



## Fall risk and frailty level in older adults admitted to the emergency department with a complaint of falling

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### ABSTRACT

**Introduction and aim.** Falls are the second leading cause of unintentional death in the world. The study was conducted to examine the risk of falls and levels of frailty in older adult patients admitted to the emergency department due to fractures, as well as to identify the factors that influence fall risk and frailty levels.

**Material and methods.** This cross-sectional and correlational study conducted with 155 older patients. Data collected by the patient information form, Itaki Fall Risk Scale and Edmonton Frail Scale.

**Results.** Patients diagnosed with fracture in the emergency department had a high risk of falling with a mean score of  $9.55 \pm 3.84$ . 70.3% of the patients were frail. The one-third (30.3%) had severe frailty. There was a moderate positive correlation between the risk of falling and the mean frailty score of the older adult patients ( $p < 0.001$ ).

**Conclusion.** The study showed that older adults admitted to the emergency department due to falls are at high risk of falling and the majority of them are frail. Early determination of fall risk and frailty levels in the older adults with a history of falling, prevention of falls and fractures due to falls will be beneficial in increasing the quality of life of the older adults.

**Keywords.** emergency department, fracture, frailty, older adults, risk of falling

### Introduction

A fall is defined as an event that results in undesirable movement of a person on the ground or other lower level. Falls are the second leading cause of unintentional death in the world. The age range with the highest number of fatal falls is adults aged 60 and over. The World Health Organization states that the number and proportion of individuals aged 60 and over in the population has increased.<sup>1</sup> According to statistical data, one in six people in the world is expected to be 60 years or older by 2030. It is estimated that the world population aged 60 and over will double by 2050 (2.1 billion). The number of people aged 80 and over is expected to reach 426 million between 2020 and 2050.<sup>2</sup> In Turkey, according to the data of the Turkish Statistical Institute, the propor-

tion of the older population in the total population has increased to 9.5% in 2020. In 2020, 44.2% of the older population is male and 55.8% is female. According to population data, it is estimated that the proportion of the older population will reach 11% in 2025, 12.9% in 2030, and 16.3% in 2040.<sup>3</sup>

Prolonged life expectancy is increasing significantly from year to year due to falls.<sup>4</sup> In a meta-analysis study, it reported as 26.5% the prevalence of fall among the older adults in the world.<sup>5</sup> Falls in the older adults constitute approximately 10% of admissions to emergency department and 6% of hospitalizations from emergency department.<sup>6</sup> Centers for Diseases Control and Prevention reported that every year 3 million older adults treated in emergency rooms due to fall injuries.<sup>7</sup> Erdem

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and Atay stated that 95.5% of older patients in Turkey have a high risk of falling.<sup>8</sup> In a different study conducted in Turkey, it was determined that 19.5% of older patients applied to the emergency department due to falls, and 31.7% of them had a fall history.<sup>9</sup>

It is emphasized that the risk of falling is high in the older population with low education level, unemployed, using multiple drugs, malnourished, living in urban areas, consuming cigarettes and alcohol in developed countries. In addition, comorbidities such as heart disease, hypertension, diabetes, stroke, frailty, previous history of falls, depression, Parkinson's disease and pain have been shown to increase the risk of falling.<sup>10-16</sup> It has been determined that the older adults in Turkey also experience falls for similar reasons.<sup>17-21</sup>

All studies conducted in previous year show that falls will continue as an important problem among the older adults in our country and in the world. Therefore, it is important to identify of falling risk with sensitive, specific and reproducible tools on the older adults.<sup>22</sup> In a study conducted in the emergency department, it emphasized that the need to determine fall risk and determine appropriate fall risk assessment tools continues.<sup>23</sup> In addition, a limited number of studies evaluating the fall risk and frailty of patients who applied to the emergency department with a fall found.

## Aim

The study was conducted to examine the risk of falls and levels of frailty in older adult patients admitted to the emergency department due to fractures, as well as to identify the factors that influence fall risk and frailty levels.

## Research questions

- What is the risk of falling in older adult patients admitted to the emergency department and diagnosed with a fracture?
- What is the frailty levels in older adult patients admitted to the emergency department and diagnosed with a fracture?
- What are the factors affecting the risk of falling and frailty levels in older adult patients admitted to the emergency department and diagnosed with a fracture?
- Is there a relationship between the risk of falling and frailty levels of older adult patients admitted to the emergency department and diagnosed with a fracture?

## Material and methods

### Ethical approval

Firstly, ethical approval was obtained from the Social and Human Sciences Ethics Committee of the University (decision date: 07.01.2022, approval number: 21).

Subsequently, written permission was obtained from the health directorate. Informed consent was obtained from the patients. Throughout the research, adherence to the Helsinki Declaration was maintained.

### Design and sample

The population for this cross-sectional and correlational study comprised 258 patients aged 60 and over who were admitted to the orthopedic service and emergency department with fractures in a state hospital in Turkey between January 1 and December 31, 2020. The sample size was determined as 155 patients using the known population sample formula ( $n=258$ ,  $t=1.96$ ,  $p=0.5$ ,  $q=0.5$ ,  $d=0.05$ ).

The inclusion criteria for the study were as follows: i) willingness to participate, ii) age over 60 years, iii) presentation to the emergency department with a complaint of falling and subsequently being admitted to the orthopedic service due to fracture, iv) ability to speak and understand Turkish, and v) conscious state. Patients who were under the age of 60 ( $n=3179$ ), who did not volunteer to participate ( $n=6$ ), who did not experience fractures after falling ( $n=1880$ ), and who were not admitted to the orthopedic service ( $n=42$ ) were excluded from the study.

### Data collection

Data for the study were collected between March 2022 and January 2023 using three instruments: the patient information form, the Itaki Fall Risk Scale, and the Edmonton Frail Scale. The data collection process involved face-to-face interviews with the participants.

### Patient Information Form

This form consists of 23 questions evaluating the socio-demographic characteristics and clinical status of the older adults.

### Itaki Fall Risk Scale

It is a scale developed by the Republic of Türkiye Ministry of Health to evaluate the fall risks of adult patients in health institutions in our country. The Itaki Fall Risk Scale used to question 19 risk factors (8 items major risk factors, 11 items minor risk factors) that cause patient falls. Minor risk factors scored with 1 point and major risk factors with 5 points. A score of less than 5 points considered low risk and 5 points or over considered high risk.<sup>24</sup>

### Edmonton Frail Scale

The scale developed by Rolfson et al. in 2006. Turkish reliability and validity were done by Aygör et al.<sup>25</sup> The scale consists of 11 items. A minimum of 0 and a maximum of 17 points can be obtained from the scale. There are areas of vulnerability, item section consisting

of questions and scoring areas according to the answers to be given between 0 and 2 points. According to the answers received, 0-4 is not fragile, 5-6 is apparently vulnerable, 7-8 is mildly fragile, 9-10 is moderately fragile, 11 and above is severely fragile. The Cronbach alpha value of the Turkish version of the scale is 0.75.<sup>25</sup> The cronbach's alpha was determined as 0.78 in this study.

### Data analysis

Data evaluated by entering the SPSS 22.0 package program (IBM, Armonk, NY, USA). The normally distribution analyzed with the Shapiro Wilk test. Data evaluated with chi-square test, Mann Whitney U test, Kruskal Wallis test and Spearman Correlation analysis as well as descriptive statistical analysis methods. The significance was evaluated at the  $p < 0.05$  level.

**Table 1.** Profile of older adult patients (n=155)<sup>a</sup>

		Mean (SD)
Age		75.85 (9.22)
		n (%)
Gender	Female	109 (70.3)
	Male	46 (29.7)
Employment status	Working	2 (1.3)
	Not working	153 (98.7)
Residential location	Village	82 (52.9)
	Town	35 (22.6)
	City	38 (24.5)
People they live with	Alone	19 (12.3)
	Family	134 (86.5)
	Nursing home	1 (0.6)
	Caregiver	1 (0.6)
Assistive device use	Yes	77 (49.7)
	No	78 (50.3)
Chronic disease*	Absent	29 (18.7)
	Diabetes mellitus	62 (40)
	Hypertension	93 (60)
	Heart disease	46 (29.7)
	COPD	19 (12.3)
	Osteoporosis	14 (9.0)
Co-morbidity*	Absent	95 (61.3)
	Cerebrovascular disease	17 (11)
	Alzheimer's	20 (12.9)
	Parkinson's	4 (2.6)
	Loss of physical activity	26 (16.8)
	Psychiatric illness	14 (9)
Continuous drug use	No	24 (15.5)
	One drug	16 (10.3)
	Two drug	27 (17.4)
	Three and more	88 (56.8)
History of fall	Yes	116 (74.8)
	No	39 (25.2)
History of falling in the last 6 months	Yes	51 (32.9)
	No	104 (67.1)
Fracture after falling in the last 6 months	Yes	31 (26.7)
	No	85 (73.3)

<sup>a</sup> COPD – chronic obstructive pulmonary disease; SD – standard deviation; \* – more than one answer was given, the percentages were taken according to the number n (155)

### Results

Table 1 presents the findings related to the demographic characteristics and previous health history of the patients. According to the table, the average age of the patients was 75.85 (SD=9.22) years, with 70.3% being female and 98.7% being non-working. Among the patients, 52.9% resided in rural areas, and 86.5% lived with their families. Around 81.7% of the patients had chronic diseases, with 49.7% of them using assistive device. Approximately 85.5% of the patients were on continuous medication, and 56.8% of them were taking three or more drugs. Furthermore, 74.8% of the patients had a history of falling, with 32.9% experiencing a fall in the last 6 months, and 26.7% of those falls resulting in fractures (Table 1).

Among the older adult patients admitted to the emergency department, 80% of them had femur fractures and 9.7% had arm fractures. Additionally, it was found that 3.6% of the patients experienced multiple fractures. In Table 2, it is shown that 59.4% of the patients fell at home, 32.3% while walking, and 40.6% of the falls occurred at noon (Table 2).

**Table 2.** Fracture types and characteristics of falls on the older adult patients (n=155)

	n (%)
<b>Fracture types</b>	
Femur	124 (80)
Femur and pelvis	1 (0.6)
Spine and arm	1 (0.6)
Pelvis and spine	1 (0.6)
Pelvis	3 (1.9)
Arm	15 (9.7)
Ankle	6 (3.9)
Wrist	1 (0.6)
Wrist and femur	1 (0.6)
Arm and wrist	1 (0.6)
Spine and ankle	1 (0.6)
<b>Place of fall</b>	
Indoor	92 (59.4)
Outside of home	63 (40.6)
<b>Circumstances for falling</b>	
While turning in bed	16 (10.3)
Getting up from the toilet	25 (16.1)
While performing ablution	7 (4.5)
Getting up	15 (9.7)
Working in the garden	23 (14.8)
While bathing	8 (5.2)
When using stairs	11 (7.1)
While walking	50 (32.3)
<b>Falling Time</b>	
Morning	39 (25.2)
Noon	63 (40.6)
Evening	37 (23.9)
Night	16 (10.3)

The older adults patients in the study exhibited a high risk of falling, with a mean score of 9.55 (SD=3.84). This high risk was observed in 91.6% of the older adults. Furthermore, the older patients had mild frailty, with an average score of 8.51 (SD=3.39). However, 70.3% of

the older adults patients were classified as frail, and one-third (30.3%) had severe frailty. There was a moderate positive correlation between the risk of falling and the average frailty score of the older patients ( $p < 0.001$ ) (Table 3).

**Table 3.** Fall risk and frailty level in the older adult patients (n=155)<sup>a</sup>

		Mean (SD)	Min–Max
Itaki Fall Risk Scale		9.55 (3.84)	1–20
Edmonton Frail Scale		8.51 (3.39)	1–16
$\rho$	$p$	0.468	<0.001*
		n	%
Fall Risk	Low	13	8.4
	High	142	91.6
Frailty level	Not fragile	25	16.1
	Seemingly defenseless	21	13.5
	Slightly fragile	26	16.8
	Medium fragile	36	23.2
	Severely fragile	47	30.3

<sup>a</sup> SD – standard deviation; Min – minimum; Max – maximum; \* –  $p < 0.001$

The mean scores of the Itaki Fall Risk Scale and Edmonton Frail Scale were found to be significantly higher ( $p < 0.05$ ) in patients who used assistive devices, had a chronic disease, had a concomitant disease, and were consistently taking medication. Furthermore, the mean scores of the Edmonton Frail Scale were significantly higher ( $p < 0.05$ ) in patients who were not working and had a history of falling in the last 6 months (Table 4).

In Table 4, it was observed that there was a weak negative correlation between the mean fall risk score of the patients and hemoglobin levels, as well as a weak positive correlation between the mean frailty score and the INR value ( $p < 0.05$ ). Additionally, a moderate negative correlation was found between T3 levels and the mean scores of fall risk and frailty ( $p < 0.05$ ) (Table 4).

**Discussion**

In this study, we investigated the risk of falls and levels of frailty in older adult patients who were admitted to the emergency department due to fractures. Additionally, we examined to identify the factors that influence fall risk and frailty levels in this population. The results revealed that the majority of the patients experienced a femoral fracture as a result of a fall, followed by fractures of the arm. Furthermore, it was observed that some older adult patients had multiple fractures. Falls were more frequent in the home environment, during walking, and at noon. Our study findings regarding fracture type and fall environment were consistent with previous research, except for the timing of falls. In a report published by the Australian Institute of Health and Welfare, it was stated that femur fractures (73%) are the most common type of injury resulting from falls in old-

**Table 4.** Comparison of the profile of the older adult patients and their fall risk and frailty level (n=155)<sup>a</sup>

		Itaki Fall Risk Scale Mean (SD)	Edmonton Frail Scale Mean (SD)
Gender	Female	9.83 (3.81)	8.49 (3.15)
	Male	8.87 (3.87)	8.57 (3.93)
		Z=-1.494 p=0.135	Z=-0.112 p=0.911
Employment status	Working	7 (0.00)	3.50 (0.70)
	Not working	9.58 (3.38)	8.58 (3.36)
		Z=0.161 p=0.188	Z=-2.037 p=0.03*
Residential location	Village	9.29 (4.06)	8.48 (3.28)
	Town	8.97 (3.49)	7.86 (3.69)
	City	10.63 (3.53)	9.18 (3.31)
		$\chi^2=4.419$ p=0.110	$\chi^2=3.010$ p=0.222
Assistive device use	Yes	10.44 (3.61)	9.73 (2.75)
	No	8.67 (3.88)	7.31 (3.55)
		Z=-3.045 p=0.002*	Z=-4.471 p<0.001*
Chronic disease	Yes	10.50 (3.12)	8.80 (3.32)
	No	5.41 (4.00)	7.24 (3.47)
		Z=-6.364 p<0.001*	Z=-2.151 p=0.031*
Co-morbidity	Yes	10.58 (3.67)	10.58 (2.54)
	No	8.89 (3.82)	7.20 (3.21)
		Z=-2.808 p=0.005*	Z=-6.228 p<0.001*
Continuous drug use	Yes	10.51 (3.21)	8.87 (3.32)
	No	4.29 (2.59)	6.54 (3.17)
		Z=-6.961 p<0.001*	Z=-2.984 p=0.003*
History of falls	Yes	9.77 (3.67)	8.82 (3.34)
	No	8.90 (4.30)	7.59 (3.41)
		Z=-1.571 p=0.116	Z=-1.798 p=0.072
History of falling in the last 6 months	Yes	10.20 (3.53)	9.82 (3.01)
	No	9.23 (3.96)	7.87 (3.39)
		Z=-1.474 p=0.141	Z=-3.347 p=0.001*
Fracture after falling in the last 6 months	Yes	10.06 (3.62)	8.90 (3.03)
	No	9.66 (3.71)	8.79 (3.46)
		Z=-0.888 p=0.375	Z=-0.003 p=0.998
		$\rho$	$p$
Laboratory results in the emergency department	Hemoglobin	-1.179	0.026*
	Glucose	0.093	0.249
	Sodium	0.006	0.945
	Potassium	-0.056	0.49
	INR	0.084	0.297
	T3	-0.334	<0.0001*
	T4	0.016	0.844
	TSH	-0.059	0.467
		$\rho$	$p$
		-0.184	0.022
		-0.023	0.775
		-0.001	0.988
		-0.052	0.519
		0.230	0.004*
		-0.237	0.003*
		0.130	0.106
		-0.040	0.625

<sup>a</sup> SD – standard deviation; INR – international normalized ratio; T3 – triiodothyronine; T4 – thyroxine  
Z – Mann Whitney U test;  $\rho$  – Spearman correlation; \* –  $p < 0.005$

er adults. In the same report, it was highlighted that the most common causes of falls in older adults are slipping, tripping, and stumbling while walking.<sup>26</sup> Another study found that the most common cause of injury in older adults was falling from a level (55.2%), with the pelvis and lower extremities being the most frequently affected areas (43.7%).<sup>27</sup> Pierre et al. also reported that the leading cause of fractures among all older patients presenting with a complaint of falling was falling during movement (82.8%).<sup>28</sup>

It has been demonstrated that hip and femur fractures are the predominant causes of hospitalization due

to fall-related injuries in Sweden.<sup>29</sup> However, there are varying results in the literature regarding the location and timing of falls. One study reported that over half of the falls took place at home and during daytime hours.<sup>30</sup> In another study, it was reported that falls occurred at night and the reasons behind them were unknown.<sup>31</sup> Choi et al. also found that more than half of the falls occurred within the individual's home, with 60% of them being attributed to slipping or tripping over objects. They further identified a significant association between admission to the emergency department and the diagnosis of fracture in these patients (RR = 3.59, 95%CI = 2.58–5).<sup>32</sup>

In this study, it was found that older adult patients diagnosed with fractures in the emergency department had a high risk of falling. Furthermore, there was a significant association between an increased risk of falling and higher levels of frailty ( $p < 0.001$ ). In the literature, various fall risk assessment tools such as the Morse Fall Risk Scale, Hendrich II Fall Risk Scale, and STRATIFY Fall Risk Scale have been utilized to assess the fall risk in older adult patients. In our country, the Itaki Fall Risk Scale, developed by the Ministry of Health, is extensively employed in health institutions to assess the fall risks of older adult patients.<sup>24</sup> Several studies conducted in our country utilizing the Itaki Fall Risk Scale have consistently demonstrated that older adults are at a high risk of falling.<sup>33–37</sup> The results of our study are in line with these previous studies conducted in our country, further supporting the notion of a high fall risk among older adults.

Frailty is indeed a crucial aspect of older adult care and has significant implications for hospitalization and health outcomes. Numerous studies have demonstrated the association between frailty and adverse health outcomes.<sup>14,38,39</sup> It underscores the importance of recognizing and addressing frailty as a key consideration in the healthcare management of older adults. In our study, the patients exhibited mild frailty based on the total score of the Edmonton Frail Scale. However, it is noteworthy that the majority of the patients were classified as frail, and approximately one-third of them were identified as severely frail. These results highlight the significant prevalence and severity of frailty among the older adult population included in our study.

A study utilizing the Edmonton Frail Scale revealed that 51% of older patients who were admitted to the hospital with a femoral neck fracture exhibited a high frailty score.<sup>40</sup> Furthermore, another study reported that one-third of the patients included in their sample were identified as frail, highlighting the association between frailty and increased risk of falls and fractures in older adults.<sup>41</sup> Jankowska-Polańska et al. highlighted in their study that a significant proportion (41.9%) of individuals aged over 65 years exhibit frailty.<sup>42</sup> Moreover,

a systematic review and meta-analysis of 29 prospective studies demonstrated that frailty serves as a significant risk factor for falls and the development of bone fractures.<sup>43</sup> These results underscore the need for early assessment of frailty in order to prevent falls and enhance the quality of life for older adults.<sup>38</sup>

In our study, it was observed that patients who used assistive devices, had a chronic disease, had a concomitant disease, and were on constant medication had higher levels of both fall risk and frailty ( $p < 0.05$ ). Furthermore, it was found that patients who were unemployed and had a history of falling in the last 6 months had significantly higher levels of frailty ( $p < 0.05$ ). In the literature, several studies have reported a statistically significant relationship between various factors and fall risk, including advanced age, chronic disease, need for physical support while standing/walking, urinary/fecal disorders, use of more than four drugs, high-risk drug use in the last week, and environmental factors.<sup>32,35,43–47</sup> A study reported that frail individuals had a higher risk of falling in older adults, and this association was statistically significant ( $p < 0.05$ ).<sup>48</sup> According to our results, 32.9% of the patients experienced a fall in the last 6 months. Moreover, our study revealed that patients with a history of falls in the last six months had significantly higher mean scores on the Edmonton Frail Scale. This suggests that the occurrence of recurrent falls in older adult patients should be carefully assessed and monitored. Indeed, recurrent falls in older adults can serve as an indicator of underlying frailty.<sup>49</sup> As supported by previous research, the likelihood of experiencing another fall is 33–51% higher in older adults exhibiting signs of frailty.<sup>50</sup> Sri-On conducted a follow-up study on 350 older patients who were initially admitted to the emergency department due to a fall. The study revealed that within the subsequent 6 months, a significant number of patients (43%) experienced another fall, leading to 31% of them seeking re-admission to the emergency department and 12% requiring hospitalization.<sup>51</sup> Similarly, Schaap et al. reported that out of 498 older patients, 26.1% experienced recurrent falls, with 12% of these falls resulting in fractures.<sup>52</sup> These findings highlight the concerning nature of recurrent falls among older adults and the potential for subsequent healthcare utilization and serious injuries.

In our present study, we observed that low hemoglobin levels in older adults were associated with an elevated risk of falling. It is worth noting that low hemoglobin levels are a prevalent health issue among older individuals and are linked to risk factors for fractures, including reduced physical function and decreased bone mass. A decline in hemoglobin levels can lead to symptoms such as fatigue, dizziness, and weakness. These symptoms can indeed contribute to an increased risk of falling and are associated with a significant elevation in fracture risk.<sup>53,54</sup>

A study conducted among the general patient population have demonstrated that low hemoglobin levels ( $p=0.003$ ) and a history of falls within the previous year ( $p<0.001$ ) are independent factors influencing the severity of falls and fall-related injuries.<sup>55</sup> It has been reported that approximately 40% of all hip fractures, including femoral neck, intertrochanteric, or subtrochanteric fractures, occur in patients with hemoglobin levels below 12 g/dL at the time of hospitalization. Additionally, a significant decrease in hemoglobin levels is observed in extracapsular fractures, particularly in the days preceding surgery.<sup>56</sup> Another study emphasized that older patients with a hemoglobin level below 11.55 g/dL, who presented to the emergency department after a fall, had a higher mortality rate. The risk of death was found to increase by 5.488 times within the first two months.<sup>57</sup>

Frailty is a prevalent biological syndrome observed in older adults, and it is known that thyroid functions are associated with the aging process. Thyroid hormones play a crucial role in various physiological processes, including skeletal muscle development, tissue formation, growth, differentiation, and metabolism. Triiodothyronine (T3), in particular, stimulates the myosin heavy chain of fast-twitch muscle fibers, leading to increased mitochondrial activity and an improved relaxation-contraction ratio.<sup>58,59</sup> These effects contribute to the overall functionality and performance of the musculoskeletal system. In our study, we observed a moderate negative correlation between T3 levels and the mean scores of fall risk and frailty, indicating that lower T3 levels were associated with higher levels of fall risk and frailty in the older adults ( $p<0.05$ ). However, we did not find a significant correlation between T4 levels and fall risk or frailty levels ( $p>0.05$ ). These findings differ from previous studies, suggesting that the relationship between thyroid hormone levels and fall risk/frailty may vary across different populations or study settings. Indeed, the study by Bano et al. reported that higher T4 levels in older patients were associated with an increased risk of becoming more fragile over time.<sup>60</sup> This suggests that T4 levels may play a role in the progression of frailty in older adults. Additionally, several other studies have found a significant relationship between T3 levels and frailty, further supporting the notion that thyroid hormone levels, particularly T3, may be associated with the development and progression of frailty in the older population.<sup>59,61,62</sup> These findings highlight the potential importance of thyroid function in relation to frailty and call for further investigations to better understand the underlying mechanisms and clinical implications of these associations.

In our study, a significant relationship was observed between the International Normalized Ratio (INR) values measured in the emergency department and the frailty levels of the patients. This finding suggests that

as the INR level increases, the frailty levels also tend to increase in older adults. Previous studies have also indicated a link between high frailty levels and the use of anticoagulants in older adults. The uncontrolled use of anticoagulants can lead to an elevation in the INR level.<sup>63-65</sup> These findings are consistent with the existing literature, although it should be noted that there is a limited number of studies available on this topic. Further research is needed to explore the relationship between INR levels, anticoagulant use, and frailty in older adults, in order to better understand the underlying mechanisms and implications of these associations.

## Conclusion

In conclusion, this study revealed that older adults presenting to the emergency department after falling are at a high risk of future falls and frailty. The majority of these patients were found to be frail, and femoral fractures were the most common type of injury resulting from falls. Several factors, including the use of assistive devices, chronic diseases, comorbidities, and continuous medication use, were identified as risk factors for frailty and fall risk in this population.

Based on these findings, it is recommended to assess fall risk and frailty levels in older adults at an early stage to prevent falls and fall-related fractures. This proactive approach can contribute to improving the independence and overall quality of life for older adults. Furthermore, it is crucial to provide education and training to older adults, healthcare professionals, family members, and caregivers on fall prevention strategies and frailty management. Increasing public awareness through public service announcements can also play a significant role in promoting the health and well-being of older adults.

## Declarations

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### Author contributions

Conceptualization, S.Ç.; Methodology, S.Ç.; Software, S.Ç. and E.K.; Validation, S.Ç.; Formal Analysis, S.Ç. and E.K.; Investigation, N.U.; Resources, S.Ç. and N.U.; Writing – Original Draft Preparation, S.Ç., N.U., E.K. and İ.D.; Visualization, S.Ç., N.U. and İ.D.; Supervision, S.Ç.; Project Administration, S.Ç. and N.U.; Funding Acquisition, N.U.

### Conflicts of interest

The author declares no conflicts of interest.

### Data availability

Data will be made available on request.

### Ethics approval

Ethical approval was obtained from the Social and Human Sciences Ethics Committee of the University (decision date: 07.01.2022, approval number: 21).

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