J Nutr Health Aging. 2018;22(9):1039-1044

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RELIABILITY AND VALIDITY OF TURKISH VERSION OF THE SIMPLIFIED NUTRITIONAL APPETITE QUESTIONNAIRE (SNAQ)

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Abstract: *Objective:* We aimed to investigate reliability and validity of the Turkish version of the Simplified Nutritional Appetite Questionnaire (SNAQ) in geriatric outpatients. *Design/Setting:* A cross-sectional study was designed through 2013-2016 years. At first, translation and back translation processes of the SNAQ from English to Turkish languages were done consecutively. Then construct validity was performed. *Participants:* They were recruited among the outpatients aged >=60 years that were consecutively admitted to the geriatric outpatient clinic of the Istanbul University hospital. *Measurements:* Demographic data was recorded. SNAQ, Mini Nutritional Assessment (MNA), six-item Katz activities of daily living (ADL) and eight-item Lawton instrumental activities of daily living (IADL) scales were applied. *Results:* 442 participants consisted of 305 women and 137 men with a mean age of 77.1 ± 6.8 years. The SNAQ identified 21.5% (n=95) of the participants with poor appetite. Reliability analysis showed good inter-rater reliability (r= 0.693, p< 0.05) and test-retest stability (r= 0.654, p< 0.05). Cronbach's alpha coefficient was 0.522. In terms of construct validity of SNAQ, Cohen's kappa analysis showed fair to moderate agreement between SNAQ and MNA (κ=0,355, p<0.001). Female gender, being illiterate, functional dependency in IADL were significantly associated with poor appetite. The SNAQ score was weakly correlated with scores of MNA-SF and MNA-LF (r=0.392 and r=0.380, respectively, p<0.0001 for both). There was statistically significantbut negligible correlation between the SNAQ and Katz ADL index, Lawton IADL index, and age. *Conclusion:* Turkish version of the SNAQ is a simple measurement with sufficient reliability and validity to screen poor appetite in community-dwelling older adults.

Key words: SNAQ, appetite, reliability, validity, Turkish.

Introduction

Loss of appetite and changes in appetite are natural parts of aging and can lead to severe weight loss. 15-30% of older adults are estimated to have anorexia of ageing, with higher rates in women, nursing home residents, hospitalized patients and with increasing age (1). Anorexia of aging has been stated as a geriatric syndrome with multiple adverse health outcomes such as malnutrition (MN), sarcopenia, and physical frailty (1, 2).

MN is a prevalent geriatric syndrome. In a study involving 4507 older adults from different settings, prevalence of MN is reported approximately 25%, with differences between the settings (rehabilitation, 50.5%; hospital, 38.7%; nursing home, 13.8%; community, 5.8%). Risk of MN prevalence is almost 50% (3). MN is often undetected and untreated causing a wide variety of adverse consequences. MN and anorexia related weight loss contributes to progressive decline in health, reduced physical function, impaired cognitive status, increased falls, hip fractures, compromised immunity, pressure ulcers, increased utilization of health care services, premature institutionalization, and mortality (4, 5). Screening, early detection and treatment of anorexia may prevent weight loss and MN, improve health outcomes, and reduce mortality. Thus, screening of poor appetite may be essential for older adults periodically (6).

The Simplified Nutritional Appetite Questionnaire (SNAQ) was developed to predict >5% weight loss over six months in older adultsliving in both long-term care facilities and in the community with a sensitivity and specificity of 81.6% and 84.6%, respectively (7). Patients identified as having poor appetite using this screening tool will need further investigation to identify the cause.The Mini Nutritional Assessment test (MNA) is worldwide accepted and shows high prevalence of MN in different settings. Because of its specific geriatric focus, MNA is recommended as the basic evaluation of nutritional status in older adults (8).

According to the Turkish government datas in 2016, the proportion of the population aged >=65 years has risen to 8.3% in Turkey (9). The prevalence of malnutrition, including a risk of malnutrition, was reported 27–39% in Turkish community-dwelling older adults (10, 11, 12). It is important to detect loss of appetite, which may lead to malnutrition, risk of malnutrition and weight loss. SNAQ is a commonly used tool but the Turkish version of this scale had not been validated yet. The aim of this study is to assess the validity and reliability of the Turkish version of the SNAQin regards to well-known malnutrition screening test such as MNA which has been validated for Turkish population (13).

Received April 3, 2018
Accepted for publication April 24, 2018

Published online May 28, 2018, http://dx.doi.org/10.1007/s12603-018-1051-3

Methods

Translation and Testing Reliability of the SNAQ

For reliability analysis, only community-dwellingoutpatients aged >=60 years able to give informed consent were eligible for language validation. Hence,those with conditions such as dementia, confusion and unconsciousness were excluded. One bilingual expert translated SNAQ from English to Turkish. 3 bilingual experts in geriatrics reviewed the translation and discussed on conceptual adequacy and clarity and decided on the final draft version. After the consensus on the final version, a bilingual translator blinded to the original questionnaire performed the back-translation process from Turkish to English. 4 bilingual experts reviewed the back-translation. After approval of all translated versions, Turkish SNAQ version was applied face-to-face to a small group of participants to reveal their doubts and suggestions regarding comprehension and cultural relevance of the questionnaire. Afterwards, two independent experts applied the SNAQ to the participants in separate rooms in order to assess "inter-rater reliability". One of the experts also applied the questionnaire by phone to these participants two weeks later in order to evaluate "test-retest reliability".

Testing Construct Validity of the SNAQ

Community-dwelling older adults >=60 years of age admitted to Istanbul Medical School Geriatrics outpatient clinic at the first admissionbetween 2013-2016 were enrolled to the study.Patients with informed consent were included the study. Demographic data including age, sex, and educational status were collected through interviews. Comorbidities were recorded. The SNAQ and the full MNA forms were applied to the patients by interviewing. SNAQ consists of four simple questions. Responses were scored by using a 5-point (A to E) scale. The total SNAQ score is the sum of scores on the 4 items, with lower scores indicating loss of appetite. Possible scores range from 4 (worst) to 20 (best). SNAQ score <=14 may identify persons with anorexia at risk of >5% weight loss over six months. Results of the SNAQ was compared to the MNA as a reference technique (14). The two-step MNA procedure (MNA-short form and MNA) was used: screening with the MNA-short form (MNA-SF, 6 questions) followed by, if required, assessment using the full MNA (9 questions and 3 anthropometric measurements). A MNA-SF score >=12 excludes MN and MN risk, which signs further assessment unnecessary. A MNA-SF score <12 indicates a need for the full MNA test. A total score >23.5 signifies normal nutritional status, 17–23.5 means MN risk and <17 indicates MN. Poor nutrition was defined as the presence of either MN or MN risk. Functional status was assessed by the six-item Katz activities of daily living (ADL) scores and eight-item Lawton instrumental activities of daily living (IADL) scores.The scores for each item were determined as 1, 2, and 3 in case the patient was totally dependent, partially dependent and independent for the activity, respectively. ADL total scores <=6, 7–12 and 13–18 points and IADL total scores <=8, 9–16 and 17–24 points corresponded to dependency, partial dependency, and independency, respectively (15). For testing the construct validity, the SNAQ was administered concurrently with MNA then Cohen's kappa coefficient and Spearman rank correlations were assessed between the SNAQ and MNA. Ethical approval was obtained from the Local Ethics Committee.

Statistical analysis

Data analyses were performed by IBM SPSS Statistics version 21 for Windows (SPSS Inc, Chicago, Ill, USA). Descriptive statistics are reported as means ± standard deviations, median and interquartile range or percentages as appropriate. The inter-rater reliability and test–retest reliability were assessed using the Spearman's correlation. Internal consistency reliability was determined using Cronbach's alpha. Cohen's kappa coefficient was examined to test the agreement between SNAQ and MNA. Kappa result is interpreted as follows: values ≤ 0 as indicating no accordance and 0.01–0.20 as none to slight, 0.21–0.40 as fair to moderate, 0.41–0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as almost perfect agreement. Chi-square test was used to compare categorical variables. Spearman's correlation was run to determine the relationship between SNAQ and MNA, Katz ADL index, Lawton IADL index, and age. Correlation results were interpreted as follows: values between 0.0-0.24 as weak, 0.25-0.49 as moderate, 0.50- 0.74 as substantial, and 0.75- 1.00 as almost perfect.A p-value of less than 0.05 was considered statistically significant.

Results

Reliability

A total of 15 older adults (10 female, 5 male; mean age: 74.4±5.3 years) were included in the reliability analyses. Regarding the inter-rater reliability, the evaluations made by the two experts were substantially correlated indicating good inter-rater reliability ($r= 0.693$, $p< 0.05$). Similarly, test-retest stability was good ($r= 0.654$, $p< 0.05$). Cronbach's alpha coefficient was 0.522. The scores of each item are given in Table 1. Item 4 has the narrowest range which has been scored from 3 to 4.

Table 1
Mean, standard deviation, and minimum and maximum score for each item of the Turkish version of the SNAQ

Questions	Mean	SD	Min-Max
1	4.1	1.1	1-5
2	3.5	0.9	1-4
3	4	0.8	2-5
4	3.6	0.5	3-4

Construct Validity

1107 older adults admitted to the geriatric outpatient clinic in the study period. 442 participants had informed consent among those underwent comprehensive geriatric assessment. Study population comprised 305 women and 137 men, with a mean age of 77.1 ± 6.8 years.72.9% of participants were with hypertension, 28.1% with diabetes mellitus. Almost all participants (95.9%) were independent in their ADL and 76.5% were independent in their IADL.28.7% (n=127) had poor nutritional status. According to the SNAQ 21.5% (n=95) of the participants had poor appetite. Table 2 shows detailed social and clinical characteristics of the study population.

Table 2
Social and clinical characteristics of the study population (n=442)

Characteristics		mean±SD or proportion (n)
Age		77.1 ± 6.8 years
Gender		
Female		69% (n=305)
Male		31% (n=137)
Educational status		
Illiterate		32.6% (n=144)
Primary school		32.8% (n=145)
Secondary school		9.5% (n=42)
High school		11.1% (n=49)
University		14% (n=62)
Systemic diseases		
Hypertension		72.9% (322)
Diabetes mellitus		28.1% (n=124)
Functional status		
ADL		
	Independent	95.9% (n=424)
	Partially dependent	4.1% (n=18)
	Dependent	n=0
IADL		
	Independent	76.5% (n=338)
	Partially dependent	21.3% (n=94)
	Dependent	2.3% (n=10)
Nutritional status assessed by MNA		
Poor nutrition		28.7% (n=127)
Malnutrition		4.1% (n=18)
Malnutrition risk		22.9% (n=101)
Normal nutrition		71.5% (n=323)
Appetite status assessed by SNAQ		
Normal		78.5% (n=347)
Decreased		21.5% (n=95)

ADL: Activities of daily living, IADL: Instrumental activities of daily living, MNA: Mini Nutritional Assessment, SNAQ: Simplified Nutritional Appetite Questionnaire

The mean and median scores of the SNAQ were 15.7±2.3 and 16 (7-20, min-max). The mean scores of MNA-SF and MNA-LF were 12.1±2.1 and 19.9±3.7, respectively. The mean Katz ADL and Lawton IADL scores were 17±1.7 and 20.4±4.9, respectively. Table 3 shows mean scores of the tools.

Table 3
Mean scores of the tools used in comprehensive geriatric assessment

Scales (number)	Mean±Std. Deviation
SNAQ (n=442)	15.7±2.3
MNA-SF (n=442)	12.1±2.1
MNA-LF (n=85)	19.9±3.7
Katz ADL index (n=442)	17±1.7
Lawton IADL index (n=442)	20.4±4.9

SNAQ: Simplified Nutritional Appetite Questionnaire, MNA-SF: Mini Nutritional Assessment Short Form, MNA-LF: Mini Nutritional Assessment Long Form, ADL: Activities of daily living, IADL: Instrumental activities of daily living

Regarding construct validity; results of the SNAQ compared to the MNA as a gold standard method was examined. Cohen's kappa analysis showed fair to moderate agreement between SNAQ and MNA ($\varkappa$=0,355, p<0,001) (Table 4). According to Mann Whitney-U analysis MNA scores were statistically significantly lower in group with poor appetite assessed by SNAQ (median scores were 13 (5-14) and 11 (3-14), p<0,0001).

In terms of associations between SNAQ and social and clinical factors; female gender (poor appetite was 25.2% and 13.1% in females and males, respectively), being illiterate, functional dependency in IADL were significantly associated with poor appetite. There was no association between poor appetite and comorbidites (hypertension, diabetes mellitus) and functional status in ADL (Table 4). The Spearman's correlation coefficients between the SNAQ and nutritional status, functional status and age are shown in Table 5. The SNAQ score was statistically significantly weakly correlated with scores of the both MNA-SF and MNA-LF (r=0.392, p<0.0001 and r=0.380, p<0.0001, respectively). There was statistically significant negligible correlation between the SNAQ and Katz ADL index, Lawton IADL index, and age.

Discussion

In this study, we studied the reliability and validity of Turkish SNAQ. We found that Turkish version of the SNAQ had sufficient reliability and validity. Reliability analysis showed good inter-rater raliability and test-retest stability. C. alpha coefficient was 0.522 which has been suggested to be 0.70 or higher in order to reflect good internal consistency in general (16). Similarly, previous studies of the SNAQ reported C. alpha coefficient between 0.5-0.6 in accordance with our study (7, 14, 17, 18). A possible associated factor with current lower C. alpha result is item 4 (number of meals eaten a day)

Table 4
Associations between poor appetite assessed by SNAQand social and clinical parameters

Characteristics			Poor appetite ratio% (number)	Significance (p value)
Gender				0,004
	Female		25.2 % (n=77)	
Male			13.1 % (n=18)	
Educational status				0.006**
	Illiterate		29.9% (n=43)	
	Primary school		15.9% (n=23)	
	Secondary school		26.2% (n=11)	
	High school		10.2% (n=5)	
	University		21% (n=13)	
Medical histories				
	Hypertension		22.4% (n=72)	0.467
	Diabetes mellitus		21% (n=26)	0.867
	Dementia		24% (n=12)	0.647
	Parkinson‘s disease		26.3% (n=5)	0.574
Functional status				
	ADL			0.24
		Independent	21% (n=89)	
		Partially dependent	33.3% (n=6)	
	IADL			
		Independent	17.5% (n=59)	
		Partially dependent	34% (n=32)	
		Dependent	40% (n=4)	
Nutritional status assessed by MNA				<0.001#
	Poor nutrition		44.9% (n=57)	
	Normal nutrition		12.1% (n=38)	

** post hoc analysis showed the significant difference between illiterate group and primary school group (p=0.0045); #Cohen’s kappa analysis; SNAQ: Simplified Nutritional Appetite Questionnaire, MNA: Mini Nutritional Assessment, ADL: Activities of daily living, IADL: Instrumental activities of daily living

of the SNAQ which has been scored between 3-4 pointwhile other items scored between a larger range in the present study. 60% of the participants answered “d” (4 points). When item 4 is excluded from the scale the new c. alpha is calculatedas 0.757. Consistent with our result, item 4 was reported with a narrow range in Japanese and Brazil validation of the SNAQ. Another possible associated factor is that the scale has fewer items (4 questions) which has been stated as associated with lower C.alpha values of instruments in general (16). Neverthless, Turkish SNAQ reliability was sufficient and was in accordance with other reported languages.

According to the SNAQ 21.5% of the participants had poor appetite in our study. This result is consistent with prevalences of poor appetite in community dwelling older adults which has been reported between 15-30% in previous studies.

Regarding the construct validity, we observed that SNAQ was associated with MNA which is a worldwide accepted instrument as the basic evaluation of nutritional status in older adults.Similarly, Nakatsu et al. and Rolland et al. reported the total SNAQ score was moderately correlated with MNA (r= 0.30 and r = 0.47, respectively) (14, 19). SNAQ is a questionnarie which promises to predict >5% weight loss over six months. However, we compared SNAQ and MNA at the same visit as aforementioned previous validation studies performed. Because of this cross sectional design of the study, MN would not occur while we were screening poor appetite. Hence r value may not be resulted higher. Despite this lower correlation coefficient we observed a significant relationship between poor appetite and current lower MNA scores in Mann Whitney-U analysis. Consistent with our result, Donini et al. observed that MNA scores were significantly lower in anorexic older adults than non-anorexic older adultsin their cross-sectional study (20). Other cross-sectional studies have shown associations between anorexia of aging and nutritional

status; however, both were assessed by different scales (18, 21).

We observed poor appetite assessed by SNAQ is associated with older age and female gender in accordance with previous studies (1,22).

Table 5
Correlations between SNAQ and nutritional status, functional status and age

	MNA-SF	MNA-LF	ADL	IADL	Age
r-value	0.392	0.380	0.184	0.197	-0.111
p-value	<0.0001	<0.0001	<0.0001	<0.0001	0.019

SNAQ: Simplified Nutritional Appetite Questionnaire, MNA-SF: Mini Nutritional Assessment Short Form, MNA-LF: Mini Nutritional Assessment Long Form, ADL: Activities of daily living, IADL: Instrumental activities of daily living

Previous studies reported that anorexia of aging tends to occur in people with disabilities and dependency for the activities of ADL (21, 23, 24). There was no functionally "dependent" participant in ADL in our study. So, analysis run for comparing "partially dependent" and "independent" participants.We did not observe a significant difference in terms of poor appetite prevalence of those groups. However we observed an association between poor appetite assessed by SNAQ and functional dependency in IADL in our study. Although the association between poor appetite and functional dependency has been known (1), we are not able to find studies especially compared the SNAQ with functional status evaluated by Katz ADL and Lawton IADL indexes.

Our study has some limitations. We performed the reliability and validity of the SNAQ in only community-dwelling outpatients not in other settings and our participants were functionally independent individuals mostly. The original SNAQ has been reported with reliability and validity in 2 groups of subjects: residents of long-term care facilities and community-dwelling adults. It might be needed to assess the validity and reliability of the SNAQ in long-term care facilities especially for frail older adults. We studied the association between SNAQ and malnutrition assessed by MNAin terms of construct validity. Originally the SNAQ has been designed to predict weight loss in older adults. Similar with previous validation studies of SNAQ, we did not examine the success of the SNAQ in terms of predicting weight loss in our participants. However current good relationship between SNAQ and MNA could sign the higher possibility of the relationship between SNAQ and weight loss since it is a well known predictor for MN in older adults.

In conclusion, because of screening and early detection of poor appetite may prevent MN and its negative consequences among older adults (6), it is important to have a reliable and validated screening instrument.We observed that SNAQ is a simple measurement to screen poor appetite in community-dwelling older adults in this study. It has lower C. alpha coefficient which looks like related to the question 4 as also stated in previous studies. SNAQ had sufficient reliability and concurrent validity in Turkish community-dwelling older adults.

Acknowledgments: We are grateful to Kadriye Gümüş for helping us to translate and back-translate the original version of the SNAQ.

Conflicts of interest: The authors declare no conflict of interest.

Financial disclosure: The study received no financial support.

Ethical standard: The authors declare that the study procedures comply with current ethical standards for research involving human participants in Turkey. The study protocol had been approved by the ethical committee of Istanbul University, Istanbul Medical School.

Author contributions: This study was designed by all authors. Data were obtained by BI, SD and CK. Statistical analysis was performed by BI, CK, GB and MMO. BI, GB and MMO prepared the manuscript. All authors read and approved the final manuscript.

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