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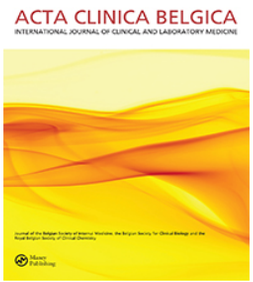

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An important problem in an aging country: identifying the frailty via 9 Point Clinical Frailty Scale-

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ABSTRACT

Objectives: Frailty is a geriatric syndrome which develops as a result of cumulative decline in many physiological systems and results in an increased vulnerability and risk of adverse outcomes. The Clinical Frailty Scale (CFS) was validated as a predictor of adverse outcomes in community-dwelling older people and evaluates items such as comorbidity, cognitive impairment and disability. We aimed to study the concurrent and construct validity and reliability of the 9 point CFS in Turkish Population.

Methods: This study was designed as a cross-sectional study. Participants, who were admitted to a geriatric medicine outpatient clinic, were included. Validity of 9 point CFS was tested by its correlation with the assessment and opinion of an experienced geriatric medicine specialist and Fried frailty phenotype. Test-retest and inter-rater reliability analyses were also performed.

Results: Median age of the 118 patients was 74.5 years (min: 65 max: 88) and 64.4 % were female. The concordance of CFS and experienced geriatric medicine specialist's opinion was excellent (Cohen's *K*: 0.80, $p < 0.001$).The concordance of CFS and Fried Frailty phenotype was moderate (Cohen's *K*: 0.514, $p < 0.001$).CFS inter-rater reliability and test-retest reliability was very strong (Cohen's *K*: 0.811, $p < 0.001$ and Cohen's *K*: 1.0, $p < 0.001$, respectively).

Conclusions: CFS appears to be a quick, reliable and valid frailty screening tool for community-dwelling older adults in the Turkish population.

KEYWORDS

Clinical frailty scale; elderly; frailty; Turkish population

1. Introduction

Frailty is a geriatric syndrome characterized by the reduction of physiological functions and strength, results in an increased vulnerability and risk of higher dependency and/or death [1]. Frailty prevalence ranges between 4.0% and 59.1% in community-dwelling people aged >65 years [2]. As the population ages, frailty becomes an increasingly important public health problem and also it may represent a vicious cycle responsible for the onset of negative health-related outcomes, a transition phase between successful aging and disability [3]. Identification of frail or pre-frail older individuals with appropriate evaluation and intervention constitutes a cornerstone of geriatric medicine and quality care for the aging population [4]. In recent years there has been an increased importance of early identification of frailty in older persons. The European Union has placed specific importance on defining frailty as frail persons are higher users of community resources, hospitalization and nursing homes [5]. Furthermore, early intervention of frail persons and prevention of frailty will improve the quality of life and reduce costs of care [5]. Despite its importance, no clear consensus exists on the definition of frailty for clinicians, researchers, and policy makers. Because of the uncertainty and a need to determine whether there is sufficient information available to advocate screening by all physicians for frailty, a consensus conference was convened on 2012 [1]. The consensus agreed that frailty screening instruments can be used to identify frailty syndrome and recommend to screen all persons over 70 years old and any person with significant weight loss (≥5% over the past year) [1].

Too many screening tools have been developed to detect frailty in geriatric medicine clinics [6]. Among these, the Fried frailty index, the Edmonton Frailty Scale and the recently developed Clinical Frailty Scale (CFS) are the most frequently used tools [6,7]. Most of the frailty definitions are based on two basic approaches [8]. The first approach described by Fried is physical frailty including three or more of unacceptable weight loss, fatigue, weakness, slow walking speed, and low physical activity based from the Cardiovascular Health Study [9]. Other approach combines a broader scope of frailty, including

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cognitive, social, and psychological components, next to the physical characteristics [10]. Although the frailty syndrome includes multiple domains, physical frailty (and more specifically musculoskeletal frailty) is seen as the main component of frailty.

CFS was developed to measure frailty in the second stage of the Canadian Study of Health and Aging (CSHA) [11]. CFS is an effective tool to detect frailty and recommended for screening of frailty [1]. Moreover, CFS mixes items such as comorbidity, cognitive impairment, and disability with physical frailty. It is scored on a scale from 1 (very fit) to 9 (terminally ill), in which the patient should be in one category, and is based on clinical judgment [11]. Each point on this scale corresponds with a written description of frailty, complemented by a visual chart to assist with the classification of frailty. A score ≥5 is considered to be frail [11]. The CFS provides predictive information about death, length of hospital stay, and institutionalization in hospitalized older people [12].

In most of the developing countries, including Turkey, Geriatrics and Gerontology is a new and rising mention field and number of geriatricians and other healthcare workers with geriatric medicine training remains low. Frailty is usually not recognized by the healthcare professionals dealing with elderly population. Therefore, there is a requirement for scales that can be used practically and quickly to detect frailty. Since most of the frailty tests have no validity and reliability in Turkish population, we aimed to assess the validity and reliability of the 9 point CFS in this study.

2. Methods

2.1. Study participants and study tool

The study population included patients aged 65 years and older who were admitted to the University Hospital geriatric medicine outpatient clinic between March 2017 and December 2017. The exclusion criteria were hospitalization required due to acute illnesses, delirium, active malignancy, and failure to give informed consent. In case of dementia, required informations were asked to both the patients and the primary caregivers who were taking care of the patient for at least 20 h per week and able to give reliable information about the patient. Data including age, gender, and comorbidities which were obtained according to the medical records or statement of patients were recorded. All of enrolled patients were assessed with medical, family and social history, drug usage and physical examination. After this assessment, CFS was scored for each patient. The patients who were scored 1–3 grouped as 'normal,' the patients who scored 4 grouped as 'vulnerable' and the patients who scored ≥5 grouped as 'frail'. Two weeks after the first examination, CFS was scored by the same doctor for the re-test reliability. Also for some of patients, a second doctor scored CFS in a different room for inter-rater reliability in the first visit.

2.2. Reference tools

Although, there is no standard method for the identification of the frailty, the usual and best method is comprehensive geriatric assessment (CGA) [13]. CGA requires the evaluation of physical, cognitive, affective, social, financial, and environmental components. For that purpose; activities of daily living was assessed by basic and instrumental activities of daily living (Katz BADL and Lawton-Brody IADL) scales [14,15]. The Katz BADL measures six self-care tasks, including bathing, dressing, toileting, transferring to and from a chair, maintaining continence and feeding. The Lawton–Brody IADL measures eight levels of self-performance including using the telephone, shopping, cooking, housekeeping, laundry, transportation, ability to take his/her medications, and financial management. The cognitive status was assessed by the Mini-Mental State Examination (MMSE) and mood was evaluated by Yesavage Geriatric depression scale short form [16,17]. Nutritional status was evaluated by Mini Nutritional Assessment [18]. After the CGA, the geriatric medicine doctor with over 10 years clinically experience, decided if the patient was 'Frail,' 'Vulnerable,' or 'Not frail'. This method was used as a reference point for identifying frailty.

Furthermore, frailty was assessed by using Fried Frailty Phenotype (FFP) and also this method was used as a reference tool [9]. Participants presenting with three or more of five criteria (weight loss, exhaustion, physical inactivity, low handgrip strength, and slow walking speed) are considered as frail, with one or two criteria as pre-frail, with none of the criteria as robust. Weight loss was defined as unintentional weight loss of 4.5 kg or 5% of body weight in the prior year. Exhaustion was identified by the questions from the Center for Epidemiologic Studies – Depression (CES–D) scale: 'How often in the last week you felt that everything you did was an effort?,' and 'How often in the last week you felt that you could not get going?,' 0 = rarely or none of the time (1 day), 1 = some or a little of the time (1–2 days), 2 = a moderate amount of the time (3–4 days), or 3 = most of the time. Participants answering 2 or 3 either of these questions are categorized as presenting exhaustion criteria [19]. Sedentary behavior was assessed by Minnesota Leisure Time Physical Activity Questionnaire [20]. Muscle strength was assessed by hand grip (HG) strength measured by a dynamometer (Takei TKK 5401 Digital Handgrip Dynamometer, Niigata-City, Japan). Grip strength was measured in upright position with the arms parallel to the body. The participants were asked to apply the maximum grip strength for 3 times with the unsupported dominant hand. The highest value of three repeated trials was recorded as the grip strength. Originally defined thresholds in Cardiovascular Health Study adjusted for gender and body mass index was used as cutoff points [21]. Walking speed (WS) was assessed by 4-m walking test. Participants were informed to walk over a 4-m course

with their usual speed. The cutoff point was accepted as <0.8 m/s according to previous studies [22].

2.3. Translation

Process of language translation and adaptation complied with the recommendations of WHO. First, two native Turkish speakers in medical sciences majoring in translation and fluent in English translated the original CFS tool into Turkish. All authors checked and agreed on the Turkish version. Second, the Turkish version was retranslated into English, by two native English speaker postgraduates in medical sciences, who were blinded to the original questionnaire. Two Geriatric medicine doctors compared the back-translated version with the original version. Lastly, the Turkish CFS tool was applied to a convenient sample of community-dwelling older adults by medical doctors for cultural adaptation assessment.

2.4. Statistical analysis

All statistical analyses were conducted using IBM SPSS 22. The sample size of this study estimated with Epi İnfo software systems. Descriptive statistics were shown as mean ± standard deviation (SD) for normally distributed continuous variables, median (IQR) for skewly distributed variables, and percentages in case of categorical variables. Chi-square test was used to determine differences between categorical variables. The construct validity and inter-rater reliability of CFS was analyzed by Cohen's Kappa. Also, test–retest reliability was analyzed by Cohen's Kappa. While associations between patients CFS score and FFP score variables, the correlation coefficients and their significance were calculated using the Spearman test. The p value of <0.05 was accepted as statistically significant.

2.5. Ethical statement

Ethical approval was obtained from the local Ethical committee with the ID: GO 17/237–04 number. Human research was completed in accordance with the guidelines of the Helsinki Declaration. Written informed consent was obtained from all participants and it was further obtained from the caregivers of patients with dementia.

3. Results

Overall, 118 geriatric subjects were included in our study; 35.6% patients were in the Frail group, 22% were in the vulnerable group, and 42.4% were in the non-frail group, described via CGA. The median age was 74.5 years (IQR: 9 years), and 64.4% were women. Within all of 118 elderly patients, 12.7% were living alone, 2.5% were living with caregiver, and 83.1% were living with family members or as a couple. In the whole study group, 77.1% of patients were hypertensive, 29% patients had coronary heart disease, 10% had atrial fibrillation, 16% had chronic respiratory problems, and 33 % had diabetes mellitus. Twenty-three patients (19%) had dementia. Clinical dementia rating scale was performed, 7 patients' CDR was 1, 12 patients' CDR was 2, and 4 patients had severe dementia as CDR 3. In the overall group, 1.7% of patients were not taking any medications, however 58.5% were using ≥4 drug (median: 4, IQR: 4).

Median body mass index (BMI) was 28.4 kg/cm^2 (IQR: 7.5 kg/cm^2). Median hand grip strength was 17 (IQR: 6.9) in women and median hand grip strength was 26 (IQR: 13.1) in men. In the overall group, 6 patients were unable to walk and needed walking chair, median 4 m walking speed was 0.72 m/s (IQR: 0.39 m/s). Frailty status and CGA results were given in Table 1.

When frailty was examined within three groups (normal, vulnerable, and frail group); concordance of CFS and experienced Geriatrician opinion after CGA was excellent (Cohen's K: 0.809, $p < 0.001$). The concordance of CFS and FFP was moderate (Cohen's K: 0.514, $p < 0.001$). CFS score and FFP scores were positively and strongly correlated (Spearman r: 0.731 $p < 0.001$). CFS inter-rater reliability and retest reliability was excellent (Cohen's K: 0.811, $p < 0.001$ and Cohen's K: 1.0, $p < 0.001$; respectively).

When frailty was just examined within two groups (normal [normal+vulnerable] and frail group); concordance of CFS and experienced Geriatrician opinion after CGA was excellent too (Cohen's K: 0.84, $p < 0.001$). The concordance of CFS and FFP was good (Cohen's K: 0.715, $p < 0.001$). The concordance of CFS and the reference tests were given in Table 2.

4. Discussion

The main aim of this study was to validate the CFS tool for the frailty evaluation of patients with a simple

Table 1. Frailty status and comprehensive geriatric assessment results.

	Normal (n:50)		Vulnerable (n:26)		Frail (n:42)	
	Median	IQR	Median	IQR	Median	IQR
Age	73	8	72	8	79	8
BMI (kg/m2)	28.7	5.1	26.5	9.1	26.5	8.6
Drug #	4	4	4	4	6	6
Handgrip strength (kg)	22.0	9	18.9	7.1	15.0	6
4 m walking speed (m/s)	0.8	0.33	0.73	0.30	0.44	0.24
Katz ADL	6	0	6	0	5	3
Lawton–Brody IADL	8	0	8	1	4	5
MMSE	29	3	29	0	23.5	7
MNA	14	2	13	2	11	5
Yesavage GDS	1	2	2	5	3	6

BMI: Body mass index (kg/cm2); ADL: activities of daily living; IADL: instrumental activities of daily living; MMSE: Mini Mental State Examination; MNA: Mini Nutritional Assessment; Yesavage GDS: Yesavage geriatric depression scale short form.

Table 2. CFS and reference test concordance results.

	Three Group Examination (Frail/ Vulnerable/ Normal)		Two Group Examination (Frail/ Normal)	
	Cohen's Kappa	*P*	Cohen's Kappa	*P*
CFS-Geriatrician Opinion)	0.809	<0.001	0.840	< 0.001
CFS-FFP	0.514	<0.001	0.715	< 0.001
Inter-Rater Reliability	0.811	<0.001	–	–
Retest Reliability	1.0	<0.001	–	–

CFS: Clinical Frailty Scale; FFP: Fried Frailty Phenotype.

and quick way. The final goal of this study is to offer a suitable instrument to the Turkish scientific community to identify frailty. In our study, we showed that CFS, FFP, and clinical opinion after CGA were highly and positively concordant for evaluating frailty. CFS and CGA concordance was excellent; also CFS and FFP concordance was good.

Frailty is one of the most important concerns regarding our aging population. Frailty is characterized by age-associated declines in physiologic reserve and function, affecting multiorgan systems leading to increased vulnerability for adverse outcomes. Furthermore, it is a common public health problem. Frailty prevalence ranges between 4.0% and 59.1% in community-dwelling people aged >65 years [9]. After excluding acute and chronic diseases, frailty prevalence reach over 7% in >65 years and 20% in >80 years [9].

Frail patients have higher rates of adverse outcomes, and thus require adaptations of care, personalization of interventions, and modifications of standard protocols [23,24]. Evidence grows that the syndrome is linked to several important health outcomes. İnfections, falls, disability, cognitive decline, depression, institutionalization, hospitalization, and death are some of these outcomes [9]. Frail patients had much worse prognosis than non-frail patients. In the intensive care unit, frailty was associated with higher hospital mortality, long-term mortality and also associated with low discharge rates [25]. Furthermore, in geriatric patients with severe coronary artery disease or heart failure, the prevalence of frailty was 50–54% and frail cardiovascular disease patients had worse outcomes than non-frail patients [26].

In Turkey as a developing country, increase in the geriatric population is inevitable with the increased life expectancy all over the world. According to the study conducted by the Turkish Statistical Institute on March 2018, the geriatric population (65 and over) was identified as 6.895.385 persons in 2017 [27]. The percentage of geriatric population in 2014 was 8%, increased to 8.5% in 2017 and expected to increase gradually [27]. Frailty prevalence in Turkey was found 39% in adult Frail TURK project [28]. The study included 1126 individuals over 65 years of age, from Physical Medicine and Rehabilitation outpatient clinics of 13 different centers. Frailty was evaluated using the Fried Frailty criteria, and patients were grouped as 'frail,' 'pre-frail,' and 'non-frail'. Finally, 43.3% of the participants were rated as pre-frail and 39% of the participants were rated as frail [28].

It is necessary to better understand the importance of frailty because of the increased adverse outcomes, having a high work load and economic burden. The identification of frailty is increasingly important because, the goals of the medical treatment of the patient, the need for social support systems, prediction of comorbidities that may develop (i.e. falls, immobility, hospitalization, etc.), and determining the long-term prognosis are very important. Early detection of any form of frailty in geriatric subjects is critical for managing the medical status and to preserve patients' biological, psychological, and social status.

In the healthcare setting, the identification of frailty should be simple and require little time [29]. We need to develop more efficient methods to detect frailty and measure its severity in routine clinical practice, especially methods that are useful for primary care or other medical departments beyond geriatric medicine. The gold standard method for frailty evaluation is CGA. However, CGA is time consuming and generally number of experienced geriatricians is few in developing countries. For these reasons, identifying the frailty of outpatient clinic patients, hospitalized patients and nursing home patients is highly important. In our study, we showed that CFS, FFP, and clinical opinion after CGA were highly and positively concordant for evaluating frailty. CFS and CGA concordance was excellent; also CFS and FFP concordance was good. The reason of this result could be that FFP was searching mostly for physical frailty. However, CFS is a combination of items regarding cognitive and physical functions. Since cognition is a relevant domain of frailty, it should be evaluated within frailty assessment. The links between physical frailty, cognitive frailty, and social frailty were also addressed in researches [30]. CFS is prior than FFP as it includes cognitive frailty assessment. In our opinion, most of the dementia patients, especially ones in early stage, can be classified as 'normal' or 'vulnerable' if only screened with FFP. Dementia, even in the early stage is an important cause of frailty, so it is a disease that should not be overlooked while assessing frailty. These early stage dementia patients were in 'frail' state when screened with CFS. Therefore, CFS enables physicians to make a more comprehensive frailty diagnosis. However, FFP is an objective frailty assessment tool while CFS is a subjective tool. Nonetheless, CFS was derived from CSHA and it has reliability and validity in clinical practice, also predicts outcomes.

To the best of our knowledge, this is the first study to assess the validity of CFS compared with professional assessment in geriatric population. The results

of this study demonstrated that the Turkish version of CFS is a valid tool for the identification of frailty in Turkish Population.

Disclosure statement

No potential conflict of interest was reported by the authors.

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