

RESEARCH

Open Access



Association between the finger-ring test and quality of life in community-dwelling older women: cross-sectional study

Byung Chan Lee¹, Juhyun Lee², Kang Hee Cho^{2,3} and Changwon Moon^{2,3*} 

Abstract

Background Sarcopenia is a geriatric syndrome characterized by the loss of muscle mass, strength, and physical function. Screening or early detection of sarcopenia in community settings is crucial to prevent associated adverse outcomes. The finger-ring test offers a simple self-screening method, but its clinical relevance beyond diagnostic accuracy remains underexplored. Therefore, this study aims to investigate the association between the finger-ring test and various indicators of sarcopenia, including muscle mass, strength, physical performance, and health-related quality of life (HRQoL) in community-dwelling older women.

Methods One hundred forty-five women aged 65–80 years were enrolled in this cross-sectional study. Participants were categorized into three groups (“bigger”, “just fit”, and “smaller”) based on finger-ring test results. Muscle mass and strength were measured via bioimpedance analysis and handgrip strength, respectively. Physical performance was assessed using the Short Physical Performance Battery (SPPB) and Timed Up and Go (TUG) test. HRQoL was evaluated using the Sarcopenia Quality of Life (SarQoL) questionnaire.

Results The “smaller” group had significantly lower skeletal muscle mass, handgrip strength, and total SarQoL scores (Total overall: “bigger”, 80.44 ± 9.74 ; “just fit”, 77.54 ± 10.83 ; “smaller”, 71.83 ± 12.89 , post-hoc $p = 0.003$ vs. “bigger”), particularly in the domains of functionality and daily activities. Although no significant differences were observed in objective physical performance measures (SPPB and TUG), subjective HRQoL declined according to the results of the finger-ring test. This association between the finger-ring test and total HRQoL remained significant after adjusting for age and weight. When applying a threshold of ≥ 1 point (“just fit” or “smaller”), the finger-ring test demonstrated a sensitivity of 100% and a negative predictive value of 100% for identifying sarcopenia, supporting its potential role as a simple rule-out screening tool.

Conclusions The finger-ring test may indicate both reduced muscle mass and strength, along with reduced HRQoL. These findings suggest that the finger-ring test is a useful preliminary rule-out screening tool to exclude individuals unlikely to be at risk, and it may also help predict health-related quality of life.

Keywords Sarcopenia, Finger-ring test, Muscle strength, Body composition, Quality of life

*Correspondence:
Changwon Moon
mcw0171@naver.com

¹Department of Physical Medicine and Rehabilitation, College of Medicine, Chung-Ang University, Seoul, Republic of Korea

²Department of Biomedical Institute, Chungnam National University, Daejeon, Republic of Korea

³Department of Rehabilitation Medicine, Chungnam National University College of Medicine, 266 Munhwa-ro, Daejeon 35015, Republic of Korea



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

Introduction

Sarcopenia is a geriatric condition characterized by a decline in muscle mass, muscle strength, and physical function [1], and it is associated with an increased risk of falls, fractures, and mortality [2–4]. The prevalence of sarcopenia varies depending on the diagnostic criteria and region but generally ranges from approximately 10–27% [5]. Therefore, case-finding or screening for sarcopenia among community-dwelling older adults is considered important in clinical practice.

Different case-finding approaches have been proposed by various groups [6–8]. Among various screening tests, the most widely recognized screening tool is the SARC-F questionnaire, which includes five questions, each scored from 0 to 2 points. A score of 4 or higher suggests the need for further sarcopenia testing. However, the SARC-F questionnaire has been limited by its low sensitivity [9].

Several other screening methods used for sarcopenia exist, with the finger-ring test being the easiest for self-assessment [10]. In this test, the index finger and thumb of both hands form a ring, which is then compared to the thickest part of the calf. The results are categorized into three groups: the calf is smaller, just fits, or larger than the finger-ring. Studies report that individuals with a just-fits or smaller calf than the finger-ring have an increased odds ratio of sarcopenia [10, 11].

Despite its simplicity, the diagnostic accuracy of the finger-ring test has shown considerable variability across studies, and its performance is generally inferior to direct calf circumference measurement [11]. The sensitivity and specificity of the finger-ring test were 85.7% and 71.2% in men, 87.5% and 80.8% in women, respectively [12].

However, rather than evaluating the finger-ring test solely based on its diagnostic accuracy, exploring its associations with sarcopenia-related indicators, such as muscle mass, muscle strength, physical function, and quality of life, is essential. Accumulating such information may facilitate the effective use of the finger-ring test in clinical practice.

Therefore, this study aims to investigate the relationship between the finger-ring test and various sarcopenia-related indicators, particularly muscle mass, muscle strength, physical performance, psychological factors, and quality of life (QoL) in community-dwelling older women.

Methods

This cross-sectional study was conducted at a single tertiary medical hospital. Participants were recruited from March 2024 to June 2025. The inclusion criteria were as follows: (1) Community-dwelling women aged 65–80 years, and (2) Individuals who provided consent to participate in the study. The exclusion criteria were as follows: (1) Diagnosed with secondary osteoporosis, (2)

Current long-term use (over 1 month) of steroid medication, (3) Presence of an active malignant neoplasm requiring treatment, (4) Alcohol addiction, (5) History of any prior lifetime fragility fracture (distal radius, hip, neck, or spine compression fracture), (6) Cognitive impairment preventing comprehension of the study protocol, (7) Presence of a metal implant, and (8) Declining to participate. Participants were recruited from seven local senior centers located in urban areas, and only those who met the inclusion and exclusion criteria were enrolled in the study. The ethical validity of this study was approved by the Institutional Review Board of Chungnam University Hospital (CNUH-2022-12-026). All participants provided written informed consent and agreed to participate in the study.

Finger-ring test

For the finger-ring test, each participant performed the test themselves by forming a ring with the index fingers and thumbs of both hands and placing it around the thickest part of the nondominant calf in a natural, relaxed manner, while the leg was bent at a 90-degree angle under the supervision of trained researchers [10]. The calf was then assessed and categorized as “bigger,” “just fits,” or “smaller” in relation to the finger-ring circumference. For example, if the calf exceeded the circumference of the finger-ring, it was classified as “bigger”; if it matched the ring closely, it was classified as “just fits”; and if there was a visible gap between the calf and the ring, it was classified as “smaller.” The test was performed based on the participant’s own hand anatomy, without standardization for finger thickness or hand size, which is a recognized limitation of the FRT but consistent with its intended use as a self-administered tool.

Outcome analysis

Baseline demographics, including age, sex, and medical history, were collected through patient questionnaires. The SARC-F questionnaire was used for sarcopenia screening [13], while the Simple Nutritional Appetite Questionnaire (SNAQ) was used to assess basic nutritional status and appetite in participants [14]. Body composition, including skeletal muscle mass (SMM), skeletal muscle index (SMI), body fat (%), and whole-body phase angle (WBPA), was measured using a multi-frequency bioimpedance analysis machine (BIA, S10, Inbody, Seoul, Republic of Korea). All measurements were performed in a standing position after removal of metal accessories, with participants having fasted and refrained from fluid intake for at least 2 h prior to testing, according to the manufacturer’s guidelines to ensure standardization, consistent with prior reports emphasizing the importance of standardized measurement conditions in BIA [15]. Participants were also instructed to void their bladder

immediately before the assessment to minimize the influence of urine volume on impedance measurements. Participants were instructed to refrain from eating, drinking, or engaging in resistance exercises for at least 2 h before the BIA measurement. Muscle strength was determined using handgrip strength (HGS; in kilograms), measured three times on the dominant hand with a 60-second rest interval between each measurement, and the highest value was used for analysis [7]. A handheld dynamometer (Jamar; Hoggan Scientific, Salt Lake City, Utah, USA) was used. Participants were seated on a chair with their shoulders adducted and elbows flexed at 90° during the HGS test [7]. Physical performance was measured using the Short Physical Performance Battery (SPPB) and Timed Up and Go test (TUG). The SPPB included three tasks: static standing balance, 4-m walking speed at a usual pace, and a 5-time chair rise test. The results were recorded as numerical ratings (range: 0–12), with higher scores indicating better performance [16]. The TUG test was used to assess the functional mobility of participants [17]. For this test, participants were seated in a standard chair with their backs against the backrest. Upon the command of the examiner, participants were instructed to stand, walk 3 m at a comfortable pace, turn around, walk back to the chair, and sit down. The total time from the initial command to the full seating was recorded using a stopwatch. A shorter completion time indicated better functional mobility. Based on the evaluation results, sarcopenia was diagnosed according to the 2019 criteria of the Asian Working Group for Sarcopenia (AWGS) [7].

Quality of life measurement

Health-related quality of life (HRQoL) measurement was conducted using the Korean version of the Sarcopenia Quality of Life (SarQoL-K) questionnaire. The SarQoL-K comprised 22 questions encompassing seven domains and 55 items, including “Physical and Mental Health,” “Locomotion,” “Body Composition,” “Functionality,” “Activities of Daily Living,” “Leisure Activities,” and “Fears.” Each domain and the total score were converted to a numeric scale ranging from 0 to 100, with higher scores indicating better outcomes. The SarQoL-K was translated into Korean and validated [18].

Statistical analysis

Descriptive analyses were performed using the mean and standard deviation for continuous variables, and frequencies and percentages for categorical variables. The normality of the data was assessed using the Kolmogorov–Smirnov test. Depending on the normality assumption, either a one-way Analysis of Variance (ANOVA) or the Kruskal–Wallis test was employed. When a statistically significant difference was detected,

post-hoc analysis was conducted using the Bonferroni correction for ANOVA and Dunn’s pairwise comparisons with Bonferroni adjustment for the Kruskal–Wallis test. In addition, an analysis of covariance (ANCOVA) was performed for the SarQoL-K total score, with FRT group as the fixed factor and age and weight as covariates, to evaluate whether group differences persisted after adjustment. To evaluate the diagnostic performance of the finger-ring test for sarcopenia, sensitivity and specificity were calculated based on sarcopenia status defined by the 2019 AWGS criteria. All analyses were performed using IBM SPSS Statistics (version 23.0; IBM, Armonk, NY, USA), and a p -value of <0.05 was considered statistically significant. A post-hoc power analysis was performed using G*Power 3.1.9.7 (Heinrich-Heine-Universität Düsseldorf, Germany) for the Total SarQoL-K score. Although group sizes were unequal (59, 52, 34), G*Power computes power based on the average group size. The effect size was calculated from observed means, standard deviations, and sample sizes ($\eta^2 = 0.086$, Cohen’s $f = 0.31$). With a total sample size of 145 and $\alpha = 0.05$, the achieved statistical power was 0.92, exceeding the conventional threshold of 0.80.

Results

Basal demographics of participants

A total of 145 community-dwelling women participated in the study. Among them, 59 participants were in the “bigger” group, 52 in the “just fit” group, and 34 in the “smaller” group. Age differed significantly across groups (overall $p = 0.013$), and post-hoc comparisons showed that both the “just fit” and “smaller” groups were significantly older than the “bigger” group (“bigger”, 70.6 ± 3.7 ; “just fit”, 73.0 ± 5.9 ; “smaller”, 74.2 ± 6.1 years). Body weight also differed significantly (overall $p < 0.001$), with post-hoc analysis indicating that the “just fit” and “smaller” groups had significantly lower weight than the “bigger” group (“bigger”, 61.6 ± 8.2 ; “just fit”, 57.8 ± 7.8 ; “smaller”, 52.6 ± 6.1 kg). Similarly, BMI showed significant group differences (overall $p < 0.001$), and post-hoc comparisons revealed that the “just fit” and “smaller” groups had significantly lower BMI than the “bigger” group (“bigger”, 25.4 ± 2.6 ; “just fit”, 24.1 ± 3.0 ; “smaller”, 22.1 ± 2.4 kg/m²). Height did not differ significantly among groups. No significant difference was observed among the three groups regarding the presence of underlying diseases. SARC-F scores and SNAQ scores showed no statistically significant differences among the groups (Table 1).

Muscle mass, grip strength, and physical performances of participants

The SMM and SMI measured via BIA showed significant differences among the three groups. Compared to the “bigger” group (SMM: 20.96 ± 2.71 kg,

Table 1 Baseline demographics according to the finger-ring test results

F (n = 145)	Bigger (59)	Just fit (52)	Smaller (34)	p-value
Age (Years)	70.6 (3.7)	73.0 (5.9) [†]	74.2 (6.1) [†]	0.013 ^a
Weight (kg)	61.6 (8.2)	57.8 (7.8) [†]	52.6 (6.1) [†]	< 0.001
Height (cm)	155.3 (6.1)	154.8 (4.8)	154.2 (4.8)	0.624
BMI (kg/m ²)	25.4 (2.6)	24.1 (3.0) [†]	22.1 (2.4) [†]	< 0.001 ^a
HTN	24 (40.7%)	19 (36.5%)	17 (50%)	0.459
Dyslipidemia	32 (54.2%)	26 (50.0%)	19 (55.9%)	0.438
Diabetes	14 (23.7%)	8 (15.4%)	10 (29.4%)	0.199
SARC-F [‡]	0.0 (1.0)	1.0 (1.0)	1.00 (2.0)	0.063 ^a
SNAQ [‡]	14.0 (2.0)	15.0 (3.0)	14.0 (3.0)	0.453 ^a

BMI Body Mass Index, HTN Hypertension, SNAQ Simple Nutritional Appetite Questionnaire

[†]Post-hoc analysis revealed a statistically significant difference compared to the 'bigger' group

[‡]Data are presented as Median (Interquartile Range, IQR)

^aKruskal–Wallis test

Table 2 Muscle mass, muscle strength, and physical performance according to the results of the finger-ring test

F (n = 145)	Bigger (59)	Just fit (52)	Smaller (34)	p-value
SMM (kg)	20.96 (2.71)	19.75 (2.19) [†]	18.82 (2.04) [†]	< 0.001
SMI (kg/m ²)	6.54 (0.62)	6.14 (0.57) [†]	5.80 (0.57) [†]	< 0.001
PBF (%)	35.88 (6.18)	34.31 (7.18)	31.70 (6.04) [†]	0.005 ^a
WBPA (°)	5.16 (0.50)	4.85 (0.54) [†]	4.69 (0.54) [†]	< 0.001
HGS (kg)	23.63 (4.59)	21.55 (4.02) [†]	21.52 (3.69) [†]	0.015
SPPB	11.44 (0.88)	11.35 (0.95)	11.27 (1.02)	0.745 ^a
TUG (s)	8.65 (1.38)	8.81 (1.23)	9.02 (2.00)	0.512

SMM Skeletal Muscle Mass, SMI Skeletal Muscle Index, PBF Percent Body Fat, WBPA Whole-body Phase Angle, HGS Hand Grip Strength, SPPB Short Physical Performance Battery, TUG Timed up and go Test

[†]Post-hoc analysis revealed a statistically significant difference compared to the 'bigger' group

^aKruskal–Wallis test

95% CI: 20.25–21.67; SMI: 6.54 ± 0.62 kg/m², 95% CI: 6.37–6.70), both the “just fit” (SMM: 19.75 ± 2.19 kg, 95% CI: 19.14–20.36; SMI: 6.14 ± 0.57 kg/m², 95% CI: 5.98–6.30) and “smaller” groups (SMM: 18.82 ± 2.04 kg, 95% CI: 18.11–19.53; SMI: 5.80 ± 0.57 kg/m², 95% CI: 5.60–6.00) had significantly lower values. The PBF showed significant differences between groups and “smaller” group had significant lower values than “bigger” group (“bigger”, 35.88 ± 6.18%, 95% CI: 34.27–37.49; “just fit”, 34.31 ± 7.18%, 95% CI: 32.31–36.31; “smaller”, 31.70 ± 6.04%, 95% CI: 29.59–33.81). WBPA was also significantly lower in the “just fit” and “smaller” group than in the “bigger” group (“bigger”: 5.16 ± 0.50°, 95% CI: 5.03–5.29; “just fit”: 4.85 ± 0.54°, 95% CI: 4.70–5.00; “smaller”: 4.69 ± 0.54°, 95% CI: 4.51–4.88). HGS showed a statistically significant difference among the three groups. post-hoc analysis revealed that the “smaller” and “just fit” group had significantly lower HGS compared to that of the “bigger” group (“bigger”: 23.63 ± 4.59 kg, 95% CI: 22.43–24.83; “just fit”: 21.55 ± 4.02 kg, 95%

Table 3 Cross-tabulation of sarcopenia diagnosis by finger-ring test

	Bigger (FRT 0)	Just fit (FRT 1)	Smaller (FRT 2)	Total
Non-Sarcopenia	59 (100%)	47 (90.4%)	27 (79.4%)	133
Sarcopenia	0 (0%)	5 (9.6%)	7 (20.6%)	12
Total	59	52	34	145

FRT Finger-ring Test

Table 4 Diagnostic performance of the finger-ring test for sarcopenia at two thresholds (≥ 1 point and ≥ 2 points)

Threshold	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)
≥ 1 point (Just fit)	100.0% (75.8–100.0)	44.4% (36.2–52.8)	14.0% (8.2–22.8)	100.0% (93.9–100.0)
≥ 2 points (Smaller)	58.3% (32.0–80.7)	79.7% (72.1–85.7)	20.6% (10.3–36.8)	95.5% (89.9–98.1)

PPV, positive predictive value; NPV, negative predictive value; CI, confidence interval

CI: 20.43–22.67; “smaller”: 21.52 ± 3.69 kg, 95% CI: 20.23–22.81). No statistically significant differences were observed in physical performance measures, including SPPB and the TUG test (Table 2). All confidence intervals are provided in Supplementary Table 2.

Diagnostic properties of finger-ring test of sarcopenia

A total of 145 female participants were classified into three groups according to their finger-ring test results: “bigger” (n = 59), “just fit” (n = 52), and “smaller” (n = 34). The prevalence of sarcopenia was 0% in the “bigger” group, 9.6% in the “just fit” group, and 20.6% in the “smaller” group (Table 3). When the finger-ring test was interpreted as positive at a threshold of 1 point or higher (i.e., “just fit” or “smaller”), the test demonstrated a sensitivity of 100.0% (95% CI, 75.8–100.0), a specificity of 44.4% (95% CI, 36.2–52.8), a positive predictive value (PPV) of 14.0% (95% CI, 8.2–22.8), and a negative predictive value (NPV) of 100.0% (95% CI, 93.9–100.0). However, when a stricter threshold of 2 points or higher (“smaller” group only) was applied, the sensitivity decreased to 58.3% (95% CI, 32.0–80.7), while the specificity increased to 79.7% (95% CI, 72.1–85.7), with a PPV of 20.6% (95% CI, 10.3–36.8) and an NPV of 95.5% (95% CI, 89.9–98.1) (Table 4).

HRQoL measurements of participants

The total SarQoL-K score showed a statistically significant difference among the three groups (p = 0.002). Post-hoc analysis using Bonferroni correction indicated that the “smaller” group scored significantly lower than the “bigger” group. (Total overall: “bigger”, 80.44 ± 9.74, 95% CI: 77.90–82.98; “just fit”, 77.54 ± 10.83, 95% CI: 74.53–80.56; “smaller”, 71.83 ± 12.89, 95% CI: 67.33–76.32). After adjustment for age and weight using ANCOVA, this

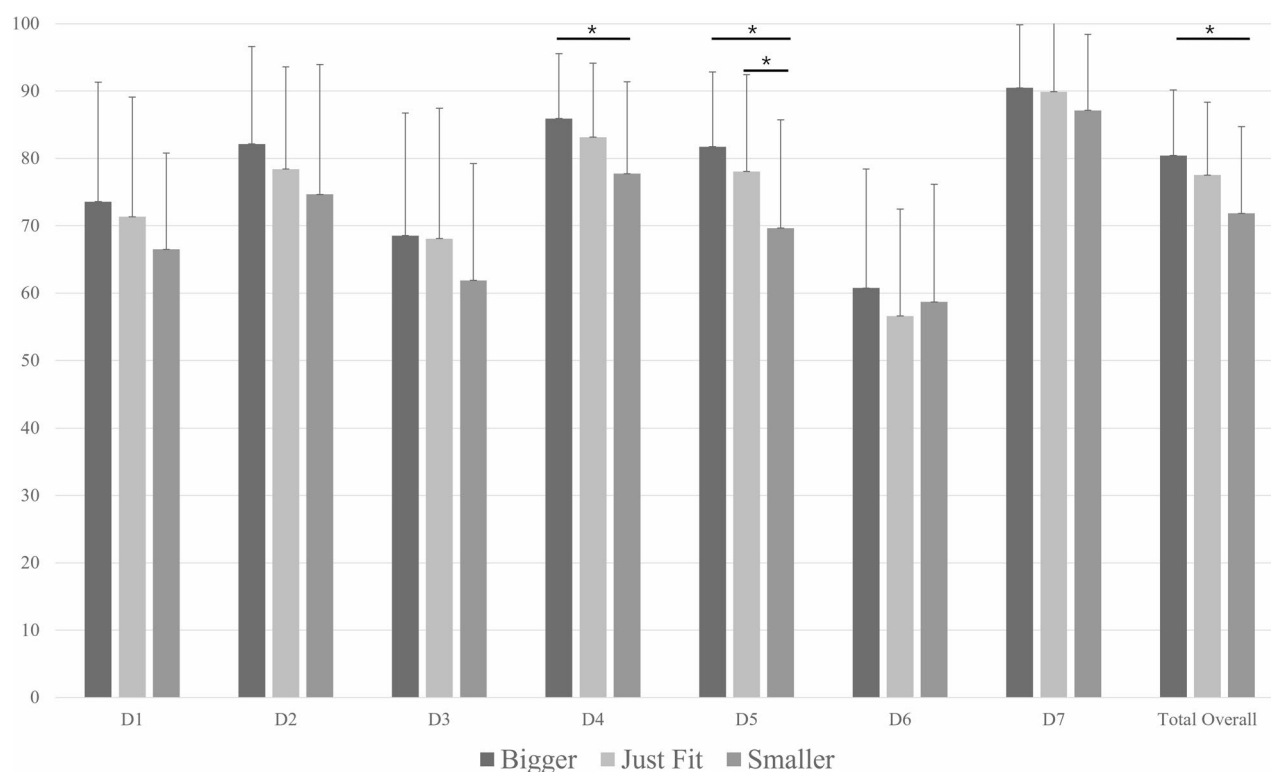


Fig. 1 SarQoL-K domain and total scores by finger-ring test groups. Comparison of SarQoL scores across seven domains (D1–D7: D1 physical and mental health, D2 locomotion, D3 body composition, D4 functionality, D5 activities of daily living, D6 leisure activities, D7 fears) and total scores among participants classified by finger-ring test results (“bigger”, “just fit”, and “smaller” groups). Asterisks (*) indicate statistically significant differences between groups ($p < 0.05$; ANOVA with Bonferroni post hoc tests or Kruskal–Wallis with Dunn’s test and Bonferroni adjustment, as appropriate; see Table 5 for details of pairwise comparisons). Error bars represent standard deviations. SarQoL, Sarcopenia Quality of Life; ANOVA, analysis of variance

Table 5 Results of SarQoL questionnaires according to finger-ring test results

SarQoL	Bigger (59)	Just fit (52)	Smaller (34)	p-value
D1	73.59 (17.75)	71.33 (17.80)	66.51 (14.29)	0.121 ^a
D2	82.15 (14.47)	78.42 (15.18)	74.65 (19.31)	0.144 ^a
D3	68.53 (18.22)	68.09 (19.36)	61.89 (17.32)	0.187 ^a
D4	85.92 (9.61)	83.15 (11.01)	77.74 (13.65) [†]	0.015 ^a
D5	81.74 (11.10)	78.06 (14.36)	69.65 (16.08) ^{†‡}	< 0.001
D6	60.76 (17.66)	56.61 (15.86)	58.69 (17.46)	0.240 ^a
D7	90.47 (9.38)	89.90 (12.63)	87.13 (11.30)	0.246 ^a
Total Overall	80.44 (9.74)	77.54 (10.83)	71.83 (12.89) [†]	0.002

D4 was analyzed using the Kruskal–Wallis test followed by Dunn’s post-hoc test with Bonferroni adjustment. Total overall score and D5 were analyzed using one-way ANOVA with Bonferroni correction for post-hoc comparisons

D1 physical and mental health, D2 locomotion, D3 body composition, D4 functionality, D5 activities of daily living, D6 leisure activities, D7 fears, QoL Quality of life, SarQoL Sarcopenia Quality of Life

[†]Statistically significant difference compared with the “Bigger” group

[‡]Statistically significant difference compared with the “Just fit” group

^aKruskal–Wallis test

association remained statistically significant ($F = 5.442$, $p = 0.005$; Supplementary Table 1).

Among the individual domains, significant differences were observed in functionality (D4) and activities of daily living (D5). For D4, post-hoc analysis using Dunn’s test

with Bonferroni adjustment indicated that the “smaller” group demonstrated significantly lower scores than the “bigger” group (D4: “bigger”, 85.92 ± 9.61 , 95% CI: 83.41–88.43; “smaller”, 77.74 ± 13.65 , 95% CI: 72.97–82.50; $p = 0.015$). For D5, post-hoc analysis using Bonferroni correction revealed that the “smaller” group scored significantly lower than both the “bigger” and “just fit” groups (D5: “bigger”, 81.74 ± 11.10 , 95% CI: 78.85–84.63; “just fit”, 76.22 ± 12.94 , 95% CI: 72.23–80.21; “smaller”, 69.65 ± 16.08 , 95% CI: 64.04–75.26; $p < 0.001$).

No significant differences were found in other domains, including physical and mental health (D1), locomotion (D2), body composition (D3), leisure activities (D6), and fears (D7) ($p > 0.05$ for all). (shown in Fig. 1; Table 5). All confidence intervals are provided in Supplementary Table 3.

Discussion

In this cross-sectional study of community-dwelling older women, classification by the finger-ring test revealed meaningful differences in clinical and functional characteristics across groups. Participants in the “just fit” and “smaller” groups were significantly older and had lower body weight and BMI compared to those in the

“bigger” group. No significant differences were found in the prevalence of underlying diseases or in the SARC-F and SNAQ scores. Muscle mass indicators, including SMM and SMI measured by BIA, were significantly lower in both the “just fit” and “smaller” groups compared to the “bigger” group. Similarly, WBPA was significantly lower in these two groups. Although physical performance measures such as SPPB and TUG showed no significant differences, HRQoL assessed via the SarQoL-K indicated significantly lower total scores in the “smaller” group. Importantly, this association remained significant after adjusting for age and weight, suggesting that the relationship is robust and that confounding is unlikely to meaningfully affect the findings. Furthermore, post-hoc analysis showed that the “smaller” group had significantly lower scores in the domains of functionality and activities of daily living compared to the “bigger” group. From a diagnostic perspective, the finger-ring test demonstrated excellent sensitivity (100.0%) but limited specificity (44.4%) for detecting sarcopenia when the threshold was set at “just fit” or “smaller”.

The finger-ring test, proposed by Tanaka in 2018, demonstrates an association with sarcopenia. Compared to that of the “bigger” group, the OR for sarcopenia was 2.4 (95% CI, 1.4–4.1) in the “just fit” group and 6.6 (95% CI, 3.5–13.0) in the “smaller” group. Furthermore, the test showed an increased hazard ratio (HR) for new-onset sarcopenia over a 2-years: HR 2.1 (95% CI, 1.2–3.8) for the “just fit” group and HR 3.4 (95% CI, 1.8–6.4) for the “smaller” group [10]. Although a meta-analysis reveals that the finger-ring test shows moderate sensitivity (71%, 95% CI: 0.65–0.77) and high specificity (85%, 95% CI: 0.82–0.87), it is recommended as a supplementary tool rather than as a stand-alone method for sarcopenia screening [19].

Based on the findings of Lin et al., the finger-ring test demonstrated a sensitivity of 92.9% and a specificity of 43.5% when a “just fit or smaller” threshold was used to define a positive result. The corresponding positive predictive value was 53.0%, and the negative predictive value was 90.0%. Compared with SARC-F (sensitivity 36.5%, NPV 68.9%) and calf circumference (sensitivity 74.1%, NPV 75.8%), the finger-ring test demonstrated superior sensitivity and NPV. Notably, this pattern of a high NPV is consistent with the findings of our study [11]. The small difference in sensitivity between studies may be attributed to differences in population characteristics, as our study included only women, whereas Lin et al. included both sexes. In this study, when the finger-ring test was interpreted as positive at a threshold of 1 point or higher (i.e., “just fit” or “smaller”), the sensitivity was 100% and the specificity was 44.4%, with a PPV of 14.0% and a NPV of 100.0%. Although this cut-off results in a high false-positive rate and the low PPV indicates that a

positive result has limited diagnostic meaning, the NPV suggests that a negative FRT result can rule out sarcopenia. When the threshold was set at 2 points or higher (“smaller” only), the sensitivity decreased to 58.3% while the specificity improved to 79.7%, with a PPV of 20.6% and an NPV of 95.5%, indicating reduced overall diagnostic performance. Therefore, despite the lower specificity and limited PPV, using finger-ring test with a cutoff of “just fit” or “smaller” may be appropriate as an initial community-based screening step to identify individuals who require no further testing (if “bigger”) and to trigger further assessment (if “just fit” or “smaller”). While the SARC-F questionnaire is also widely used for case finding, its low sensitivity has raised concerns regarding its clinical utility [9]. In fact, studies have shown that calf circumference measurements may have greater diagnostic value compared to SARC-F [11]. Based on our findings and previous reports, the finger-ring test also demonstrated high sensitivity and NPV, supporting its utility as a potential rule-out tool in community screening for sarcopenia. In particular, when the result is “just fit or smaller,” clinicians should consider this as a positive screen that warrants further confirmatory assessments, such as calf circumference or other established diagnostic evaluations.

Additionally, the finger-ring test shows a strong correlation with muscle mass measured via DEXA, aligning with the findings of this study [20]. In our study as well, participants in the “just fit” or “smaller” groups showed significantly lower SMM and SMI compared to those in the “bigger” group. Furthermore, WBPA was also significantly lower in these groups, suggesting that results of the finger-ring test may also have a good correlation with body composition results obtained through BIA. Studies show that sarcopenia is associated with decreased HRQoL [21, 22]. The SarQoL questionnaire, developed in 2013, was used to evaluate seven domains—domain 1: “Physical and Mental Health,” domain 2: “Locomotion,” domain 3: “Body Composition,” domain 4: “Functionality,” domain 5: “Activities of Daily Living,” domain 6: “Leisure Activities,” and domain 7: “Fears.” It is widely used in both clinical and research settings [18]. A previous study reports that the SarQoL scores were, on average, 12.37 points lower in the sarcopenia group than those in the non-sarcopenia group [22]. Similarly, this study showed lower HRQoL among groups categorized by the finger-ring test. Although no significant differences were observed in objective performance measures such as the SPPB and TUG, this should be interpreted with caution. The mean SPPB scores across all groups exceeded 11 out of 12, indicating a potential ceiling effect that may have reduced the sensitivity of this assessment in our relatively high-functioning, community-dwelling cohort. In contrast, lower scores in SarQoL domains related to

functionality (D4) and activities of daily living (D5) suggest that subjective functional declines may emerge earlier than measurable changes in standard objective tests. Accordingly, simple subjective screening tools such as the finger-ring test, when combined with HRQoL assessments, may help identify early functional deterioration before it becomes apparent on conventional performance-based evaluations and support timely exercise or rehabilitation interventions to prevent further decline [23, 24]. Previous longitudinal studies have reported that individuals with a positive finger-ring test result have a higher hazard ratio for developing sarcopenia over a 2-year follow-up period compared to those with negative results [10]. This longitudinal evidence supports our finding that the FRT may capture early vulnerability, reinforcing its potential utility as a simple, community-based screening tool for identifying individuals at increased risk.

Therefore, the finger-ring test, as a simple and easily administered self-assessment tool, may be useful as a rule-out test owing to its high sensitivity and negative predictive value. Individuals with positive FRT results (“just fit” or “smaller”) should be referred for diagnostic evaluation of sarcopenia, including assessments of muscle mass, strength, and physical performance.

Limitation

This study has some limitations, which may affect its generalizability. First, Because of the cross-sectional design of this study, causal relationships between FRT results and SarQoL-K scores cannot be established. Second, the study population consisted exclusively of older Korean women aged 65–80 years. Therefore, the findings may not be generalizable to men, other ethnic groups, or younger/older age ranges. Although the sample size provided sufficient power for our primary analysis, larger studies in more diverse populations are needed to confirm these findings and enhance generalizability. Third, because participants were recruited from senior centers that voluntarily agreed to cooperate, and the participation rate was not systematically documented, some degree of selection bias cannot be excluded. In addition, this recruitment approach may have biased the sample toward individuals who are more health-literate or health-conscious, potentially leading to an underestimation of the true effect sizes. Fourth, the finger-ring test may be influenced by individual anthropometric variations, such as finger thickness and hand size. In addition, anthropometric measurements of finger or hand size were not conducted in this study, which may have affected the interpretation of the FRT results. Future studies should include measurements of finger or hand size to standardize the test or develop calibrated rings. Fifth, While FRT groups differed in age and weight, the association with the total

SarQoL score remained significant after adjusting for these covariates using ANCOVA. This reduces, although does not entirely eliminate, concerns regarding potential confounding. Lastly, muscle mass was assessed using BIA rather than DEXA, and although standardized protocols were applied, BIA is known to be less accurate and may be affected by hydration and nutritional status, potentially introducing measurement bias [15]. Nonetheless, BIA is a recognized and practical method in community-based studies, offering good feasibility and accessibility for estimating muscle mass, even if DEXA is the gold standard. Nevertheless, a key strength of this study lies in its demonstration that the finger-ring test, a simple, low-cost, and easy-to-administer tool, was meaningfully associated with both objective measures (e.g., SMI, SMM) and subjective outcomes (e.g., HRQoL) related to sarcopenia. Compared with calf circumference measurement, the finger-ring test eliminates the need for a tape measure, making it more suitable for self-administration by elderly women in community settings. Furthermore, compared with the SARC-F questionnaire, it exhibits higher sensitivity, thereby reducing the risk of missed diagnoses. These findings suggest that the finger-ring test may serve as a practical rule-out screening method for identifying older adults at risk for sarcopenia in community settings.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12877-025-06908-3>.

Supplementary Material 1.

Acknowledgements

We thank Chungnam National University Hospital and the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health and Welfare, Republic of Korea, for providing grants to support this clinical trial.

Authors' contributions

Byung Chan Lee - Conceptualization, Methodology, Data curation, Formal analysis, Writing-original draft; Juhyun Lee - Investigation, Data curation; Kang Hee Cho - Supervision, Writing-review and editing; Changwon Moon - Conceptualization, Methodology, Writing-review and editing, Funding acquisition.

Funding

This research was supported by.

1. Chungnam National University Hospital Research Fund, 2022.
2. A grant from the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health and Welfare, Republic of Korea (grant number: HR22C1734).

The funders had no role in the design, data collection, data analysis, and reporting of this study. The research team was autonomous in all aspects of the study.

Data availability

The datasets used and/or analyzed in the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The ethical validity of the trial was assessed and approved by the Institutional Review Board of Chungnam National University Hospital (CNUH-2022-12-026). All methods were performed in accordance with the relevant guidelines and regulations, including the Declaration of Helsinki. All the participants provided written informed consent before the trial and agreed to participate.

Consent for publication

Not Applicable.

Competing interests

The authors declare no competing interests.

Received: 19 July 2025 / Accepted: 11 December 2025

Published online: 19 December 2025

References

- Bauer J, Morley JE, Schols A, Ferrucci L, Cruz-Jentoft AJ, Dent E, Baracos VE, Crawford JA, Doehner W, Heymsfield SB, et al. Sarcopenia: A time for Action. An SCWD position paper. *J Cachexia Sarcopenia Muscle*. 2019;10(5):956–61.
- Veronese N, Smith L, Barbagallo M, Yang L, Zou L, Haro JM, Koyanagi A. Sarcopenia and fall-related injury among older adults in five low- and middle-income countries. *Exp Gerontol*. 2021;147:111262.
- Zhang X, Huang P, Dou Q, Wang C, Zhang W, Yang Y, Wang J, Xie X, Zhou J, Zeng Y. Falls among older adults with sarcopenia dwelling in nursing home or community: A meta-analysis. *Clin Nutr*. 2020;39(1):33–9.
- Xu J, Wan CS, Ktoris K, Reijnierse EM, Maier AB. Sarcopenia is associated with mortality in adults: A systematic review and Meta-Analysis. *Gerontology*. 2022;68(4):361–76.
- Petermann-Rocha F, Balntzi V, Gray SR, Lara J, Ho FK, Pell JP, Celis-Morales C. Global prevalence of sarcopenia and severe sarcopenia: a systematic review and meta-analysis. *J Cachexia Sarcopenia Muscle*. 2022;13(1):86–99.
- Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyere O, Cederholm T, Cooper C, Landi F, Rolland Y, Sayer AA, et al. Sarcopenia: revised European consensus on definition and diagnosis. *Age Ageing*. 2019;48(1):16–31.
- Chen LK, Woo J, Assantachai P, Auyeung TW, Chou MY, Iijima K, Jang HC, Kang L, Kim M, Kim S, et al. Asian working group for sarcopenia: 2019 consensus update on sarcopenia diagnosis and treatment. *J Am Med Dir Assoc*. 2020;21(3):300–7. e302.
- Baek JY, Jung HW, Kim KM, Kim M, Park CY, Lee KP, Lee SY, Jang JY, Jeon OH, Lim JY. Korean working group on sarcopenia guideline: expert consensus on sarcopenia screening and diagnosis by the Korean society of sarcopenia, the Korean society for bone and mineral Research, and the Korean geriatrics society. *Ann Geriatr Med Res*. 2023;27(1):9–21.
- Bahat G, Yilmaz O, Kilic C, Oren MM, Karan MA. Performance of SARC-F in regard to sarcopenia Definitions, muscle mass and functional measures. *J Nutr Health Aging*. 2018;22(8):898–903.
- Tanaka T, Takahashi K, Akishita M, Tsuji T, Iijima K. Yubi-wakka (finger-ring) test: A practical self-screening method for sarcopenia, and a predictor of disability and mortality among Japanese community-dwelling older adults. *Geriatr Gerontol Int*. 2018;18(2):224–32.
- Lin YH, Lee KC, Tzeng YL, Lin YP, Liu WM, Lu SH. Comparison of four screening methods for sarcopenia among community-dwelling older adults: A diagnostic accuracy study. *Geriatr Nurs*. 2023;49:157–63.
- Lawongsa K, Srisuwan P, Tejavaniya S, Gesakomol K. Sensitivity and specificity of Yubi-wakka (finger-ring) screening method for sarcopenia among older Thai adults. *Geriatr Gerontol Int*. 2024;24(3):263–8.
- Bahat G, Erdogan T, Ilhan B. SARC-F and other screening tests for sarcopenia. *Curr Opin Clin Nutr Metab Care*. 2022;25(1):37–42.
- Wilson MM, Thomas DR, Rubenstein LZ, Chibnall JT, Anderson S, Baxi A, Diebold MR, Morley JE. Appetite assessment: simple appetite questionnaire predicts weight loss in community-dwelling adults and nursing home residents. *Am J Clin Nutr*. 2005;82(5):1074–81.
- Buckinx F, Landi F, Cesari M, Fielding RA, Visser M, Engelke K, Maggi S, Denison E, Al-Daghri NM, Allepaerts S, et al. Pitfalls in the measurement of muscle mass: a need for a reference standard. *J Cachexia Sarcopenia Muscle*. 2018;9(2):269–78.
- Guralnik JM, Simonsick EM, Ferrucci L, Glynn RJ, Berkman LF, Blazer DG, Scherr PA, Wallace RB. A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. *J Gerontol*. 1994;49(2):M85–94.
- Podsiadlo D, Richardson S. The timed up & go: a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc*. 1991;39(2):142–8.
- Yoo JI, Ha YC, Kim M, Seo SH, Kim MJ, Lee GY, Seo YM, Sung C, Park KS. Translation and validation of the Korean version of the sarcopenia quality of life (SarQoL-K(R)) questionnaire and applicability with the SARC-F screening tool. *Qual Life Res*. 2021;30(2):603–11.
- Qian S, Zhang S, Lu M, Chen S, Liu L, Liu S, Jiang F, Zhang J. The accuracy of screening tools for sarcopenia in older Chinese adults: a systematic review and meta-analysis. *Front Public Health*. 2024;12:1310383.
- Rosa B, Valdivieso R, Cunha-Rodrigues M, Rodrigues M, Lucena ML, Guerra RS, Sousa AS, Mendes J, Sousa-Santos AR, Silva C, et al. The finger-ring test as an indicator of muscle mass estimated by dual-energy X-ray absorptiometry in an adult community-dwelling population. *Eur J Clin Nutr*. 2025;79(5):435–42.
- Beaudart C, Demonceau C, Reginster JY, Locquet M, Cesari M, Cruz-Jentoft AJ, Bruyere O. Sarcopenia and health-related quality of life: A systematic review and meta-analysis. *J Cachexia Sarcopenia Muscle*. 2023;14(3):1228–43.
- Beaudart C, Tilquin N, Abramowicz P, Baptista F, Peng DJ, de Souza Orlandi F, Drey M, Dzhush M, Fabrega-Cuadros R, Fernandez-Garrido J, et al. Quality of life in sarcopenia measured with the SarQoL questionnaire: A meta-analysis of individual patient data. *Maturitas*. 2024;180:107902.
- Bucchi F, Dal Ben S, Culcasi A, Lecora S, Tedeschi R, Da Roit M. Entry-level physical therapist curricula in geriatric care: an Italian National survey study. *Arch Physiother*. 2025;15:69–76.
- Beckwée D, Delaere A, Aelbrecht S, Baert V, Beaudart C, Bruyere O, de Saint-Hubert M, Bautmans I. Exercise interventions for the prevention and treatment of Sarcopenia. A systematic umbrella review. *J Nutr Health Aging*. 2019;23(6):494–502.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.