Journal of Aging Research & Clinical Practice©
Volume 2, Number 1, 2013

THE MINI NUTRITIONAL ASSESSMENT AS AN INDICATOR OF FRAILTY IN OLDER FINNISH PEOPLE

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Abstract: *Objective:* To evaluate how well the Mini Nutritional Assessment (MNA) screening test is able to identify frailty in community-dwelling older people. *Design:* Cross-sectional study. *Setting:* Population-based. Participants: 584 persons aged 75 and older (mean 81.2 SD 4.6), 70% female. *Measurements:* Nutritional status was assessed using the MNA and frailty was defined according to the modified Fried´s frailty criteria (FCC). *Results:* According to the mini-nutritional assessment classification, 65% (n=380), 34% (n=199), and 1% (n=5) of the participants were assessed as well-nourished, at risk of malnutrition, and malnourished, respectively. Using the FFC, 38% (n=219) were not-frail, 47% (n=276) were pre-frail and 15% (n=89) were frail. Of all 199 participants identified as being the risk of malnutrition by MNA, 15% (n=30) were not-frail, 52% (n=104) were pre-frail and 33% (n=65) were frail, by FFC. Furthermore 50% (n=189) were not-frail, 45% (n=170) were pre-frail and 5% (n=21) were frail among well-nourished participants. The sensitivity of the MNA in identifying frailty was 0.50, specificity 0.86, positive predictive value 0.85, negative predictive value 0.52 and the Youden Index 0.36. *Conclusion:* Mini Nutritional Assessment screening test is not sufficiently sensitive for screening frailty status in older population. Frailty is a comprehensive syndrome and may require a more extensive screening tool including all components of frailty.

Key words: Frailty, MNA, community-dwelling, older people.

Introduction

Frailty is a clinically important syndrome in older people and it is associated with at an increased risk of functional decline (1), dementia (2, 3), falls, morbidity, or mortality (4-7). The first time frailty was defined by Fried et al. (7). They derived criteria from clinical data and the main components were unexplained weight loss, muscle weakness, self-reported exhaustion, poor endurance and low activity level. Fried and coworkers also validated their definition for frailty (7). Later other definitions have been described: the FRAIL scale (6, 8), the Study of Osteoporotic Fractures (SOF) Frailty Index (9), and The Comprehensive Geriatric Assessment (CGA) Frailty Index (10). However, there is no consensus about the criteria.

Poor nutritional status is conceptualized to be an essential component of frailty in criteria. One of the main characteristics of frailty is shrinking of muscle and total body mass (7) measured by unintentional weight loss, as well as a low functional capacity (3, 11, 12). The Mini Nutritional Assessment (MNA) method has been designed to provide a screening tool for malnutrition risk in older people (13) also among community-dwelling older people (14, 15). The maximum sum score of the MNA is 30; scores 24.0-30.0 indicate normal nutritional status, scores 17.0-23.5 risk of malnutrition, and 0-16.5 malnutrition (13). Scores of 17.0 to 23.5 have been significantly associated with frailty in the recent studies (16-18). In addition to screening malnutrition or risk of malnutrition MNA has been proved to be a good tool for predicting frailty in hospitalized older people (18). However, we do not know if we can identify the person with frailty or risk of frailty by MNA among community-dwelling older people. As far as we know, our study is the first study to examine whether the MNA is useful in identifying frailty among community-dwelling older people. The aim of this study was to evaluate whether the MNA is an appropriate tool for assessing frailty among community-dwelling older people.

Methods

The cross-sectional data are based on Geriatric Multi¬disciplinary Strategy for the Good Care of the

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Received November 12, 2012
Accepted for publication December 3, 2012

Elderly (GeMS) study. This was a population-based randomized comparative study evaluating the effects of multidisciplinary geriatric assessment and rehabilitation. The study sample (n=1,000) was randomly selected from all the ≥ 75-year-old people (n=5,615) living in the city of Kuopio in November 2003. A total of 700 home-dwelling persons attended the baseline examination in 2004 (15). This study utilized the data from 2005 because one of the five frailty criteria was defined using each participant's change in weight from 2004 to 2005. Seventy-five participants were lost to follow-up in 2005 because of death (n=62), refusal to participate (n=10), and loss of contact (n=3). For the purpose of this study persons with insufficient data on frailty criteria or MNA scores (n=41) were excluded from the analysis. The present study was thus based on 584 community-dwelling older people. All participants or their proxies gave written informed consent to participate in the study. The study protocol was approved by the Research Ethics Committee of the Northern Savo Hospital District, Kuopio, Finland.

All participants were interviewed by three trained nurses. Data collection, including nutritional assessment, was supplemented by a caregiver interview if the participant had cognitive impairment. The MNA developed by Guigoz et al. (13) was used for the subjective assessment of nutritional status. The validated questionnaire is administered in 2 stages (screening and assessment). The full MNA includes 18 items grouped into 4 categories: anthropometric assessment (BMI calculated from weight and height, weight loss, and arm and calf circumferences); general assessment (lifestyle, medication, mobility and presence of signs of depression or dementia); short dietary assessment (number of meals, food and fluid intake, and anatomy of feeding), and subjective assessment (self-perception of health and nutrition) (13).

Frailty was defined according to the five frailty criteria used in the Cardiovascular Health Study (CHS): shrinking / sarcopenia, weakness, poor endurance and energy, slowness and low physical activity level (7). For shrinking / sarcopenia, weakness and slowness, similar criteria as in the CHS were used. Adapted criteria were used for poor endurance/energy and low physical activity (19).

1. Shrinking / sarcopenia was defined as a weight loss of ≥ 5% of body weight in the prior year (7). Weight was measured at each study examination by the study nurse using the same digital scale with an error of 100g.
2. Weakness was defined as the lowest quintile for grip strength (7) adjusted for gender. Grip strength was measured on the left and right hand using a Saehan dynamometer. The highest value of the two measurements was used. Subjects who were unable to perform the grip strength test received the value of zero.
3. Poor endurance and energy were defined based on the answer to the following item of the self-report Geriatric Depression Scale (GDS): (20) "Do you feel full of energy? Yes/No". Subjects who answered 'no' were positively identified for this criterion.
4. Slowness was defined as the slowest quintile (7) of the subjects based on the time to walk 10 meters, adjusted for gender, and as the subjects who were unable to perform this test. A digital stopwatch was used. Two-meter run-in distance was applied.
5. Low physical activity level was defined using a modified version of the six-grade Grimby scale for classification of physical activity (21). Subjects who reported being in the lowest grade ('I do not move any more than necessary to cope with activities of daily life') or who were bedridden were defined as having a low physical activity level.

Participants were considered frail if they met three or more of the five frailty criteria, pre-frail if they met one or two of the criteria, and not-frail if they met none of the criteria. This was consistent with the categories used in the CHS (7).

MNA for assessing frailty status was evaluated according to sensitivity, specificity, positive and negative predictive value with regard to the frailty scores. Sensitivity, specificity and predictive values for the tools were calculated using the standard cut-off score for risk of malnutrition <24. Diagnostic accuracy was calculated by Youden index (sensitivity+specificity-1), with at least 0.7 indicating good diagnostic accuracy. Analyses were performed using SPSS version 19.0. (SPSS, Inc., Chicago, IL).

Results

The mean age of 584 community-dwelling participants was 81.2 (SD 4.6) years; 70% (n=409) were women. According to the MNA classification, 65% (n=380), 34% (n=199), and 1% (n=5) of the participants were assessed as well-nourished, at risk of malnutrition, and malnourished, respectively (Table 1). Using the FFC, 38% (n=219) were not-frail, 47% (n=276) were pre-frail and 15% (n=89) were frail. Of all 199 participants identified as being the risk of malnutrition by MNA, 15% (n=30) were not-frail, 52% (n=104) were pre-frail and 33% (n=65) were frail, by FFC. Furthermore among well-nourished persons 50% (n=189) were not-frail, 45% (n=170) were pre-frail and 5% (n=21) were frail. The sensitivity of the MNA in identifying frailty was 0.50, specificity 0.86, positive predictive value 0.85, negative predictive value 0.52 and the Youden Index 0.36 (Table 2).

Discussion

In our study, we found that among participants at risk of malnutrition, one third had frail and every other had

pre-frail, and one seventh had not-frail status. This is contradictory in comparison with the study of Abellans (9) where all participants with not-frail status were well nourished. One reason for the discrepancy could be differences between populations. Our population was community–dwelling and healthier and sample size was larger than in previous studies (16-18).

Table 1
Frailty by MNA categories

Variable	Not-frail 219 (37.5)	Pre-frail 276 (47.3)	Frail 89 (15.2)	All 584 (100.0)
MNA groups, n (%)				
Well-nourished	189 (49.7)	170 (44.7)	21 (5.5)	380 (100.0)
At risk	30 (15.1)	104 (52.3)	65 (32.7)	199 (100.0)
Malnourished	0 (0.0)	2 (40.0)	3 (60.0)	5 (100.0)

MNA = Mini Nutritional Assessment

Table 2
Diagnostic performance of the FFC compared to the MNA

	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)	Youden Index
FCC to MNA	0.50 (0.45-0.55)	0.86 (0.83-0.92)	0.85 (0.79-0.90)	0.52 (0.47-0.57)	0.36

PPV = Positive predictive value; NPV = Negative predictive value; FFC=Five Frailty Criteria; MNA=Mini Nutritional Assesment

The low sensitivity value (0.50) limit to the use of the MNA as a screening tool for frailty. The MNA would be able to identify only every other of true frail cases when FFC was used as a standard. However, the specificity (0.85) was better, suggesting that people with the nutritional problems are likely to have frailty status and are in need of comprehensive frailty assessment. Youden Index also indicated weak overall diagnostic accuracy. One possible explanation is that slowness as one of the major frailty criteria (22-24) was based on the time to walk 10 meters, whereas MNA measured mobility as the ability to get out of bed or go out (13). In addition, MNA is not assessing muscle strength or physical activities, which are essential part of frailty criteria. Also weakness is one of the fifth frailty criteria (7) based on the grip strength, but not include in MNA test. Grip strength is a powerful predictor of disability and morbidity and is used in many scores of frailty so as the FFC (16). However malnutrition speeds lean body mass loss and decreases competence and therefore underlies declining grip strength in the frail older person (25).

The strengths of the present study were the population-based design and a representative sample of community-dwelling participants. The participants underwent comprehensive interviews and geriatric assessment, and the study design and data collection was conducted by a multiprofessional research team. Furthermore, all the nutritional screens with the MNA-SF were carried out by the same three nurses.

Conclusion

In conclusion, the Mini Nutritional Assessment screening test is not sensitive enough for screening frailty status in older community-dwelling population. Frailty is a comprehensive syndrome and may require a more extensive screening tool including other components of frailty.

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