

ORIGINAL ARTICLE

EPIDEMIOLOGY, CLINICAL PRACTICE AND HEALTH

Validity of the Kihon Checklist for evaluating frailty status in Turkish older adults

Mehmet Erdinc Esenkaya,¹ Ozge Dokuzlar,² Pinar Soysal,³ Lee Smith,⁴ Sarah E Jackson⁵ and Ahmet Turan Isik^{2,6}

¹Faculty of Medicine, Department of Internal Medicine, Dokuz Eylul University, Izmir, Turkey

²Faculty of Medicine, Department of Geriatric Medicine, Dokuz Eylul University, Izmir, Turkey

³Faculty of Medicine, Department of Geriatric Medicine, Bezmialem Vakif University, Istanbul, Turkey

⁴The Cambridge Center for Sport and Exercise Sciences, Anglia Ruskin University, Cambridge, UK

⁵Department of Behavioral Science and Health, University College London, London, UK

⁶Faculty of Medicine, Unit for Aging Brain and Dementia, Department of Geriatric Medicine, Dokuz Eylul University, Izmir, Turkey

Correspondence:

Professor Ahmet Turan Isik MD, Unit for Aging Brain and Dementia, Department of Geriatric Medicine, Dokuz Eylul University, Faculty of Medicine, Balçova, Izmir 35340, Turkey.
Email: atisik@yahoo.com

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Aim: The Kihon Checklist (KCL) was developed to identify vulnerable older adults residing in Japan who are at a high risk of becoming dependent. The present study aimed to determine the validity of the KCL for detecting frailty in Turkish older adults.

Methods: A total of 300 outpatients were enrolled in the study. All patients underwent comprehensive geriatric assessment and completed a Turkish translation of the KCL. Frailty status was defined by five dimensions, including weight loss, exhaustion, low levels of activity, weakness and slowness: 0 for robust, 1–2 for prefrail and 3–5 for frail.

Results: The mean age of the patients was 73.85 ± 7.12 years. According to Fried definitions, 25.7% were considered frail, 48.0% prefrail and 26.3% robust. There was a significant difference between the groups in terms of age, sex, education, Charlson's Comorbidity Index, the number of medications used, sarcopenia, dynapenia and all the comprehensive geriatric assessment parameters ($P < 0.05$). Cronbach's α value of the KCL was 0.876. The area under the receiver operating characteristics curve was 0.855 for frail, and 0.697 for prefrail. We found that the KCL can show frail and prefrail older adults when the cut-off values are ≥ 9 and ≥ 4 , respectively, with a sensitivity of 80.52% and 65.28%, and specificity of 81.17% and 56.96%.

Conclusions: The KCL can be used as a quick, simple and sensitive screening method for detecting frailty among Turkish older adults. We recommend its use by healthcare professionals in Turkey in order to identify frail older adults and direct them to relevant support.
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Keywords: frailty, geriatric assessment, Kihon Checklist, older adults.

Introduction

The older population is increasing globally. Epidemiological studies show that 11% of the world's population is aged >60 years, and this is forecast to increase to 22% by 2050.¹ However, a long life does not necessarily mean a healthy life.² Frailty is the difficulty in restoring the homeostatic balance against stress factors developing with age. Although there are many factors in its pathogenesis, it is defined as a medical syndrome characterized by a decrease in strength and stamina, an increase in external dependence, and a decline in physical functions.³ The reduced capacity of the organism increases the risk of undesirable health outcomes, such as falling, hospitalization, disability, institutionalization and mortality.^{4,5}

Although many scales have been developed for the diagnosis of frailty, there is still no gold standard method for diagnosis

because of the condition's multifactorial etiopathogenesis. The Kihon Checklist (KCL), which comprises 25 yes/no questions covering a range of factors including instrumental and social activities of daily living, physical functions, nutritional status, oral function, cognitive function and depressive mood, was created in 2006 to identify vulnerable older adults who have a higher risk of becoming dependent in Japan.⁶ The KCL has been translated into several different languages, including English,⁷ Portuguese⁸ and Spanish,⁹ and its validity for identifying frailty was established in 2016.¹⁰ Any question in favor of dependency and frailty is considered as a score in the KCL, and indicates that the individual is at a high risk of requiring support or care in the relevant field.⁷ The prevalence of frail and prefrail older adults in Turkey is high.^{11,12} Therefore, easy-to-apply frailty scales are required for early detection of these patients. The aim of the present study was to test the validity of a Turkish version of the KCL, and to evaluate its strength in determining the frailty defined by Fried criteria.

Method

Procedure

A total of 375 outpatients, who were admitted to Dokuz Eylul University, Department of Geriatrics between January 2017 and April 2017 for any health issue and volunteered to participate in the study, were evaluated. As a result of comprehensive geriatric assessment by a geriatrician, 300 outpatients who did not have exclusion criteria were included in this study.

Patients who had a history of severe illness that might impair general health status (such as an acute cerebrovascular event, gastrointestinal bleeding, sepsis, acute renal failure, acute coronary syndrome, acute liver failure or acute respiratory failure) and those aged <60 years were excluded from the study. In addition, patients who had a diagnosis of Clinical Dementia Rating scale (CDR)-2 and CDR-3 dementia were excluded from the study, because self-reports based on their memory might be unreliable for both KCL and Fried questions, and the reliability of handgrip strength is low for older patients with dementia because of the difficulty of judgment and conception, which can cause them to fail to fully comprehend and complete tasks.

A geriatrician evaluated and recorded demographic characteristics (age, sex and educational status), comorbidities, the Charlson Comorbidity Index score and the number of drugs used by the patients. Serum thyroid-stimulating hormone, vitamin D, vitamin B₁₂, folic acid levels and glomerular filtration rates were recorded to evaluate the metabolic status of the patients. Dementia was diagnosed according to the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition criteria.¹³

The ethics committee of Dokuz Eylul University, Turkey, approved the study protocol with a decision number 3098-GOA. Each participant or a legal guardian provided written, informed consent to participate in the study. We carried out this study in accordance with the provisions of the Declaration of Helsinki.

Comprehensive geriatric assessment

The following assessments were used for detailed geriatric evaluation¹⁴ by geriatricians: the Mini-Mental State Examination (MMSE), CDR and the Clock Drawing Test (CDT)¹⁵ were used for neurocognitive assessment; the Geriatric Depression Scale¹⁶ for emotional state assessment; the Lawton-Brody Instrumental Daily Living Activity Scale (IADL) and Barthel Index (BADL) for activities of daily living; the Mini Nutritional Assessment (MNA) for nutritional evaluation; and the Tinetti Performance-Oriented Assessment of Mobility (POMA) and Timed Up and Go (TUG) test for mobility evaluation.

Translation procedure

Translating the KCL into Turkish was a five-stage process: (i) the first stage was to obtain translation permission from the authors of the original scale; (ii) three independent translations into Turkish were carried out by three native linguistic specialists, and all the translators were blind to each other's translation; (iii) then, the translations were analyzed by another researcher who was a native Turkish speaker, and turned into a single text: (iv) this consensus forward version was back translated into English by two native linguistic specialists, and the backward version and the original text were compared with the English translation; none of the items of the Turkish text required any modifications after this stage; and (v) the final text was applied to 10 patients, in order to test whether there were any problems in practice; none were detected.

Diagnosis of sarcopenia and dynapenia

For the evaluation of walking speed, muscle strength and muscle mass in patients, 4-m walking test, handgrip test and bioimpedance were carried out for each patient, respectively.¹⁷ The

handgrip test was measured by a Jamar (Model J00105, Lafayette, USA) branded hand dynamometer, and bioimpedance was established by Tanita (MC-780U Multi Frequency Segmental Body Composition, Tokyo, Japan). We accepted slow walking speed <0.8 m/s, low handgrip power in women <20 kg, in men <30 kg. Based on muscle mass bioimpedance values, skeletal muscle (kg) = (height² / R × 0.401) + (sex × 3.825) + (age × -0.071) + 5.102 is formulated. Values in terms of resistance (R) 50 Hz hand-leg (body), length in centimeters, female sex 0, male sex 1, age in years are accepted and replaced in formula. The muscle mass index (skeletal muscle mass index = muscle mass / height²) was calculated by dividing the muscle mass in kg by length in square meters, which was obtained to prevent the muscle mass from varying according to the height. Skeletal muscle mass index was regarded as low muscle mass <8.87 kg/m² for men and <6.42 kg/m² for women.

Decreased muscular strength and/or walking speed together with decreased muscle mass were evaluated as sarcopenia. Without any decrease in muscle mass, decreased muscle strength was defined as dynapenia.

KCL

The KCL comprises 25 self-reporting yes/no questions regarding instrumental (3 questions) and social (4 questions) activities of daily living, physical functions (5 questions), nutritional status (2 questions), oral function (3 questions), cognitive function (3 questions) and depressive mood (5 questions). Any question in favor of disability and frailty is considered as a score in the KCL and indicates that the individual is at a high risk of requiring support or care in that domain.

Diagnosis of frailty

Frailty status was defined based on five dimensions of frailty phenotype, including shrinking, exhaustion and low levels of physical activity, weakness, and slowness. People with 0 criteria were considered robust, one or two as prefrail and three or more as frail, as suggested by Fried *et al.*¹⁸ Weight loss of >4.5 kg within the past year (either measured or reported by the patient or patients' caregivers) was taken as a sign of shrinking. The exhaustion criterion was met if the answer was "much or most of the time" when asked, "How often in the last week did you feel this way" to either of the following two statements: "I felt that everything I did was an effort" and "I could not get going." Weakness, assessed by grip strength of the dominant hand (mean of 3 measurements) with a dynamometer, was accepted to be less than or equal to the cut-off points according to sex and body mass index (BMI) points, which were determined by Fried *et al.*¹⁸ Low levels of physical activity were considered as decisive in patients who had no physical activity, spent most of the time sitting or rarely had short walks in the past year, instead of using the Minnesota Leisure Time Questionnaire.¹⁹ Low gait speed was evaluated using the 4-m walking test, and if the time to complete the test was less than or equal to the cut-off points according to sex and height, it was regarded as slowness.¹⁸

Statistical analysis

Statistical analyses were carried out by the Statistical Package for Social Sciences (SPSS) version 22.0 for Windows (SPSS, Chicago, IL, USA) and Power Analysis and Sample Size (PASS) 2008 Statistical Software (NCSS Statistical Software, Kaysville, UT, USA). Nominal variables were assessed by Pearson's χ^2 -test. Continuous variables with normal distribution were analyzed with one-way ANOVA followed by a post-hoc test, and the Kruskal-Wallis test was used to assess the presence of non-normal distribution (shown as the P_1 value in Table 1). Adjustment according to age, sex and educational status was carried out by multinomial logistic regression analysis (shown as the P_2 and P_3 value in Table 1). The

Table 1 Demographic characteristics of participants

	Robust (<i>n</i> = 79)	Pre frail (<i>n</i> = 144)	Frail (<i>n</i> = 77)	<i>P</i> ₁	<i>P</i> ₂	<i>P</i> ₃
Age (years)	71.05 ± 5.96	73.15 ± 7.34	78.03 ± 5.88	<0.001	–	–
Sex, women/men (%)	20.8/40.5	50.0/42.8	29.2/16.7	0.001	–	–
Education (years)	10.14 ± 4.34	7.35 ± 4.29	5.18 ± 3.56	<0.001	–	–
CCI	0.72 ± 1.21	0.90 ± 1.07*	1.42 ± 1.32 [#]	0.001	0.014	<0.001
No. drugs	4.35 ± 2.72	5.41 ± 2.49*	6.86 ± 2.99 [#]	<0.001	0.008	<0.001
Laboratory findings						
Vitamin D, ng/mL (SD)	27.01 (9.30)	25.21 (12.00)	24.41 (14.11)	0.381	–	–
Vitamin B ₁₂ , pg/mL (SD)	432.70 (248.73)	478.65 (292.39)	483.88 (365.26)	0.482	–	–
Folate, ng/mL (SD)	8.93 (3.81)	9.34 (4.35)	9.00 (4.48)	0.750	–	–
TSH, uIU/mL (SD)	1.70 (1.97)	1.81 (1.29)	1.77 (2.11)	0.905	–	–
eGFR, MDRD (SD)	79.03 (14.87)	74.92 (17.91)	71.24 (18.86)	0.025	0.592	0.730
Comprehensive Geriatric Assessment						
MMSE (SD)	27.42 (4.86)	26.52 (4.36)	23.59 (5.70)	<0.001	0.048	0.007
CDT (SD)	4.3 (1.40)	4.09 (1.41)	3.32 (1.59)	<0.001	0.038	0.002
CDR (SD)	0.15 (0.51)	0.32 (0.55)	0.60 (0.88)	<0.001	0.029	0.004
GDS (SD)	1.20 (1.81)	2.99 (3.47)	5.24 (3.72)	<0.001	<0.001	<0.001
POMA (SD)	27.59 (1.33)	26.34 (2.79)	21.26 (5.70)	<0.001	0.002	<0.001
Timed Up and Go (SD)	9.45 (2.44)	11.93 (5.63)	21.69 (13.73)	<0.001	0.001	<0.001
BADL (SD)	96.30 (5.20)	93.92 (6.45)	80.52 (16.00)	<0.001	0.049	<0.001
IADL (SD)	21.76 (2.86)	20.01 (4.17)	15.16 (5.79)	<0.001	0.003	<0.001
MNA-SF (SD)	13.49 (0.99)	13.10 (1.45)	12.07 (2.04)	<0.001	0.034	<0.001
Body mass index (SD)	28.04 (4.05)	28.89 (4.62)	31.68 (5.97)	<0.001	0.477	0.001
Dynapenia (%)	11.1	54.8	34.2	<0.001	<0.001	<0.001
Sarcopenia (%)	12.0	51.0	37.0	<0.001	0.009	0.015

Statistically significant values are provided in bold. BADL, basic activities of daily living; CCI, Charlson Comorbidity Index; CDR, clinical dementia rating; CDT, clock drawing test; eGFR, estimated glomerular filtration rate; GDS, Geriatric Depression Scale; IADL, instrumental activities of daily living; MDRD, Modification of Diet in Renal Disease; MMSE, Mini-Mental State Examination; MNA-SF, Mini Nutritional Assessment-Short Form; TSH, thyroid-stimulating hormone; *P*₁, *P*-values for comparison of three groups; *P*₂, *P*-values for comparison of pre-frail and robust after adjusted for age, sex and education; *P*₃, *P*-values for comparison of frail and robust after adjusted for age, sex and education; POMA, Tinetti Performance Oriented Mobility Assessment.

kappa consistency test was used to evaluate the consistency between the Fried Frailty Index and the items of KCL, and also to assess concurrent validity. Internal consistency was assessed from Cronbach's α value. The receiver operating characteristics curves used for evaluating the validity of the KCL for estimating frailty status. The cut-off value for the optimal estimation of frailty status was determined using the Youden Index. Sensitivity, specificity, and positive and negative predictive values were calculated for cut-off scores. The correlation of KCL total test scores with CCI, POMA, TUG, MMSE, CDT, CDR, BADL, IADL, MNA scores and BMI were assessed by Spearman's correlation coefficient. In all analyses, $P < 0.05$ was considered to show statistical significance. A sample size of 272 participants was calculated to ensure that the minimum required size was within a 95% confidence interval and 5% standard error, based on a previous study that reported the prevalence of frailty was 26.3%.¹²

Results

A total of 300 patients aged >60 years were included in the present study. The mean age of the patients was 73.85 ± 7.12 years, and 72% were women. The patients were divided into three groups as robust, prefrail and frail according to the Fried criteria: 25.7% of the patients were frail, 48% were prefrail and 26.3% were robust. When the patients were evaluated according to the groups, there was a significant difference between the groups in terms of age, sex and education level ($P < 0.001$). Demographic data of the patients are summarized in Table 1. After the detailed geriatric evaluation, when MMSE, CDT, CDR, Geriatric Depression Scale, POMA, TUG, BADL, IADL, MNA scores and body mass index were evaluated, there was a significant difference between the groups ($P < 0.001$). Sarcopenia and dynapenia also showed a significant difference between the groups ($P < 0.001$). *P*-values are shown in Table 2 after adjustment for age, sex and educational status.

The mean total score of KCL was 12.25 ± 4.82 in the frail group, 6.27 ± 4.61 in the prefrail group and 3.35 ± 3.01 in the robust group, and there was a significant difference between the groups ($P < 0.001$). The Cronbach's α coefficient of the KCL was 0.876. This result showed that the internal consistency of the scale was sufficient. The kappa value for determining the frailty of each problem in the KCL is shown in Table 2.

Receiver operating characteristics curves drawn for frail and non-frail, frail and robust, prefrail and robust groups, area under the curve and *P*-values are shown in Figure 1. According to the data obtained from the receiver operating characteristics curve, the sensitivity, specificity, positive predictive values and negative predictive values of the cut-off points for frail and prefrail older adults are shown in Table 3. In addition, KCL total test scores were significantly correlated with CCI, POMA, TUG, MMSE, CDT, CDR, BADL, IADL, MNA scores and BMI ($P < 0.05$; Table 4).

Discussion

In the present study, the KCL was found to be a valid scale for evaluating frailty in Turkish older adults. We also showed that the KCL, which has also been used as a frailty scale in recent years, can distinguish frail and prefrail older adults with cut-off values of ≥ 9 and ≥ 4 , respectively. The world population is getting older, with life expectancy increasing.²⁰ Increased frailty with advancing age has been found to be associated with many negative consequences, such as limitation in daily life activities, decrease in mobilization, loss of cognitive function, increased frequency of hospitalization and mortality.²¹ Although the prevalence of frailty varies according to the scales used, it is between 7% and 12% among individuals aged >65 years.²² In a study carried out in Turkey, the prevalence of frailty was found to be 26.3% in individuals aged >65 years.¹² Similarly, the prevalence of frailty in the present study was 25.7%. It is known that frailty is more common in

Table 2 Kappa values for each item of the Kihon Checklist

No.	Questions	Kappa value
1.	Do you go out by bus or train by yourself? <i>Kendi başınıza otobüs ya da trene biner misiniz?</i>	0.570
2.	Do you go shopping to buy daily necessities by yourself? <i>Kendi başınıza günlük ihtiyaçlarınızı almak için alışveriş yapar mısınız?</i>	0.485
3.	Do you manage your own deposits and savings at the bank? <i>Banka hesaplarınızı kendiniz mi yönetirsiniz?</i>	0.401
4.	Do you sometimes visit your friends? <i>Zaman zaman arkadaşlarınızı ziyaret eder misiniz?</i>	0.411
5.	Do you turn to your family or friends for advice? <i>Aileniz ve arkadaşlarınıza tavsiye almak için danışır mısınız?</i>	0.013
6.	Do you normally climb stairs without using handrail or wall for support? <i>Merdivenleri trabzan veya duvar desteği olmadan çıkar mısınız?</i>	0.360
7.	Do you normally stand up from a chair without any aids? <i>Herhangi bir yardım almadan sandalyeden kalkar mısınız?</i>	0.373
8.	Do you normally walk continuously for 15 min? <i>Hiç durmadan 15 dakika yürür müsünüz?</i>	0.506
9.	Have you experienced a fall in the past year? <i>Geçtiğimiz yıl hiç düştünüz mü?</i>	0.243
10.	Do you have a fear of falling while walking? <i>Yürürken düşmekten korkar mısınız?</i>	0.299
11.	Have you lost 2 kg or more in the past 6 months? <i>Son 6 ayda 2 ya da daha fazla kilo kayıbmış oldu mu?</i>	0.254
12.	Height: cm, weight: kg, BMI: kg/m ² If BMI is <18.5, this item is scored <i>Boy: cm, kilo: kg, Vücut kitle endeksi: kg/cm²</i> <i>(Vücut kitle endeksiniz 18,5'dan azsa bu madde puanlanır.)</i>	0.007
13.	Do you have any difficulties eating tough foods compared to 6 months ago? <i>6 ay öncesine kıyasla katı gıdaları yemekte zorlanıyor musunuz?</i>	0.088
14.	Have you choked on your tea or soup recently? <i>Son zamanlarda çay ya da çorba içerken soluk borunuza kaçtı mı?</i>	0.071
15.	Do you often experience having a dry mouth? <i>Sık sık ağzınız kurur mu?</i>	0.131
16.	Do you go out at least once a week? <i>Haftada en az bir kez dışarı çıkar mısınız?</i>	0.373
17.	Do you go out less frequently compared to last year? <i>Geçen yıla göre daha mı az dışarı çıkarsınız?</i>	0.328
18.	Do your family or your friends point out your memory loss? e.g. "You ask the same question over and over again." <i>Aileniz veya arkadaşlarınız unutkan olduğunuzu söyler mi?</i> <i>(Örneğin: "Aynı soruyu tekrar tekrar soruyorsun.")</i>	0.152
19.	Do you make a call by looking up phone numbers? <i>Rehber bakarak telefon araması yapar mısınız?</i>	0.389
20.	Do you find yourself not knowing today's date? <i>Günün tarihini hatırlamadığınız olur mu?</i>	0.180
21.	In the last 2 weeks have you felt a lack of fulfillment in your daily life?	0.216

(Continues)

Table 2 Continued

No.	Questions	Kappa value
	<i>Son 2 haftada günlük yaşamınızda bir şeyler yapma isteğinizin kaybolduğunu hissettiniz mi?</i>	
22.	In the last 2 weeks have you felt a lack of joy when doing the things you used to enjoy? <i>Son 2 haftada normalde zevk aldığımız şeylerden zevk alamadığımız oldu mu?</i>	0.280
23.	In the last 2 weeks have you felt difficulty in doing what you could do easily before? <i>Son 2 haftada önceden kolaylıkla yaptığımız şeyleri yaparken zorlandığımız oldu mu?</i>	0.272
24.	In the last 2 weeks have you felt helpless? <i>Son 2 haftada kendinizi çaresiz hissettiniz mi?</i>	0.170
25.	In the last 2 weeks have you felt tired without a reason? <i>Son 2 haftada kendinizi sebep yokken yorgun hissettiniz mi?</i>	0.246

women. The reasons for this might include longer life expectancy for women, and changes in biological factors, such as hormones, inflammatory cytokines, sarcopenia and educational status.²³ In fact, female sex is considered a risk factor for frailty.²⁴ In the present study, the frailty rate in women was found to be high in accordance with the literature. In addition, age is one of the most important risk factors for frailty.²⁴ In the present study, it was also found that frailty increased with advancing age. Studies have shown that low education level is among the risk factors for frailty.²⁵ This is attributed to multifactorial reasons, such as individuals with a higher education status preferring a healthier lifestyle and having better financial means.²⁵ Similarly, in the present study, a significant relationship was found between education level and frailty. Malnutrition and low walking speed related to frailty are problems that are in the diagnostic criteria.^{18,26} It is known that malnutrition causes frailty, and low walking speed, balance disorders, falls, immobility and dependence are more common in frail individuals.^{11,27} One of the reasons for this might be the intertwined etiopathogenesis of sarcopenia and frailty, and also the loss of the muscle strength and muscle mass. Another dimension of frailty is the cognitive frailty.³ For these reasons, frailty is expected to be associated with the components of the comprehensive geriatric assessment, which evaluates parameters such as nutrition, functionality, cognitive functions and mood. In the present study, the relevance of frailty to all the comprehensive geriatric assessment parameters further highlights the importance of the subject.

Although many scales have been developed for the diagnosis of frailty, there is no gold standard method because of the multifactorial etiopathogenesis of frailty. There is a need for simple, easy to use, fast scales that can be used by all physicians in daily practice. The KCL consists of 25 yes/no questions that are easy to understand and apply. Therefore, it is validated in English,⁷ Portuguese⁸ and Spanish,⁹ and it was shown that it is a valid scale for the diagnosis of frailty.¹⁰ In the present study, we found that the KCL has good internal consistency (Cronbach's α value 0.876) in Turkish older adults. In order to distinguish between frail and prefrail older adults, the most appropriate cut-off points are ≥ 9 and ≥ 4 , respectively. In a study carried out in Japan, these cut-off points were ≥ 8 and ≥ 4 , respectively.¹⁰ Although the sensitivity and specificity values of the groups with and without frailty were similar (sensitivity 89.5% and specificity 80.7%), the sensitivity and specificity values were lower in the present study to distinguish prefrail and robust older adults. Again, Ogawa *et al.* reported that the sensitivity and specificity of the first 20 items of the KCL were 60.0% and 86.4%, respectively, with the use of 6 as a cut-off point for frailty, unlike previous studies.²⁸ This may be because the last five items of the KCL were ignored.

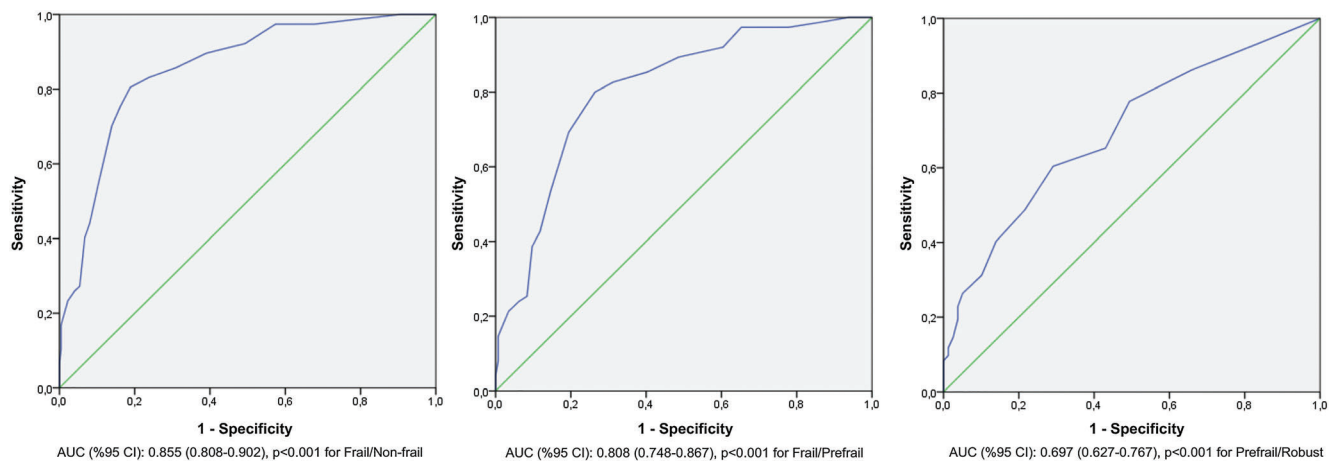


Figure 1 Receiver operating characteristic curve (ROC) analysis of the Kihon Checklist.

Table 3 Discriminant validity of the Kihon Checklist for frail, prefrail and robust older adults

	Cut-off	Sensitivity	Specificity	PPD	NPD
Frail – non-Frail	≥9	80.52%	81.17%	59.62%	92.35%
Frail – prefrail	≥9	80.52%	73.61%	62.00%	87.60%
Prefrail – robust	≥4	65.28%	56.96%	73.44%	47.37%

NPV, negative predictive value; PPV, positive predictive value.

In the present study, questions 5, 12, 13, 14, 15 and 20 have lower kappa values. These questions evaluate social, nutritional, chewing and swallowing, and cognitive functions. It was thought that the low discriminatory power of questions related to cognitive function was related to the lack of evaluation of cognitive frailty in the present study, because the Fried criteria were used. In our study, questions about nutrition and weight loss were limited in determining frailty. Studies have shown that frailty is more common in obese people.²⁹ Similarly, in the present study, BMI was higher in the frail group. In addition, the rates of sarcopenia and dynapenia were higher in the frail group. These results might be associated with sarcopenic obesity, whose importance is even more common.³⁰ Another domain with low discriminative power in detecting frail patients regards the questions about chewing and swallowing. It was thought that comprehensive geriatric assessment parameters and the Fried criteria were not related to the evaluation of dysphagia, chewing and swallowing functions. Evaluation of oral functions might be one of the strengths of KCL. In the present study, another question with limited power to assess

frailty according to the kappa value was the 24th question that queried about “feeling helpless.” In previous studies of Turkish older adults, the questions about “feeling helpless” have been shown to have low discriminative power in screening for depression.¹⁶ These reasons might explain the low sensitivity and specificity of the frail candidates of the KCL and the control group.

The strengths of the present study include the prospective design and that the diagnosis of frailty was established according to the Fried criteria, which is one of the most accepted scales, and that a sufficient number of patients aged >60 years were included in the study. One of the limitations of the present study is that cognitive frailty was not evaluated. We did not examine the association between KCL and cognitive frailty, and such research can be necessary for the future. Another is the fact that CDR-2 and CDR-3 dementia patients were excluded from the study, and the results therefore might not generalize to patients with dementia.

The KCL is a simple, fast and easy-to-use scale that can be applied in clinical practice without the need for additional training. The evaluation of problems in seven different domains allows for detection of problem areas. In addition, the evaluation of cognitive functions, chewing and swallowing functions in the KCL offers advantages over the Fried criteria. The KCL, which is found to be valid in Turkish older adults, and can distinguish frailty with high sensitivity and specificity, is a scale that can be used by all health workers in order to identify and guide older adults in the early stages of frailty.

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Disclosure statement

The authors declare no conflict of interest.

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Table 4 Correlation of Kihon Checklist total test scores with other parameters

	R	P-value
MMSE	–0.451	<0.01
CDT	–0.312	<0.01
CDR	0.455	<0.01
BADL	–0.569	<0.01
IADL	–0.666	<0.01
MNA-SF	–0.385	<0.01
Body mass index	0.147	<0.05
POMA	–0.591	<0.01
Timed Up and Go	0.585	<0.01
CCI	0.216	<0.01

Statistically significant values are provided in bold. BADL, basic activities of daily living; CCI, Charlson Comorbidity Index; CDR, Clinical Dementia Rating; CDT, Clock Drawing Test; IADL, instrumental activities of daily living; MMSE, Mini-Mental State Examination; MNA-SF, Mini Nutritional Assessment-Short Form; POMA, Tinetti Performance Oriented Mobility Assessment.

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