

# In elderly with cardiovascular disease over 65 years of age the relationship between frequency of frailty and quality of life

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## Abstract

This study aim was designed as an analytical cross-sectional study to assess the prevalence of frailty in patients aged 65 years and older with cardiovascular disease and to investigate its relationship with quality of life. The population consisted of a State Hospital Cardiology patients, and the sample consisted of 255 patients, who were calculated according to the incidence of the event (frequency of frailty) (25%) at the 95% confidence interval. Data were collected face to face by interview method between 25.07.2019-01.04.2020. In this study, frailty was observed in 30.9% of cardiovascular patients aged 65 and older. Frailty is mostly seen in illiterate people, women, single people, those who state that their income does not meet their expenses, and those who live alone, and there is a statistically significant difference between them ( $p \leq 0.05$ ). A statistically significant relationship was found between frailty and factors such as the number of comorbidities, fall history in the past year, frequency of hospitalizations, and the number of medications taken within the last year in patients with cardiovascular disease. This study identified a negative correlation between the total score of the quality of life scale, its sub-dimension scores, and frailty ( $r = -0.414$ ;  $p = 0.000$ ). Additionally, it was observed that patients with cardiovascular frailty experience a lower quality of life. In our study the frequency of frailty due to sociocultural factors is high in elderly individuals living alone with cardiovascular disease.

**Keywords:** Cardiovascular disease, elderly, frailty, quality of life

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## Introduction

With the rise in life expectancy, the global elderly population, particularly in our country, is growing. This demographic shift brings about new age-related health challenges. Frailty, a key issue among older adults, is characterized by a gradual decline in physical, psychological, and social functioning [1]. Geriatric frailty increases with advancing age. Vulnerability affects approximately 6% to 42 percent of the population over 65 years of age [2-5]. Frailty is linked to multiple morbidities. Vulnerability leads to increased burnout associated with illness. Frailty makes the elderly dependent on basic activities of daily living. Cardiovascular diseases associated with frailty are important causes of morbidity in the aging population. Common risk factors and pathophysiological processes in the elderly increase both the risk of cardiovascular disease and the risk of frailty [6-8]. Frailty is about three times more common in those with cardiovascular disease than in those who are not elderly. There is a bidirectional relationship between cardiovascular disease and frailty [9]. Frailty increases the risk of cardiovascular disease. The risk of death is also higher in cardiovascular patients [10]. In a study, it was determined that cardiovascular disease increased the frailty frequency by 2.7 times (95% CI: 1.5-5.1). [11]. In another study, it was found that the risk of frailty increased by 1.26 times (95% CI: 0.79-2.03) in those with congestive heart failure, 1.47 times (95% CI: 1.25-1.73) in coronary heart patients [12]. In their review article, Singh et al. (2014) highlighted the negative impact of frailty on the prognosis of cardiovascular disease and quality of life. They noted that frailty is often underrecognized in clinical settings and stressed the importance of considering it when planning interventions for high-risk individuals [13]. A study exploring the link between frailty and quality of life in patients with atrial fibrillation found that 53.1% of patients were frail, with 25.9% experiencing moderate frailty, 10.1% having moderate frailty, and 17.1% exhibiting severe frailty. Frailty has been stated that the quality of life is low and arrhythmia is more common in fragile patients [14]. In the study investigating the quality of life and frailty in

coronary artery patients, it was emphasized that the quality of life was low in patients who underwent percutaneous coronary intervention and that the expected improvement could not be observed due to frailty [15]. In a meta-analysis study examining quality of life and frailty in the elderly, it was stated that interventions aimed at reducing frailty could improve quality of life [16]. Upon reviewing the literature, it becomes evident that there are limited studies addressing the relationship between quality of life and frailty in patients with conditions such as atrial fibrillation, hypertension, venous thromboembolism, coronary artery disease, myocardial infarction, or those who have undergone percutaneous coronary intervention. In their 2020 study, Sławuta et al. highlighted the scarcity of research exploring the link between frailty and quality of life in patients with chronic diseases [14]. Similarly, Wleklík et al. (2022) emphasized the need for further studies to better understand the connection between frailty and cardiovascular diseases, in order to mitigate or prevent their adverse effects [10].

## Materials and Methods

Approval for the study was granted by the Clinical Research Ethics Committee of Aydın Adnan Menderes University Faculty of Nursing (approval number 2019/105, date: 08.07.2019). Written informed consent was provided by all participants. The research was carried out in full compliance with the ethical guidelines outlined in the Declaration of Helsinki.

### Research Type

The type of research is cross-sectional and analytical.

### Sample

A review of the literature reveals a range of reported frequencies for frailty, with estimates between 20 and 30% [17]. The mean fragility frequency was deemed to be 25%. In this study, the sample size was determined based on the event's incidence rate. A total of 255 elderly patients participated, with a standard deviation of  $\pm 0.05$  and a 95% confidence interval. According to data provided by the Turkish Statistical Institute (TUIK), individuals over the age of 65 comprise

9.8% of women and 7.7% of men in Turkish society. As a result, 143 of the participants were female, and 112 were male. Inclusion criteria were as follows: patients over 65 years of age, hospitalised in cardiology clinics, not in the terminal period, diagnosed with cardiovascular disease. Exclusion criteria: patients diagnosed with Alzheimer's and dementia according to the International Classification of Diseases (ICD-10) system codes F.00 -F.09 in the patients' electronic medical records.

Sample calculation if the number of individuals in the population is known.

$$N = Nt^2 * pq / d^2 (N-1) + t^2 pq$$

$$N = 2183 \quad (1.962 * 0.252 * 0.75 / 0.05^2 * (2183 - 1) + 1.962 * 0.75 * 0.25 = 255)$$

### Data Collection Forms

The data for this study were obtained through face-to-face interviews with patients aged 65 and above. A Patient Information Form was completed with the patients. This included socio-demographic data, information on drugs and diseases that affect the frequency of frailty, created as a result of a literature review. Frailty was determined with the Edmonton Frail Scale. Quality of life was determined with the Quality of Life Scale for the Elderly (CASP-19) (Item 3 out of 41 questions in total) [11,18,19].

**Edmonton Frail Scale:** The scale, created by Rolfson et al. (2006), was designed to assess frailty in older adults [20]. Its Turkish validity and reliability were established by Aygör et al. (2018) [21], with a Cronbach's alpha coefficient of 0.75. The scale includes 11 items that evaluate various aspects of elderly health, such as cognitive function, general health, functional independence, social support, medication use, nutrition, mood, continence, and overall functional performance. The results are evaluated according to the frailty analysis score. 0-4 points is not fragile, 5-6 points are fragile, 7-8 points is slightly fragile, 9-10 points are moderately fragile, a score of 11 and above is severely fragile. The scale score is between 0 and 17 [21]. In our study, those who scored 7 or higher on the Edmonton Vulnerability Scale were considered fragile. In the study, the Cronbach's alpha ( $\alpha$ )

value of the scale was found to be 0.74.

**Elderly Quality of Life Scale (CASP-19):** The scale, developed by Hyde et al. (2003), was designed to assess the quality of life in older adults [22]. Türkoğlu et al. (2014) conducted the Turkish adaptation of the scale, establishing its validity and reliability [19]. The scale consists of 4 sub-dimensions. The Cronbach's alpha value of each sub-dimension was found to be between 0.59 and 0.77. Item-total score correlation coefficients were found to be between  $r=0.35$  and  $r=0.67$ . The scale consists of 19 items and 4 sub-dimensions (control, autonomy, pleasure, self-actualization). Scale items are scored between 0-3 points. A higher total score on the scale indicates a better quality of life [22]. In the study, the Cronbach's alpha ( $\alpha$ ) value of the scale was found to be 0.76.

### Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows version 22. The results were assessed with a 95% confidence interval and a significance level of  $p < 0.05$ . Descriptive statistics, *Mann Whitney U-* test were used. Factors affecting vulnerability were analyzed by logistic regression. Correlation analysis was used to assess the relationship between quality of life and frailty. The strength of the correlation coefficient; very weak (0.00-0.25), weak (0.26-0.49), moderate (0.50-0.69), high (0.70-0.89), very high (0.90-1.00) was evaluated [23].

### Results

Participants was the mean age of  $72.34 \pm 6.08$  years, 55.1% were male, more than half (59%) were elementary school graduates and 71.1% were married. It is seen in Table 1 that nearly three quarters of the participants stated that their income sufficient expense, one-third have at least one chronic disease other than cardiovascular disease, approximately one-third have a history of fall in the last year and 54.3% take between five and eight drugs in per day. There was frailty in 79 (30.9%) of 256 participants.

Those who are not frail have a low mean rank according to age, frailty is highest in literate (52.8%), women (55.7%), single (52.7%), those who state that their income sufficient expense (50.8%), it was determined that it was more common in people living alone (55.9%) and the difference was statistically significant (Tablo 2).

Table 3 shows that there is a significant difference between the number of chronic diseases, the history of falls in the last year, the number of hospitalizations in the last year, the number of drugs per day and the development of frailty. In the without chronic disease, frailty is observed in 15.9% of the elderly, when the number of chronic diseases increases (the frailty rate in 1 chronic disease: 24.7; frailty in the presence

of two chronic diseases 43.4%). The frequency of the elderly with frailty increases, 3 and the presence of more chronic diseases did not cause an increase in the frailty rate compared to the elderly with 2 chronic diseases. There is a very weak positive correlation between the number of drugs per day by the elderly and the frailty total score.

Upon comparing the total score of the quality of life scale, its sub-dimensions, and frailty among the participants, it was found that the mean rank values of the frail elderly for the CAPS 19 and its sub-dimensions were significantly lower than those of the non-frail elderly (Table 4).

**Table 1.** Socio-Demographic characteristics, health status and frailty frequency of the participants (n=256).

Socio-Demographic Characteristics		Mean	Standard Deviation
	Age	72.34 (min 65 max 101)	6.08
	Number of drugs per day	4.8 (min 1 max 15)	2.77
		<b>n</b>	<b>%</b>
<b>Gender</b>	Female	115	44.9
	Male	141	55.1
<b>Educational level</b>	Literate	53	20.7
	Elementary	151	59
	Secondary	18	7
	High School	19	7.4
<b>Marital status</b>	University	15	5.9
	Married	182	71.1
	Single	74	28.9
<b>Income status</b>	Income is sufficient for expense	195	76.2
	Income is not sufficient for expense	61	23.8
<b>Living</b>	With wife	178	69.5
	With family	44	17.2
	Alone	34	13.3
Health Status		Mean	Standard Deviation
	<b>Body Mass Indeks</b>	27.14	4.48
<b>Medical history</b>	No	44	17.2
	1 chronic disease	93	36.3
	2 chronic diseases	76	29.7
	3 and over chronic diseases	43	16.8
<b>Falls in the last year</b>	No	178	69.5
	Yes	78	30.5
<b>Physical therapy history</b>	No	232	90.6
	Yes	24	9.4
<b>Hospitalization in the last year</b>	No	154	60.2
	1-2 times	66	25.8
	3-4 times	20	7.8
	5 and over times	16	6.3
<b>The frequency of frailty</b>	Not frail	177	69.1
	Frail	79	30.9

A moderate negative correlation was observed between the total score of the quality of life scale and the self-actualization sub-dimension, as well as the total frailty score in the elderly.

Additionally, weak negative correlations were found between the frailty total score and the control, autonomy, and pleasure dimensions of the quality of life scale (Table 5).

**Table 2. Participants' frailty status based on socio-demographic characteristics.**

Socio-Demographic Characteristics		Frailty				
		Not Frail (n=177)		Frail (n=79)		
		Mean Rank		Mean Rank		
		108.95		172.3		
Age	<i>Mann-Whitney U</i>	3531				
	<i>p</i> value	<b>0,000</b>				
Gender		<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>
	Female	51	44.3	64	55.7	115
	Male	126	89.3	15	10.7	141
		<i>Pearson</i> Chisquare 17.804 (df:1)				
		<i>p</i> value <b>0,000</b>				
Educational level	Literate	25	47.2	28	52.8	53
	Elementary	104	68.9	47	31.1	151
	Secondary and over*	48	92,3	4	7.7	52
		<i>Pearson</i> Chisquare 25.076 (df:2)				
		<i>p</i> value <b>0,000</b>				
Marital status	Married	142	78	40	22.2	182
	Single	35	47.3	39	52.7	74
		<i>Pearson</i> Chisquare 23.276 (df:1)				
		<i>p</i> value <b>0,000</b>				
Income status	Income is sufficient for expense	147	75.4	48	24.6	195
	Income is not sufficient for expense	30	49.2	31	50.8	61
		<i>Pearson</i> Chisquare 14.954 (df:1)				
		<i>p</i> value <b>0,000</b>				
Living	With wife	142	79.8	36	20.2	178
	With family	20	45.5	24	54.5	44
	Alone	15	44.1	19	55.9	34
		<i>Pearson</i> Chisquare 30.983 (df:2)				
		<i>p</i> value <b>0,000</b>				

\*Since frailty was not determined in those with high school and university, the patients in this group were analyzed by including them in the class of those with secondary and over.

df: degrees of freedom

**Table 3.** Participants' frailty status based on their health conditions (n=256).

Health Status	Frailty					
	Not Frail (n=177)			Frail (n=79)		
	Mean Rank		Mean Rank			
	127.21		131.39			
<b>Body Mass Indeks</b>	<i>Mann-Whitney U</i>			6763		
	<i>p</i> value			0,676		
<b>Medical history</b>		<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>
	No	37	84.1	7	15.9	44
	1 chronic disease	70	75.3	23	24.7	93
	2 chronic diseases	43	56.6	33	43.4	76
	3 and over chronic diseases	27	62.8	16	37.2	43
	<i>Pearson</i> Chisquare			12,679 (df:3)		
	<i>p</i> value			<b>0,005</b>		
<b>Falls in the last year</b>	No	138	77.5	40	22.5	178
	Yes	39	50	39	50	78
		<i>Pearson</i> Chisquare			19.262 (df:1)	
	<i>p</i> value			<b>0,000</b>		
<b>Physical therapy history</b>	No	160	69	72	31	232
	Yes	17	70.8	7	29.2	24
		<i>Pearson</i> Chisquare			0.036 (df:1)	
	<i>p</i> value			>0,005		
<b>Hospitalization in the last year</b>	0	135	87.7	19	12.3	154
	1-2	35	53	31	47	66
	≥3-4	7	19.4	29	80.6	20+16
		<i>Pearson</i> Chisquare			74.46 (df:2)	
	<i>p</i> value			<b>0.000</b>		
<b>Number of drugs per day</b>	Frailty Total Score					
	<i>Pearson</i> Correlation			0.144		
	<i>p</i> value			<b>0.021</b>		

**Table 4.** Variation in Quality-of-Life Scores based on frailty status of participants (n=256).

	Frailty		<i>Mann-Whitney U</i>	<i>p</i> value
	Not Frail (n=177)	Frail (n=79)		
	Mean rank	Mean rank		
<b>CAPS 19</b>	148.16	84.46	3512.5	<b>0.000</b>
<b>CAPS 19 Control</b>	137.53	108.26	5392.5	<b>0.003</b>
<b>CAPS 19 Autonomy</b>	145.72	89.92	3943.5	<b>0.000</b>
<b>CAPS 19 Self Realization</b>	147.86	85.13	3565.5	<b>0.000</b>
<b>CAPS 19 Pleasure</b>	142.5	96.8	4487.5	<b>0.000</b>



**Table 5.** Association between frailty and quality of life in the participants (n=256).

	Frailty	
	Pearson Correlation	
	r value	p value
CAPS 19	-0.414**	0.000
CAPS 19 Control	-0.165**	0.008
CAPS 19 Autonomy	-0.429**	0.000
CAPS 19 Self Realization	-0.520**	0.000
CAPS 19 Pleasure	-0.359**	0.000

\*\*Correlation significance level: 0.01

## Discussion

In this study, frailty was observed in 30.9% of cardiovascular patients aged 65 and older. Carneiro et al. (2017) utilized the Edmonton Frailty Scale in their research on the prevalence of frailty among the elderly [2]. They found frailty in 54.4% of cardiovascular patients aged 65 and over. The prevalence of frailty in the study by Carneiro et al. (2017) was higher compared to our findings. This difference is likely due to age-related factors. In our study, the average age of participants was  $72.34 \pm 6.08$ , while in Carneiro et al.'s study, the average age was  $75 \pm 7.6$ . Additionally, 89 (24.7%) of the 360 participants in the Carneiro et al. study were aged 80 or older, whereas only 12.10% of participants in our study were over 80 years old. In Qayyum et al.'s (2020) study on coronary artery disease patients aged 80 and above, the mean age of frail patients was found to be  $84.4 \pm 3.4$  years, while non-frail patients had a mean age of  $82.2 \pm 1.8$  years [15]. Similarly, Liu et al. (2021) studied hypertensive patients over 60 years of age and reported that frail patients had a mean age of  $81.15 \pm 8.42$  years, while non-frail patients had a mean age of  $67.92 \pm 6.58$  years [24]. The frequency of frailty increases with advancing age in cardiovascular patients [13]. In the study of Düzgün et al. (2021), the fragility score of individuals in the older age group was found to be higher [25]. Based on our findings, both cardiovascular disease and age appear to be linked to physical frailty. In the 12-year cohort study of Tazzeo et al. (2021), elderly people with certain diseases were evaluated at six years and 12 years. The relative risk ratio of frailty was found at six years was 2.25; 95% CI:1.13–4.49

and at years 12 was 4.81; 95% CI:1.59–14.60 in those with cardiovascular disease [26].

According to our findings, the frequency of frailty in women (55.7%) is higher than in men (19.9%). In the study by Carneiro et al. (2017) on frailty prevalence in the elderly, frailty was observed in 48.8% of women and 41.8% of men [2]. In the study by Hiriscau et al. (2022), 76% of frail cardiovascular patients aged 65 and older were women [27]. Comparing our findings with those of other studies, it appears that female gender is a risk factor for frailty. In our study, the prevalence of frailty in women was lower than that reported by Hiriscau et al. (2022), but higher than the findings from Carneiro et al. (2017) [2,27]. Since cardiovascular diseases are known to increase the prevalence of frailty, all participants in our study had cardiovascular conditions, unlike in the study by Carneiro et al. (2017), where not all participants had cardiovascular disease. This may explain the higher frequency of frailty in women in our study. Additionally, in Carneiro et al.'s study, the greater prevalence of frailty among male participants compared to our study may be attributed to differences in age [2]. In their study, 65.2% of individuals over 80 years of age were found to be frail. Similarly, Liu et al. (2021) reported a mean age of  $81.15 \pm 8.42$  years for frail patients, with 60.4% of them being male [24].

In this study, frailty according to education level was found mostly in illiterate people (52.8%). In the study of Hiriscau et al. (2022), the frequency of frailty was found to be 82% in cardiovascular patients over 65 years of age with primary education [27]. As the level of education rose,

the prevalence of frailty decreased. In the study by Carneiro et al. (2017), elderly patients with lower educational levels were found to have a higher incidence of frailty [2]. In the study of De Oliveira et al. (2020), it was determined that the education level of fragile patients over 60 years of age was low [28]. The results of this study are similar to our study finding. In the study of Liu et al. (2021), frailty was found the most (37%) in hypertensive patients over 65 years of age and older with secondary education [24]. Wang et al. (2022) reported in their systematic review that high education level is a risk factor for frailty [29]. Education is a social factor. While some studies suggest that frailty prevalence increases with higher educational levels, the differing results in our study may be attributed to factors such as the number of comorbidities, disease duration, and age. In our study, frailty prevalence was found to rise as the number of accompanying health conditions increased in elderly individuals over 65. Similarly, De Oliveira et al. (2020) identified that comorbidities contribute to the progression of frailty in patients over 65 years of age [28]. As the number of diseases in the elderly population increases, so does the likelihood of frailty [7]. Our findings are consistent with the existing literature.

In our study, the prevalence of frailty was higher among singles (52.7%) compared to married individuals. Hiriscau et al. (2022) reported a frailty prevalence of 65% in single cardiovascular patients aged over 65. Similarly, Lisiak et al. (2016) found that the quality of life was lower in single cardiovascular patients over 65 years of age [27,30].

According to all research findings, it can be thought that the inadequacy of psychological and social support of singles causes a decrease in frailty and quality of life.

Our study found that the prevalence of frailty was higher (55.9%) among individuals living alone. In contrast, Liu et al. (2021) reported a higher frequency of frailty (64.6%) in hypertensive patients aged over 60 who lived with their families [24]. Retirement incomes are lower in our country. The elderly living alone meets their health and basic needs with

low income. The elderly who participated in our study are thought to be more vulnerable to physical, mental and social effects due to low economic status and loneliness. It is thought that the frequency of frailty is higher than those who live with their families. The low frequency of frailty can also be explained by cultural factors. It is thought that interaction increases in those living with their families in our society and contributes positively to the healing processes. Socially and culturally, the elderly is supported in economic and social areas within the family. 86.7% of the participants in our study live with their families. In their study, Softa et al. (2016) determined that the higher the perceived social support of the elderly, the better their healthy lifestyle behaviors [31].

This study found a significant association between a history of falls in the past year and the development of frailty. In the research by Hiriscau et al. (2022), frailty was observed in 63% of cardiovascular patients over 65 who had experienced a fall in the previous year [27]. Frailty, including symptoms such as slowness, weakness, inactivity, and exhaustion, is known to contribute to an increased risk of falls in older adults [13].

The total score, all subscale scores, and mean rank values of the CAPS 19 quality of life scale were significantly lower in frail patients with cardiovascular disease than in their non-frail peers. In the study of Hiriscau et al. (2022), statistically significant differences between the EQ-5D-5L quality of life scale subgroups in elderly cardiovascular patients were found to be associated with mobility, self-care, and usual activities [27].

This study identified a negative correlation between the total score of the quality of life scale, its sub-dimension scores, and frailty. In the study of Lisiak et al. (2016), The MacNew quality of life scale and Tilburg Frailty Indicator were used in cardiovascular patients over 65 years of age. A negative correlation was found between patients' quality of life and the frequency of frailty [30]. In the study of Liu et al. (2021), the SF-36 quality of life scale and unintentional weight loss, self-recognized fatigue, weakness, slowness



and lack of activity, and frailty were evaluated in hypertensive patients over 60 years of age. A negative correlation was observed between the patients' quality of life and the prevalence of frailty [24]. In the study by Slawuta et al. (2020), the HRQoL scale and the Edmonton Frailty Scale were used to assess patients over 60 with atrial fibrillation. The analysis of total scores revealed that frail patients had significantly higher scale scores, indicating the impact of arrhythmia on quality of life [14]. Uchmanowicz et al. (2019) employed the WHOQOL-BREF quality of life scale and the Tilburg Frailty Indicator in cardiovascular patients aged over 65. They found a negative correlation between quality of life and frailty frequency [32]. Similarly, in the study by Qayyum et al. (2020), coronary artery patients aged over 80 were assessed with the SF-12 quality of life scale and the Edmonton Frailty Scale, and it was found that as frailty increased, quality of life decreased [15]. De Oliveira et al. (2020) also reported a decline in quality of life in frail patients over 60 years of age [28]. These findings align with the results of our study. Across the literature, quality of life and frailty frequency have been assessed using various scales in elderly cardiovascular patients, with frailty consistently shown to have a statistically negative effect on quality of life.

### *Study Limitations*

As the study was conducted at a single center and relied on self-reported data collection tools, the findings may not be generalizable to the broader population.

### **Conclusion**

This study explored the association between frailty and quality of life in older adults with cardiovascular disease. It was found that sociodemographic factors, particularly social support and economic status, have a significant impact on the frailty levels of elderly individuals. The rise in chronic conditions with age, along with their link to various geriatric syndromes, represents a critical factor to consider in the health management of older adults. The frequency of frailty and related sociodemographic variables can serve as useful indicators for evaluating the health status of

elderly individuals and improving their quality of life. Increasing access to healthcare services for older adults, strengthening social support systems, and managing chronic diseases require further research and intervention. Such measures can improve the overall health of the elderly population and contribute to reducing the negative outcomes associated with frailty.

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### *Conflict of interest*

The authors report no conflicts of interest.

### *Data availability statement*

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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