Original Article

The Prevalence of Frailty and its Associated Factors among Iranian Hospitalized Older Adults

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ABSTRACT

Background: As the population ages, the impact of age-related diseases on health is becoming more apparent. Frailty is one of the most important issues faced by older adults. **Objectives:** This study aimed to determine the prevalence of frailty and the factors affecting it among older adults admitted to teaching hospitals in Ilam in 2020. **Methods:** This cross-sectional study was performed on 270 older adults admitted to teaching hospitals in Ilam. Participants were selected through consecutive sampling. Data were collected using the Tilburg Frailty Indicator and analyzed by the Chi-square test and logistic regression analysis. **Results:** The mean age of the older adults participating in the study was 71.97 ± 8.42 years. Overall, 18.1% of older adults were frail, and frailty was significantly associated with having a chronic disease, being accompanied by a close relative, hospitalization, age, sex, marital status, and education level ($P < 0.05$). The most important predictors of frailty in older adults were age, sex, history of stroke, and being accompanied by a close relative ($P < 0.05$). **Conclusion:** About one-fifth of the older adults participating in this study were frail. The prevalence of frailty was higher among women, those with chronic diseases or a history of stroke, single people, and those with low education levels. Therefore, these people need special attention.

KEYWORDS: *Frailty, Older adults, Prevalence*

INTRODUCTION

Frailty is generally defined as a clinical syndrome characterized by reduced physiological reserve, leading to increased sensitivity to stressors, decreased stabilization, and impaired physical, mental, and social functions.[1] The prevalence of frailty was reported at 17% in Spanish older adults,[2] 18.02% among hospitalized Chinese older adults,[3] 19.1% in Tanzania[4] and Caribbean older adults,[5] 28% in the older adults in Saudi Arabia,[6] and 83.4% among those over 80 years of age in India.[7] This syndrome is a potential health problem due to its multiple clinical and social consequences,[8] and is a major cause of decreased performance, trauma, disability,[9] recurrent hospitalization, and early death.[10,11] It is also associated with dependence in activities of daily living (ADL), institutionalization,[12] and increases the costs of the health-care system.[13] A study of "iatrogenic disability"

in hospitalized frail older adults has reported that 30%–60% of older patients lose some independence in their basic ADLs during hospitalization and that this dependence complicates their management.[14] Therefore, screening and prevention of frailty in older populations are increasingly emphasized[15] and may help provide appropriate care to this vulnerable population.[16]

There are conflicting studies on the prevalence of frailty among Iranian older adults. In one study, the prevalence of frailty in rural areas of East Azerbaijan was reported to be 46.7%.[17] In other studies, the prevalence of frailty

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among older adults was 10.4% in Khuzestan,[18] 33.4% in northern Iran,[19] and 14.3% in Southwestern regions.[20]

Given the contradictory studies on the prevalence of frailty among Iranian older adults and the lack of study on hospitalized ones, as well as the fact that frailty may be influenced by socioeconomic factors; the question is, what is the prevalence of frailty among older adults in Ilam?

Objective

This study was conducted to investigate the prevalence of frailty among older adults admitted to teaching hospitals in Ilam, Iran, in 2020.

METHODS

Study design and participants

This cross-sectional study was conducted in older adults (i.e., people aged 60 years and over) admitted to the medical, surgical, emergency, critical care unit (CCU), post-CCU and Intensive care unit Departments of Imam Khomeini and Shahid Mostafa Khomeini Teaching Hospitals in Ilam, Iran.

The sample size was estimated based on the results of a previous study,[21] where the prevalence of frailty in older adults was 20%. Then, with a type I error of 0.05, $P = 0.2$, and $d = 0.05$, and using the following formula $(n=Z^2.P(1-P)/d^2)$, and considering a possible dropout of 10%, the sample size was calculated at 270. Eligible patients were recruited through a consecutive sampling during the first half of 2020.

Inclusion criteria were age over 60 years, at least 48 h elapsing from hospitalization, no cognitive impairment (based on the Mini-Mental State Examination questionnaire), ability to communicate, not being in the end-of-life stage, and inclination to participate in the study. A patient's decision to withdraw from the study and not respond to more than 20% of the questions was considered exclusion criterion.

The researcher visited the aforementioned hospitals, found older adults that met the inclusion criteria, invited them to participate in the study, and if they agreed, they were provided with a copy of the study instrument and asked to answer it in a private setting. In the case of illiterate patients or patients with low literacy, the researcher read the questionnaire items and the possible responses to them and entered the answers in the related questionnaire. Sampling continued until the sample size was completed.

Data collection instruments

Data were collected using the Tilburg Frailty Indicator (TFI).[22] This questionnaire consists of two parts:

A and B. The first part contains 10 questions on the determinants of frailty, including age, gender, education level, income, marital status, unfortunate events in the past year, comorbidities, satisfaction with the living environment, and lifestyle. The second part includes 15 items to assess frailty in the physical, psychological, and social domains. The physical domain is assessed with eight items about physical health, weight loss, difficulty in walking and maintaining balance, tiredness, hand strength, and visual and hearing impairments. The psychological domain is assessed with four items about cognition, depression, feeling anxious, and coping problems. The social domain is assessed with three items about living alone, social relationships, and social support. Eleven of the 15 items are answered either yes or no, and the remaining four items are answered yes, no, or sometimes. The "yes," "sometimes," and "no" answers are scored 1, 0.5, and 0, respectively.[22] Scores for the physical, psychological, and social domains range from 0 to 8, 0 to 4, and 0 to 3, respectively, and the total TFI score varies from 0 to 15. A score of 5 or higher indicates frailty.[22] The Persian translation of the TFI was validated by Jafarian Yazdi *et al.*, and its Cronbach's alpha was reported at 0.807.[13]

Ethical considerations

This study was approved by the Ethics Committee of Ilam University of Medical Sciences, Ilam, Iran (code: IR.MEDILAM.REC.1398.134). Permission to conduct the study was also obtained from the authorities in the aforementioned hospitals. Participants were informed of the aims of the study and their written informed consent was obtained. All participants were free to participate or voluntarily withdraw from the study and were assured that their personal information would be kept confidential. Participants were also assured that their participation or withdrawal would not affect their treatment and that they would not incur any costs.

Data analysis

Data were analyzed using the SPSS version. 16 software (SPSS Inc., Chicago, IL, USA). The normality of quantitative variables was examined using the Kolmogorov–Smirnov test, indicating a normal distribution of the data. Descriptive statistics (frequency, percent, mean and standard deviation) were used to describe and classify the data. The Chi-square test was used to examine the relationship between the demographic variables and the frailty subscales. Logistic regression analysis was used to determine the factors associated with frailty. The significance level was considered to be < 0.05.

Results

Totally 270 patients completed the study. The mean age of the participants was 71.97 ± 8.42 years. Most of the older adults (85.9%) were male (75.7%), married, illiterate (78.8%), and lived with their spouses and children (42.6%) [Table 1]. A majority of the patients and were hospitalized in surgical (22%) and gynecological departments (17%), respectively. More than a quarter of the older adults were housewives (32.2%) and farmers (24.4%). In part A of the questionnaire, there are six questions that examine the important events experienced by the elderly during the past year. Among these questions, attributing crime to the elderly was the least reported (7.4%). A majority of the participants had experienced the death of a loved one in the past year (40.4%), and 20.7% had a severe illness. More than half of the participants (67.4%) were satisfied with their living conditions. In the physical domain of frailty, most older adults complained of fatigue (83%) and hearing loss (78.9%). In the psychological domain, the majority of participants suffered from nervousness or anxiety (74.4%) and homesickness (67.4%) in the past month. Overall, 18.1% of older adults were frail and scored the highest average in the physical domain [Table 1].

The incidence of frailty was significantly associated with chronic diseases, having a relative with the patients, age, sex, marital status, and education level. Furthermore, the incidence of frailty was significantly higher in older adults admitted to Mostafa Khomeini Hospital than in those admitted to Imam Khomeini Hospital [Table 1]. The risk of frailty was also significantly associated with the death of a loved one (P = 0.04), having a severe illness (P = 0.00), divorce, or separation (P = 0.03). Frailty was also significantly associated with a history of hypertension and stroke (P < 0.05). The participants' scores of the TFI are presented in Table 2.

The accuracy of the logistic regression model was confirmed by the Hosmer and Lemeshow test (P = 0.407, Chi-square = 8.271). Furthermore, for the frail and nonfrail groups, the classification of the variables was confirmed at 81.9%. According to the regression model, age, sex, history of stroke, and being accompanied by a relative were the most important predictors of frailty in older adults [Table 3].

Discussion

The present study showed that 18.1% of the older adults who participated in the study were frail. This finding is consistent with the results of some previous studies in Tanzania,[4] China,[3] and Latin America and the Caribbean,[5] which reported the prevalence of frailty in older adults to be between 17% and 19.1%.

Table 1: Frequency distribution of frailty in terms of demographic variables in older adults participating in the study

Variable	Frailty, *n* (%)		χ^2	*P*
	Nonfrail	Frail		
Age				
60-74	156 (85.7)	26 (14.3)	4.68	0.01
75-84	51 (78.5)	14 (21.5)		
>85	14 (60.9)	9 (39.1)		
Sex				
Female	78 (75.7)	25 (24.3)	4.20	0.03
Male	143 (85.6)	24 (14.4)		
Marital status				
Married	194 (83.6)	38 (16.4)	3.53	0.03
Single	1 (100)	0		
Other	26 (70.3)	11 (29.7)		
Hospital				
Imam Khomeini	157 (86.3)	25 (13.7)	7.31	<0.01
Mustafa Khomeini	64 (72.7)	24 (27.3)		
Being accompanied by a relative				
Yes	195 (83.7)	38 (16.3)	3.87	0.04
No	26 (70.3)	11 (29.7)		
Education				
Literate	57 (91.1)	5 (8.1)	5.51	0.01
Illiterate	164 (78.8)	44 (21.2)		
Insurance				
Yes	213 (81.3)	49 (18.7)	1.82	0.19
No	8 (100)	0		
Chronic diseases>2				
Yes	67 (69.8)	29 (30.2)	14.58	<0.01
No	154 (88.5)	20 (11.5)		

Table 2: Scores of the Tilburg Frailty Indicator

Domains	Mean ± SD	Maximum	Minimum
Physical	1.82 ± 1.72	8	0
Psychological	1.36 ± 0.66	4	0
Social	0.55 ± 0.48	2.5	0
Total	3.74 ± 2.17	11.5	0.5

SD: Standard deviation

However, there are conflicting reports. Some reports from Spain,[2] Saudi Arabia,[6] and the provinces of East Azerbaijan[17] and Khuzestan[18] in Iran estimated the prevalence of frailty at 83.4%, 28%, 46.7%, and 10%, respectively. The prevalence of frailty in the southern industrial zone of Poland was reported to be 2.5%, reflecting the acceptable physical and mental health of older adults in the area.[11] The prevalence of frailty in older German men and women was also 2.8% and 2.3%, respectively.[23] Although differences in the socioeconomic status of older adults in different regions and countries may affect the prevalence of frailty among them, the observed differences in the prevalence of frailty can be partly attributed to

Table 3: Logistic regression analysis of frailty predictors in terms of demographic variables and diseases in the older adults

Variable	B	*P*	OR	95.0% CI for EXP (B)	
				Lower	Upper
Age	0.097	<0.001	1.102	1.051	1.155
Sex (1)	0.993	0.021	2.699	1.158	6.290
Hospital	0.742	0.067	2.099	0.948	4.648
CVA	−3.695	<0.001	0.025	0.006	0.107
Being accompanied by a relative	1.281	0.010	3.601	1.367	9.490
Education	−0.105	0.469	0.900	0.678	1.196
Marriage	−0.005	0.984	0.995	0.604	1.639

OR: Odds ratio, CI: Confidence interval, CVA: Cerebral vascular accident

the operational definitions and instruments used in different studies. For example, Jiao *et al*. in China,[3] and Alqahtani and Nasser in Saudi Arabia[6] used the FRAIL scale - a clinical frailty screening tool consisting of only five self-reported items - with a cutoff of 3–4 for frailty, whereas Abizanda *et al*. in Spain[2] and Batko-Szwaczka *et al*. in Poland[11] used another frailty criteria that assess five criteria of unintentional weight loss, weakness, poor endurance, slowness in walking, and low activity. However, as we did, Mousavisisi *et al*.[17] in East Azerbaijan, Iran, used the Tilburg Frailty Indicator. Nonetheless, frailty in older adults predicts dependency and mortality and is a major challenge for the health care system in countries with rapidly aging populations. For instance, in China, the prevalence of frailty has been reported to increase with age and to be significantly higher among women and people living in rural areas.[9] Given that frailty is a predictable and preventable process, health-care systems are responsible to identify frail and prefrail people[13] and develop plans to promote the physical, mental, and social health of older adults to prevent frailty in vulnerable older adults, especially older women and those living in rural areas.[9]

According to our findings, the rate of frailty increased significantly with age. Moreover, the rate of frailty was higher in women than in men, which is consistent with other studies.[3,24-27] In one study, the prevalence of frailty in older adults was found to increase with age between 4% and 59%, regardless of the assessment tool, and was more common in women than in men.[28] Conflicting data are available on the association between education and frailty. In a study, lower levels of frailty and disability have been observed in individuals with higher levels of education and wealth. In studies in China, India, and Russia, both education and income were protective factors against frailty and disability, whereas, in Mexico, only income and in South Africa, only education were found to be protective factors.[29]

In our study, older adults with chronic diseases reported higher levels of frailty, which is consistent with the findings of other studies.[7,25,30] In the present study, the frequency of frailty was significantly associated with hypertension and stroke. Older adults with frailty and hypertension were reported to have a poorer physical function and higher mortality.[31] In another study, weakness and frailty were predictors of mortality, hospitalization, and falls in patients with hypertension.[32] According to the logistic regression model in the present study, the most important predictors of frailty in older adults were age, sex, history of stroke, companionship, and hospitalization.

Frailty can be possibly prevented or treated by appropriate interventions such as physical exercise. In particular, aerobic and resistance exercises have been shown to improve components of frailty. Exercise can prevent or reverse frailty and reduce the risk of nursing home admission in older adults.[33] Physical activity has also been found to significantly reduce frailty, improve muscular strength, physical function, and muscular mass[34] and increase the incidence of falls in older adults.[35]

The heavy health burden of frailty and disability in older adults is a major challenge for health-care systems in low- and middle-income countries.[29] Physicians and healthcare professionals can obtain valuable information about the prognosis of a disease by examining frailty in patients, which helps determine optimal care interventions for patients. Ideally, frailty assessment can provide a basis for more patient-centered care.[36]

In this study, we examined only hospitalized older adults who typically have inappropriate physical conditions or are diagnosed with a disease, so they may be diagnosed with frailty more commonly than community-dwelling older adults. Another limitation was the lack of cooperation from some of the patients, which postponed sampling. In addition, the COVID-19 pandemic, which coincided with our study, might have limited the presence of older adults in hospitals. We also used a self-report questionnaire. Such instruments may increase the possibility of recall and social desirability biases. We also used a convenience sampling method which might be at risk for selection bias. There is also a risk of researcher bias because the researcher reads the questionnaire items to illiterate patients. Finally, we used a cross-sectional design. The cause-effect relationships discovered in such studies need to be confirmed by longitudinal and more rigorous studies.

CONCLUSION

Frailty is relatively common in older adults, but the different rates of frailty in different countries might be attributed to socioeconomic conditions. In developing countries, where the health of older adults has been somewhat neglected, research on frailty has received less attention. Frailty in old age can lead to adverse medical, economic, and social consequences. In this study, the prevalence of frailty in older adults was higher among women, those with chronic diseases or a history of stroke, single people, and those with low education levels. Therefore, these people need special attention. Given the growing trend of aging in Iran, better planning for the aged population seems necessary. Screening for frailty in older adults can provide effective preventive care to these vulnerable people.

Conflicts of interest

There are no conflicts of interest.

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