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Fear of falling and its related factors in older adults following a fall in Kashan, Iran (2023–2024)

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Abstract

Background Falling is a significant challenge in old age, often leading to isolation, self-imposed limitation, reduced movement, and muscle strength. This study aimed to explore the fear of falling and its related factors in older adults following a fall in Kashan, Iran.

Methods This cross-sectional study followed 200 older adults who visited medical centers in Kashan from July 2023 to May 2024. Continuous sampling was carried out. Data collection involved a background information questionnaire, the shortened version of the falls efficacy scale-international in older adults, the independence scale of activities of daily living, and the short-form state-trait anxiety inventory. Data were gathered before, one month, and three months after the fall. Data analysis utilized SPSS-24, including t-test, ANOVA, Pearson's correlation coefficient, and repeated measures analysis of variance.

Results Participants had a mean age of 71.34 ± 8.36 years (ranging from 65 to 96 years). There was a significant increase in fear of falling scores one month and three months after the fall ($P < 0.001$). Multiple linear regression revealed that factors such as illiteracy, old age, and previous falls were predictors of fear of falling before the fall ($P < 0.05$). One month after the fall, predictors included illiteracy, hip fracture, and high anxiety scores ($P < 0.05$). Three months after the fall, predictors encompassed illiteracy, hip fracture, high anxiety score, and internal fixator placement as a treatment intervention ($P < 0.05$), explaining 15% of the variance in fear of falling.

Conclusions Identifying predictive factors for fear of falling can assist health policymakers in developing a holistic care plan to enhance the quality of life for older adults post-fall. It is essential to screen for fear of falling levels, particularly after trauma, offer educational counseling services, particularly in mental health, after discharge, and prepare training programs related to fall prevention.

Keywords Accidental falls, Aged, Fear

Background

In recent years, the world's population is aging faster. According to the World Health Organization, individuals over 60 will constitute 22% of the population by 2050, a notable increase from the 12% recorded in 2015 [1]. The countries of the Middle East region and the Asian region have faced significant changes in terms of the number of older adults [2]. In Iran, over 7 million people are older adults, posing a major global challenge [2]. Aging brings about changes in the body, including a decrease in

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skeletal muscle mass. This decline in muscles is a common effect of aging. In addition to musculoskeletal problems, older adults often experience sensory impairments and balance problems, increasing their risk of falls [4].

Falls can pose a significant challenge for older adults [5], causing both physical and psychological harm [6]. Global statistics show fall rates ranging from 34% to 66 [6]. These incidents can result in organ fractures, brain injuries, reduced independence, limited activity, decreased quality of life, and even death [7, 8]. Recovery from injuries is often incomplete, resulting in substantial costs for older adults, their families, and the healthcare system [7]. As individuals grow older, the risk of falling and its related physical, psychological, social, and economic effects also increase. One psychological impact of falling is the fear it instills [9].

Fear of falling is a persistent concern that can lead individuals to avoid activities that might result in falls [5]. Studies show varying statistics, with rates ranging from 20 to 85% globally [10]. Prevalence of fear of falling in Asian older adults reported 21% to 88% [2]. In the study by Bahat Öztürk et al. (2021) in Turkey, the prevalence of fear of falling among older people was reported as 44% [11]. A meta-analysis study among Iranian older adults reported a 32% fall rate and a 41% fear of falling rate [12]. Research in Ethiopia revealed that around 60% of older adults had a fear of falling [13]. The results of a study in Iraq showed that the fear of falling in older adults after falling was 73% and the rate has increased compared to before the fall [14]. This fear can lead to self-imposed limitations, further weakening muscle strength, and inactivity [14]. Approximately 30% of older adults restrict their activities due to fear of falling [15]. Those afraid of

falling often alter their gait or use mobility aids, impacting their self-assurance and social interactions [13]. Figure 1 shows a conceptual framework for examining the relationships between aging, falling, and fear of falling.

Various factors can influence the fear of falling, including demographics, medical history, surgeries, and psychosocial aspects. Research by Bastani et al. highlighted that being female showed the strongest correlation with fear of falling, particularly among older widows, illiterate individuals, and those with lower economic status [16]. Another study revealed that older adults over 70 years old who had a history of sedative use reported more fear of falling [17]. Birhanie et al. (2021) found that fear of falling was notably linked to older age, female gender, lower education levels, existing medical conditions, and reliance on mobility aids [13]. A significant factor contributing to the fear of falling is a previous history of falls, which can heighten anxiety and fear post-trauma [16]. Depression, social isolation, and loneliness are psychosocial factors that contribute to the fear of falling. Research indicates that factors such as living alone, environmental risks, anxiety, depression, and decreased daily life capabilities are associated with this fear [16, 18]. Maintaining independence in daily activities is a crucial health indicator for older adults, offering valuable insights for effective older care planning. A study revealed that 32% of older adults were either partially or fully dependent on others three months post-trauma [8].

Studies in Iran have explored the fear of falling among older adults. For instance, one study investigated the connection between the fear of falling and functional tests in older adults with diabetes [19], while another examined the fear of falling and its associated factors in older adults

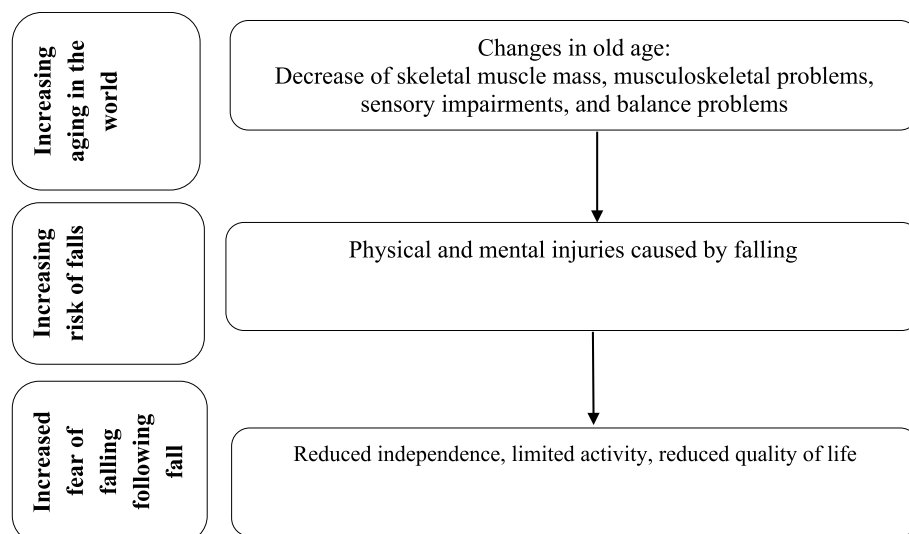


Fig. 1 A conceptual framework for exploring the relationships between old age, fall, and fear of fall

without considering prior trauma history [17]. However, fear of falling is expected to change after trauma, highlighting the need for research across diverse cultures and societies. Currently, older adults account for 7% of Iran's overall population, with Kashan City exhibiting a higher percentage of 12% (over 460 thousand people) [20]. Given the elevated older population in Kashan compared to the national average and limited local studies in this area, this study was conducted to investigate the fear of falling and its related factors in older adults following a fall in Kashan, Iran.

Method

Study design and participants

This cross-sectional study aimed to investigate the fear of falling and the associated factors in older adults following a fall. The research was conducted at two hospitals in Kashan from July 2023 to May 2024. Continuous sampling was carried out following approval from the Research Vice-Chancellor of Kashan University of Medical Sciences and ethical clearance. The researcher identified eligible participants by visiting the trauma emergency departments of Shahid Beheshti and Naqavi hospitals in Kashan. To adhere to ethical standards, the researcher introduced the study, obtained informed written consent, and assured participants of confidentiality. Data collection was conducted through questionnaires, with items completed based on patient preference and literacy level, either independently or with researcher assistance.

The inclusion criteria comprised older adults aged 65 and above, willingness to participate, ability to respond to questions, absence of severe uncorrectable hearing impairment, no pre-fall dependency in daily activities, limb trauma resulting in fracture and hospitalization due to a fall, absence of cognitive problems (AMT score ≥ 7 , according to the reliability and validity of this tool in the Iranian older adult population) [21], and no self-reported mental illness. Exclusion criteria involved incomplete questionnaires during the initial visits, one month, or three months after the fall, and unavailability for follow-up.

The sample size was estimated to be 160 people based on Cochran's formula with $p=0.9$, $q=0.1$, $d=0.05$ [22]. Taking into account 10% of the dropout rate in each stage, the sample size was determined to be 200 people.

$$n = \frac{(z1 - \frac{a}{2})^2 * p(1 - p)}{d^2}$$

Data collection

The questionnaires utilized for data collection consist of the background information questionnaire, the shortened version of the falls efficacy scale-international in older adults (the Short FES-I), the independence scale

of activities of daily living (ISADL), and the short-form state-trait anxiety inventory (Short-form STAI). Initially, the background information questionnaire, the FES-I, the ISADL, and the ISTAI were administered based on pre-fall conditions. Subsequently, the patient's contact details were recorded for one-month and three-month follow-ups. At these intervals, the FES-I, the ISADL, and the ISTAI were completed via telephone or in person. On average, it took 30 min to complete the questionnaires, and a token of appreciation was given to the patients.

Data collection tools

A- The background information questionnaire covered details such as age, gender, education level, marital status, number of children, injured limb, type of treatment received, and trauma-related hospitalization history. Ten experts, including seven nursing doctorates specializing in geriatrics and three staff nurses in the orthopedic department, qualitatively assessed the questionnaire's content validity.

B- The shortened version of the falls efficacy scale-international the older adults, developed by Kempen et al. (2008), assesses fear of falling with 7 questions. Each item rates worry or fear of falling during activities on a four-point Likert scale from 1 (never worried about falling) to 4 (very worried about falling). Higher scores indicate a greater fear of falling, with a questionnaire score range of 7 to 28 [23]. A cut-off point of ≥ 11 has been established [24]. In a study by Kashani et al. (2019), the FES-I internal consistency was 0.95 using Cronbach's alpha coefficient, and its temporal reliability resulted in 0.87 using the intraclass correlation coefficient over a 15-day duration [25].

C- The independence scale of activities of daily living, introduced by Yaghmaie (2005), assesses independence in daily life activities among older adults [26]. The questionnaire includes 20 questions covering daily activities like bathing, going to the toilet, observing personal hygiene, shopping, doing financial tasks, using public transportation, navigating stairs, walking, cleaning the house, dressing, using the telephone, washing clothes, cooking, eating and drinking, controlling urine and feces, taking medications, standing up from a chair, going to and getting out of bed, and cleaning the bed. Each question is rated on a Likert scale from 1 to 4, with a total score range of 20–80. Scores of 61–80 indicate complete independence, 41–60 signify relative independence, 21–40 suggest relative dependence, and a score of 20 indicates complete dependence. In a study by Masoudi et al. (2014), the questionnaire's reliability was 98% using a Cronbach's alpha coefficient [8].

D- The short-form state-trait anxiety inventory, introduced by Spielberger et al. (1970) [27], consists of six items rated on a 4-point Likert scale (1=not at all to 4=very much). Scores range from 6 to 24, with higher scores indicating increased anxiety levels. Scoring 6–12 signifies mild anxiety, 13–18 indicates moderate anxiety and 19–24 reflects severe anxiety. Marteau and Bekker (1992) confirmed the validity and reliability of the 6-item version, reporting an internal consistency of 0.89 [28]. In the research conducted by Taavoni et al. (2018), seven experts confirmed the content validity of the questionnaire, while 20 experts determined its reliability to be 0.76 through the bisection method and 0.73 using a Cronbach's alpha coefficient [29].

Data analysis

Descriptive statistics, including frequency, mean, and standard deviation, as well as SPSS software version 24 (Armonk, NY, IBM Corp, USA), were utilized for data analysis. The normality of data was confirmed through the Kolmogorov–Smirnov test. T-test was used to compare questionnaires' scores for two-state variables and ANOVA for three-state variables or more. Pearson's correlation test assessed relationships between quantitative variables. Repeated measures ANOVA examined the effect of time on fear of falling in older adults one month and three months post-trauma. Stepwise multiple linear regression predicted relevant factors. The significance level was set at 0.05.

Ethical consideration

The research received approval from the ethics committee of Kashan University of Medical Sciences under the ID No. IR.KAUMS.NUHEPM.REC.1402.041 (research project No. 402096), adhering to the Declaration of Helsinki. Participants were informed of the study's objectives and the confidentiality of their information. Written consent was obtained from all participants, ensuring they would receive the research results upon request.

Results

The participants' mean age was 71.34 ± 8.36 years (65–96) with an average of 4 children per participant (0–14). Among the participants, 52.5% were male, 63% were married, and 68.5% reported a history of falling. The most frequently injured limbs after falling were ankles and fingers (Table 1).

Two older adults were excluded from the study due to being unavailable for the three-month follow-up. The mean (SD) fear of falling scores for participants were 12.44 ± 5.43 before the fall, 19.62 ± 5.61 one month after the fall, and 15.25 ± 5.55 three months after the fall. Initially, 50% of participants reported fear of falling, which

Table 1 Some demographic information of the participants

Variable	Measuring data	Number	Percent
Sex	Female	95	47.5
	Male	105	52.5
Marital status	Married	126	63
	Single/widowed	74	37
Education level	Uneducated	70	35
	Lower/upper secondary/diploma	102	51
	Associate degree	15	7.5
	Bachelor's degree	13	6.5
History of falling	None	63	31.5
	Falls without trauma	119	59.5
	Falls resulting in hospitalization	18	9
History of hospitalization due to trauma	Yes	147	73.5
	No	53	26.5
Injured limb	Multiple fractures	22	11
	Hip	39	19.5
	Femur	30	15
	Tibia or fibula	35	17
	Ankle and fingers	74	37
Type of treatment	Casting	59	29.5
	Internal fixator	119	59.5
	Traction	22	11

increased to 91% (183 people) one month after the fall and decreased to 71.2% (141 people) three months later. Table 2 displays the mean independence scores of the participants before, one month, and three months after the fall.

Pearson's correlation coefficient showed a negative and significant correlation between participants' independence scores and their fear of falling scores before falling ($P=0.004$, $r=-0.20$), one month later ($P=0.0001$, $r=-0.36$), and three months later ($P=0.0001$, $r=-0.52$). Table 3 shows the mean anxiety scores of the participants before, one month, and three months after the fall.

Pearson's correlation coefficient showed a positive and significant relationship between participants' anxiety scores and their fear of falling scores one month ($P=0.04$, $r=0.34$) and three months after the fall ($P=0.0001$, $r=0.60$).

A repeated measures ANOVA was conducted to analyze the effect of time on fear of falling changes. Mauchly's test results ($P=0.002$) indicated no assumption of compound symmetry. The model using the Greenhouse–Geisser revealed a notable increase in fear of falling scores over time. Figure 2 illustrates this progression. Fear of falling significantly increased one month after the

Table 2 The scores of ISADL in participants before, one month, and three months after fall

The scores of ISADL	Mean ± SD	According to questionnaire levels				P Value*
		Completely dependent N (%)	Relatively dependent N (%)	Relatively independent N (%)	Completely independent N (%)	
Before the fall	72.24 ± 10.17	0 (0)	4 (2)	18 (9)	178(89)	P < 0.0001 F = 121.72
One month after the fall	59.09 ± 14.69	5 (2.5)	22 (11)	71 (35.5)	102(51)	
Three months after the fall	64.07 ± 15.29	5 (2.5)	11 (5.6)	50 (25.2)	132(66.7)	

* ANOVA test

Table 3 The scores of anxiety in participants before, one month, and three months after the fall

The scores of anxiety	Mean ± SD	According Questionnaire levels			P Value*
		Low	Moderate	High	
Before the fall	13.55 ± 2.45	71 (35.5)	125 (62.5)	4 (2)	P < 0.0001 F = 24.76
One month after the fall	14.52 ± 2.04	47 (23.5)	141 (70.5)	12 (6)	
Three months after the fall	14.41 ± 1.75	24 (12.1)	169 (85.4)	5 (2.5)	

* ANOVA test

fall. While fear of falling slightly decreased three months post-fall, it still exceeded pre-fall levels (Fig. 2).

Multiple linear regression showed that before falling, predictors of fear of falling included old age, illiteracy, and prior history of falling. One month after the fall, predictors were illiteracy, hip fracture, and high anxiety score. Three months post-fall, predictors included illiteracy, hip fracture, high anxiety score, and undergoing internal fixator treatment ($P < 0.05$) (Table 4).

Discussion

This study aimed to examine the fear of falling and related factors in older adults following falls in Kashan, Iran (2023–2024). Results indicated that 50% of older adults were afraid of falling before the fall, increasing to 91% one month after the fall and 71% three months after the fall. Studies measuring the fear of falling after falling are limited. The results of the studies reported the fear of falling among community-dwelling older adults in Pakistan at 75% [30], China at 88% [31], and Thailand at 56% [32]. The fear of fall rate in developed countries like America and Australia is 9% [33] and 14% respectively [34]. The high rate of fear of falling in older adults in developing countries compared to developed countries raises concerns about its dangerous consequences. The fear of falling seems more prominent in developing countries due to limited healthcare access and unsafe environments. Contrastingly, developed nations often have

structured support systems and healthcare services that can alleviate fear and promote safer living conditions.

In this study, fear of falling significantly rose one month after the fall, then slightly decreased over the next three months but remained higher than before the incident. Research showed that the fear of falling doubled in older adults who had a fall within the past month or year [35]. In a one-year follow-up, 25% of individuals with hip fractures maintained a fear of falling, with the highest levels observed between one month and two months post-fracture [24]. In the study of van der Vet et al. (2021), 40% of older adults experienced fear of falling after trauma. Fear of falling was more prevalent in older adults over 75 years old, even after re-fracture during one-year follow-up, leading to a notable decrease in activity level and quality of life [36]. Bastani et al. found that 99% of older adults with falls-related orthopedic surgery had fear of falling. This was particularly prevalent among women, those with lower education levels, and those over 70 years old. After surgery, 80% of older adults experienced mild to severe anxiety [16]. Discrepancies in results may be attributed to participant age, study timing, type of trauma, and measurement tool. Nonetheless, fear of falling is significant in older adults even before experiencing a fall, with a substantial increase following trauma.

In this study, 89% of older adults were fully independent in daily activities before the fall. However, this rate decreased to 51% one month later and then increased

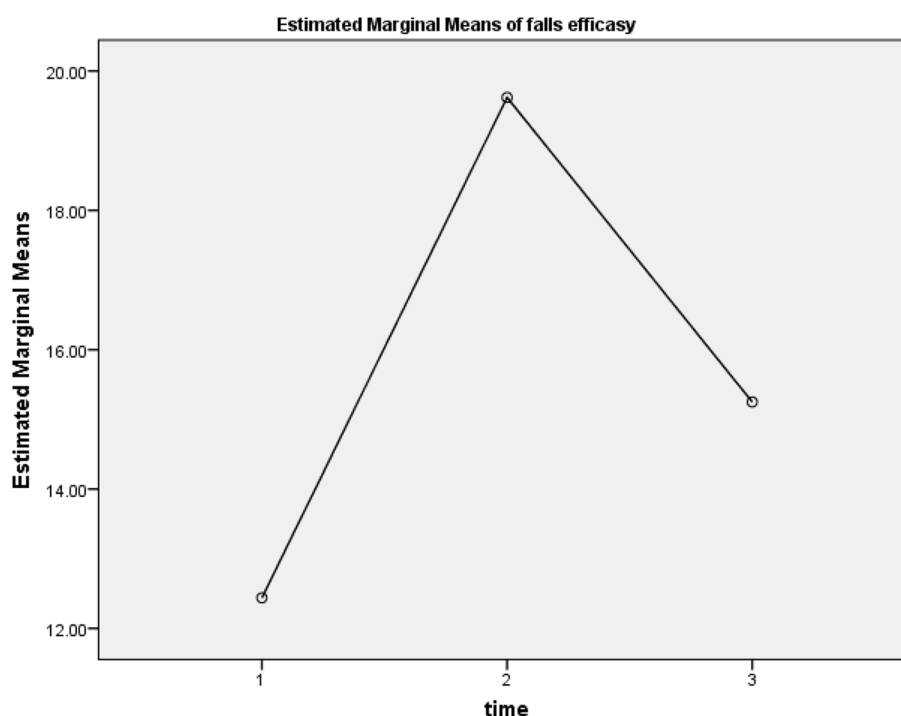


Fig.2 Fear of fall in participants before, one month, and three months after the fall

Table 4 Regression analysis of associations between variables and fear of fall in participants before, one month, and three month after the fall

Variables	P* Value	T	Beta	R	Adjusted R ²	R ²
Fear of fall level before the fall				0.20	0.04	0.02
Education (uneducated)	0.02	2.21	0.172			
Age	0.04	1.72	0.133			
History of fall (yes)	0.04	1.82	0.130			
Fear of fall level one month after the fall				0.30	0.06	0.09
Education (uneducated)	0.007	-2.749	-0.190			
Injured limb (hip fracture)	0.02	-2.266	-0.157			
The scores of anxiety	0.03	-2.156	-0.142			
Fear of fall level three months after the fall				0.43	0.19	0.15
Education (uneducated)	0.008	-2.686	-0.209			
Injured limb (hip fracture)	0.004	-2.882	-0.213			
Type of surgical intervention (internal fixator)	0.0001	-3.710	-0.221			
The scores of anxiety	0.04	-1.324	-0.112			

* Multiple linear regression

to 66% three months after the fall. Despite a correlation between older adults' independence in daily activities and their fear of falling, independence in daily activities was not a predictor of fear of falling. Mortazavi et al. (2021) found that although 95% of older adults were independent in basic daily activities, fear of falling hindered their independence [37]. Another study revealed a

significant association between daily activity independence and fear of falling, suggesting that fear of falling could predict daily activity independence [38]. A study in Palestine demonstrated a significant and direct connection between older adults' functional status and fear of falling [39]. In this study, 64.5% of older adults had moderate to high anxiety scores before the fall, increasing to

76.5% one month later and 88% three months after the fall. Research shows that anxiety and depression symptoms in older adults are directly associated with fear of falling [39].

The present study revealed that before falling, predictors of fear of falling in older adults included old age, illiteracy, and a history of falling. Another study demonstrated a direct relationship between fear of falling, age over 70, and a history of taking anxiolytics [17]. A review study highlighted a direct correlation between fear of falling in women, older adults, those with a history of falling, the presence of depressive symptoms, and low activity levels [40]. In a separate study, older adults living alone, with a history of falls, and balance disorders experienced increased fear of falling [41]. Aging leads to a decline in muscle mass and strength in older adults, impacting balance, gait, and increasing the risk of falling [42]. Hence, it appears reasonable that the fear of falling rises with age. In the current study, one significant factor influencing fear of falling in older adults was their level of education. While some studies did not find a significant relationship between fear of falling and education level [43], Most studies, especially in developing countries indicated that illiterate individuals or those with lower literacy levels reported higher levels of fear of falling [17, 39]. This could be attributed to awareness among educated older adults regarding preventing and managing risks of falls. While many studies highlight the female gender as a key predictor of fear of falling [17, 41], this study did not find gender to be a predictor. Nonetheless, a study identified fear of falling as a crucial risk factor for both genders, particularly among men [44].

The study results indicated that one month after the fall, predictors of fear of falling included illiteracy, hip fracture, and high anxiety scores. Three months after the fall, illiteracy, hip fracture, high anxiety scores, and the presence of an internal fixator were also predictive factors. The fall resulted in injuries to various body parts such as the hip, femur, tibia or fibula, ankle, and fingers, with hip fractures notably predicting fear of falling. Individuals tend to experience an increased fear of falling following a hip fracture. A study in the U.S. reported fear of falling in 60.5% of older adults one month after a hip fracture and in 47% three months later [45]. Additionally, anxiety scores emerged as predictors of fear of falling in this study. Consistent with these findings, another study highlighted a significant relationship between fear of falling and anxiety in older adults [46]. A meta-analysis indicated that high anxiety levels increased the likelihood of falling by 53% [47]. The rise in anxiety and fear of falling leads to reduced activity levels and constraints on daily activities. Research suggests that fear of falling can correlate with limitations in activity, frequent falls,

and disability [48]. Hence, aside from other factors, it is crucial to address psychological aspects related to falls, which can heighten the fear of falling, and they should be integrated into fall prevention programs. Psychological counseling is recommended to manage older adults' anxiety, particularly post-trauma.

Strengths

While previous studies on fear of falling were mostly cross-sectional, this is the first study in Kashan that examined fear of falling in older adults one month and three months after the fall.

Limitation

A limitation of this study was the patients' unwillingness to complete questionnaires during follow-up by phone. As a result, the researcher visited the patients in person, read the questions to them, and completed the questionnaires.

Conclusion

The fear of falling is a significant issue for older adults, especially after experiencing a fall. This fear can make them more vulnerable following trauma, with both physical and psychological consequences. Identifying the factors that predict this fear, especially in developing countries, can help policymakers and healthcare providers create a comprehensive care plan to enhance the quality of life of older adults after a fall. Utilizing this study's findings can aid in developing interventions to reduce the fear of falling and increase the independence of older adults after a fall. It is essential to screen older adults for fear of falling, especially post-trauma, offer counseling and educational services, particularly in mental health, after discharge, and prepare fall prevention training programs.

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Authors' contributions

Study concept and design: FSI and AS. Acquisition of data: NS and AS. Analysis and interpretation of data: FSI, AS, MAK. Drafting of the manuscript: AS. Critical revision of the manuscript: FSI, AS, MAK, NS. The authors approved the final manuscript.

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Data availability

The dataset generated and analyzed during the current study is available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the Kashan Medical College Institutional Review Board and Research Ethics Committee (Project NO: 402096, Ethical code: IR.KAUMS.NUHEPM.REC.1402.041). Participants were informed in detail about the research and informed consent was obtained from all participants. All procedures were performed under approved protocols and all relevant local and national research guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. Falls: World Health Organization; 2021.
2. Vo MTH, Thonglor R, Moncatar TJR, Han TDT, Tejtavaddhana P, Nakamura K. Fear of falling and associated factors among older adults in Southeast Asia: a systematic review. *Public Health*. 2023;222:215–28. <https://doi.org/10.1016/j.puhe.2022.08.012>.
3. Valieiny N, Poorcheraghi H, Pashaepoor S. Nursing interventions in prevention of fall in older adults An integrated review study. *J Gerontol*. 2022;6(4):14–27.
4. Rahimi A, Balouchi R, Eslami R, Shahrokhi M. The relationship between back extensor muscle strength with dynamic balance and fear of falling in elderly people. *J Pract Stud Biosci Sport*. 2016;4(7):114–24.
5. Hosseini M, Lajevardi L, Taghizade G. Effect of mental practice on fear of falling in activities of daily living, satisfaction and lower extremity function in the community-dwelling elderly: A clinical trial. *Koomesh*. 2019;21(4):619–27.
6. Pahlavanian AA, Najarian R, Adabi S, Mirshoja MS. The prevalence of fall and related factors in Iranian elderly: A systematic review. *Arch Rehab*. 2020;21(3):286–303.
7. Raeisi Z, Yasavoli SM. Effects of eight weeks Otago home-based exercises on balance, quality of life and fear of falling in elderly people. *J Gerontol*. 2022;6(4):28–41.
8. Masoudi Alavi N, Safa A, Abedzadeh-Kalahroudi M. Dependency in activities of daily living following limb trauma in elderly referred to Shahid Beheshti hospital, Kashan-Iran in 2013. *Arch Trauma Res*. 2014;3(3):e20608.
9. Barani H, Balali M, Nasiri I. The effect of manipulation of task constraints on functional indicators and the anxiety related to fear of falling in the elderly. *Mot Behav*. 2023;15(51):167–90.
10. Lee D, Tak SH. A concept analysis of fear of falling in older adults: insights from qualitative research studies. *BMC Geriatr*. 2023;23(1):651.
11. Bahat Öztürk G, Kılıç C, Bozkurt ME, Karan MA. Prevalence and Associates of Fear of Falling among Community-Dwelling Older Adults. *J Nutr Health Aging*. 2021;25(4):433–9.
12. Tavan H, Azadi A. The frequency of fall, fear of fall and its related factors among Iranian elderly: A systematic review and meta-analysis. *Int J Africa Nurs Sci*. 2024;20:100660.
13. Birhanie G, Melese H, Solomon G, Fissaha B, Teferi M. Fear of falling and associated factors among older people living in Bahir Dar City, Amhara, Ethiopia- a cross-sectional study. *BMC Geriatr*. 2021;21(1):586.
14. Abdal Qader MA, Amin RM, Shah SA, Isa ZM, Latif KA, Ghazi HF. Psychological risk factors associated with falls among elderly people in Baghdad city. *Iraq Open J Prev Med*. 2013;3(07):441–5.
15. Sadeghi N, Heravi-Karimooi M, Rejeh N, Montazeri A. Translation and initial validation of the Persian version of Geriatric Fear of Falling Measure (GFFM). *Payesh*. 2021;20(3):347–56.
16. Bastani F, Hajaty S, Hoseini RS. Anxiety and Fear of falling in older adults with fall-related orthopedic surgery. *Iran J Ageing*. 2021;15(4):506–23.
17. Taghadosi M, Motaharian E, Gilasi H. Fear of falling and related factors in older adults in the city of Kashan in 2017. *Arch Trauma Res*. 2018;7(2):50–5.
18. Freigang V, Müller K, Ernstberger A, et al. Reduced Recovery Capacity after Major Trauma in the Elderly: Results of a Prospective Multicenter Registry-Based Cohort Study. *J Clin Med*. 2020;9(8):2356.
19. Arani SJ, Rezaei M, Dianati M, Atoof F. The association between fear of falling and functional tests in older adults with diabetes mellitus. *Nurs Midwifery Stud*. 2020;9(3):163.
20. Available from: <https://www.irna.ir/news/85001941>. Access 1 July 2023.
21. Foroughan M, Wahlund LO, Jafari Z, Rahgozar M, Farahani IG, Rashedi V. Validity and reliability of Abbreviated Mental Test Score (AMTS) among older Iranian. *Psychogeriatr*. 2017;17(6):460–5.
22. Nguyen LH, Thu VuG, Ha GH, et al. Fear of falling among older patients admitted to hospital after falls in vietnam: Prevalence, associated factors and correlation with impaired health-related quality of life. *Int J Environ Res Public Health*. 2020;17(7):2493.
23. Kempen GI, Yardley L, Van Haastregt JC, et al. The Short FES-I: a shortened version of the falls efficacy scale-international to assess fear of falling. *Age Ageing*. 2008;37(1):45–50.
24. Scheffers-Barnhoorn MN, Haaksma ML, Achterberg WP, et al. Course of fear of falling after hip fracture: findings from a 12-month inception cohort. *BMJ Open*. 2023;13(3):e068625.
25. Kashani V, Golmohammadi B, Attarzadeh-Fadaki S. Preparing a Short Version of the International Falls Efficacy Scale to Iranian Elders. *J clin psychol*. 2019;10(4):13–22.
26. Yaghmaie F. Introducing a new scale for activities of daily living. *J Nurs Midwifery Shahid Beheshti Univ Med Sci*. 2006;15(50):3–12.
27. Spielberger C, Gorsuch R, Lushene R, Vagg P, Jacobs G. Manual for 22 the State-Trait Anxiety Inventory (STAI) Form Y. Palo Alto, CA Consulting 23 Psychologists Press. Inc; 1983.
28. Marteau TM, Bekker H. The development of a six-item short-form of the state scale of the Spielberger State—Trait Anxiety Inventory (STAI). *Br J clin Psychol*. 1992;31(3):301–6.
29. Taavoni S, Abdoli Najmi L, Haghani H. Investigating the effect of viewing scenes of nature and nature scenes along with nature sounds on the anxiety during the first stage of labor in primiparous women. *Complement Med J*. 2018;8(3):2354–63.
30. Shahid S, Tariq MI, Ramzan T. Correlation of fall efficacy scale and Hendrich fall risk model in elder population of Rawalpindi-Islamabad. *J Pak Med Assoc*. 2020;70(11):1938–40.
31. Wang QX, Ye ZM, Wu WJ, Zhang Y, Wang CL, Zheng HG. Association of Fear of Falling With Cognition and Physical Function in Community-Dwelling Older Adults. *Nurs Res*. 2022;71(5):387–93.
32. Nawai A, Phongphanngam S, Khumrunsee M, Radabutr M. Chronic pain as a moderator between fear of falling and poor physical performance among community-dwelling older adults. *Geriatr Nurs*. 2022;45:140–6.
33. Liu M, Hou T, Li Y, Sun X, Szanton SL, Clemson L, et al. Fear of falling is as important as multiple previous falls in terms of limiting daily activities: a longitudinal study. *BMC Geriatr*. 2021;21(1):350.
34. Clemson L, Kendig H, Mackenzie L, Browning C. Predictors of injurious falls and fear of falling differ: an 11-year longitudinal study of incident events in older people. *J Aging Health*. 2015;27(2):239–56.
35. Chen WC, Li YT, Tung TH, Chen C, Tsai CY. The relationship between falling and fear of falling among community-dwelling elderly. *Medicine (Baltimore)*. 2021;100(26):e26492.
36. van der Vet PCR, Kusen JQ, Rohner-Spengler M, et al. Fear of falling, recurrence of falls, and quality of life in patients with a low energy fracture-part II of an observational study. *Medicina (Kaunas)*. 2021;57(6):584.
37. Mortazavi H, Tabatabaiechehr M, Taherpour M, Masoumi M. The relationship between activities of daily living, falls and fear of falling in older adults: A cross-sectional study. *Bangladesh J Med Sci*. 2021;20(2):420–5.
38. Khajavi D, Moradi Veghar MS. Prediction of activities of daily living in older adults in Qom city based on fall-related psychological factors. *Qom Univ Med Sci J*. 2015;9(8):57–65.
39. Badrasawi M, Hamdan M, Vanoh D, et al. Predictors of fear of falling among community-dwelling older adults: Cross-sectional study from Palestine. *PLoS ONE*. 2022;17(11):e0276967.

40. MacKay S, Ebert P, Harbidge C, Hogan DB. Fear of falling in older adults: A scoping review of recent literature. *Can Geriatr J*. 2021;24(4):379–94.
41. Zarepour M, Jadgal MS, Moradi Z, Movahed E. Assessment of fear of falling and its relation to balance in elderly people of Urmia. *Casp J Health Res*. 2020;5(2):23–7.
42. Hafer JF, Boyer KA. Age related differences in segment coordination and its variability during gait. *Gait Posture*. 2018;62:92–8.
43. Salavati M, Baharlouei H, Akhbari B. The relationship between fear of falling and level of education and living style in the elderly. *J Research in Rehabilitation Sci*. 2015;11(4):257–62.
44. Wang RH, Hsu HC, Chen SY, et al. Risk factors of falls and the gender differences in older adults with diabetes at outpatient clinics. *J Adv Nurs*. 2021;77(6):2718–27.
45. Bower ES, Wetherell JL, Petkus AJ, Rawson KS, Lenze EJ. Fear of falling after hip fracture: Prevalence, course, and relationship with one-year functional recovery. *Am J Geriatr Psychiatry*. 2016;24(12):1228–36.
46. Shirini AR, Arsham S, Yaali R. The relationship between fear of falling, anxiety, functional mobility and balance in nursing-home older adults. *Motor Behavior*. 2017;9(29):135–48.
47. Hallford DJ, Nicholson G, Sanders K, McCabe MP. The association between anxiety and falls: A meta-analysis. *J Gerontol B Psychol Sci Soc Sci*. 2017;72(5):729–41.
48. Donoghue OA, Setti A, O'Leary N, Kenny RA. Self-reported unsteadiness predicts fear of falling, activity restriction, falls, and disability. *J Am Med Dir Assoc*. 2017;18(7):597–602.

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