Frailty and its associates in community-dwelling older adults

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SUMMARY

OBJECTIVE: While the literature contains several studies on the frailty assessed during hospitalization and/or outpatient settings and nursing homes, few studies have assessed frailty in community-dwelling older adults. We investigated the prevalence of frailty and associated factors among older adults in a sample of community-dwelling older adults.

METHODS: We included community-dwelling older adults >60 years living in the Fatih District of the Istanbul Province. We conducted the study between November 2014 and May 2015. We collected the data such as age, sex, number of diseases and drugs, functional status, frailty, the presence of geriatric syndromes, common diseases, and quality-of-life assessment. Frailty was evaluated by the FRAIL scale.

RESULTS: A total of 204 adults (mean age: 75.4±7.3 years) were included, of whom 30.4% were robust, 42.6% were pre-frail, and 27% were frail. In multivariate analyses, associated factors of frailty were the number of drugs [odds ratio (OR)=1.240, p=0.036], the presence of cognitive impairment (OR=0.300, p=0.016), and falls (OR=1.984, p=0.048).

CONCLUSION: The present study established the prevalence of frailty in a large district in the largest metropolis in the country through a valid screening method. Our results suggest that clinicians should consider frailty evaluation in patients with multiple drug usage, cognitive impairment, and falls.

KEYWORDS: Community dwelling. Older adults. Frail elderly. Geriatric assessments.

INTRODUCTION

Our country is experiencing the same significant demographic changes worldwide, along with a continuous increase, especially in the older population. It is estimated that one in every six (16%) people will be above 65 years of age by 2050[1]. Frailty is a multidimensional geriatric syndrome that can be defined as a state of increased vulnerability resulting from decreased physiological reserves, multiple system irregularities, and limited capacity to maintain homeostasis[2]. Although frailty is often associated with comorbidities and restrictions on movement, these terms have different meanings[2-6]. The comorbidities that accompany frailty can be caused by frailty but may also be considered a risk factor for frailty and disability[3-9].

While the literature contains several studies on the frailty assessed during hospitalization and/or outpatient clinic visits and nursing homes, few studies assess the community-dwelling older adults in our country[2-5]. However, there is not yet a frailty prevalence study in the most populated metropolitan area of our country, where elderly patients are evaluated with home visits. Istanbul is the 22nd largest metropolitan city in the world and is also located in a region that receives the most

significant number of migrations due to our country's industrialization and cultural and historical heritage.

In light of this information, the present study investigated the prevalence of frailty and associated factors among the older adults assessed within the scope of a comprehensive geriatric study in the Fatih District of Istanbul Province.

METHODS

This was a population-based, prospective, cross-sectional study. The sample size was calculated considering the prevalence of frailty in the community with a 10% error margin at a power of 80% and a 95% confidence interval.

The study included community-dwelling older adults aged 61–101 years living in the Fatih District of Istanbul Province between November 2014 and May 2015. We selected the participants by a simple random sampling method among the older adults living at the addresses determined in the Fatih District of Istanbul. Participants aged over 60 years who agreed to participate in the study were included, while participants who had an implant, had edema/major fluid-electrolyte disorders, had

cognitive impairment without anyone to accompany them, and were illiterate were excluded.

Functional capacity was measured using a six-item KATZ Activities of Daily Living (ADL) Scale and an eight-item LAWTON-BRODY Instrumental Activities of Daily Living Scale (IADL)[10].

Frailty was assessed through the application of the FRAIL scale. Based on the results of the five-item FRAIL scale, fatigue, resistance, ambulation, illnesses, and weight loss were measured[11].

The malnutrition screening was carried out using the Mini Nutritional Assessment-Short Form (MNA-SF)[12].

The cognitive screening was carried out using a Mini-Cog test[13].

The depressive mood was evaluated using the Geriatric Depression Scale-Short Form (GDS-SF)[14].

For the chronic pain assessment, we asked participants if they had pain for more than 6 months and, in the presence of pain, we asked them to give a score between 0 and 10 using the visual analog scale (VAS)[15].

Handgrip strength (HGS) was measured using a Jamar hydraulic hand dynamometer. For HGS, the previously reported cutoffs of 27 and 16 kg for males and females, respectively, were used according to the European Working Group on Sarcopenia in Older People2 (EWSGOP2)[16,17].

Statistical analysis

The normality of continuous data was analyzed with a Kolmogorov-Smirnov test. For the descriptive statistics, continuous variables were expressed as mean±standard deviation, median, and minimum-maximum values, while categorical variables were expressed as number (of subjects) and percentages. The differences between groups were determined by independent samples t-test or Mann-Whitney U test. The chi-square test and Fisher's exact test for 2×2 probability tables are suitable for categorical variables. Multivariate logistic regression analysis with the Enter method was used to determine the independent factors associated with frailty among the factors found to be significant in univariate analyses. Multicollinearity was checked among the selected parameters.

RESULTS

The study involved 204 older adults (94 men and 110 women) with a mean age of 75.4±7.3 years. Of the cases, 30.4% were robust, 42.6% were pre-frail, and 27% were frail. Significant differences between the genders were recorded in the number of diseases and drugs, IADL score, FRAIL score, malnutrition, GDS-SF score, fear of falling, urinary incontinence, chronic pain, and handgrip strength (Table 1).

In univariate analysis, the frailty groups (robust vs. frail) differed significantly in terms of age, sex, number of diseases and drugs, ADL-IADL score, the presence of malnutrition, the risk of malnutrition, cognitive impairment, dementia, depression, fear of falling, falls, urinary incontinence, chronic pain, and probable sarcopenia (Table 2).

A multivariate logistic regression analysis evaluating frailty-associated independent factors [dependent variable: frailty (robust vs. pre-frail+frail)] revealed an association between the frailty and the number of drugs (OR=1.240, p=0.036, CI=1.010–1.500), cognitive impairment (OR=0.300, p=0.016, CI=0.113–0.799), and falls (OR=1.984, p=0.048) (Table 3).

DISCUSSION

There have been several studies examining frailty and potentially associated factors among patients during hospitalization and outpatient clinic visits, while there have been only few studies making extensive assessments of older people living in the community[6,8,18-22]. There have also been studies conducted in our country evaluating the older inpatients and outpatients admitted to family health centers. To the best of our knowledge, to date, no study involving a community screening for frailty, as in the present study, has been conducted[12].

We established that 42.6% of the respondents were pre-frail, while 27% were frail. Çakmur et al., in their population-based study in Kars, a rural area of Turkiye, screened frailty in community-dwelling older adults with the FFI scale[19]. They found the prevalence of frailty to be 7.1% and the prevalence of pre-frailty to be 47.3%. In addition, they found advanced age, lower education level, lower economic level, comorbidities, polypharmacy, diabetes, chronic obstructive pulmonary disease, stomach disease, arthritis, widespread pain, benign prostatic hyperplasia, urinary incontinence, auditory disorder, impaired oral care, caregiver, burden, cognitive dysfunction, depression, and social isolation as factors associated between frailty in univariate analyses in this study[19]. In the study conducted by Jurschik et al., among people aged 75 years and older living in a community in Spain, the frailty prevalence was identified as 9.6% by the Fried Frailty Index (FFI) criteria[21]. In the study by Moreira et al., of the participants aged over 65 years living in a community in Brazil, 9.1% were frail and 47.3% were pre-frail, based on the results of the FRAIL scale[8]. A meta-analysis by Kojima et al., examining five studies in which frailty was assessed using the FFI, involving 11,940 community residents aged 65 years or older in Japan, identified frailty in 7.4% and pre-frailty in 48.1% of the respondents[6]. The study by Collard et al., assessed 21 studies with 61,500 participants using the

Table 1. Comparative data of the study population by sex.

	Male (n=94)	Female (n=110)	Total (n=204)	p-value
Age	74.7±6.6	76±7.8	75.4±7.3	0.190
Number of diseases	3 (0–7)	3 (0–9)	3 (0–9)	0.006*
Number of drugs	3 (0–18)	4 (0–12)	4 (0–18)	0.001*
ADL	18 (6–18)	18 (6–18)	18 (6–18)	0.194
IADL	24 (8–24)	23 (8–24)	24 (8–24)	<0.001*
FRAIL score	1 (0–5)	1 (0–5)	1 (0–5)	0.002*
FRAIL group				
Robust (n, %)	38 (40.4%)	24 (21.8%)	62 (30.4%)	0.004*
Pre-frail (n, %)	39 (41.5%)	48 (43.6%)	87 (42.6%)	
Frail (n, %)	17 (18.1%)	38 (34.5%)	55 (27%)	
Malnutrition (MN+MNR) (n, %)	29 (30.9%)	56 (50.9%)	85 (41.7%)	0.004*
Probable sarcopenia (n, %)	25 (26.6%)	23 (21.7%)	48 (24%)	0.418
Cognitive impairment (n, %)	32 (34%)	33 (31.1%)	65 (32.5%)	0.660
GDS-SF score[x]	2 (0–11)	4 (0–14)	3 (0–14)	<0.001*
Fear of falling (n, %)	17 (18.1%)	49 (45%)	66 (32.5%)	<0.001*
Falls (n, %)	24 (25.5%)	34 (30.3%)	58 (28.1%)	0.470
Urinary incontinence (n, %)	25 (26.6%)	48 (44%)	73 (36%)	0.010*
Faecal incontinence (n, %)	2 (2.1%)	4 (3.7%)	6 (3%)	0.510
Chronic pain (n, %)	32 (34%)	61 (56.5%)	93 (46%)	0.001*
Chronic diseases				
DM (n, %)	29 (30.9%)	33 (30%)	62 (30.4%)	0.890
HT (n, %)	61 (64.9%)	83 (75.5%)	144 (70.6%)	0.100
Dementia (n, %)	17 (18.1%)	15 (13.6%)	32 (15.7%)	0.380

ADL: activities of daily living; IADL: instrumental activities of daily living; BIA: bioimpedance analysis; DM: diabetes mellitus; GDS-SF: geriatric depression scale-short form; HT: hypertension; MN: malnutrition; MNR: malnutrition risk; MNA-SF: mini nutritional assessment-short form. [x]GDS-SF score is between 0 and 15. *Significant p-value.

FFI and reported frailty in 10.7% and pre-frailty in 41.6% of the older community residents[23]. Roche et al., used the FFI in community-dwelling people aged 65 years and older in the United States and identified frailty in 15% and pre-frailty in 45% of the population[7]. The differences in the prevalence of frailty may result from differences in the mean ages of the study groups, the genetic differences between communities, and the differences in sociodemographic characteristics between regions, along with differences in the scales used for the frailty assessment[4,8,9,21]. In Akın et al.'s study, the FRAIL scale was used in those aged 65 years and over who applied to family health centers in Turkiye, and frailty was identified in 10% and pre-frailty in 45.6% of the participants. They also used the FFI scale to screen for frailty. They found frailty at 27.8% and pre-frailty at 34.8% on the FFI scale[5]. Unlike the present study, which involved the community screening of a sample selected by stratification, the study by Akın et al., included patients applying to a family health center (primary care health center). The difference in the prevalence of frailty between the two studies may be due to older people's poorer general health status during home visits, thus not being able to apply to health centers and the higher prevalence of frailty.

Our findings indicated that multiple drug use was associated with frailty. The study by Woo et al., examined frailty and associated factors among community-dwelling residents above 65 years residing in rural and urban areas in China and found polypharmacy to be associated with frailty in both such areas, which was consistent with the findings of our study[22]. The retrospective study by Zheng et al., followed older residents of a community for 1 year and found that older people with polypharmacy became frail within 1 year more frequently[23]. These findings were in line with those of the present study and

Table 2. The associates of frailty (univariate analyses).

	Frail[a] (>3) n: 55 (27%)	Pre-frail[b] (1–2) n: 87 (42.6%)	Robust[c] (0) n: 62 (30.4%)	p-value	Frailty groups
Age	78.2±8.4	75.3± 6.9	72.9 ±5.8	0.001*	(a–c)
Sex (n, %)					(a–c)
Female	38 (69%)	47 (54%)	25 (40%)		
Male	17 (31%)	40 (46%)	37 (60%)	0.004*	
Number of diseases	4 (1–9)	3 (0–7)	2 (0–7)	<0.001*	(a–c), (a–b), (b–c)
Number of drugs	5 (1–18)	4 (0–15)	3 (0–8)	<0.001*	(a–c), (b–c)
ADL	17 (3–18)	18 (1–18)	18 (16–18)	<0.001*	(a–c), (a–b)
IADL	16 (8–24)	24 (10–24)	24 (15–24)	<0.001*	(a–c), (a–b)
Malnutrition (MN+MNR) (n, %)	35 (63%)	35 (40%)	15 (24%)	<0.001*	(a–c), (b–c)
Probable sarcopenia (HGS)	22 (43.1%)	17 (19.5%)	9 (%14.5)	0.001*	(a–b), (a–c)
Cognitive impairment (n, %)	28 (53.8%)	28 (32.6%)	9 (14.5%)	<0.001*	(a–c), (a–b), (b–c)
Depression (GDS-SF) (n, %)	17 (30%)	10 (11%)	1 (1.6%)	<0.001*	(a–c), (b–c)
Fear of falling (n, %)	28 (50%)	28 (32%)	10 (16%)	<0.001*	(a–c)
Falls (n, %)	23 (41%)	25 (28%)	29 (46%)	0.011*	(a–c)
Urinary incontinence (n, %)	32 (58%)	32 (36%)	11 (17%)	<0.001*	(a–c)
Faecal incontinence (n, %)	2 (3.6%)	4 (4.5%)	0 (0%)	0.100	N/A
Chronic pain (n, %)	37 (67%)	39 (44%)	17 (27%)	<0.001	(a–c), (a–b)
Chronic diseases					
DM (n, %)	18 (32%)	27 (29%)	18 (29%)	0.900	N/A
HT (n, %)	43 (78%)	67 (77%)	37 (59%)	0.065	N/A
Dementia (n, %)	15 (27%)	15 (17%)	2 (3.2%)	<0.001*	(a–c), (b–c)

ADL: activities of daily living; DM: diabetes mellitus; GDS-SF: geriatric depression scale-short form; HT: hypertension; IADL: instrumental activities of daily living; MN: malnutrition; MNR: malnutrition risk; MNA-SF: mini nutritional assessment-short form; HGS: handgrip strength. a: Frail, b: pre-frail, and c: robust. a–c: Statistically significant relationship between groups a and c. a–b: Statistically significant relationship between groups a and b. b–c: Statistically significant relationship between groups b and c. *Significant p-value.

Table 3. The associates of frailty (multivariate analyses).

	p-value	OR	95%CI	
			Lower	Upper
Age	0.249	1.039	0.974	1.108
Sex	0.858	0.912	0.330	2.518
Number of drugs	0.036*	1.240	1.010	1.500
IADL	0.232	0.856	0.662	1.105
MNA-SF	0.867	0.927	0.381	2.258
Probable sarcopenia (HGS)	0.726	0.890	0.464	1.706
Cognitive impairment	0.016*	0.300	0.113	0.799
GDS-SF	0.485	0.446	0.046	4.300
Falls	0.048*	1.984	1.005	3.917

CI: confidence interval; GDS-SF: geriatric depression scale-short form; IADL: instrumental activities of daily living; MNA-SF: mini nutritional assessment-short form; HGS: handgrip strength; OR: odds ratio. *Significant p-value.

suggested that a prescribing cascade occurred with older patients due to their focus on different complaints at each admission with no extensive geriatric assessment, leading to polypharmacy. This revealed that a complete examination was required for a comprehensive evaluation of the older population.

In the present study, cognitive impairment was also associated with frailty, which was consistent with the studies of Jurschik et al.[21], Akın et al.[5], Moreira et al.[8], and García et al.[24], all of which demonstrated an association between frailty and cognitive disorder. Furthermore, frailty may lead to cognitive impairment through social isolation, just as cognitive impairment may also lead to frailty. The association between these two factors is two-sided and embedded[5,8,21,24].

Similar to other national studies, the results of our study showed an association between falls and frailty in community-dwelling older adults[18,20-24]. Again, it was conducted in our

society. Akın et al., detected a relationship between falls and frailty, like our study and most studies in the literature[5].

The findings of the present study could serve as a guide for the assessment of frail older adults living in the community, as well as for the development and implementation of intervention strategies and measures for the treatment of frailty in older patients. The strength of the present study lies in its presentation of the results of an extensive geriatric assessment of the older population residing in the community in the Fatih District of Istanbul Province. Furthermore, the fact that the study was conducted in a large district of a metropolitan city like Istanbul is also of importance as it provides insight into frailty in the general population. The patient screening in the present study was based on a stratification method, which enhanced the importance of study findings even further, and the strength of the study is further increased in its analysis of the multiple and variable factors associated with frailty.

There were also some limitations. The exact causes of frailty could not be ascertained due to the cross-sectional design of the study, although major contributing factors were established.

CONCLUSION

The present study established the prevalence of frailty in a large district like Fatih, the largest metropolis in the country, through a valid screening method. The prominent associated factors were multiple drug usage, cognitive impairment, falls, and low quality of life. Nationwide population studies involving multiple centers are required.

ETHICS APPROVAL

We obtained ethical approval from the Istanbul University Istanbul Medical School ethical board (number: 1213 and file number: 2014/1199).

AUTHORS' CONTRIBUTIONS

MEB: Conceptualization, Data curation, Formal Analysis, Investigation, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. **NMC:** Conceptualization, Formal Analysis, Investigation, Resources, Writing – original draft. **TE:** Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing. **MMO:** Data curation, Formal Analysis, Methodology, Supervision, Writing – original draft. CK: Conceptualization, Data curation, Formal Analysis, Writing – original draft, Writing – review & editing. **MAK:** Conceptualization, Data curation, Formal Analysis, Supervision, Writing – original draft, Writing – review & editing. **GB:** Conceptualization, Data curation, Formal Analysis, Supervision, Writing – original draft, Writing – review & editing.

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