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Mini Nutritional Assessment-Short Form and Frailty Screening According to 2 Different Frailty Scales

Serdar Ceylan, Merve Güner Oytun, Arzu Okyar Baş, Meltem Koca, Yelda Öztürk, Cafer Balcı, Burcu Balam Doğu, Mustafa Cankurtaran, Meltem Gülhan Halil

Department of Internal Medicine, Division of Geriatrics, Hacettepe University, Faculty of Medicine, Ankara, Turkey

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ABSTRACT

Objective: Mini Nutritional Assessment-Short Form is a malnutrition screening scale that evaluates the patient from different perspectives and is thought to be used in frailty screening. The present study aimed to evaluate the reliability of Mini Nutritional Assessment-Short Form for frailty screening by using 2 frailty scales.

Methods: It was a cross-sectional study that included patients admitted to the geriatric medicine outpatient clinic of a university hospital. Mini Nutritional Assessment-Short Form was performed on all patients. The FRAIL Scale and Clinical Frailty Scale were used as reference frailty scales.

Results: While 62.2% (n = 61) of the 98 participants were female, the median age was 72 (interquartile range: 10.0). The FRAIL Scale (Spearman rho: −0.64, $P < .001$) and Clinical Frailty Scale (Spearman rho: −0.55, $P < .001$) were both correlated inversely and moderately with Mini Nutritional Assessment-Short Form. For both frailty scales, Mini Nutritional Assessment-Short Form cut-off for frailty identification was 11 (for FRAIL Scale, sensitivity: 68.00%, specificity: 87.67%, area under the curve: 0.83, $P < .001$; for Clinical Frailty Scale, sensitivity: 76.47%, specificity: 83.95%, area under the curve: 0.84, $P < .001$), and the cut-off was 13 for robust and pre-frail/frail identification (for FRAIL Scale, sensitivity: 71.70%, specificity: 73.33%, area under the curve: 0.80, $P < .001$; for Clinical Frailty Scale, sensitivity: 71.74%, specificity: 67.31%, area under the curve: 0.74, $P < .001$).

Conclusion: For quick evaluation of frailty and nutritional status concurrently, Mini Nutritional Assessment-Short Form may be an appropriate option.

Keywords: Frail elderly, frailty, malnutrition

INTRODUCTION

Malnutrition is a state resulting from insufficient intake of nutrients and energy that could lead to vitamin and mineral deficiencies, altered body composition (decreased fat-free mass), and body cell mass, resulting in diminished physical and mental function and impaired clinical outcomes from disease.[1] Individuals with malnutrition are at risk for sarcopenia, frailty, and increased mortality.[2] Various screening tools have been developed to diagnose the risk of malnutrition.[3] One of the tools is the Mini Nutritional Assessment-Short Form (MNA-SF) which evaluates the patient in many aspects, such as body mass index (BMI), weight loss, decreased food intake, neuropsychological problems, psychological stress or acute illness, and mobility.[4]

Frailty is a condition that decreases the appropriate response to stressors with the decrease of multiple physiological systems and increases the risk for adverse health outcomes. As frailty progresses, the risk of developing adverse health outcomes increases.[5] The risk of frailty climbs up with advancing age. Frailty ratios vary between 4% and 59% in community-dwelling older adults.[6] It is necessary to evaluate frailty in terms of physical, social, cognitive, and psychological aspects, but the number of scales evaluating frailty in various aspects is low.[7]

Frailty and malnutrition are geriatric syndromes and are common in the aged population. It is valuable that they are screened concurrently for the management of patients.[8,9] Based on this, it has been investigated that MNA-SF, a malnutrition screening tool, can be used in frailty screening

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due to conditions that increase the level of frailty, such as weight loss, low BMI, mobility, dementia, depression, psychosocial stress, and decreased food intake. Using Fried's frailty phenotype (FFP), the cut-off score of 11 for MNA-SF was appropriate for frailty identification.[10] The present study was designed to examine the relationship between MNA-SF and frailty and aimed to evaluate the reliability of MNA-SF for frailty screening by using 2 frailty scales, Clinical Frailty Scale (CFS) and FRAIL Scale (FS).

METHODS

Study Design and Participants

As a cross-sectional study, it was conducted with patients who met the study's inclusion criteria from patients who applied to geriatrics outpatient clinics between 03.01.2022 and 04.03.2022. Inclusion criteria were agreeing to participate in the study, being 65 years and older, and being able to cooperate in the tests. A comprehensive geriatric assessment was performed on all patients. Multimorbidity is the presence of 2 or more chronic diseases.[11] Polypharmacy has been accepted as the usage of 5 or more daily medications.[12] All tests were completed on the same day. Demographic, clinical, and laboratory information of the patients were also recorded.

SCREENING TOOLS

Mini Nutritional Assessment-Short Form

It consists of 6 items as BMI, weight loss in the last 3 months, psychological stress or acute illness in the last 3 months, mobility status, neuropsychological problems such as dementia and depression, and decreased food intake in the last 3 months due to loss of appetite, digestive problems, or chewing or swallowing difficulties. Weight loss and BMI are scored between 0 and 3, and other items are scored between 0 and 2. The maximum score is 14. A score of 12 or more is considered normal nutrition status, 7-11 is considered malnutrition risk, and 7 or under is considered malnutrition.[4] The Turkish validity and reliability study was performed by Sarikaya and colleagues.[13]

Main Points

- Frailty and malnutrition are common, interrelated conditions.
- Screening for malnutrition and frailty together can help healthcare professionals.
- Mini Nutritional Assessment-Short Form is valid and reliable for frailty screening according to reference scales.
- Mini Nutritional Assessment-Short Form may be an appropriate option for quick evaluation of frailty and nutritional status concurrently.

FRAIL Scale

It consists of 5 items and is scored according to the answers given by the patient. Fatigue is interpreted according to the response to "How much time during the previous four weeks did you feel tired?". Answer options were "1 = All of the time, 2 = Most of the time, 3 = Some of the time, 4 = A little of the time, and 5 = None of the time." Answers 1 and 2 are scored as 1 point. Resistance is evaluated according to "By yourself and not using aids, do you have any difficulty walking up ten steps without resting?". "Yes" response is scored as 1 point. Ambulation scored according to the response: "By yourself and not using aids, do you have any difficulty walking several hundred yards?". "Yes" answer is scored as 1 point. Illnesses are evaluated by illness number. "Did a doctor ever tell you that you have hypertension, diabetes, cancer (other than a minor skin cancer), chronic lung disease, heart attack, congestive heart failure, angina, asthma, arthritis, stroke, and kidney disease?" question is asked to the patients. Having 5 or more illnesses is 1 point. Loss of weight item is interpreted based on weight loss in 1 year. First "How much do you weigh with your clothes on but without shoes?" is asked. Second "One year ago in (MO, YR), how much did you weigh without your shoes and with your clothes on?" is asked. After the answers are received, the weight loss ratio is calculated. Percent change > 5 (representing a 5% loss of weight) is scored as 1 point. Zero-point is considered robust, 1 and 2 points pre-frail, and 3 or more points frail.[14] Turkish reliability and validity study was performed by Hymabaccus.[15]

Clinical Frailty Scale

It was developed for the Canadian Study of Health and Aging. A scoring system is based on clinical judgment by interpreting cognition, physical activity, functional dependence, and disease symptoms. Points are regarded as 1: very fit, 2: well, 3: managing well, 4: vulnerable, 5: mildly frail, 6: moderately frail, 7: severely frail, 8: very severely frail, and 9: terminally ill.[16] Reliability and validity study on the Turkish geriatric population was conducted by Özsürekci and colleagues.[17]

Some of the reasons for selecting these frailty scales as references are that their Turkish validity and reliability have previously been proved, they show high performance in predicting adverse health outcomes, they do not require an instrument, and they can be performed quickly.

Ethical Approval

The Non-interventional Clinical Researches Ethics Board of Hacettepe University Faculty of Medicine approved the study (Date: 22.03.2022, Decision Number: 2022/03-14). All subjects signed consent forms.

Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences 24.0 (IBM Corp., Armonk, NY, USA). By making descriptive statistics, categorical variables were expressed as numbers and percentages, and numerical variables were expressed as mean and SD or median and interquartile range (IQR) according to the normal distribution status. Pearson or Spearman tests were used according to the normal distribution status to evaluate the correlation. Using receiver operating characteristics (ROC), the cut-off value, sensitivity, and specificity values of MNA-SF were determined, which are suitable for identifying frailty. A *P*-value of <.05 was accepted to be statistically significant.

RESULTS

While 62.2% (n = 61) of the 98 participants were female, the median age was 72 (IQR: 10.0). The mean BMI was 30.11 ± 5.72. In frailty scales, the median of FS was 1.0 (IQR: 3.0) and the median of CFS was 3.0 (IQR: 1.0) (Table 1).

Mini Nutritional Assessment-Short Form cut-off points were examined for frailty identification with the ROC curve. For both frailty scales, the MNA-SF cut-off for frailty identification was 11, and the cut-off was 13 for robust and pre-frail/frail identification. The area under the curve, sensitivity, and specificity values are indicated in Table 2 and Figure 1.

DISCUSSION

The relationship of MNA-SF with 2 different frailty scales was revealed in the present study. The FS and CFS show a negative correlation with MNA-SF and the MNA-SF cut-off point of 11 was appropriate in terms of sensitivity and specificity in identifying frailty for both frailty scales. When FS and CFS are used as reference scales, MNA-SF appears to be valid and reliable in identifying frailty.

Table 1. Demographic, Clinical, and Laboratory Characteristics of Patients

	N = 98 (n, %)
Age (years) (median, IQR)	72.0 (10.0)
Sex (female)	61 (62.2)
Education (≤5 years)	64 (65.3)
Body mass index (kg/m^2) (mean, SD)	30.11 ± 5.72
Smoking	37 (37.8)
Multimorbidity (≥2 diseases)	67 (68.4)
Polypharmacy (≥5 medicines)	52 (53.1)
Drug number (median, IQR)	5.0 (3.0)
MNA-SF (median, IQR)	13.0 (4.0)
FRAIL scale (median, IQR)	1.0 (3.0)
CFS (median, IQR)	3.0 (1.0)
Comprehensive geriatric assessment	
Urinary incontinence	38 (38.8)
Falls	21 (21.4)
Katz ADL (median, IQR)	6.0 (1.0)
MMSE (median, IQR)	28.0 (4.3)
GDS-15 (median, IQR)	2.0 (6.0)
SARC-F (median, IQR)	1.0 (3.0)
Grip strength (kg) (mean, SD)	Females: 17.87 ± 5.09, Males: 27.84 ± 6.99
Gait speed (m/s) (median, IQR)	0.94 ± 0.35

ADL, activities of daily living; CFS, Clinical Frailty Scale; GDS-15, Geriatric Depression Scale-15; IQR, interquartile range; kg, kilogram; m, meter; MMSE, mini-mental state examination; MNA-SF, Mini Nutritional Assessment-Short Form; N, number; s, second; SARC-F, Strength, Assistance in walking, Rise from a chair, Climb stairs, Falls; FRAIL, Fatique, Resistance, Ambulation, Illnesses, Loss of weight.

Table 2. Sensitivity and Specificity of MNA-SF

MNA-SF Cut-Off	Frailty Scale	Diagnosis	AUC	*P*	Sensitivity (%)	Specificity (%)
11.0	FRAIL	Frail	0.83	<.001	68.00	87.67
	CFS	Frail	0.84	<.001	76.47	83.95
13.0	FRAIL	Pre-frail/frail	0.80	<.001	71.70	73.33
	CFS	Pre-frail/frail	0.74	<.001	71.74	67.31

AUC, area under the curve; CFS, Clinical Frailty Scale; MNA-SF, Mini Nutritional Assessment-Short Form.

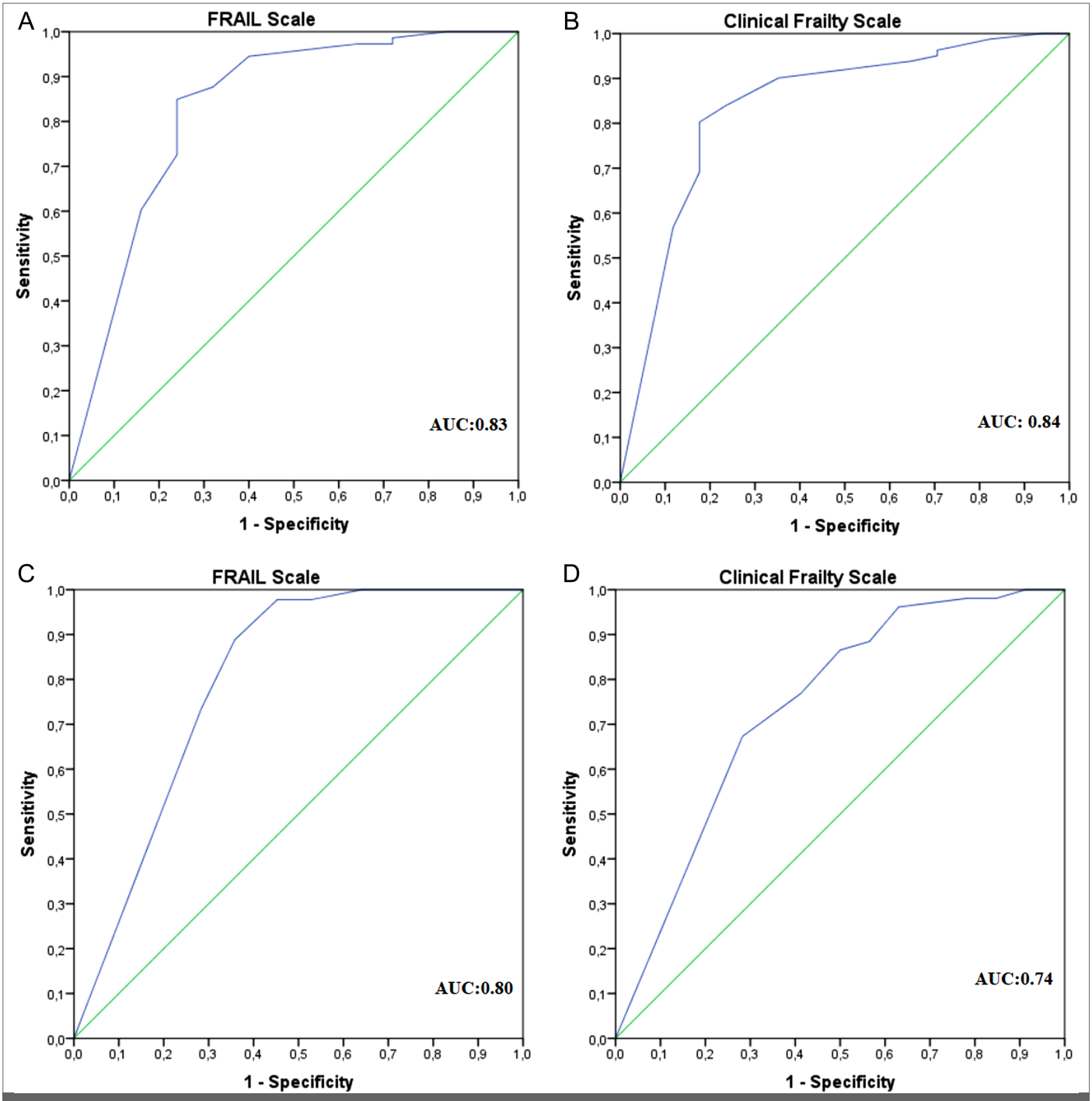

Figure 1. Receiver operating characteristic curve (ROC) analysis of the MNA-SF to detect (A, B) frailty and (C, D) pre-frailty/frailty. AUC, area under the curver; MNA-SF, mini-nutritional assessment-short form

Frailty is a complex condition with physical, social, psychological, and cognitive components.[18] To evaluate this multi-component condition, many scales have been developed. There are many variables like weight loss, weakness, slow walking, cognition, number of medications, use of medications, social relations, number of hospitalizations, functional independence, number of chronic diseases, disease symptoms, vision and hearing functions, falls, age, and gender in these scales.[19] The most significant characteristic connected to malnutrition among these frailty variables is weight loss.[20] Weight loss is one of the indicators of malnutrition and frailty coexistence[8,21,22] that has a negative impact on the patients' clinical course.[23,24] This strong relationship is also seen in the present study. The majority of malnourished or at malnutrition risk patients are pre-frail or frail.

Mini Nutritional Assessment-Short Form is a valid malnutrition screening scale developed from Mini Nutritional Assessment to use the time effectively.[4] It can be used in hospitalized, frail (outpatient/home care/institutionalized), and community-dwelling older adults.[25] Besides malnutrition, it predicts other adverse health outcomes. It can predict post-operative delirium,[26] prolonged length of hospital stay, complications, and mortality.[27] Considering the role of MNA-SF in evaluating these different adverse health outcomes and evaluating the patient in many different aspects with 6 different parameters, MNA-SF was proposed as a potential tool for frailty screening. As a result of the study conducted by Soysal et al,[10] MNA-SF could be used for frailty assessment due to the evaluation made with reference to FFP. In the present study, the MNA-SF cut-off point for frailty identification was 11, and the MNA-SF cut-off for pre-frail/frail identification was 13 for both frailty scales. The same cut-off results were obtained in the previous study with FFP by Soysal et al.[10] This state reveals that MNA-SF cut-off points do not differ between frailty scales. In addition, there is a moderate negative correlation between frailty scales and MNA-SF.

Items of MNA-SF play an essential role in MNA-SF's ability to recognize frailty. Weight loss and decline in food intake are among the questions asked while performing MNA-SF. These 2 items are closely related to frailty as well as malnutrition.[28,29] As age progresses, health problems that reduce mobility such as impaired strength and balance, joint diseases, heart failure, dementia, depression, Parkinson's disease, and cerebrovascular events increase. The mobility limitation is also becoming more frequent for these reasons.[30] This item, used in MNA-SF, gives a strong opinion on frailty. The examination of neuropsychological problems is valuable for evaluating conditions closely related to frailty, such as the presence of dementia and depression.[31,32] Other parameters that increase frailty include acute hospitalization and psychological stress.[33,34] So, MNA-SF has essential questions for assessing frailty, and the present study shows the relationship between MNA-SF and frailty.

The study has some limitations. First, it is a single-center cross-sectional study. The second disadvantage is the limited number of patients. On the other hand, its strengths are the use of frailty scales whose relationship with MNA-SF has rarely been evaluated before, including a frailty scale that evaluates cognitive function.

In conclusion, it has been shown that MNA-SF can be used in frailty screening by comparing it with 2 different scales. Mini Nutritional Assessment-Short Form may be a suitable choice for a quick assessment of frailty and nutritional status simultaneously.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Hacettepe University (Date: 22.03.2022, Number: 2022/03-14).

Informed Consent: Written informed consent was obtained from all patients who participated in this study.

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