Evaluation of falling risk and quality of life in the elderly

Yaşlılarda düşme riski ve yaşam kalitesinin değerlendirilmesi

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Abstract

Aim: The aim of this study is to determine the risk of falling, which is one of the conditions that threaten the health of the elderly, and to evaluate its relationship with quality of life.

Methods: A cross-sectional study was conducted in a province located in the west of Türkiye between September and November 2022. The questionnaire was conducted face-to-face in family health centers after obtaining informed consent from the participants. In this study, a questionnaire including sociodemographic characteristics, features related to falls, the fall risk for the older in the community (FROP-Com) screening scale, and the EQ-5D quality of life scale was used.

Results: The study was completed with 413 participants. The prevalence of falls within the last year in the study group was 21.1%. According to FROP-Com screen; 8.0% of the participants had a low fall risk and 92.0% had a high fall risk. The median EQ-5D index score was 0.7 (minimum=-0.2; maximum=1.0). FROP-Com fall risk was accepted as the dependent variable, the risk of falling; It was found that it increased 2.5 times in those who did not exercise, 5.1 times in those who did have balance problems, and 3.6 times in those who used assistive devices compared to those who did not.

Conclusion: In the Central District of Kütahya, one out of every five people over the age of 65 had a history of falling within the last year. In the study, it is remarkable that there is a relationship between exercise status and the risk of falling. Falls can be prevented or reduced by increasing exercise status.

Keywords: Accidental falls; aged; quality of life

Öz

Amaç: Bu çalışmanın amacı, yaşlıların sağlığını tehdit eden durumlardan biri olan düşme riskini belirlemek ve yaşam kalitesi ile ilişkisini değerlendirmektir.

Yöntemler: Çalışma, Türkiye'nin batısında yer alan bir ilde Eylül-Kasım 2022 tarihleri arasında yürütülen kesitsel bir çalışmadır. Anket, katılımcıların bilgilendirilmiş onamları alındıktan sonra aile sağlığı merkezlerinde yüz yüze uygulandı. Anket formu; sosyodemografik özellikler, düşmeye ilişkin özellikler, toplumdaki yaşlılarda düşme riski (FROP-Com) tarama ölçeği ve EQ-5D yaşam kalitesi ölçeğini içermekte idi.

Bulgular: Araştırma 413 katılımcıyla tamamlandı. Çalışma grubunda son bir yılda düşme görülme sıklığı %21,1 idi. FROP-Com taramasına göre; katılımcıların %8,0'ı yüksek düşme riskine, %92,0'ı düşük düşme riskine sahipti. EQ-5D indeks puan ortancası 0,7 (minimum=-0.2; maksimum=1.0) idi. FROP-Com düşme riski bağımlı değişken olarak kabul edildiğinde, düşme riski; egzersiz yapmayanlarda 2,5 kat, denge sorunu olanlarda 5,1 kat, yardımcı cihaz kullananlarda ise kullanmayanlara göre 3,6 kat arttığı belirlendi.

Sonuç: Kütahya'nın Merkez ilçesinde 65 yaş üstü her beş kişiden birinde son bir yıl içinde düşme öyküsü vardı. Çalışmada, egzersiz durumu ile düşme arasındaki ilişki dikkat çekmektedir. Egzersiz durumunun artırılması ile düşmeler önlenebilecek ya da azaltılabilecektir.

Anahtar Sözcükler: Düşme; yaşam kalitesi; yaşlılık

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INTRODUCTION

Falls are the second leading cause of unintentional injury death worldwide, and they are a major public health concern (1). Adults over the age of 60 have the highest number of fatal falls. Approximately one-third of the elderly worldwide fall, and an estimated 684,000 people die from falls each year, with over 80% of these deaths occurring in low- and middle-income countries (2,3). Declines in fertility and mortality in recent years have increased life expectancy at birth, and the world's elderly population is growing. In 2019, the elderly population will comprise about 1 billion people and is projected to increase to 1.4 billion in 2030 and 2.1 billion in 2050 (4). In Türkiye, it is seen that the population aged 65 and over, which is considered the elderly population, increased from 8.3% (6.5 million people) in 2016 to 9.7% (8.2 million people) in 2021 (5).

The incidence of falls is an important health problem among the elderly due to its physical, psychological, and social consequences, as well as being a preventable problem. Therefore, it is very important to identify the risk factors associated with falls in the elderly and to develop different algorithms to prevent falls, improve quality of life and reduce healthcare costs (6).

Although the causes and risk factors for falls in the elderly differ according to studies, many risk factors for falls have been defined. Environmental factors (loose carpets, slippery bathtubs, poor lighting, unsafe stairs, unsuitable shoes), medications (antidepressants, sedatives, and hypnotics), medical conditions and changes associated with aging (poor vision, cognitive impairment), nutrition (calcium, which can be classified into five categories as vitamin D deficiency), and exercise deficiency are all factors that contribute to falls (7). As the number of these risk factors increases, so does the risk of falling (6). As well as physical injury, the psychological consequences, such as the fear associated with falling, can be equally harmful to the individual in the long term. It can lead to the need for care, loss of self-confidence, limitation of daily activities, isolation from society, and loss of independence, all of which have a significant impact on a person's quality of life (8).

According to the World Health Organization (WHO), the main goal of health care, in addition to increasing life expectancy, is to "add life to years", recognizing the importance of high quality of life for people (8). The fact that the elderly spend their years with the least health problems, with preventive measures, with activities that increase their physical and cognitive capacity, and with a positive outlook on life is defined as healthy aging. "Healthy elderly" are defined as those who, on average, have little or no functional decline for their age group (9). There are variations and different classifications in the scales used in the assessment of quality of life. The most commonly used scales to evaluate general health status are the Short Form SF-36, EQ-5D, and World Health Organization Quality of Life-Brief Form (WHOQOL-BREF) scales (10).

Old age is a period in which the physical abilities of the individual decrease, the individual's dependence on others increases, and the quality of life is negatively affected. As age progresses, cognitive deterioration increases, and in parallel with this destruction, the daily activities and quality of life of the elderly are negatively affected. The risk and fear of falling are important health problems that cause loss of independence in daily living activities for the elderly and negatively affect their quality of life (11).

The aim of this study is to determine the risk of falling, which is one of the conditions that threaten the health of the elderly, and to evaluate its relationship with quality of life.

MATERIAL AND METHODS

A cross-sectional study was conducted in a province located in the west of Türkiye between September and November 2022. The study population consisted of 38817 people over 65 years of age in the central district of Kütahya. The sample size was calculated as 381 individuals with a confidence level of 95%, a prevalence of 50% (for unknown cases), and a margin of error of 5%. The study was conducted in six randomly selected family health centers (22 of the 84 Family Medicine Units in the central district are located in selected Family Health Centers) in the central district of Kütahya among people over 65 years of age who were registered with the relevant family medicine units (10542

Table 1. Relationship between falling status in the last year and sociodemographic characteristics

	Total (n)	Fall status		Statistical analysis*	Fall risk (FROP-Com)		Statistical analysis*
		None (n(%))	Yes (n(%))	X^2; p	Low risk (n(%))	High risk (n(%))	X^2; p
Gender							
Man	200	162 (81,0)	38 (19,0)	0,995; 0,319	184 (92,0)	16 (8)	0,000; 1,000
Woman	213	164 (77,0)	49 (23,0)		196 (92,1)	17 (7,9)	
Age							
65-74	299	244 (81,6)	55 (18,4)	5,642; 0,060	283 (94,6)	16 (5,3)	17,020; ***<0,001***
75-84	98	72 (73,5)	26 (26,5)		86 (87,8)	12 (12,2)	
85 and over	16	10 (62,5)	6 (37,5)		11 (68,8)	5 (31,2)	
Marital status							
Not married	104	81 (77,9)	23 (22,1)	0,092; 0,761	92 (88,5)	12 (11,5)	1,779; 0,182
Married	309	245 (79,3)	64 (20,7)		288 (93,2)	21 (6,8)	
Education status							
Primary school and less	224	175 (78,1)	49 (21,9)	0,193; 0,660	206 (92,0)	18 (8)	0,000; 1,000
Middle school and above	189	151 (79,9)	38 (20,1)		174 (92,1)	15 (7,9)	
Income status							
Income more than expenses	70	55 (78,6)	15 (21,4)	0,394; 0,821	64 (91,4)	6 (8,6)	0,080; 0,961
Income equal to expenses	272	213 (78,3)	59 (21,7)		251 (92,3)	21 (7,7)	
Income less than expenses	71	58 (81,7)	13 (18,3)		65 (91,5)	6 (8,5)	
Personal daily care							
Can't	21	9 (42,9)	12 (57,1)	17,319; ***<0,001***	13 (61,9)	8 (38,1)	27,275; ***<0,001***
Can	392	317 (80,9)	75 (19,1)		367 (93,6)	25 (6,4)	
Exercise status							
Do not	159	116 (73,0)	43 (27,0)	5,558; ***0,018***	134 (84,3)	25 (15,7)	19,353; ***<0,001***
Do	254	210 (82,7)	44 (17,3)		246 (96,9)	8 (3,1)	
Sleep status							
Irregular	137	96 (70,1)	41 (29,9)	9,682; ***0,002***	118 (86,1)	19 (13,9)	8,476; ***0,004***
Regular	276	230 (83,3)	46 (16,7)		262 (94,9)	14 (5,1)	
Walking problem							
Yes	177	122 (68,9)	55 (31,1)	18,658; ***<0,001***	148 (83,6)	29 (16,4)	27,721; ***<0,001***
No	236	204 (86,4)	32 (13,6)		232 (98,3)	4 (1,7)	
Balance problem							
Yes	123	79 (64,2)	44 (35,8)	22,786; ***<0,001***	97 (78,9)	26 (21,1)	38,681; ***<0,001***
No	290	247 (85,2)	43 (14,8)		283 (97,6)	7 (2,4)	
Use of assistive devices							
None	251	218 (86,9)	33 (13,1)	24,127; ***<0,001***	245 (97,6)	6 (2,4)	25,387; ***<0,001***
Yes	162	108 (66,7)	54 (33,3)		135 (83,3)	27 (16,7)	
Fall risk (FROP-Com)							
Low risk	380	324 (85,3)	56 (14,7)	114,548; ***<0,001***			
High risk	33	2 (6,1)	31 (93,9)				

FROP-Com: Fall Risk for Older People in the Community, n: Number, %: Percentage, *X2: Chi-square test

individuals). Individuals aged 65 and older who applied to the relevant Family Health Center and agreed to participate in the study were included. Participants who did not agree to participate and those who provided incomplete or incorrect information during the survey interview were excluded from the study. The data of the study were obtained by face-to-face interview method by the researchers after obtaining the informed consent of the participants with a questionnaire form including sociodemographic characteristics, fall risk factors, fall status in the last year, personal characteristics, Fall Risk Screening Scale for the Elderly in the Community and EQ-5D General Quality of Life Scale prepared by the researchers based on the literature.

The study was approved by the Ethics Committee of Kütahya Health Sciences University Non-Interventional Clinical Research Ethics Committee (date: 17.08.2022, decision no: 2022/08-18).

In the post-hoc power analysis, since the fall prevalence was found to be 21.1% in a study with 413 participants, the power of the study was determined to be 99.9%.

Table 2. Relationship between EQ-5D index score and sociodemographic characteristics

		EQ5D Index score Median (min-max)	Statistical analysis*	
			MWU/KWT	p
Gender				
	Man	0,7641 (-0,0748 - 1)	-5,138	***<0,001***
	Woman	0,6607 (-0,1584 - 1)		
Age				
	65-74[a]	0,7444 (-0,1584 - 1)	26,734	***<0,001****
	75-84[b]	0,6589 (-0,0748 - 1)		
	85 and over[c]	0,4728 (0,0194 - 1)		
Marital status				
	Not married	0,61275 (-0,1584 - 1)	-5,789	***<0,001***
	Married	0,7444 (-0,0748 - 1)		
Education status				
	Primary school and less	0,6699 (-0,1584 - 1)	-3,655	***<0,001***
	Middle school and above	0,7641 (-0,0748 - 1)		
Income status				
	Income more than expenses	0,6897 (-0,0748 - 1)	4,365	0,113
	Income equal to expenses	0,7234 (-0,0013 - 1)		
	Income less than expenses	0,6607 (-0,1584 - 1)		
Personal daily care				
	Can't	0,4728 (-0,1584 - 1)	-4,509	***<0,001***
	Can	0,6897 (-0,0013 - 1)		
Exercise status				
	Do not	0,6392 (-0,1584 - 1)	-5,760	***<0,001***
	Do	0,7444 (0,1031 - 1)		
Sleep status				
	Irregular	0,607 (-0,1584 - 1)	-5,665	***<0,001***
	Regular	0,7444 (-0,0013 - 1)		
Walking problem				
	Yes	0,5863 (-0,1584 - 1)	-8,396	***<0,001***
	No	0,7641 (-0,0013 - 1)		
Balance problem				
	Yes	0,5863 (-0,1584 - 1)	-6,402	***<0,001***
	No	0,7444 (-0,0013 - 1)		
Use of assistive devices				
	None	0,7641 (-0,1584 - 1)	-6,903	***<0,001***
	Yes	0,5863 (-0,0748 - 1)		
Falling status in the last one year				
	None	0,7444 (-0,0748 - 1)	-4,548	***<0,001***
	Yes	0,6299 (-0,1584 - 1)		
Falling risk				
	Low risk	0,7333 (-0,0748 - 1)	-5,562	***<0,001***
	High risk	0,5762 (-0,1584- ,7733)		

*MWU: Mann-Whitnet U test, KWT: Kruskal Wallis test; ** Significance arises between groups a-b and a-c, min: Minimum, max: Maximum, a: 65-74 age group, b: 75-84 age group, c: 85 and over age group

Falls Risk for Older People in the Community (FROP-Com) Screen Scale

The score was obtained from the FROP-Com screen scale, which consists of 3 questions (fall history, activities of daily living, balance) and was developed by Russell et al., (12). The answer to each question is scored between 0 and 3, the minimum score from the scale is 0 and the maximum score is 9. On the scale, 0–3 points are considered low risk, and 4–9 points are considered high risk. The necessary permission to use the scale in Türkiye was obtained from the researcher who developed the scale. There is no Turkish validity and reliability study for the FROP-Com screening tool. Permission to use the scale was obtained from the author who developed it. The comprehensibility, validity and reliability of the scale questions were tested in a group of ten people (Cronbach's alpha = 0.790). In the data of our study, the reliability of the FROP-Com screen was 0.740.

Table 3. Multiple logistic regression analysis of some personal characteristics with fall risk

Risk Group		Odds Ratio	95% C.I. for OR		p
			Lower	Upper	
Age	65-74	1			
	75-84	1,079	0,430	2,708	0,871
	85 and over	1,824	0,428	7,770	0,416
Personal daily care	Can't	1			
	Can	3,000	0,921	9,773	0,068
Exercise status	Do	1			
	Do not	2,532	1,010	6,346	***0,047***
Sleep status	Regular	1			
	Irregular	1,233	0,524	2,904	0,631
Walking problem	No	1			
	Yes	2,881	0,884	9,390	0,079
Balance problem	No	1			
	Yes	5,119	1,990	13,165	***0,001***
Use of assistive devices	None	1			
	Yes	3,596	1,290	10,020	***0,014***

C.I. for OR: Confidence Interval for Odds ratio, p: p value

Table 4. Correlation relationship between EQ-5D index and FROP-Com Score and some variables

		EQ5D Index	FROP-Com Score
Age	r	-0,273	0,269
	p	***<0,001***	***<0,001***
Education status	r	,221	-0,108
	p	***<0,001***	***0,028***
Income status	r	-0,075	0,019
	p	0,127	0,693
Falling status in the last one year	r	-0,442	0,840
	p	***<0,001***	***<0,001***
Current health score	r	0,417	-0,299
	p	***<0,001***	***<0,001***
EQ5D Index score	r	1,000	-0,464
	p	-	***<0,001***
FROP-Com score	r	-0,464	1,000
	p	***<0,001***	-

FROP-Com: Fall Risk for Older People in the Community

EQ-5D General Quality of Life Scale

The scale, which consists of five dimensions: movement, self-care, usual activities, pain or discomfort, and anxiety or depression, was developed by the European Quality of Lİfe (Euro-Qol) in 1987 (13). Responses to each dimension have three options as 'no problem', 'some problem' and 'important problem' and the scale describes 243 (3^5) possible different outcomes. The 5 dimensions of the scale are used to calculate an index score ranging from -0.59 to 1. A score of 0 indicates death, a score of 1 indicates perfect health, and negative scores indicate conditions such as unconsciousness and being bedridden. The Turkish validity and reliability of the scale was conducted by Kahyaoğlu Süt (14).

Statistical analyses

The data of the study were evaluated with the Jamovi statistical package program version 2.2.5. Descriptive data were presented as number, percentage, median, minimum, and maximum values. Pearson chi-square test (Yates correction and Fisher's chi-square test when necessary) was used to compare categorical variables. Mann-Whitney U Test and Kruskal-Wallis test were used to compare groups with continuous variables that did not fit the normal distribution. In univariate analyses examining the relationship between the risk of falls and independent variables, a multiple logistic regression model was created with independent variables with $p<0.1$ values. The correlation between variables was examined using Spearman correlation test. For statistical significance level of $p<0.05$ was accepted.

RESULTS

The study was completed with 413 participants, 200 (48.4%) men and 213 (51.6%) women. The mean age of the participants was 71.5±6.1 (min=65, max=93), and 72.4% (n=299) were in the 65–74 age range, 23.7% (n=98) were 75–84, and 3.9% (n=16) were 85 and over. 74.8% (n=309) of the participants were married; 54.2% (n=224) had a primary school education or less; and 65.9% (n=272) had income equal to their expenses (Table 1).

The prevalence of falls within the last year in the study group was 21.1% (n = 87). Among the participants, those who could not do their personal daily care (p<0.001), those who did not exercise (p=0.018), those with irregular sleep status (p=0.002), those with walking and balance problems (p<0.001), and those who used assistive devices (p<0.001), those with a high risk of falling FROP-Com (p<0.001) The rate of falling in the last year was higher. There was no relationship between the falling status in the last year and the variables of gender, age group, marital status, education level, and income status (p>0.05).

FROP-Com is higher in those with a high age group (p<0.001), those who cannot do their personal daily care (p<0.001), those who do not exercise (p<0.001), those with irregular sleep status (p=0.004), those who have walking and balance problems (p<0.001), those who used assistive devices (p<0.001), and those who had a fall in the last year (p<0.001) (Table 1).

When the quality of life of the participants was evaluated, the median EQ-5D index score was 0.7 (min=-0.2; max=1.0). The EQ-5D quality of life index score was found to be significantly lower in those who have female gender (p<0.001), those who are in the high age group (p<0.001), those who are not married (p<0.001), those who have a primary school and below education level (p<0.001), those who cannot do personal daily care (p<0.001), those who do not exercise (p<0.001), those who have irregular sleep status (p<0.001), those who have walking and balance problems (p<0.001), those who use assistive devices (p<0.001), those who had a fall in the last year (p<0.001) and in those with a high FROP-Com risk of falling (p<0.001) (Table 2).

FROP-Com fall risk was accepted as the dependent variable, the risk of falling; It was found that it increased 2.5 times (p=0.047) in those who did not exercise, 5.1 times (p=0.001) in those who did not have balance problems, and 3.6 times (p=0.014) in those who used assistive devices compared to those who did not (Table 3). The correlation between the participants' EQ-5D index values and FROP-Com scores with some variables is presented in Table 4.

DISCUSSION AND CONCLUSION

It is known that falls, which are an important health problem for the elderly in society, have a negative impact on quality of life. Determining the risk of falling and the prevalence of falls is considered to be crucial for the proper implementation of protective measures (15,16). In this study, which examined falls, which are both an important health problem and reduced quality of life due to various consequences, approximately two in ten participants had a history of falling within the last year, while 8% of participants were found to be at high risk of falling. Furthermore, those who had a history of falling in the previous year had a lower quality of life than those who had not, and those with a high risk of falling had a lower quality of life than those with a low risk of falling.

The prevalence of falls within the last year was found to be 21.1%. A review of the literature shows that the prevalence of falls in the elderly ranges from 18% to 60.3% (9,17–19). This wide range may be due to the place, time, and socio-cultural structure of the society. In addition, because our study asked retrospectively about falls within the previous year, the prevalence may have been lower due to reasons such as recall and not taking falls seriously.

In our study, although the risk of falling and having fallen in the last year increased with age, only the relationship between the risk of falling and age was found to be statistically significant. Some studies show that being older increases the risk of falling (3,17,20). No relationship was found between gender, marital status, education, income status, and the risk of falling or falling status. Similar to our study, no relationship was found between gender and marital status and the risk of falling in one study (6). In the study of Wu and Ouyang, the risk of falling has been reported to be higher in women, married people, and those with physical

dysfunction (18). In another study conducted in China, it was shown that the risk of falling is higher in women and those living alone (19). It can be thought that these differences in the relationship between fall risk and sociodemographic variables may be due to the structure of the society or the characteristics of the place and time of the study.

The risk of falling was found to be 2.5 times higher in those who did not exercise, 5.1 times higher in those with balance problems, and 3.6 times higher in those who used assistive devices. There are studies reporting that the risk of falling is high in people with low physical activity and walking problems (17,19,21). An Indian study of individuals aged 60 to 95 years, found that those with balance problems were 3.1 times more likely to fall than those who used assistive devices (22). It has been reported that deterioration of balance, which is one of the most important reactive elements in preventing falls, can lead to increased injury, disability and falls, and reduced quality of life (23). Considering that individuals with an increased risk of falling and with walking and balance problems use assistive devices, it is not unexpected that more falls will be observed in the population using assistive devices, although their purpose is to prevent falls.

Some studies that have looked at aging and quality of life have found that the elderly have a moderate quality of life (24,25). In our study, the elderly people included in the study were found to have a low quality of life. The findings in these studies are similar to the findings in our study in terms of the relationship between falls and quality of life (24). This is an expected situation because of the old age period; it is a period in which factors such as physical and social regression and chronic diseases are experienced more common (26,27). It should also be noted that the results may vary depending on the diversity of quality of life scales and differences in scoring. According to our study, the quality of life of the elderly is lower in older age, in women, in the elderly with low education, in the unmarried, and in those who do not exercise. Studies examining quality of life in the elderly support the findings of our study (28). In addition to sociodemographic characteristics, other factors also affect quality of life. Although the relationship between health status and quality of life is important at all ages, it is said to be more pronounced with age (26,28). In our study, in addition to the sociodemographic characteristics that affect the quality of life of the elderly, it was determined that some health conditions and functional levels also reduced the quality of life. Among them are irregular sleep, walking problems, balance problems, and the use of assistive devices. According to these findings, as the health and functionality of the elderly decrease, their quality of life also decreases.

Other factors affecting the quality of life are the risk of falling and the fact that the elderly has fallen in the last year. Studies investigating the relationship between falling and quality of life in the elderly have found significant relationships between the falling status of individuals and their quality of life (15,16). The findings of our study are similar to the findings of these studies in the literature. In particular, the quality of life was found to be significantly lower in the elderly with a high risk of falling than in the elderly with a low risk. According to our study, the high risk of falling affects the quality of life of the elderly more than experiencing a fall. The fact that the risk of falling is high may decrease the quality of life since the elderly experience constant anxiety, which decreases their functionality and limits their social participation and activities of daily living. From this point of view, reducing the fall risk of the elderly can increase both the number of falls and the quality of life by reducing the perception of a lower risk of falling. Therefore, this finding suggests that it is particularly important to determine the risk of falling and the factors that increase the risk of falling.

Among the limitations of the study are the ignoring of the effect on the prevalence of falls, since those who lost their lives due to falls could not be determined and the fact that the elderly, who could not apply to a health institution, could not be reached because the study was carried out in family health centers.

In conclusion, the prevalence of falls within the last year was found to be 21.1%. The risk of falling was discovered to be 5.1 times higher in those with balance issues, and 3.6 times higher in those who used assistive devices. Quality of life was affected by many sociodemographic and personal characteristics. The quality of life decreased as the age increased, the educational status decreased, and the risk of falling increased in those with a history of falling.

Considering that the world population has an increasing proportion of elderly people, it is extremely important to prevent falls, which are an important cause of morbidity and mortality in this population. It is important for local governments to create protective environments to prevent falls in the elderly. Although some findings in this study indicate that exercise status may be related to the risk of falling, further research is needed to determine the causality of this relationship. Nevertheless, we believe that increasing exercise status can prevent or reduce falls. Falls can be prevented or reduced by increasing exercise status. Researchers recommend that policymakers focus on the importance of exercise in the elderly. It should be taken into account that every attempt to reduce the risk of falling will not only reduce the health problems caused by falls in the elderly but also increase the quality of their lives.

Conflict-of-interest and financial disclosure

The authors declare that they have no conflict of interest to disclose. The authors also declare that they did not receive any financial support for the study.

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