reliability and diagnostic characteristics of SARC-F across diverse healthcare systems.

Nevertheless, this study has limitations. The relatively young mean age of the sample (31.76 years) may not reflect the primary population at risk for sarcopenia—older adults. While the results indicate good feasibility and reliability in a general

adult sample, future research should target older and clinical populations, including those with chronic illnesses or frailty, to confirm generalizability. Additionally, although content and face validity were robustly assessed, the current study did not evaluate criterion validity. Future work should compare Arabic SARC-F scores against objective markers such as grip strength, gait speed, or muscle mass using DXA or BIA, as recommended by the EWGSOP2 and AWGS 2019 guidelines.^{4,23}

Conclusions

In conclusion, the Arabic version of the SARC-F questionnaire demonstrates acceptable validity and reliability and holds promise as a culturally adapted screening tool for sarcopenia. Its simplicity, clarity, and alignment with international findings make it a practical choice for integration into routine clinical assessments and community health screenings across Arabic-speaking countries.

Abbreviations

SARC-F questionnaire, Strength, Ambulation, Rising from A Chair, Stair Climbing and History of Falling (SARC-F); BMI, Body Mass Index; ICC, Interclass Correlation Coefficient; CI, Confidence Interval.

Data Sharing Statement

All data are provided within the article.

Ethics Approval and Consent to Participate

Ethical approval was obtained from the Institutional Review Board (IRB) of Princess Nourah bint Abdulrahman University (IRB No. 21-0414), the study adhered to the principles of the World Medical Association's Declaration of Helsinki. Informed consent was obtained from all subjects involved in the study.

Consent for Publication

Publication consent was obtained from all authors.

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Author Contributions

SAA, AAA, and AFA contributed to the study conception and design. Data acquisition was performed by DA, LA, ASA, and SAA. Data curation was performed by ASA and SAA. Funding acquisition was carried out by SAA. The formal analysis was performed by DA, SAA, and SA. The first draft of the manuscript was written by SAA, SA, AA, WA, MA, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript. The work reported in the paper has been performed by the authors, unless specified in the text. All authors read and approved the final manuscript. All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

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