



## Impact of Frailty on Health Service Used: A Sample of Aksaray

Tugce Turten Kaymaz<sup>1\*</sup> and Guler Duru Asiret<sup>2</sup>

<sup>1</sup> Department of Nursing, Duzce University, Duzce, Turkey

<sup>2</sup> Department of Nursing, Aksaray University, Aksaray, Turkey

\*Corresponding e-mail: [tgctrtn@gmail.com](mailto:tgctrtn@gmail.com)

### ABSTRACT

**Objective:** Frailty has negative consequences such as reduced quality of life and increased need for specialized care. This study aimed to determine the impact of frailty on health service use among older adults. **Methods:** A sample of 189 patients ( $\geq 65$  years) was recruited from internal and surgical disease services and polyclinics at the State Hospital in Turkey. Data were collected in face-to-face interviews using an information form, the Edmonton Frail Scale and the Nottingham Health Profile. Relationships between continuous variables were analysed using Pearson rank-correlation coefficient. Multiple linear regression analyses were conducted to determine the association between frailty and each health service use variable. **Results:** In total, 49.2% of the participants were frail. The mean Nottingham Health Profile score was  $163.58 \pm 114.03$ . The Edmonton Frail Scale score increases by 1 unit, the frequency of using health care service increases by 0.892. There were statistically significant moderate positive linear relationships between The Edmonton Frail Scale score, and Nottingham Health Profile score ( $r=0.692$ ,  $p<0.001$ ). **Conclusions:** The frailty frequency was high. The results of this study showed a weak association between frailty and healthcare service application. The quality of life of frail older people is lower.

**Keywords:** Epidemiology, Frail elderly, Health services, Nursing, Quality of life

### INTRODUCTION

As the older adult population increases, health professionals will encounter more age-related problems [1]. One such problem is frailty, which presents a complex and challenging problem for follow-up, treatment, and care [2]. Frailty is defined as a functional loss in multiple organs or systems, a decrease in physiological reserves and increase vulnerability to stressors [3]. In various parts of the world, an estimated 4%-59.1% of those aged 65 years and over are defined as frail, with the rate of frailty increasing with age [4-8]. Frailty is also associated with physical and cognitive factors such as nutritional deficiency, pressure ulcers, gait disturbance, general weakness, dementia, and confusion; psychological factors such as fear of falling and depression and social factors such as poor social engagement [9-11].

Frailty has negative consequences, including prolongation of hospital stay, increased need for specialized care, increased health costs, reduced quality of life and increased morbidity [3,6,12]. Frailty reduces the quality of life by 10 times [6] and also increases the use of healthcare services by older adults [7-13]. Dupre, et al., found that frailty increased the risk of being bedridden for 30 days or more [14]. Rothman, Leo-Summers, and Gill reported frailty increased the length of nursing home stay [15]. Dent, et al., found that frail older adults were more likely to visit physiotherapists, community health nurses, dieticians, and mental health services than their non-frail peers [7].

Various studies have shown that the use of healthcare services is higher among frail older adults. Knowledge about the effect of frailty on healthcare service use and quality of life may contribute to studies on preventing frailty. Currently, no research is available on the use of healthcare services by frail or non-frail older adults in Turkey. The present study aimed to determine the impact of frailty on health service use in this population.

### PATIENTS AND METHODS

#### Type of Study

This cross-sectional and correlative study aimed to determine the impact of frailty on health service use among older adults in Turkey.

### Study Population and Sampling

A sample of 189 patients was recruited from internal and surgical diseases services and polyclinics at the State Hospital in Aksaray, Middle Anatolia, Turkey. The sample size was determined with a power of 88.85% and an alpha value of 0.05; the power analysis was conducted using G\*Power, version 3.1.7 [16]. This study was conducted from April 2016-July 2016. Face-to-face interviews were conducted in the patient's rooms (inpatients) or in the waiting room (outpatients). Each interview lasted approximately 20-25 minutes. The inclusion criteria were: at least 65 years of age, no speaking or hearing problems, no dementia or psychological diseases and an interest in joining the study.

### Data Collection

Data were gathered in face-to-face interviews using an information form prepared by the present researchers (based on previous literature), the Edmonton Frail Scale (EFS) and the Nottingham Health Profile (NHP). The information form comprised of 16 questions covering patients' socio-demographic characteristics (e.g. age, sex, education level); health status (e.g. chronic diseases, drugs used); and use of health services (e.g. visits to health services, hospital admission as an inpatient).

The EFS includes 11 items investigating cognition, general health status, functional independence, social support, medication use, nutrition, mood, continence and functional performance [17]. The scale is scored from 0-20: scores of 0-4=robust; 5-6=apparently vulnerable; 7-8=mildly-frail; 9-10=moderately frail and  $\geq 11$ =severely frail. In the present study, the Cronbach's alpha was 0.795.

The NHP is a quality of life scale that assesses personal health problems and how these problems affect daily activities. The scale includes 38 items in 6 subscales: energy (3 items), pain (8 items), emotional reaction (9 items), sleep (5 items), social isolation (5 items) and physical activity (8 items). Each subscale is scored from 0-100, with a higher score indicating poorer quality of life. The NHP was developed by Hunt, et al., [18]. Its validity and reliability were tested in a Turkish population by Küçükdeveci, et al., who reported Cronbach's alphas of 0.56-0.87 and validity coefficients of 0.70-0.88 [19]. In the present study, the Cronbach's alpha was 0.82.

### Statistical Analysis

Data were analysed using IBM SPSS statistics version 23.0 (IBM Corporation, Armonk, NY, USA). Data were descriptively expressed as mean  $\pm$  standard deviation, frequency, and percentage. Relationships between continuous variables were analysed using Pearson rank-correlation coefficient. Multiple linear regression analyses were conducted to determine the association between frailty and each health service use variable. The p-values less than 0.05 were considered statistically significant.

### Ethical Considerations

The present study adhered to the Helsinki Declaration. The study was approved by the Ethical Commission of Aksaray University, Aksaray, Turkey, and by the hospital's Institutional Review Board. Informed consent was obtained from all participating patients.

## RESULTS

Participants' mean age was  $71.29 \pm 6.51$  years. More than half of participants were male 53.4%, 84.7% were married, 46.6% were primary school graduates and 69.3% indicated their expenses were equal to their income. Overall, 39.2% of participants reported a medium health status, and almost all (91%) had applied to health services in the last year. Applications to the State Hospital were the most common ( $4.44 \pm 5.41$ ). And the most common reasons to applied to healthcare services being an examination (69.8%) and prescriptions (64.6%). In total, 45.5% of participants were hospitalised in the last year, with 62.5% of these being hospitalised for medical treatment (Table 1).

**Table 1 Participants' descriptive characteristics**

Variables	n	%
	<b>Age, years (<math>71.29 \pm 6.51</math>)</b>	
65-74	140	74.1%
75-84	42	22.2%
$\leq 85$	7	3.7%

<b>Gender</b>		
Female	88	46.6%
Male	101	53.4%
<b>Marital status</b>		
Married	160	84.7%
Single	29	15.3%
<b>Education</b>		
Illiterate	60	31.7%
Literate	17	9.0%
Primary school	88	46.6%
Secondary school	20	10.6%
High school	4	2.1%
<b>Income level</b>		
Expenses less than income	33	17.5%
Expenses equal to income	131	69.3%
Expenses more than income	25	13.2%
<b>Chronic diseases</b>		
Yes	167	88.4%
No	22	11.6%
<b>General health status</b>		
Perfect	3	1.5%
Very good	11	5.8%
Good	68	36.0%
Medium	74	39.2%
Bad	33	17.5%
<b>Applied to health services in the last year</b>		
Yes	172	91.0%
No	17	9.0%
<b>Application frequency</b>		
	Mean ± SD	
Family practitioner	2.67 ± 3.70	
State hospital	4.44 ± 5.41	
University hospital	0.29 ± 1.01	
Private hospital/Clinic/ Doctor's office	0.69 ± 2.10	
Dentist	0.16 ± 0.59	
<b>Application reason*</b>		
Emergency state	48	25.4%
Transfer from another hospital	2	1.1%
Blood pressure measurement	69	36.5%
Post-treatment control	35	18.5%
Medical operation	30	15.9%
Laboratory tests	55	29.1%
Vaccination	1	0.5%
Examination	132	69.8%
Prescription	122	64.6%
Check-up	9	4.8%
Injection/dressing	19	10.1%
<b>Hospitalised in the last year</b>		
Yes	86	45.5%
No	103	54.5%
<b>Reason for hospitalisation*</b>		
Medical treatment	37	62.5%
Medical operation	18	33.0%
Diagnosis	2	5.5%

\*Multiple options marked. SD, standard deviation

The mean NHP score was  $163.58 \pm 114.03$  and the mean EFS score was  $6.77 \pm 3.86$ . EFS scores indicated that 49.2% of participants had some level of frailty (Table 2).

**Table 2 Nottingham health profile and edmonton frail scale mean scores**

Variables	N (%)	
Nottingham Health Profile	$163.58 \pm 114.03$	
Edmonton Frail Scale	$6.77 \pm 3.86$	
Robust	66	34.9%
Apparently vulnerable	30	15.9%
Mildly frail	18	9.5%
Moderately frail	35	18.5%
Severely frail	40	21.2%

Result of the correlation analysis, there was a statistically significant effect of the EFS and energy level subscale of NHP on the frequency of using health care services ( $p < 0.05$ ). When the score of EFS increases by 1 unit, the frequency of using health care service increases by 0.892; the energy level subscale of NHP increases by 1 unit, the frequency of using health care services decreases by 0.037. There is no statistically significant effect of pain, sleep, physical activity, social isolation and emotional reaction subscales on the frequency of using health care services ( $p > 0.05$ ) (Table 3).

**Table 3 The effect of EFS and NHP subscales scores on health services use frequency**

Variable	$\beta$	Std error	t	p	VIF	Model statistics
Constant	2.127	1.033	2.058	0.041	-	F=7.799
EFS	0.892	0.185	4.827	0.000*	2.211	
Pain Subscale	0.019	0.022	0.878	0.381	2.070	p=0.000*
Sleep Subscale	-0.001	0.021	-0.050	0.960	1.531	
Physical Activity Subscale	0.010	0.030	0.333	0.740	2.230	R <sup>2</sup> =0.234
Energy Subscale	-0.037	0.017	-2.186	0.030*	1.804	
Social Isolation Subscale	0.023	0.034	0.655	0.514	1.422	Adj. R <sup>2</sup> =0.204
Emotional Reaction Subscale	0.023	0.030	0.786	0.433	1.648	D.W=1.728

The dependent variable: Health services use frequency. D.W: Durbin Watson; \*Statistically significant ( $p < 0.05$ )

There are statistically significant moderate positive linear relationships between EFS score, and NHP total score ( $r=0.692$ ,  $p < 0.001$ ) and its pain ( $r=0.551$ ,  $p < 0.001$ ), sleep ( $r=0.433$ ,  $p < 0.001$ ), physical activity ( $r=0.598$ ,  $p < 0.001$ ), energy ( $r=0.596$ ,  $p < 0.001$ ) subscales. There is a weak positive linear relationship between EFS score, and social isolation ( $r=0.377$ ,  $p < 0.001$ ), emotional reaction ( $r=0.255$ ,  $p < 0.001$ ) subscales of NHP (Table 4). There is a weak positive linear relationship between health services use, and NHP total score ( $r=0.332$ ,  $p < 0.001$ ) and its pain ( $r=0.314$ ,  $p < 0.001$ ), sleep ( $r=0.208$ ,  $p=0.004$ ), physical activity ( $r=0.308$ ,  $p < 0.001$ ), energy ( $r=0.183$ ,  $p=0.012$ ), social isolation ( $r=0.213$ ,  $p=0.003$ ), emotional reaction ( $r=0.185$ ,  $p=0.011$ ) subscales (Table 4).

**Table 4 The relationship between the EFS, the NHP scores and the health services use**

NHP Subscales		EFS	Health Services Use Frequency
Pain	r	0.551	0.314
	p	0.000*	0.000*
Sleep	r	0.433	0.208
	p	0.000*	0.004*
Physical Activity	r	0.598	0.308
	p	0.000*	0.000*
Energy	r	0.596	0.183
	p	0.000*	0.012*
Social Isolation	r	0.377	0.213
	p	0.000*	0.003*

Emotional Reaction	r	0.255	0.185
	p	0.000*	0.011*
NHP Total	r	0.692	0.332
	p	0.000*	0.000*

\*Statistically significant ( $p < 0.05$ )

## DISCUSSION

The frailty frequency was around 49.2% in the present study (Table 2). A previous study in Turkey found the prevalence of frailty was 7.1% [5]. A study conducted as part of the Survey of Health Aging and Retirement found the prevalence of frailty differed across countries (e.g. the Netherlands, Germany, Italy, Spain, and France), ranging from 3.9-21.0% [20]. A study in Taiwan by Chang, et al., reported the prevalence of frailty was 14.9% [10]. The difference in the prevalence of frailty reported in those studies and in our present study may be due to data collection methods. In the previous studies, data were collected from individuals living in households, whereas our data were collected from individuals who visited health services. Therefore, participants' health status might have differed, and this might have an impact on the participants' level of frailty.

We found that perception of general health status, admission to healthcare services and having a chronic illness were associated with frailty. Similarly, Chang, et al., found that co-morbid conditions, incontinence, depression, and a lower Mini-Mental State Examination score were associated with frailty [10]. In another study, Masel, et al., found that frailty was significantly associated with the perception of general health, physical function, bodily pain, and physical and emotional roles [6]. Physical and cognitive factors have also been associated with frailty [9-11], and poor health status, admission to health services and chronic illness may be predictors of frailty. Therefore, older adults with repeated admissions to healthcare services, a high number of chronic diseases and poor health status should be evaluated for frailty.

Our study is one of the first correlative studies on frailty and health service use in Turkey. The results of this study showed a weak association between frailty and healthcare service application (Table 3). This result is similar to the literature. In a study in rural South Australia, Dent, et al., found that frail older people were more likely to use a variety of health services than their non-frail peers, including general practitioners, physiotherapists, social workers, community nurses and dieticians [7]. Another study showed that in men, frailty was strongly associated with the use of health and community services in the last 12 months, including general practitioners, physiotherapists and home-care nurses [21]. Frailty presents complex and challenging problems for follow-up, treatment, and care, and frail older adults often require specialised care [2,12]. Health care workers should consider the possibility of frailty in older adults who are frequently referred to health services. And health professionals should evaluate the older adults in terms of the frailty who apply to healthcare services.

The results of the present study also highlighted the correlation between frailty and quality of life. The quality of life of frail older people is lower. Similar to the results in this study, Mansur, et. al., found that frailty was correlated with QOL domains, with the exception of the social domain in a patient with chronic kidney disease [22]. Masel, et al., showed that frailty reduces the quality of life by 10 times [6]. Another study indicates poor quality of life in frail older [12]. Gobbens, at al., predict the quality of life of older persons 2 and 4 years after a multidimensional assessment of frailty. They showed that particularly four physical, one psychological and one social frailty component predicted the future quality of life [23]. Frailty represents a functional loss in multiple organs or systems [3], and quality of life decreases depending on the disease and functional loss such as pain and physical dysfunction [12,24]. In our study, the frailty frequency was high. The frailty may influence the quality of life by reducing older people' physical and functional capacity.

Another result, energy was correlated with the frequency of visits to health services. The frequency of health service applications decreased as the energy level-the sub-dimension of the quality of life scale-increased. Similarly, a study by Agborsangaya, et al., showed that multi-morbidity tripled the odds of hospitalisation and emergency department visits, and those with more chronic conditions had the highest odds of hospitalisation [25]. Thus, several strategies should be implemented to improve QOL, including energy. In this way, health care application can be reduced.

In conclusion, the frequency of frailty in this study was high. Frailty is associated with increased applications to health services. The most common reasons for application were prescription and examination. In addition, the quality of life

of frail older people is lower. In summary, when older adults visit health services, age-related problems should be resolved through a comprehensive geriatric assessment and appropriate treatment and care services provided based on an interdisciplinary approach. Preventive healthcare and screening programmes could also be conducted by family practitioners and nurses to prevent frailty. Such measures may help to decrease frailty and increase the quality of life among older adults, and also contribute to decreasing health services use. Future research should focus on the role of family practitioners and nurses in preventing and managing frailty among older people.

### CONCLUSION

This study provides knowledge about the impact of frailty on health service use. However, a major limitation is that the study was conducted in one city. Another limitation is that the sample only included individuals who visited health services. We were unable to evaluate the effect of frailty on health services use in the community. Interviews with participants at their home or in a public place may enable future studies to reach people who are not currently using health services.

### DECLARATIONS

#### Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### REFERENCES

- [1] Çilingiroğlu, Nesrin, and Simge Demirel. "Aging and ageism." *Turk Journal of Geriatric*, Vol. 7, No. 4, 2004, pp. 225-30.
- [2] Aras, Varlı, Atlı. "Understanding frailty in the elderly." *Akademik Geriatric*, Vol. 3, 2004, pp. 130-7.
- [3] Espinoza, Sara, and Jeremy D. Walston. "Frailty in older adults; insights and interventions." *Cleveland Clinic Journal of Medicine*, Vol. 72, No. 12, 2005, pp. 1105-12.
- [4] Collard, Rose M., et al. "Prevalence of frailty in community-dwelling older persons; a systematic review." *Journal of the American Geriatrics Society*, Vol. 60, No. 8, 2012, pp. 1487-92.
- [5] Çakmur, Hülya. "Frailty among elderly adults in a rural area of Turkey." *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, Vol. 21, 2015, pp. 1232-42.
- [6] Masel, Meredith C., et al. "Frailty and health related quality of life in older Mexican Americans." *Health Quality of Life Outcomes*, Vol. 7, No. 1, 2009, pp. 70.
- [7] Dent, Elsa, et al. "Frailty and health service use in rural South Australia." *Archives of Gerontology and Geriatrics*, Vol. 62, 2016, pp. 53-8.
- [8] Choi, Jaekyung, et al. "Global prevalence of physical frailty by fried's criteria in community-dwelling elderly with national population-based surveys." *Journal of the American Medical Directors Association*, Vol. 16, No. 7, 2015, pp. 548-50.
- [9] Levers, Merry-Jo, Carole A. Estabrooks, and Janet C. Ross Kerr. "Factors contributing to frailty: A literature review." *Journal of Advanced Nursing*, Vol. 56, No. 3, 2006, pp. 282-91.
- [10] Chang, Ching-I., et al. "Prevalence and correlates of geriatric frailty in a northern Taiwan community." *Journal of the Formosan Medical Association*, Vol. 110, No. 4, 2011, pp. 247-57.
- [11] Topinková, Eva. "Aging, disability and frailty." *Annals of Nutrition and Metabolism*, Vol. 52, No. 1, 2008, pp. 6-11.
- [12] Kanwar, Amrit, et al. "Frailty and health-related quality of life among residents of long-term care facilities." *Journal of Aging and Health*, Vol. 25, No. 5, 2013, pp. 792-802.
- [13] Gobbens, Robbert JJ, and Marcel ALM van Assen. "Frailty and its prediction of disability and health care utilization; the added value of interviews and physical measures following a self-report questionnaire." *Archives of Gerontology and Geriatrics*, Vol. 55, No. 2, 2012, pp. 369-79.
- [14] Dupre, Matthew E., et al. "Frailty and type of death among older adults in China; prospective cohort study." *BMJ*, Vol. 338, 2009.

- 
- [15] Rothman, Marc D., Linda Leo-Summers, and Thomas M. Gill. "Prognostic significance of potential frailty criteria." *Journal of the American Geriatrics Society*, Vol. 56, No. 12, 2008, pp. 2211-16.
- [16] Faul, Franz, et al. "G\*power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences." *Behaviour Research Methods*, Vol. 39, No. 2, 2007, pp. 175-91.
- [17] Rolfson, Darryl B., et al. "Validity and reliability of the Edmonton Frail Scale." *Age and Ageing*, Vol. 35, No. 5, 2006, pp. 526-29.
- [18] Hunt, Sonja M., et al. "The Nottingham health profile; subjective health status and medical consultations." *Social Science and Medicine. Part A, Medical Sociology*, Vol. 15, No. 3, 1981, pp. 221-29.
- [19] Küçükdeveci, A. A., et al. "The development and psychometric assessment of the Turkish version of the Nottingham health profile." *International Journal of Rehabilitation Research*, Vol. 23, No. 1, 2000, pp. 31-38.
- [20] Santos-Eggimann, Brigitte, et al. "Prevalence of frailty in middle-aged and older community-dwelling europeans living in 10 countries." *The Journals of Gerontology Series a Biological Sciences and Medical Sciences*, Vol. 64, No. 6, 2009, pp. 675-81.
- [21] Rochat, Stephane, et al. "Frailty and use of health and community services by community-dwelling older men; the concord health and ageing in men project." *Age and Ageing*, Vol. 39, 2010, pp. 228-33.
- [22] Mansur, Henrique Novais, et al. "Frailty and quality of life: a cross-sectional study of Brazilian patients with pre-dialysis chronic kidney disease." *Health and Quality of Life Outcomes*, Vol. 12, 2014, pp. 27-34.
- [23] Gobbens, R. J. J., and M. A. L. M. van Assen. "The prediction of quality of life by physical, psychological and social components of frailty in community-dwelling older people". *Quality of Life Research*, Vol. 23, No. 8, 2014, pp. 2289-2300.
- [24] Heins, Marianne J., et al. "Health-related quality of life and health care use in cancer survivors compared with patients with chronic diseases." *Cancer*, Vol. 15, 2016, pp. 962-70.
- [25] Agborsangaya, Calypse B., et al. "Health-related quality of life and healthcare utilization in multimorbidity; results of a cross-sectional survey." *Quality of Life Research*, Vol. 22, No. 4, 2013, pp. 791-9.