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Quality of life and fall risk in frail hospitalized elderly patients

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Background/aim: Frailty is a complex, multifactorial, and important geriatric syndrome characterized by decline in physiological reserves and functional deficiency in multiple systems. The aim of the current study is to investigate the prevalence of frailty and to determine the correlation between quality of life (QoL) and falling risk in geriatric hospitalized patients.

Materials and methods: A total of 420 patients, aged 65 years and above, were enrolled in the study. All participants were hospitalized at a university hospital in the internal medicine clinics. The Cardiovascular Health Study (CHS) frailty scale, Health-Related Quality of Life Short Form (SF-36) scale, and Hendrich II Fall Risk Model were administered to the patients. Demographic data of patients, number of chronic diseases, and information on used medication were also collected.

Results: The median age of patients was 71.9 ± 6.3 years and 49.5% of the patients were female. By applying the CHS frailty scale, the proportion of frail patients was determined to be 65.5%. There were statistically significant differences among quality of life mean scores of robust, prefrail, and frail patients ($P < 0.001$). Frail patients had the lowest scores in all SF-36 subgroups. Eighty-three (19.8%) patients were in the low-risk group while 337 (80.2%) were high-risk according to the Hendrich II Fall Risk Model. The rate of patients with high falling risk and poor QoL reached a maximum in the frail group (96%).

Conclusion: Frailty is an important geriatric syndrome in elderly hospitalized patients. Poor QoL and high falling risk are issues commonly experienced with frailty.

Key words: Frailty, quality of life, falls

1. Introduction

The world is currently undergoing a 'demographic revolution' and the global population profile is shifting towards an increased number of elderly people. It is estimated that by 2050, the total elderly population in the world will be 1.97 billion. The elderly currently constitute 20% of the population in Europe and this rate is expected to increase rapidly in the next 20 years, reaching 29% (1). As a result of this change, a renewal will be necessary as a solution to the problems that society faces in health and health services (2).

Frailty is defined as an age-related decline in physiological reserve and increased response to external stress sensitivity due to a functional deficiency in the neuromuscular, metabolic, and immune systems (3). Despite being a common issue, identification of frail elderly syndrome and the research interest it generates have only increased in recent years (4,5). The prevalence of this syndrome is 7%–10% and 30%–40% over the ages of 65 and 80, respectively (6). Compared to the nonfrail elderly, frail elderly individuals have poorer mental health, lower life satisfaction, and decreased physical activity (7). Falls and fall-related injuries among older adults are common, costly, and deleterious, resulting in hospitalizations, nursing home placement, fear of falling, functional decline, morbidity, and mortality (8). The World Health Organization defines quality of life (QoL) as an individual's perception of their position in life in the context of their culture and value systems and in relation to their goals, expectations, standards, and concerns. (9) Poor economic, social, and health care conditions cause worse QoL in elderly people.

There are insufficient data about frailty in elderly hospitalized subjects in the literature and this is the first study about the topic. The aim of the current study is to investigate the prevalence of frailty and determine the correlations among frailty, QoL, and falling risk in geriatric hospitalized patients.

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2. Materials and methods

This cross-sectional study included 208 females and 212 males aged 65 years and above hospitalized in the internal medicine clinics of the Faculty of Medicine of Gaziantep University between March and October 2015. Following a briefing about the survey, as indicated in the Declaration of Helsinki, all patients participating in the study affirmed their consent. The relevant data were collected in accordance with the Fried Frailty Scale, SF-36 QoL survey, and Hendrich II Fall Risk Model (10–12). Ethical approval was obtained from the Human Ethics Committee of Gaziantep University.

Subjects who were nonambulatory or had a clinical history of neurological deficit, Parkinson disease, or cognitive impairment were excluded from the study. Within the scope of this study, age, sex, marital status, and medical history, including past operations and regular medicine use, were evaluated as criteria. A modified version of the index introduced by Fried et al. was employed to define frailty (10).

2.1. Fried frailty criteria

1) Unintended weight loss: Unintentional loss of >4.5 kg or 5% of weight within the last 12 months.
2) Exhaustion: Responding 'a moderate amount of the time (3–4 days)' or 'most of the time' to either of two Center for Epidemiologic Studies-Depression scale items in the last week: 'I felt that everything I did was an effort' and 'I could not get going'.
3) Low physical activity: An international physical activity survey was applied in order to determine this criterion. The patients were asked if they had performed any physically demanding activities, moderately demanding physical activities, or walking in the last week. If they had, the duration of their activities was evaluated with the metabolic equivalent of task (MET) formula.
4) Slow walking speed: Individuals with a walking speed of less than 20% of a community-dwelling elderly population, adjusted for sex and height.

   Men:

   Height ≤ 173 cm: ≥7 s Height > 173 cm: ≥6 s

   Women:

   Height ≤ 159 cm: ≥7 s Height > 159 cm: ≥6 s
5) Weakness: Dominant hand grip strength compared based on sex and body mass index; specific cut-off points as demonstrated below:

   Men:

   BMI ≤ 24 kg/m^2: ≤29 kg BMI ≤ 24.1–26 kg/m^2: ≤30 kg

   BMI ≤ 26.1–28 kg/m^2: ≤31 kg BMI > 28 kg/m^2: ≤32 kg

   Women:

   BMI ≤ 23 kg/m^2: ≤17 kg BMI ≤ 23.1–26 kg/m^2: ≤17.3 kg

   BMI ≤ 26.1–29 kg/m^2: ≤18 kg BMI > 29 kg/m^2: ≤21 kg

Patients who had a score of zero were defined as nonfrail, those who exhibited one or two symptoms were prefrail, and those who had three or more symptoms were defined as frail.

Health-related life quality was measured by using the Short Form (SF) 36. This scale was developed in 1992 by Ware to assess QoL (11). The validity and reliability of the SF-36's Turkish version was verified in 1999 by Koçyiğit et al. (13). The SF-36 is a self-report questionnaire that takes a few minutes to complete and can be used to evaluate the quality of life for both patients and the healthy population. The scale takes the past 4 weeks into consideration and is divided into two main groups: physical health (physical functioning, role-physical, bodily pain, and general health) and mental health (vitality, social functioning, role-emotional, and mental health). The SF-36 comprises eight subscales:

1) Physical functioning: Restriction of physical activity due to health problems (daily activities such as pushing a table, carrying bags, climbing stairs, walking);
2) Role-physical: Role limitations in daily activities due to physical health problems (such as working hours);
3) Role-emotional: Role limitations due to emotional problems (effects of depression or other emotional problems, such as anxiety, on working or daily activities);
4) Social functioning: Restriction of social activities for physical and emotional reasons (such as visiting friends and relatives);
5) Vitality: Energy, vitality (questions for the objective of assessing fatigue level);
6) Mental health: General mental health and well-being as related to psychological distress;
7) Bodily pain: Severity of pain and how it affects work ability;
8) General health: Patient's overall feelings about her/his health;

The items are summed up to grade 0–100 scores. Lower results represent poorer quality of life.

2.2. Hendrich II Fall Risk Model

This scale consists of 7 risk factors that may cause falls, as well as a "get up and go" test. Based on their total scores, patients are divided into two groups: low fall risk, with scores between 0 and 4, and high fall risk, with scores higher than 5. The validity and reliability of the Turkish version of this model has been previously verified (14).

2.3. Statistical analysis

SPSS 17.0 for Windows was used for statistical analysis. All data were entered into a database and were verified by a second independent person. The variables were examined using visual (histograms, probability plots) and analytical methods to determine whether they were normally

distributed or not. Data are presented as mean ± SD for normally distributed variables and as median (minimum–maximum) ± IQR for skew-distributed continuous variables. Categorical variables are shown as frequencies.

Pearson's chi-square method for categorical parameters and the Mann–Whitney U test for skew-distributed parameters were performed for univariate analysis. Correlation analyses were performed with the Spearman test for nonnormally distributed parameters. Two-sided values of $P < 0.05$ were considered as statistically significant.

One-way ANOVA was used to compare normally distributed variables. The Levene test was applied to assess the homogeneity of variances. Post hoc Tukey or Tamhane T2 tests were performed according to the homogeneity of variances.

3.Results

The median age of patients was 71.9 ± 6.3 years and the age range was between 65 and 98 years. A total of 208 patients (49.5%) were women and 212 (50.5%) were male.

The amount of medication used regularly by patients ranged from 0 to 15 units and the mean amount was 5.2 ± 2.5. The participants' concomitant chronic disease number was between 0 and 7. The most common diseases were malignancy, diabetes mellitus, and hypertension, respectively. According to the Fried criteria, the distribution of our patients was as follows: 35 (8.3%) were robust, 110 (26.2%) were prefrail, and 275 (65.5%) were frail. The demographic distribution of the patients is demonstrated in Table 1.

Frailty was more common in women compared to men, and the median age of frail patients was higher than that of prefrail and robust patients. Frail patients were also taking more medication than others. Females had a lower score in all subgroups of the SF-36 scale.

Statistically significant differences were detected in QoL mean scores of robust, prefrail, and frail patients based on the Fried criteria ($P < 0.001$) (Table 2). Frail patients obtained the lowest scores in all subgroups of the SF-36. There were also statistically significant differences in the mean scores of the life quality scale between pairs such as frail/prefrail groups, frail/robust groups, and prefrail/frail groups ($P < 0.001$).

Eighty-three patients were in the low-risk group whereas 337 were in the high-risk group according to the Hendrich II Fall Risk Model. A statistically significant difference was determined in fall risk between robust, prefrail, and frail patients ($P < 0.01$) (Table 3). The rate of

Table 1. Characteristics of participants by frailty status (n = 420).

Parameters	Robust	Prefrail	Frail	P
Sex, F/M (%)	9/26 (2.1/6.1)	40/70 (9.5/16.6)	159/116 (37.8/27.6)	<0.001
Age, years (min–max age)	69.03 ± 4.68 (65–87)	70.40 ± 5.02 (65–86)	72.92 ± 6.74 (65–98)	<0.001
Amount of medication	4.49 ± 3.033	4.99 ± 2.907	5.43 ± 2.292	0.059
Number of comorbidities	2.06 ± 1.608	2.18 ± 1.356	2.37 ± 1.318	0.269

Table 2. Health-related quality of life scores according to frailty status.

Health-related quality of life (SF-36)	Frailty status according to Cardiovascular Health Study (CHS)			
	Robust (n = 35)	Prefrail (n = 110)	Frail (n = 275)	P
Physical functioning	62.4 ± 15.7	42.2 ± 17.9	22.3 ± 16.4	<0.001
Role-physical	46.1 ± 12.1	24.3 ± 22.1	5.1 ± 12.5	<0.001
Role-emotional	51.4 ± 28.4	30.8 ± 23.7	13.2 ± 21.9	<0.001
Vitality	49.8 ± 22.1	30.5 ± 15.9	17.8 ± 11.6	<0.001
Mental health	76.2 ± 15.2	71.9 ± 24.3	63.5 ± 17.0	<0.001
Social functioning	77.5 ± 20.9	54.2 ± 22.7	29.7 ± 21.4	<0.001
Bodily pain	94.2 ± 17.5	80.0 ± 26.4	60.3 ± 34.7	<0.001
General health	41.2 ± 22.1	27.5 ±17.1	14.2 ±12.6	<0.001

Table 3. Fall risk of participants by frailty status.

Frailty status	Number of patients (%) according to Hendrich II Fall Risk Model		
	Low risk (n = 83)	High risk (n = 337)	P
Robust	29 (82.8)	6 (17.2)	<0.001
Prefrail	43 (39.1)	67 (60.9)	
Frail	11 (4.0)	264 (96.0)	

high fall risk was lowest in the robust group and highest in the frail group (17.2% and 96.0%, respectively). Patients with a high risk of falling had lower scores in all sections of the life quality scale (Table 4).

A strong positive correlation between frailty severity score and Hendrich Fall Risk (r = 0.598, P = 0.001) was determined. The scores of the health quality scale were negatively correlated with frailty severity scale and Hendrich Fall Risk (Table 5).

4. Discussion

Frailty is a new dynamic geriatric syndrome whose pathogenesis has not yet been fully explained. Studies on this subject are ongoing to investigate frailty on both a biological and clinical basis.

Numerous scales, such as the CHS, Women's Health and Aging Studies (WHAS), Study of Osteoporotic Fractures (SOF), Frailty Index (FI), and Gerontopol have been developed so far by different study groups in order to define frailty (10,15–17).

The prevalence of frailty ranges from 5.2% to 48% based on Fried criteria in studies including large populations (18,19). Collard et al. determined the general prevalence to be 10.7% within the scope of a systematic review (20). Low socioeconomic status, cognitive impairment, advanced age, female sex, excess of comorbid diseases, previous strokes, depression, and sedentary lifestyle have been identified in previous studies as factors increasing the prevalence of frailty (21–24).

In a community screening study including 7439 individuals, the prevalence of frail, prefrail, and robust patients was 15.3%, 45.5%, and 39.2%, respectively, according to CHS criteria (25). A remarkable result of that study was that while the rate of frailty was 8.9% in the group aged 65–69, it increased to 33.3% in the group aged 85–89.

There are only two studies in the literature on the prevalence of frailty in inpatients. In the first study, Khandelwal et al. evaluated 250 patients over 60 years of age, all hospitalized for acute illnesses, and determined the frailty prevalence as 33.2% (26). In addition, a significant correlation was found between frailty and anemia, heart failure, cognitive impairment, and duration of hospitalization. The second study, by Oliviera et al.,

Table 4. Health-related quality of life according to the fall risk model.

Health-related quality of life (SF-36)	Hendrich II Fall Risk Model		
	Low risk (N = 83)	High risk (N = 337)	P
PF	49.1 ± 20.3	26.4 ± 18.7	<0.001
RP	33.4 ± 20.9	8.7 ± 16.7	<0.001
RE	37.2 ± 28.4	17.0 ± 23.5	<0.001
VT	37.7 ± 21.6	20.4 ± 13.6	<0.001
MH	73.2 ± 17.2	65.2 ± 19.8	0.001
SF	61.8 ± 25.9	34.7 ± 23.9	<0.001
BP	87.4 ± 21.8	63.6 ± 34.3	<0.001
GH	32.1 ± 19.6	16.9 ± 15.1	<0.001

PF: Physical functioning, RP: role-physical, RE: role-emotional, VT: vitality, MH: mental health, SF: social functioning, BP: bodily pain, GH: general health.

Table 5. Correlation analysis results of frailty and fall risk with other variables.

Variables		Age	Sex	Amount of medication	Hendrich Fall Risk	PF	RP	RE	VT	MH	SF	BP	GH
Frailty severity score	r P	0.258 <0.001	−0.233 <0.001	0.106 0.015	0.598 <0.001	−0.633 <0.001	−0.643 <0.001	−0.464 <0.001	−0.513 <0.001	−0.240 <0.001	−0.588 <0.001	−0.398 <0.001	−0.515 <0.001
Hendrich Fall Risk	r P	0.184 <0.001	−0.126 0.005	0.131 0.004		−0.432 <0.001	−0.484 <0.001	−0.316 <0.001	−0.409 <0.001	−0.164 <0.001	−0.408 <0.001	−0.285 <0.001	−0.358 <0.001

PF: Physical functioning, RP: role-physical, RE: role-emotional, VT: vitality, MH: mental health, SF: social functioning, BP: bodily pain, GH: general health.

included fewer inpatients and indicated 46.5% frailty prevalence (27).

Our study includes more patients than both of the previous studies. Higher median age and number of chronic comorbid diseases, including cancer, are important reasons for the higher frailty proportion in our study.

Although elderly individuals may experience physical and mental functional impairments, they will maintain a higher QoL if they are satisfied in their social and emotional life. A metaanalysis including 11 cross-sectional studies indicated a linear correlation between poor quality of life and frailty, regardless of different frailty criteria and QoL scales (28). A recent study by Buckinx et al. showed that, compared to nonfrail subjects, frail subjects have lower physical and muscular performance and a lower quality of life (29). Physical components play an important role in CHS; consequently, frail individuals obtained lower scores in these areas of the life quality scale. The mental health component scores of the frail group were also lower than those of the prefrail and robust groups, which suggests not only that frailty consists of physical disabilities but also that several systems in the body can be affected simultaneously.

In our study, a negative correlation was found between QoL and frailty scores, consistent with other studies. In a prospective study, Gobbens et al. established that physical, psychological, and social components associated with frailty can be used to predict the future QoL (30). Another study conducted by Gale et al. concluded that individuals with a higher baseline QoL were less likely to become prefrail and frail in a 4-year follow-up (31). These two studies demonstrate that there is an interaction between frailty and QoL. Thus far, research has focused on frailty and QoL in elderly subjects living in nursing homes or in the community, but not on hospitalized patients. Our study is the first in this regard.

Falls are an important geriatric syndrome that increase with age. Falls not only cause disability, fear of falling, and a decrease in QoL, but also lead to an increase in morbidity and mortality. Falling incidence is as high as 50% in the population over 80 years old (32). The majority of studies indicate that falls are more common in frail than in nonfrail elderly (33–35). A new study conducted by Tan et al. demonstrated that frailty is associated with a higher number of falls and falls with serious consequences (36). Bandeen et al. determined that the incidence of falls in the past year was 30.5% in the robust population, 32.9% in prefrail patients, and 54.9% in frail patients (25). A metaanalysis carried out recently by Kojima et al. demonstrated that male, frail, community-dwelling older adults are subject to higher fall risks (23). Our study is the first in the literature to assess the risk of falls in frail elderly inpatients. We established that frail patients have a higher risk of falling compared to prefrail and robust patients. In addition, individuals with a high risk of falling had lower scores in both the physical and mental components of QoL compared to those at low risk.

A key strength of this study is that it is the first of its kind to depict the correlation among frailty, QoL, and falls in hospitalized elderly patients. Another strong aspect of its design is its large sample size.

On the other hand, the present study has several limitations. First, because it is a cross-sectional study, the causal relationships between frailty, QoL, and falls cannot be established. Second, the sample distribution of characteristics—number of comorbid diseases, amount of used medication, and proportion of frail people—was higher than in a typical population of community-dwelling elderly. As a result, we cannot generalize the outcomes of the study to all elderly people. Another limitation is the self-reporting nature of frailty and QoL scales.

In conclusion, our findings imply that frailty is an important geriatric syndrome in elderly hospitalized patients. Poor QoL and high falling risk are also commonly observed with frailty. Although larger prospective trials are required to examine the underlying mechanisms of this correlation, we recommend that clinicians pay more attention to frailty in order to increase life quality and reduce falls.

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