
EVALUATION AND PREVENTION STRATEGIES FOR FALLS AND GERIATRIC SYNDROMES: GERIATRIC INDIVIDUALS IN HOME HEALTH SERVICES A SINGLE-CENTRE STUDY

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ABSTRACT

Falls are an important health problem that can lead to morbidity and mortality in geriatric patients. In this study examined, various factors associated with falls and fear of falling in geriatric patients were examined. This was a prospective, analytical study, and the sample size was calculated to be 320 participants with a confidence level of 95% and a margin of error of 0.05. Patients who met the inclusion criteria were evaluated during home visits or hospitalizations. An 11-question sociodemographic and clinical characteristics questionnaire was developed by the researchers after reviewing the literature using a data collection form. The FRAIL Scale, Malnutrition Universal Screening Tool, Barthel Index, Itaki Fall Risk Scale, Six-Item Screener, Tinetti Balance and Gait Test, and Geriatric Depression Scale-Short Form (GDSSF) were used to evaluate whether the participants had geriatric syndromes. The mean age of the 320 participants was 81.52 ± 7.57 years, and approximately half of the participants were female. The rate of malnutrition was 77.8%. A total of 57.2% of the participants had environmental hazards in their homes, 58.8% had a history of falls, 54.4% had a fear of falling, and 44.1% had experienced an injury due to a fall. There were statistically significant correlations between a history of falls and fear of falls and age, calf circumference, the number of medications used, environmental hazards in the home, fragility, malnutrition risk, and the Itaki Fall Risk Scale, Barthel Index, total Tinetti Balance and Gait Test, and total GDS-SF scores. The incidence of falls in this study was high, and falls were associated with general health status, age, and nutritional status. In addition, using a single scale for determining the risk of falls is not appropriate, and many parameters should be included in screenings.

KEY WORDS:

prevention strategies falls geriatric syndromes home health services

BACKGROUND

The geriatric population is increasing both in Turkey and worldwide. Independence and the ability to 'age in place' are crucial for healthy ageing among older people. Falls and resulting injuries or fractures are major threats to healthy ageing and independence. Despite the intense focus on research and practice in the last 15 years, the number of deaths and severe injuries from falls have not decreased [1]. Among geriatric syndromes, falls are defined as accidental falls to the ground or a lower level. The fall rates in the geriatric population are 55% in the home, 20% near the home, and 25% away from the home. Forty percent of hospitalizations due to traumatic injuries are due to falls. The most common consequences of falls are pain, bruising, muscle tears, fractures, including upper extremity and hip fractures, and intracranial haemorrhage in severe cases. Frequent falls in the geriatric population can lead to fear of falling (FoF), depression, loss of independence, hospital or care centre admissions, and serious consequences such as death, placing a significant burden on the health system. Therefore, screening people who are at risk of falls and performing comprehensive assessments of geriatric individuals at high risk of falls are critical steps towards prevention. Many older people do not report falls or seek medical attention unless they are injured [2]. Previous falls strongly predict future falls even if they do not lead to injury. Therefore, the main goal of fall prevention is to identify people with risk factors early and prevent recurrent falls. When a healthcare provider fails to screen for falls, an opportunity to prevent future falls is missed. Therefore, physical, psychological, and environmental factors affecting an individual's physical condition should be identified early.

Too many risk factors can potentially lead to falls; although some risk factors cannot be changed, many can. Interactions between multiple risk factors and the risk of falls

increase directly with the number of risk factors that cause most falls [3].

Extrinsic risk factors include environmental hazards, such as slippery floors, the use of assistive devices, and poor lighting. Intrinsic risk factors include age, sex, muscle weakness, physical inactivity, vertigo, gait and balance disorders, visual and hearing impairments, cognitive and sensory impairments, orthostatic hypotension, diabetes, and osteoporosis [4]. Several studies have revealed that different types of psychotropic medications, such as hypnotics, sedatives, antipsychotics, and antidepressants, which can cause sedation and balance and coordination impairments, are also associated with an increased risk of falls in older adults. It has also been emphasized that polypharmacy and psychotropic medications increase the risk of falls in older adults, especially when combined with cardiovascular medications [5].

This study aimed to determine the fall status of geriatric patients followed up by Home Health Services (HHSs) and to examine the relationship between fall status and geriatric syndromes.

METHODS

Data and sample

This was a prospective, analytical study. Ethics committee approval was obtained from the Local Clinical Research Ethics Committee on 18.10.2023 (decision number 2023/184). A literature review revealed that the average risk of falls in people older than 65 years is 30%. Accordingly, the sample size was calculated to be 320 people with a confidence level of 95% and a margin of error of 0.05. Patients who met the inclusion criteria were evaluated during home visits or hospitalizations. The inclusion criteria for the present study were patients older than 65 years who could answer the survey questions, were not fully bedridden, and were followed up by HHSs.

Measures

An 11-question sociodemographic and clinical characteristics questionnaire was developed by the researchers after reviewing the literature using a data collection form. In addition, the following scales were applied to evaluate whether the participants had geriatric syndromes:

FRAIL Scale: The FRAIL scale, developed by Morley et al. [6] in 2012, consists of 5 items. Questions are used to evaluate a patient's fatigue status, resistance, ambulation, weight loss, and illnesses. The total scale score is interpreted as follows: (0 points): not frail, (1-2 points): prefrail, and (3-5 points): frail.

Six-item Screener (SIS)

Three unrelated words are spoken, and participants are asked to repeat these words after 5 minutes. Participants are also asked about the current day, month, and year. Participants receive a total of 6 points for each correct answer. An SIS score less than 4 indicates impaired cognitive status [7].

Itaki Falls Scale

This scale has 19 items under the headings of Major Risk Factors (8) and Minor Risk Factors (11) and was created for adult patients. A total score between 0 and 4 points is considered to indicate low risk, and a score greater than 5 points is considered to indicate high risk [8].

Malnutrition Universal Screening Tool (MUST)

The MUST is a ve-step screening tool recommended by the European Society for Clinical Nutrition and Metabolism [9]. First, individuals are given scores according to their body mass index (BMI) values. Then, scores are given according to weight loss in the last 3-6 months (0 points if <5%, 1 point if 5% - 10%, and 2 points if ≥10%). Last, a score of 2 points is given if the individual has an acute illness or is likely to be food deprived for more than 5 days, and a score of 0 points is given otherwise. A total score of 0 indicates that the risk of malnutrition is low; a score of 1 indicates that the risk of malnutrition is moderate; and a score of 2 or above indicates that the risk of malnutrition is high.

Calf circumference and BMI

Calf circumference (CC), which is associated with muscle mass, was measured in this study. CC was measured at the maximum circumference using a nonelastic, exible plastic band. A CC less than 31 cm was considered an indicator of malnutrition, regardless of sex [10]. The BMI classification recommended for the geriatric population was used. Accordingly, a BMI <23 kg/m² was defined as malnutrition, a BMI of 23-27 kg/m² was defined as normal, a BMI of 27-30 kg/m² was defined as overweight, and a BMI of 30 kg/m² and above was defined as obese [11].

Barthel Index

The Barthel Index was developed by Mahoney and Barthel in 1965 and was modified by Shah et al. [12]; the Turkish version of the index was edited by Küçükdeveci et al. [13, 14]. This index consists of a total of 10 items used to rate the functions of feeding, washing, self-care, dressing, defecation control, urinary control, going to the toilet, moving from a bed to a wheelchair, walking or wheelchair dependence, and stair climbing, rated on a scale from 5-15 points. The total score ranges between 0 and 100, and the higher the score is, the more independent the patient is (0-20 points, fully dependent; 21-61 points, highly dependent; 62-90 points, moderately dependent; 91-99 points, mildly dependent; 100 points, fully independent).

Geriatric Depression Scale-Short Form

This is a 15-item scale developed by Burke et al. [15]. Participants are asked to answer 15 questions (yes or no) based on their condition in the last week. Scores of 0-4 points indicate no depressive symptoms, 5-8 points indicate mild depressive symptoms, 9-11 points indicate moderate depressive symptoms, and 12 points and above indicate severe depressive symptoms. A study of the reliability and validity of the scale in Turkey was conducted by Durmaz [15, 16].

Tinetti Balance and Gait Test

This test is a simple, easily administered test that measures a patient's balance and gait.

The test scores a patient's ability to perform specific tasks. A maximum score of 12 points is possible for the gait component, and a maximum score of 16 points is possible for the balance component. A score of 25-28 points indicates low fall risk, 19-24 points indicates moderate fall risk, and <19 points indicates high fall risk [17].

Statistical analysis

The data were analysed using the Statistical Package for the Social Sciences (IBM SPSS 25.0) program. Descriptive data are shown as the frequency, percentage, mean, standard deviation, and median. $p < 0.05$ was considered to indicate statistical significance for all analyses, and correlations were evaluated at a 95% confidence interval. The chi-square test was used to evaluate the associations between participants' fall history and FoF, sociodemographic and anthropometric characteristics, and classification according to the geriatric syndrome scale scores. The relationship of falls with age was assessed by Student's t test.

RESULTS

The mean age of the 320 participants was 81.52 ± 7.57 years, and approximately half of the participants were female. One-fifth of the patients had 4 or more chronic diseases, and 16.5% were taking 8 or more prescribed medications. Approximately half of the participants' caregivers were their children. The rate of malnutrition was 77.8%. A total of 57.2% of the participants' homes were unsuitable in terms of fall risk,

58.8% of the participants had a history of falls, and 54.4% of the participants had FoF. A total of 44.1% of the participants experienced an injury after a fall; the most common injury site was the upper extremities, accounting for 36.4% of the injuries. Among the precautions taken to reduce the risk of falls, the most commonly used method was the use of walking aids (cane, walker, etc.). Table 1 shows the sociodemographic and fall-related clinical characteristics of the patients.

TABLE 1
DISTRIBUTION OF THE SOCIODEMOGRAPHIC AND ANTHROPOMETRIC
CHARACTERISTICS AND FALL STATUS OF THE PARTICIPANTS

Age (Years) 81,52 ± 7,57 (min. 65- max. 104)			
Sex	Male	148	46.2
	Female	172	53.8
Number of chronic diseases			
	1	41	12.8
	2	105	32.8
	3	99	30.9
	≥ 4	67	20,9
Number of medicines used	0	6	1.9
(prescribed)			
	1-3	60	18,7
	4-7	201	62,9
	≥ 8	53	16,5
Use of nonprescribed medicines	Yes	125	39.1
	No	° 195	60.9
Primary caregiver	Paid caregiver	19	5,9
	Adult child	169	52.8
	Other relative	57	17,8
	Spouse/Partner	46	14,4

Neighbour		9	2.8
Lives alone		20	6,3
Body mass index (kg/m ²)	< 23 (malnourished)	249	77,8
	23-27 kg/m ² (normal)	19	5,9
	27-30 (overweight)	4	1,3
	> 30 (obese)	48	15.0
Calf circumference (cm)			
≤ 31		76	23,8
> 31		244	76,2
33,01 ± 2,95 (mín. 27-máx. 43)			
Environmental hazards in the home	Yes	183	57.2
	No	137	42,8
Fall History	Yes	188	58,8
	No	132	41.2
Fall Injury	Yes	141	44.1
	No	48	15.0
Feeling of falling when walking/standing	Yes	226	70,6
	No	94	29.4
Fear of falling	Yes	174	54.4
	No	146	45,6

Knowledge of fall risk factors	Yes	99	30,9
	No	221	69.1
Number of falls	1	69	21.6
	≥ 2	116	36.3
Body part injured by a fall	Upper limb (arm, shoulder, wrist)	51	36.4
	Hip	38	31,6
	Head/Brain	21	17,5
	Thoracic/Lumbar spine	16	13.3
	Nose	2	1.6
	Lower limb (leg, knee, ankle)	37	30.8
Precautions to reduce the risk of falls	Home modifications (Using an anti-slip rug pad, cable organizers, etc.)	98	30,6
	Lighting improvement	84	26.2
	Using low-grip furniture	39	12.1
	Using a walking aid (cane, walker, etc.)	155	48.4
	Using assistive devices such as glasses and hearing aids regularly	60	18.7
	Doing fall prevention exercises	4	1.2
	Getting help from the caregiver	2	0,6

The classification of the participants according to their scores on the scales related to geriatric syndromes is shown in Table 2. A large proportion of the participants in the study group (87.8%) were frail. According to the Barthel Index score, 58.8% of the participants were severely dependent. According to the total Tinetti Balance and Gait Test score, 78.1% of the participants had a high fall risk. A total of 29.1% of the participants were in the moderate to severe depression group.

TABLE 2
CLASSIFICATION OF THE PARTICIPANTS ACCORDING TO THE GERIATRIC SYNDROME SCALE SCORES

		Norte	%
FRAIL Scale	Nonfrail	27	8.4
	Prefrail	12	3.8
	Frail	281	87,8
Six-Item Screener	Cognitive impairment	125	39.1
	No cognitive impairment	195	60,9
Escala de riesgo de caída de Itaki	Low risk of falls	27	8.4
	High risk of falls	293	91,6
Barthel Index	Severe dependency	188	58,8
	Moderate dependency	70	21.9
	Slight dependency	38	11.9
	Independence	24	7.4
Tinetti Balance & Gait Test	High risk	250	78.1
	Moderate risk	54	16.8
	Low risk	16	5.1
Malnutrition Universal Screening Tool	Low risk	213	66,6
	Medium risk	81	25.3
	High risk	26	8.1

Geriatric Depression Scale-Short Form (GDS-SF)	Normal	97	30.3
	Mild depression	130	40,6
	Moderate depression	79	24.7
	Severe depression	14	4.4

The correlation between sociodemographic characteristics and total scores according to the participants' history of falls is shown in Table 3. There were statistically significant correlations between fall history and age, BMI, CC, the number of medications used, environmental hazards in the home, frailty status, malnutrition risk, and the Itaki Fall Risk Scale, Barthel Index, total Tinetti Balance and Gait Test, and total GDS-SF scores.

TABLE 3
CORRELATION BETWEEN SOCIODEMOGRAPHIC CHARACTERISTICS AND TOTAL SCORES ACCORDING TO PARTICIPANTS' HISTORY OF FALLS

Age (years)		82,96 ± 7.28	79,48 ± 7.52	< 0.001	
Sex	Male	85 (57,4)	63 (42,6)	0.657	
	Female	103 (59,9)	69 (40,1)		
Number of chronic diseases	< 3	85 (41,8)	61 (58,2)	0.637	
	≥ 3	101 (60,8)	65 (39,2)		
BMI (kg/m ²)	< 23 (desnutrido)	141 (56,6)	108 (43,4)	0.020	
	23-27 kg/m ² (normal)		17 (89,5)		
	27-30 (overweight)		3 (75,0)		1 (25,0)
	> 30 (obese)		27 (56,3)		21 (43,8)

Calf circumference (cm)	≤ 31	67 (88.2)		< 0,001
	> 31	121 (49.6)	123 (50,4)	
Number of medications used	0-3	29 (56,1)	37 (43,9)	0.010
	4-7	130 (64,7)	71 (35,3)	
	≥ 8	29 (54,7)	24 (45,3)	
Primary caregiver first-degree relative		124 (57,7)	91 (42,3)	0.576
*Psychotropics, Narcotics, Benzodiazepines, Neuroleptics, Anticoagulants, Narcotic Analgesics, Diuretics/Laxatives, Antidiabetics, Central Venous System Drugs (Digoxin, etc.), Blood Pressure Regulators				

Other		64 (61,0)	41 (39,0)	
Knowledge of fall risk factors	Yes	63 (36,4)	36 (63,6)	0.235
	No	125 (56,6)	96 (43,4)	
Environmental hazards in the home	Yes	26 (19,0)	111 (81,0)	< 0.001
	No	162 (88,5)	21 (11,5)	
Risky medication use in the last 1 week *	Yes	143 (60,6)	93 (39,4)	0.260
	No	26 (70,3)	11 (29,7)	

FRAIL scale	Nonfrail/Prefrail	8 (20,5)	31 (79,5)	< 0,001
	Frail	180 (64,1)	101 (35,9)	
Six-Item Screener	Cognitive impairment	78 (62,4)	47 (37,6)	0.288
	No cognitive impairment	110 (56,4)	85 (43,6)	
Itaki Fall Risk Scale	Low risk of falls	6 (19,4)	25 (80,6)	< 0,001
	High risk of falls	182 (63,0)	107 (37,0)	
Barthel Index	Severe dependency	119 (63,3)	69 (36,7)	< 0,001
	Moderate dependency	41 (58,6)	29 (41,4)	
	Slight dependency	22 (57,9)	16 (42,1)	

*Psychotropics, Narcotics, Benzodiazepines, Neuroleptics, Anticoagulants, Narcotic Analgesics, Diuretics/Laxatives, Antidiabetics, Central Venous System Drugs (Digoxin, etc.), Blood Pressure Regulators

Tinetti Balance & Gait Test (Fall risk)	Independence	6 (63,6)	18 (75,0)	0.001
	High risk	159 (63,6)	91 (36,4)	
	Moderate-low risk	29 (41,4)	41 (58,6)	

Malnutrition Universal Screening Tool (Malnutrition risk)	Low risk	105 (49,3)	108 (50.7)	< 0.001
	Medium risk	66 (81.5)	15 (18.5)	
	High risk	17 (65.4)	9 (34.6)	
Geriatric Depression Scale-Short Form (GDS-SF)	Normal or mild depresión	121 (53.3)	106 (46.7)	0.002
	Moderate-severe depresión	68 (73,1)	25 (26,9)	

* Psychotropics, Narcotics, Benzodiazepines, Neuroleptics, Anticoagulants, Narcotic Analgesics, Diuretics/Laxatives, Antidiabetics, Central Venous System Drugs (Digoxin, etc.), Blood Pressure Regulators

The correlations between sociodemographic characteristics and scale scores of the participants according to fear of falling are shown in Table 4. There were statistically significant correlations between FoF and age, CC, the number of medications used, environmental hazards in the home, and the FRAIL scale, Itaki Fall Risk Scale, Barthel Index, total Tinetti Balance and Gait Test, MUST, and total GDS-SF scores.

TABLE 4
CORRELATIONS BETWEEN PARTICIPANTS' SOCIODEMOGRAPHIC CHARACTERISTICS AND SCALE SCORES ACCORDING TO FEAR OF FALLING

Age (years)	82,56 ± 80,28 ± 7,39 - 7,61	0.007

Sex	Male	78 (52.7)	70 (47.3)	0,577
	Female	96 (55.8)	76 (44.2)	
Number of chronic diseases	< 3	77 (52.7)	69 (47.3)	0,426
	≥ 3	95 (57.2)	71 (42.8)	
BMI (kg/m2)	< 23 (malnourished)	134 (53,8)	115 (46,2)	0,329
	23-27 kg/m ² (normal)	14 (73,7)		
	27-30 (overweight)	2 (50,0)		
	> 30 (obese)	24 (50,0)	24 (50,0)	
Primary caregiver	First-degree	116 (54,0)	99 (46,0)	0,829
	Other	58 (55.2)	47 (44.8)	
Knowledge of fall risk factors	Yes	57 (57.6)	42 (42.4)	0,442
	No	117 (52.9)	104 (47.1)	

<p>Number of medications used</p> <p>0-3 24 42 (36.4) (63.6)</p> <p>4-7 121 80 (60.2) (39.8)</p> <p>≥ 8 29 24 (54.7) (45.3)</p>	0.003
<p>Calf circumference (cm)</p> <p>≤ 31 63 13 (82,9) (17,1)</p> <p>> 31 111 133 (45,5) (54,5)</p>	<0.001
<p>Environmental hazards in the home</p> <p>Yes 141 42 (77,0) (23,0)</p> <p>No 33 104 (24,1) (75,9)</p>	<0.001
<p>FRAIL scale</p> <p>Nonfrail or Prefrail 17 32 (17,9) (82,1)</p> <p>Frail 167 114 (59,4) (40,6)</p>	<0.001
<p>Six-Item Screener</p> <p>Cognitive impairment 74 51 (59,2)(40,8)</p> <p>No cognitive impairment 100 95 (51,3) (48,7)</p>	0.165

Itaki Fall Risk Scale			<0.001
Low risk of falls	2 (7,4)	25 (92,6)	
High risk of falls	172 (58,7)	121 (41,3)	
Índice de Barthel			<0.001
Severe dependency	115 (61,2)	73 (38,8)	
Moderate dependency	39 (55,7)	31 (44,3)	
Slight dependency	16 (42,1)	22 (57,9)	
Independence	4 (16,7)	20 (83,3)	
Tinetti Balance & Gait Test (Fall risk)			0.006
High risk	146 (58,4)	104 (41,6)	
Moderate-Low risk	28 (40,0)	42 (60,0)	

Malnutrition Universal Screening Tool (Malnutrition risk)			< 0.001
Low Risk	95 (44.6)	118 (55.4)	
Medium risk	61 (75,3)	20 (24,7)	
High risk	8 (30,8)	18 (69.2)	
Geriatric Depression Scale-Short Form			<0.001
Normal or mild depression	106 (46.7)	121 (53.3)	
Moderate-severe depression	68 (73,1)	25 (26,9)	

DISCUSSION

Fall history and FoF are significant determinants of the general health status of older individuals. Fall history is significantly associated with being homebound [18]. In this study, the incidence of falls was 58.8%, which is generally greater than that reported in the studies by Manis et al. [19] (48%), Gonçalves et al. [20] (32.7%), and Caner and Avci [21] (56.3%). This difference in the incidence of falls can be explained by the older average age of the participants in the present study. Additionally, all participants were followed up by HHSs.

In our study, there was no statistically

significant difference in the incidence of falls or FoF according to sex, but there was a significant difference in age and the incidence of falls. The mean age of our study participants was 82 years, and the mean age of participants with a history of falls and FoF was greater than that of participants without a history of falls and FoF; these data are consistent with the findings of previous studies [22–24]. There are various results in the literature regarding the relationship between sex and falls. For example, a study including people older than 65 years showed a statistically significant association between falls and female sex and older age [25]. For both sexes, it would be appropriate to follow

up older adults at risk of falls more closely. BMI is a tool used in clinical practice to assess the nutritional status of adults. It is recommended that the BMI overweight cutoff be higher in older individuals. In this study, 77.1% of the participants were found to be malnourished according to BMI, and 33.4% were found to be at moderate or high risk of malnutrition according to the MUST. A statistically significant relationship was found between BMI and malnutrition risk and between BMI and fall history. This result is in line with the results of previous studies [26–28]. Conditions that cause malnutrition, such as sarcopenia, electrolyte disorders, and loss of immune function, may directly or indirectly cause falls. Although studies have not shown a significant relationship between BMI and fall history and between BMI and FoF, proper nutrition, regular follow-up, and rehabilitation measures are necessary to prevent falls [29].

CC is a potentially simple and valuable screening tool for sarcopenia that may improve diagnostic accuracy when used in combination with other parameters [30]. A CC less than 31 cm is considered an indicator of sarcopenia and malnutrition, and some studies have shown a significant correlation between fall history and low CC [31, 32]. Badrasawi et al. [24] reported a significant relationship between FoF and CC in women. Consistent with the literature, in this study, patients with a CC of 31 cm or less had a significantly greater risk of having a history of falls and FoF. Muscle weakness can also cause balance and gait problems, increasing the risk of falls.

Polypharmacy is expected to persist in the geriatric population because disease incidence increases with age. Many studies support these findings [33–35]. In this study, 80% of the participants used four or more medications. A statistically significant correlation was found among the number of medications used, history of falls, and FoF. Since the number of medications used indicates a person's chronic and acute diseases and symptoms, it can be related to their fall history. However, some studies did

not find a relationship among these variables [33, 36]. A Brazilian study showed that people with no history of falls were more likely to take medication than were those with a history of recurrent falls [22]. These data can be explained by the fact that patients who remain undiagnosed and untreated or who have medication nonadherence are more prone to falls.

Extrinsic factors such as a high number of steps, slippery surfaces, obstacles, incorrect footwear, and poor lighting create an unsafe home environment. A study including participants with a mean age of 70.46 years showed a statistically significant relationship among home safety status, the frequency of falls, and FoF [37]. In a study in which an occupational therapy program implemented a specific hazard elimination plan in the homes of people older than 65 years, there was a 38% reduction in the rate of falls in the intervention group compared to the control group [38]. However, some studies have shown that home assessment and modification do not reduce the number of falls [39]. This study revealed that more than half of the participants had environmental hazards in their homes, and a history of falls and FoF were significantly associated with an unsafe home. These data support the need for domestic arrangements regarding modifiable fall risk factors. People should be made aware of this issue by professional staff who recommend in-home modifications that are easy to implement, inexpensive, teachable, and permanent.

Frailty is a multisystem condition that leads to a decreased physiological reserve and an increased sensitivity to stressors.

Our study showed a statistically significant association between frailty and fall history and between frailty and FoF. These data are consistent with the results of previous studies [22, 40–42]. However, no significant relationship was found between fall history and frailty in the study by Cakır et al. [43]. The use of different frailty scales may explain this difference. In general, FoF is present in the prefrail and frail older populations. Screening

for this fear during comprehensive geriatric assessments is necessary [37].

Many tools used in clinical practice have been developed to determine the risk of falls. The Itaki Fall Risk Scale, one of these tools, was used in our study. According to this scale, 91.6% of the participants were found to be at high risk of falls. A statistically significant correlation was found among the Itaki score, fall history, and FoF. This result is consistent with studies conducted with similar age groups [23, 44, 45]. Karahan et al. [46] found no significant correlation between the Itaki Fall Risk Scale score and fall history ($p=0.090$). Fall risk assessment tools provide insight for clinicians, but falls are likely to depend on many factors. Fall screening should not be performed with a single scale but rather by considering multiple parameters [47].

Assessment of activities of daily living (ADL) is a necessary part of clinical management. The Barthel Index is a valuable tool for classifying and quantifying impairment in ADLs. In this study, 58.8% of the participants were found to be severely dependent on others. There was a statistically significant correlation between severe dependence on others to perform ADLs, assessed according to the Barthel Index score, and having a history of falls and FoF. These data support other studies in the literature [22, 25, 33, 45]. The Barthel Index, which considers ten different items in daily life, is suitable for screening people for falls because it provides essential data on a person's general health status.

The Tinetti balance and Gait Test is used in the clinic to evaluate the visual, somatosensory, and vestibular systems. In this study, for the Tinetti Balance and Gait Test, the participants scored an average of 9 points on the balance test and 5 points on the gait test. Consistent with the literature, a significant association was found between a history of falls and FoF and being at high risk according to the total Tinetti Balance and Gait Test score [48, 49]. The fact that ageing affects sensorimotor reflexes and causes deficits in postural control explains this result [50].

Depression is a geriatric syndrome. In our study, an average of 30% of the participants had moderate-high depression according to the GDS score. A history of falls and FoF were statistically significant in patients with moderate-high depression. These data support the literature [36, 51]. In the study by Çevik et al. [29], having depression increased the risk of falling by 2.22 times. Depression can present as atypical symptoms in older people, such as physical fatigue, absent-mindedness, and eating and sleeping problems, which may lead to falls. Physical activity programs that improve walking and increase confidence levels to prevent falls during ADLs can help individuals avoid developing FoF and depressive symptoms.

In this study, there were no significant correlations between risky drug use, the number of chronic diseases, or cognitive impairment and a history of falls or FoF. Although there are studies with similar data, there are no clear conclusions [33, 52]. Studies using the Mini-Mental Test to assess cognitive impairment have shown a significant correlation among cognitive impairment, a history of falls, and FoF [53, 54]. The use of the less comprehensive SIS to assess cognitive status in this study may have caused this difference. Regarding risky medication use, there are contradictions, such as the presence of untreated depression and antidepressant use, contributing to the risk of falls [55]. Nevertheless, as in all age groups, the evaluation of medication use, chronic disease status, and cognitive status is essential in geriatric assessments.

Unlike other studies, this study is unique because it was conducted among participants with a high average age and used a wide range of parameters and scales that evaluate falls in multiple dimensions.

LIMITATIONS

The findings of this study may be limited to people of a specific age group in a particular region or health service area. This may limit

the generalizability of the findings to the general population. Some data, such as data on the history of falls, were based on participants' recollections of past events. This may have led to recall errors or incomplete information.

CONCLUSIONS

In the present study, the incidence of falls was high, and falls were associated with general health status, age, and nutritional status. In addition, using a single scale is not appropriate for determining the risk of falls, and many parameters should be considered in screenings. Among the parameters used, anthropometric indices such as BMI and CC were found to be necessary. Nutritional status, especially malnutrition status and malnutrition risk, was significantly associated with a history of falls. This result emphasizes that proper nutrition and a good nutritional status are essential factors in fall prevention strategies. The importance of home safety and regulations was also evident in our study. Unsafe home environments increase the risk of falls and are associated with a history of falls. Therefore, improving safety in the home is an essential component of fall prevention programs. The findings of this study provide vital information for identifying individuals at risk of falls and developing prevention strategies for geriatric individuals. Furthermore, this study provides a basis for future research and the development of fall prevention policies.

ABBREVIATIONS

BMI
Body mass index
CC
Calf circumference
FoF
Fear of Falling
GDS-SF
Geriatric Depression Scale-Short Form
HHS
Home Healthcare Service
MUST
Malnutrition Universal Screening Tool
SIS
Six Item Screener

DECLARATIONS

Ethics approval and consent to participate

This study was conducted in accordance with the guidelines of the Declaration of Helsinki. Ethics committee approval was obtained from the Local Clinical Research Ethics Committee on 18.10.2023 (decision number 2023/184). Informed consent was obtained from all participants.

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analysed during the present study are available from the corresponding author upon reasonable request.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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