

The Validation of the Turkish Version of the PRISMA-7 Questionnaire; A Case-finding Instrument for Detecting Older Adults Living with Frailty

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Abstract

Objective: Numerous easy-to-apply and reliable tools have been developed for frailty detection with realizing the obvious importance of it. We aimed to evaluate the reliability and validity of the PRISMA-7 questionnaire in the Turkish community-dwelling older population, incorporating the geriatrician perspective.

Materials and Methods: Upon application of the exclusion criteria, a total of 97 older patients were enrolled. All participants underwent a comprehensive geriatric assessment. After the necessary permissions were obtained, the Turkish version of PRISMA-7 was properly translated into Turkish with a forward-backward translation approach. The adaptation was made complied with the guideline recommendations. A reference tool, the Turkish version of the clinical frailty scale (CFS), was used for validation.

Results: Median (interquartile range) age of participants was 72 (10) years, and 61 (62.9%) were female. According to CFS, 17.5% (n=17) patients were in the frail group, and 82.4% (n=80) were in the Robust/Vulnerable group. When we evaluated the concordance of PRISMA-7 and CFS, there was a moderate concordance (Cohen's kappa: 0.589, $p<0.001$). At its optimal cut-off for differentiating frail from non-frail patients (≥ 3), the PRISMA-7 questionnaire had a sensitivity of 94.1% and a specificity of 82.5% (area under the curve: 0.956, $p<0.001$). For PRISMA-7 inter-rater and retest reliabilities, Cohen's kappas were 0.615, $p=0.03$ & 1.0, $p<0.001$, respectively.

Conclusion: The Turkish version of PRISMA-7 is a valid and reliable frailty evaluation instrument for the Turkish geriatric population.

Keywords: Frailty, PRISMA-7 questionnaire, Turkish validation, older adults

Introduction

Frailty is characterized by a reduction in physiological reserve and in resistance to physical and psychological stressors (1). Because of the rapid aging of the population, the prevalence of frailty is projected to increase (2). However, frailty prevalence can change depending on the screening method and population. In addition, it has been reported that in community-dwelling older adults, frailty prevalence may vary from 4% to 59.1% (3). People living with frailty have an increased risk of mortality, hospitalization, falls, and institutionalization (1). In other words, frailty is a major public health concern that can initiate

a vicious cycle of many negative outcomes, including death (4). Moreover, early identification of the people living with frailty may enable a proper intervention that will enhance life quality and prevent negative consequences (5).

With realizing the obvious importance of frailty, numerous easy-to-apply and reliable tools have been developed for its detection. Based on two basic approaches, physical frailty and cumulative deficit evaluation tests have been developed to assess frailty. The Fried frailty index, Edmonton Frailty scale, clinical frailty scale (CFS), and Program of Research to Integrate the Services for the Maintenance of Autonomy-7 (PRISMA-7) questionnaire

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are among the most commonly used tools (6). The PRISMA-7 identifies frailty by utilizing a combination of seven simple self-reported components. The questions pertain to age, general health, activities, and social support, and each response receives a score of one or zero (7). PRISMA-7 has been translated into a number of languages and validated in a number of nations. Moreover, a previous study in the primary care setting tried to validate the Turkish version of PRISMA-7. However, since the study mentioned above used a reference tool that is also non-validated, it undermines that validation's credibility.

This study aimed to evaluate the validity and reliability of the PRISMA-7 questionnaire in the Turkish community-dwelling older population, incorporating the geriatrician perspective.

Materials and Methods

Participants

In this cross-sectional study conducted over a three-month period, one hundred twenty (120) older patients were evaluated after being admitted to the geriatrics outpatient clinic (November 2021-January 2022). The inability to communicate or answer questions and the presence of an acute illness were determined as exclusion criteria. Therefore, patients aged 65 years and older without exclusion criteria were included in the study. A total of 97 patients aged 65 and older were included in the study. The participants' demographic information (age, gender, education, occupation, and place of residence), chronic diseases, multimorbidity (two or more chronic diseases), geriatric syndromes, medications, polypharmacy (using five or more drugs), smoking, falls, and fracture history from the previous year were collected.

Comprehensive Geriatric Assessment (CGA)

Standardized tools were utilized to perform an optimal CGA. The Katz activities of daily living scale was used to assess the patient's functional status (8). It scored the patient over 6 points based on how independently they performed basic daily tasks and care, with a higher score indicating greater independence (9,10). The Lawton-Brody instrumental activities of daily living scale was utilized to assess patients' instrumental daily living activities (11). The mini-mental state examination test, which assesses orientation, memory, attention, calculation, recall, language, motor function, and perception skills, was used to gauge the participants' cognitive status (12). The nutritional screening was made using the mini nutritional assessment short-form; scores >11 points indicate normal nutrition status, 8-11 points indicate malnutrition risk, and 7 points indicate malnutrition (13). Using the Yesavage geriatric depression scale, the patient's mood was evaluated. The evaluation was conducted over 15 points, and patients with more than 5 points were clinically evaluated for depression (14).

The handgrip measurements were performed using the Takei grip strength dynamometer to determine the patients' muscle strength. The dominant hand was measured three times while seated, with the elbow bent at 90 degrees and the hand in the neutral position. In the analysis, the highest of the three repeated measurements was used. Low handgrip strength (HGS) was stated as less than 16 kg for women and more than 27 kg for men, respectively. The physical performance was evaluated by measuring the gait speed. During the 4-meter walking test, the patient was told to walk at a normal pace (with an auxiliary device, if one was used) and stop at a designated point. The elapsed time was recorded in seconds, and the patient's walking speed was then calculated in meters per second. Values below 0.8 m/s were deemed indicative of poor physical performance (15).

Study Tool

PRISMA-7 questionnaire is a tool recommended by the British Geriatric Society (2014) to quickly and simply screen frailty (16). It contains seven simple self-reported questions to detect frailty: Older than 85 years; male; health problems that limit activities; support of another person needed; health problems requiring staying at home; social support; and the use of a cane/walker/wheelchair. Each question is answered as "yes" or "no", and the "yes" answer is scored as 1 point and the "no" answer as 0 points. A total score ≥ 3 deems as frailty (7). In order to verify the intra- and inter-observer reliability, a sample of 20 participants (10 participants for intra-observer, 10 participants for interobserver reliability) was selected.

Translation

The necessary permissions were obtained from the authors who created the PRISMA-7 questionnaire. The process of forward-backward translation approach and adaptation was made complied with the recommendations of the ISPOR task force for translation and cultural adaptation report (17). Initially, the original PRISMA-7 tool was translated into Turkish by two native Turkish speakers who are also experts in translation and speak English fluently. All authors have reviewed and approved the Turkish version. Then, a professional, native English-speaking translator completed the backward translation without knowledge of the screening tool. Finally, the Turkish version of the PRISMA-7 instrument was administered to a convenient sample of community-dwelling older adults in order to assess cultural adaptation.

Reference Tool

The CFS, a tool created to measure frailty in the second phase of the Canadian Study of Health and Aging, was chosen as the reference instrument. CFS is a frailty screening instrument based on the "cumulative deficit evaluation" model (18). CFS describes frailty by assigning a score between 1 and 9 (1: Very fit; 2:

Well; 3: Well with the treated comorbid disease; 4: Apparently vulnerable; 5: Mildly frail; 6: Moderately frail; 7: Severely frail; 8: Very severely frail; and 9: Terminally ill) according to the physician's clinical opinion. Each point on this scale corresponds to a written description of frailty and is accompanied by a visual classification chart. Scores more than five are considered frail (19). The reliability and validation study of the Turkish version of CFS was conducted by Özsüreki et al. (20).

Statistics

Version 24.0 of SPSS was used to conduct the statistical analysis. To ascertain whether or not variables are normally distributed, visual (histogram, probability plots) and analytical methods were used to investigate the variables. For variables with a normal distribution, descriptive statistics were presented as mean and standard deviation (SD), for variables with an asymmetric distribution, as median [interquartile range (IQR)], and for nominal variables, as the number of cases and percentage (%). Additionally, the Spearman correlation test was run for the variables in the correlation analysis without a normal distribution.

The sample size was calculated using two rater kappa statistics (21) by providing 90% power to determine the correct kappa when two categories according to the CFS scale, Robust+Vulnerable and Frail frequencies in Turkey (20), were 64.0% and 36.0%, respectively.

To evaluate the construct validity of the PRISMA-7, the CFS was accepted as the reference tool. The CFS was classified as robust/vulnerable (scores <5) and frail (scores ≥5) when assessed in its concordance with the PRISMA-7. Cohen's Kappa was utilized to investigate the construct validity and inter-rater reliability of the PRISMA-7. Cohen's Kappa was also utilized to assess test-retest reliability. Sensitivity, specificity, as well as positive and negative predictive values were determined. P-values less than 0.05 were accepted as statistically significant.

Results

Ninety-seven older adults with a median (IQR) age of 72 (10) years were enrolled in the study, of whom 61 (62.9%) were female. Among the participants, 72.2% (n=70) of patients were hypertensive, 51.5% (n=50) had diabetes mellitus, 18.6% (n=18) had coronary heart disease, 12.4% (n=12) had atrial fibrillation, and 10.3% (n=10) had chronic respiratory diseases. The most common geriatric syndromes in this study were polypharmacy, with a prevalence of 55.7% (n=54), and urinary incontinence, with a prevalence of 41.2% (n=40). The mean (\pm SD) body mass index was 30.06 (\pm 5.82) kg/cm². Mean (\pm SD) HGS was 18.09 (\pm 5.08) and 27.58 (\pm 7.57) for females and males, respectively. The mean (\pm SD) gait speed was 0.93 (\pm 0.35) m/sn. The median (IQR) CFS score was 3.0 (1.0). According to CFS, 17.5% (n=17)

patients were in the Frail group, and 82.4% (n=80) were in the Robust/Vulnerable group. Demographic characteristics, comorbidities, nutritional status, and CGA parameters were summarized in Table 1.

When we evaluated the concordance of PRISMA-7 and CFS, there was a moderate concordance (Cohen's kappa: 0.589, $p < 0.001$) (Table 2). At its optimal cut-off, for differentiating frail from non-frail patients (≥ 3), calculated using the maximal accuracy approach, the PRISMA-7 questionnaire had a sensitivity of 94.1% and a specificity of 82.5% (area under the curve: 0.956, $p < 0.001$) (Figure 1). For PRISMA-7 inter-rater and retest reliabilities, Cohen's kappas were 0.615, $p = 0.03$ & 1.0, $p < 0.001$, respectively (Table 3).

According to the reference scale, the positive predictive value of PRISMA-7 determined was 53.33%, and the negative predictive value was 98.51% (Table 2). The total prevalence of each component of PRISMA-7 was presented in Table 4.

Discussion

Since frailty is an important problem for aging populations, screening tools that can detect it simply and quickly become prominent. Furthermore, it is clear that frailty screening tools require cross-cultural adaptations. Therefore, this study aimed to evaluate the validity and reliability of the PRISMA-7 questionnaire in the Turkish community-dwelling older population by comparing it with CFS. Our results revealed that the Turkish version of PRISMA-7 and CFS have a good and positive concordance for evaluating frailty.

According to the Turkish Statistical Institute data presented in 2021, the ratio of individuals aged 65 and over has increased to 9.7% (22). Furthermore, since it is expected to increase to 12.9% in 2030 in Turkey (23), it is obvious that frailty will be an essential concern in Turkey as an aging country. Considering that frailty reflects a health burden, particularly in the geriatric population, detecting and intervening at the earliest stages is crucial. In this study, PRISMA-7 was chosen to be evaluated whether it is a proper tool to screen frailty for older adults in Turkey since it is an easy-applicable and brief form to perform in geriatrics outpatient clinics.

The prevalence of frailty may vary depending on the environment and the instruments used for screening. In the Frail TURK project, a study designed to assess frailty in the population aged 65 and over in Turkey, Fried Frailty criteria were used, and 39.0% of 1126 participants were defined as frail (23). Similarly, in the validation study of the Turkish version of CFS, frailty frequency was reported as 35.6% (20). In concordance with the previous studies, 30.9% of participants in our study were frail, according to the Turkish version of PRISMA-7.

Table 1. Demographical characteristics and comprehensive geriatric assessments of patients					
	Total participants n=97	Robust (n=67, 69.1%)	Frail (n=30, 30.9%)	p	
Demographics					
Age, median (IQR)	72.0 (10.0)	71.0 (8.0)	76.0 (14.0)	<0.001	
Sex (female), n (%)	61 (62.9)	40 (59.7)	21 (70.0)	0.33	
Illiterate, n (%)	21 (21.6)	13 (19.4)	8 (26.7)	0.42	
Marital status (married), n (%)	60 (61.9)	45 (67.2)	15 (50.0)	0.11	
BMI mean \pm SD	30.06 \pm 5.82	29.25 \pm 4.84	29.49 \pm 7.55	0.46	
Smoking, n (%)	38 (39.2)	27 (40.3)	11 (36.7)	0.74	
Chronic diseases					
Diabetes mellitus, n (%)	50 (51.5)	39 (58.2)	11 (36.7)	0.05	
Hypertension, n (%)	70 (72.2)	45 (67.2)	25 (83.3)	0.10	
Coronary artery disease, n (%)	18 (18.6)	12 (17.9)	6 (20.0)	0.81	
Congestive heart failure, n (%)	6 (6.2)	4 (6.0)	2 (6.7)	1.0	
Atrial fibrillation, n (%)	12 (12.4)	7 (10.4)	5 (16.7)	0.51	
Cerebrovascular event, n (%)	10 (10.3)	6 (9.0)	4 (13.3)	0.49	
Chronic kidney disease, n (%)	4 (4.1)	2 (3.0)	2 (6.7)	0.59	
Chronic obstructive pulmonary disease-asthma, n (%)	10 (10.3)	7 (10.4)	3 (10.0)	1.0	
Malignancy, n (%)	11 (11.3)	4 (6.0)	7 (23.3)	0.03	
Hypothyroidism, n (%)	10 (10.3)	4 (6.0)	6 (20.0)	0.07	
Multimorbidity \geq 2, n (%)	70 (72.2)	47 (70.1)	23 (76.7)	0.51	
Comprehensive geriatric assessment-geriatric syndromes					
Dementia, n (%)	4 (4.1)	-	4 (13.3)	0.008	
Depression, n (%)	29 (29.9)	17 (25.4)	12 (40.0)	0.15	
Osteoporosis, n (%)	22 (22.7)	13 (19.4)	9 (30.0)	0.25	
Falls, n (%)	22 (22.7)	12 (17.9)	10 (33.3)	0.09	
Polypharmacy, n (%)	54 (55.7)	32 (47.8)	22 (73.3)	0.02	
Drug number, median (IQR)	5.0 (4.0)	4.0 (3.0)	6.0 (4.0)	0.008	
Urinary incontinence, n (%)	40 (41.2)	22 (32.8)	18 (60.0)	0.01	
Katz index of independence in activities of daily living, median (IQR)	6.0 (1.0)	6.0 (0.0)	6.0 (1.0)	0.002	
Lawton-Brody instrumental activities of daily living scale, median (IQR)	8.0 (0.0)	8.0 (0.0)	6.0 (4.0)	<0.001	
Mini nutritional assessment-short form, median (IQR)	13.0 (4.0)	14.0 (2.0)	10.0 (6.0)	<0.001	
Mini-mental state exam, median (IQR)	28.0 (5.0)	28.0 (5.0)	26.0 (8.0)	0.008	
Yesavage geriatric depression scale, median (IQR)	2.0 (6.0)	2.0 (5.0)	4.5 (6.0)	0.01	
SARC-F, median (IQR)	1.0 (3.0)	0.0 (1.0)	4.0 (6.0)	<0.001	
Grip strength mean \pm SD	Female	18.09 \pm 5.08	18.30 \pm 4.05	15.21 \pm 5.68	0.004
	Male	27.58 \pm 7.57	28.55 \pm 7.76	24.68 \pm 6.54	0.19
Gait speed (m/sn), mean (SD)	0.93 \pm 0.35	1.04 \pm 0.30	0.67 \pm 0.31	<0.001	
PRISMA-7, median (IQR)	2.0 (2.0)	2.0 (1.0)	4.0 (2.0)	<0.001	
Clinical frailty scale, median (IQR)	3.0 (1.0)	3.0 (1.0)	5.0 (2.0)	<0.001	

N: Number, IQR: Interquartile range, SD: Standard deviation, BMI: Body mass index, PRISMA-7: Program of Research to Integrate the Services for the Maintenance of Autonomy-7

		PRISMA-7 questionnaire		Kappa	Approximate significance
		Robust	Frail		
Clinical frailty scale	Robust+vulnerable	66 (98.5)	14 (46.7)	0.589	<0.001
	Frail	1 (1.5)	16 (53.3)	-	-
Inter-rater reliability		-	-	0.615	0.03
Retest reliability		-	-	1.0	<0.001

Spearman Rho CFS-prisma: 0.577, p<0.001, Sensitivity: 94.12%, Specificity: 82.50%, Positive likelihood ratio: 5.38, Negative likelihood ratio: 0.07, Positive predictive value: 53.33%, Negative predictive value: 98.51%, CFS: Clinical frailty scale, PRISMA-7: Program of Research to Integrate the Services for the Maintenance of Autonomy-7

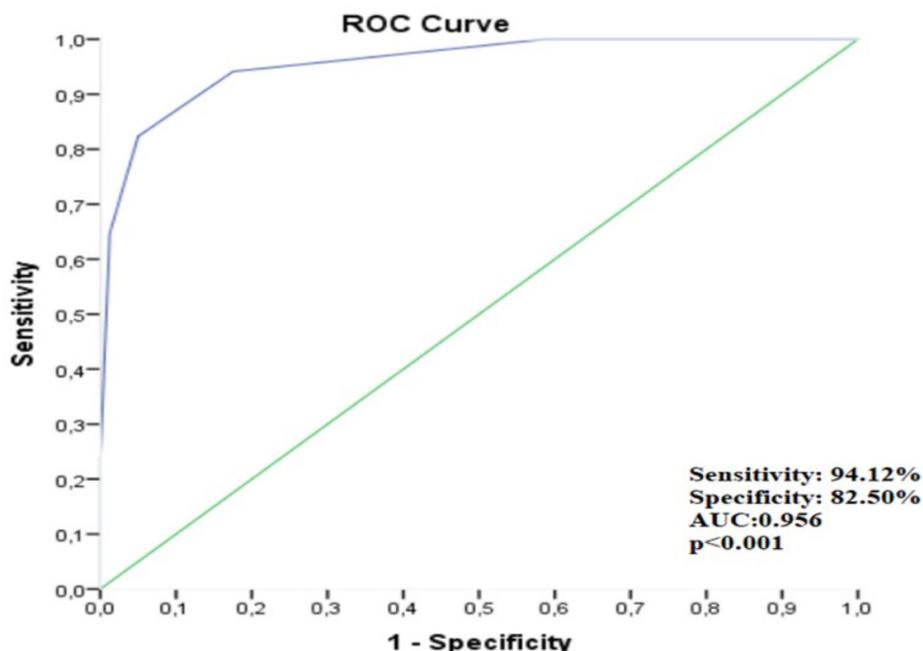


Figure 1. Receiver operating characteristics (ROC) curve demonstrating the accuracy of Turkish version of PRISMA-7 questionnaire
AUC: Area under the curve, PRISMA-7: Program of Research to Integrate the Services for the Maintenance of Autonomy-7

	Inter-rater reliability	Retest reliability
	Cronbach's alpha	Cronbach's alpha
Age >85 years	1.0	1.0
Male gender	1.0	1.0
In general, do you have any health problems that require you to limit your activities?	0.78	0.89
Do you need someone to help you on a regular basis?	0.78	0.89
In general, do you have any health problems that require you to stay at home?	0.78	0.78
If you need help, can you count on someone close to you?	1.0	1.0
Do you regularly use a stick, walker or wheelchair to move about?	1.0	1.0
Total score	0.78 (0.12-0.95)	0.91 (0.65-0.98)

PRISMA-7: Program of Research to Integrate the Services for the Maintenance of Autonomy-7

Table 4. Total prevalence of the components of PRISMA-7	
	Prevalence n (%)
Age >85 years	10 (10.3)
Male gender	36 (37.1)
In general, do you have any health problems that require you to limit your activities?	30 (30.9)
Do you need someone to help you on a regular basis?	21 (21.6)
In general, do you have any health problems that require you to stay at home?	18 (18.6)
If you need help, can you count on someone close to you?	93 (95.9)
Do you regularly use a stick, walker or wheelchair to move about?	17 (17.5)
PRISMA-7: Program of Research to Integrate the Services for the Maintenance of Autonomy-7	

Although CGA is the standard method for frailty evaluation, numerous frailty screening instruments have been created based on the physical frailty and cumulative deficit accumulation frailty models. Since CFS is focused on both biological theory and clinical judgment, it distinguishes from other methods based on cumulative frailty. Since, recently, the associations between social, cognitive and physical frailty were revealed, combining cognitive and physical function items is one of the advantages of CFS (19). Furthermore, a valid and reliable Turkish version of CFS was presented in a recent study (20). Therefore, CFS was chosen as a standard tool for this validation study. A previous study conducted in primary care in Turkey, tried to validate PRISMA-7 by comparing it with CFS. Unfortunately, when the study mentioned above was carried out, there was no validated version of the CFS (24). As this main limitation makes proper validation necessary, we re-performed an appropriate validation study by comparing the Turkish version of the PRISMA-7 questionnaire to the valid Turkish version of CFS.

International guidelines also advise using the PRISMA-7, one of the quick and practical tools for identifying frailty in older adults (25,26). Additionally, some studies have been carried out to evaluate how accurately it predicts the risk of negative outcomes in frail adults (27). The suitability of PRISMA-7 was also investigated in primary care, which is an important step in assessing frailty. In a study carried out by Hoogendijk et al. (28), five instruments (i.e., the Groningen frailty indicator, prescription of multiple medications, clinical judgement of the general practitioner, the self-rated health of the older adult and PRISMA-7) have been compared, and PRISMA-7 has been the most accurate one of these tools for identifying frailty in primary care. It has also been demonstrated to be useful in a hospital ward as a screening instrument to define elderly older adults who may benefit from further geriatric assessment during their hospitalization (29). Although this study was not primarily designed to assess the power of the Turkish version of PRISMA-7 for detecting adverse health outcomes related to frailty, future studies may evaluate this predictive value in both outpatient and hospital settings.

Study Limitations

This study has several limitations as well. Although there is no universally accepted strategy for performing a cross-cultural adaptation of questionnaires, our methodology adhered to commonly stated guidelines. In addition, the lack of a standard instrument for the accurate evaluation of frailty hinders comparability. Since reviews on frailty tools constantly document the clinical and diagnostic power of the CFS, we used CFS as a reference tool to alleviate this limitation.

Conclusion

The Turkish version of PRISMA-7 is a valid and reliable frailty evaluation tool for the Turkish geriatric population.

Ethics

Ethics Committee Approval: The study was approved by the Clinical Research Ethics Committee in the Department of Medicine at Hacettepe University (GO-21/1313). All processes were carried out in compliance with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards, as well as the ethical standards of the institutional and/or national research committee.

Informed Consent: All participants provided written informed consent.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: A.O.B., S.C., Concept: A.O.B., M.K., B.B.D., C.B., Design: A.O.B., M.K., M.G.H., M.C., C.B., Data Collection or Processing: A.O.B., S.C., M.G., Analysis or Interpretation: A.O.B., S.C., B.B.D., M.G.H., M.C., C.B., Literature Search: A.O.B., Writing: A.O.B., S.C., C.B.

Conflict of Interest: No conflict of interest was declared by the authors.

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