International Journal of Africa Nursing Sciences 20 (2024) 100660

Contents lists available at ScienceDirect

International Journal of Africa Nursing Sciences

journal homepage: www.elsevier.com/locate/ijans

The frequency of fall, fear of fall and its related factors among Iranian elderly: A systematic review and *meta*-analysis

Hamed Tavan [a,*], Arman Azadi [b]

[a] MSC of Nursing Medical Surgical, Clinical Research Development Unit, Shahid Mostafa Khomeini Hospital, Ilam University of Medical Sciences, Ilam, Iran
[b] Department of Nursing, Faculty of Nursing and Midwifery, Ilam University of Medical Sciences, Ilam, Iran

ARTICLE INFO

Keywords:
Elderly
Falling
Fear of falling
Iran
Meta-analysis

ABSTRACT

Background: Fall is a common health problem among elder and can have many physical and psychological consequences, including injuries, mobility problem, hospitalization, institutionalization, fear of falling again and even death.
Objective: The aim of present study was to assess the frequency of fall, fear of fall and its related factors among Iranian elders by systematic review and *meta*-analysis.
Methods: The data was gathered from the literature published in Scopus, Magiran, SID, PubMed, Google Scholar, Google, and Web of Science. The search strategy was done using the following combined text and MeSH terms included "elderly fall", "accidental fall", "prevalence of fall", "fear of fall", and "risk factor for fall". Persian equivalents of these keywords were also searched in Iranian databases. The time span included articles published within 2007–2017. The data was analyzed using STATA (version 14) software and *meta*-regression.
Results: The mean number of fall events among elders was 1.9 (95 % CI: 1.15–2.64, $P = 0.072$) within the past year. The fall rate was obtained 32 % (95 % CI: 0.30–0.34, $P < 0.001$) in the recent year. Fear of fall frequency was also 41 % (95 % CI: 0.38–0.45, $P < 0.001$) in elders. Fall events were more prevalent in elders living in nursing homes residents compared with those resided in home 36 % (95 % CI: 32–39). The highest rate of fall was recorded in night as 25 % (95 % CI: 0.21–0.29, $P < 0.12$). The stairs, aisle and yard comprised the most common places of fall events as 35 % (95 % CI: 0–27.42, $P < 0.001$).
Conclusion: The findings revealed high prevalence of fall and fear of fall among Iranian elders. These results can assist the policy makers of elderly health institutes, elderly nurses, and families with elder members to know risk factors and implement safety measures in homes and institutions to reduce fall episodes among elders.

1. Introduction

Elderly is a critical period in human life and a social emergency (Anderson, Goodman, Holtzman, Posner, & Northridge, 2012; Sander et al., 2015). The world's > 60 years old population will reach 2 billion (21 %) by 2050, surpassing the growth of pediatric populations (Buckinx et al., 2015; Sander, et al., 2015). Accordingly, elder populations are also growing in Iran, expected to reach > 25 million in 2050, comprising one-fourth of Iran's population at that time (Mousavi, Haghi, & Gharasi Manshadi, 2015; Noroozian, 2012).

Regarding the elevation of life expectancy in elders, preserving their health has become critically important (Najafi Ghezlcheh, Ariapour, & Jafari Oori, 2016a). According to the 2016 census in Iran, 9.3 % of Iranians (more than seven million people) were older than ≥ 60 years. Also, according to international estimates, the elderly population in Iran will grow more rapidly than in other countries (8). This rapid population aging is accompanied by the rising number of elderly with comorbidities, creating a challenge for Iran's health system, which has historically been designed to provide episodic and curative care (Ungar et al., 2013). Although the pace of population aging in Iran is much faster now than in the past, the physical infrastructure of many healthcare settings is not well matched to the new needs. In Iran, there are no special healthcare services or hospitals for elder people, and long-term care is mainly provided by family caregivers.

Elderly-related physio-psychological changes expose these individuals to various diseases and injuries. Falling is one of the most

* Corresponding author at: Clinical Research Development Unit, Shahid Mostafa Khomeini Hospital, Ilam University of Medical Sciences, Ilam, Iran, P.O. Box: 6939177143, Ilam, Iran.
E-mail address: hamedtavan@gmail.com (H. Tavan).

https://doi.org/10.1016/j.ijans.2024.100660
Received 16 January 2023; Received in revised form 14 January 2024; Accepted 18 January 2024
Available online 24 January 2024

common causes of injury in elders (Berry & Miller, 2008). Overall, one out of three elders > 60 years old and one out of two elders > 85 years old experience at least one falling episode annually (Almeida, Soldera, Carli, Gomes, & Resende Tde, 2012). This is even higher among elders living in nursing homes, where 30–40 % of residents experience one falling episode per year.

In Iran, 12 % of 8,000 individuals hospitalized due to traumas are adults aged 60 years or older, 70 % of whom experience falling (Bastami & Azadi, 2020). Nevertheless, the true incidence is even expected to be higher (Eriksson, Gustafson, & Lundin-Olsson, 2008; Marschollek et al., 2011). Falling accounts for two-thirds of all traumatic events among elders and is considered the sixth most common cause of mortality among these individuals. In Rau *et al.*'s study in Taiwan, falling was the major cause for hospital admission (59.9 %) among the elderly compared to adults (18.7 %) (Rau et al., 2014). Falling at home and in the streets shares a substantial proportion of falling events among Iranian elders (Ghaffari-Fam et al., 2015).

The estimated medical costs attributable to both fatal and nonfatal falling were reported to be approximately $50.0 billion in the US in 2015 (Florence et al., 2018). Some other consequences of falling include pain, bruising, scratches, joint problems, bone fractures, limited daily activities, unbalanced walking, social isolation, and fear of falling again (Clemson, Kendig, Mackenzie, & Browning, 2015; Florence, et al., 2018; Jafarian, Zabihi, Aziznejad, Hosseini, & Bijani, 2013; Marques et al., 2014; Pereira, Baptista, & Infante, 2013). The findings of many studies have verified that parameters such as age, sex, drugs, mental and psychological problems, chronic diseases, and environmental risk factors are among contributors to falling events (Florence, et al., 2018; Catharine R. Gale, Westbury, Cooper, & Dennison, 2018; Najafi Ghezlcheh, et al., 2016a). In some other studies, fear of falling itself has been described as an important cause of falling (Dadgari et al., 2016; Najafi Ghezlcheh, et al., 2016a). Furthermore, the fear of falling has been reported as an important factor contributing to reduced life satisfaction and increased registration at nursing homes (Bastani, Birjandi, Haghani, & Sobhan, 2016; Clemson, et al., 2015; Morowatisharifabad et al., 2017a). Aging-related imbalance has been associated with an elevated risk of falling, injuries, hospitalization, reduced independence, and death. With aging, some alterations occur in the body, such as vision, auditory, sensory, neuronal, musculoskeletal, and cardiovascular problems. These events influence physical performance and balance, ultimately boosting dependency on others and risk of falling (Catharine R. Gale, et al., 2018; Marques, et al., 2014).

Patel *et al.* reported a higher incidence of physical risk factors, including blood pressure alternations, reduced joint strength, auditory problems, uncoordinated extremities movements, and leg abnormalities, in individuals with a history of falling (Patel et al., 2014). Moreover, individuals with problems in walking and depression and those living in crowded, dark, and disordered places are more vulnerable to falling (Chang, Chi, Yang, & Chou, 2010; Clemson, et al., 2015). Therefore, multiple factors can contribute to falling events in the elderly.

Considering the high occurrence of falling events in the elderly, their dire consequences, and the financial expenses imposed on the families, health care systems, and society, this issue is a major public health concern and deserves special attention. Falling among Iranian elders has been addressed by multiple studies (Mousavi SM et al., 2015, Najafi et al., 2016, Eriksson S et al., 2008, Ungar A et al., 2013); however, there are no systematic reviews and *meta*-analyses on the overall frequency of falling and its risk factors in this population. Given the increasing trend in population aging in Iran and the high prevalence of falling among elder people, we aimed to explore the frequencies of falling and fear of falling among Iranian elderly by *meta*-analysis. Our results can be helpful in assisting health policymakers and care providers and help them identify and manage the risk factors and consequences of falling among elders.

2. Materials and methods

2.1. Study protocol

This study was conducted following four steps. These included study design and literature search, gathering studies and systematically reviewing them, qualifying studies based on inclusion and exclusion criteria, and finally, statistical analysis. Two researchers independently conducted each step to avoid bias, and the data were finally assessed by a third researcher.

2.2. Search strategy

The databases included PubMed, Scopus, Magiran, SID, Google Scholar, Web of Science, and Elsevier. The search was performed using the keywords of "elderly fall", "accidental fall", "prevalence of fall", "fear of fall", and "risk factor for fall". In parallel, the Persian equivalents of these keywords were searched in Persian databases. The studies published between 2007 and 2022 were recruited. Boolean operators (AND, OR, NOT) were utilized to combine the keywords with each other. Ultimately, the reference lists of the recruited articles were read to find any additional related studies.

2.3. Inclusion and exclusion criteria

All the studies with the phrases "rate/prevalence of falls in elderly", "fear of fall", "factors influencing falls in elderly", and "Iran" in their titles were included. The time span was 2007–2022. Studies on interventional and preventive measures were excluded. Studies other than original works (i.e., brief and case reports, letters to editors) and those with a retrospective design were also excluded.

2.4. Study selection

After collecting all related studies obtained during the literature search, the articles' features were recorded into a checklist. After concealing the names of the journals and first authors, the full texts were sent to the researchers, and each article was independently checked by two authors. If a study was excluded, reasons for their removal were noted, and in the case of disagreements, the article was assessed by a third researcher.

A total of 60 related articles were obtained in the primary search. The titles and abstracts were scrutinized by two researchers. At this step, 30 studies were omitted due to being either irrelevant or duplicated. The remaining 30 articles with relevant titles were further screened by reading their abstracts. Another 12 studies were removed at this stage. The remaining 18 articles were further checked by full-text reading, and 8 unqualified articles were further removed. Finally, 12 qualified articles entered systematic review and *meta*-analysis (Fig. 1).

2.5. Selection and qualification of articles

The quality of the articles was assessed using the STROBE checklist. Two of the authors independently gave each item of the checklist a score between 0 and 2. Based on these scores, the articles were categorized as weak, moderate, or good quality with the respective scores of 1–15, 16–30, and 31–44. Articles that attained at least 16 scores (i.e., moderate and good quality) entered into the *meta*-analysis process (Tavan et al., 2019, Sayehmiri K et al., 2019, Sayehmiri K et al., 2021).

2.6. Data extraction

The data were finally recorded in a data gathering form and entered into STATA software (version 14). The data gathering form included information such as first authors' names, year of study publication and conduction, title, place of study, sample size, number of females and

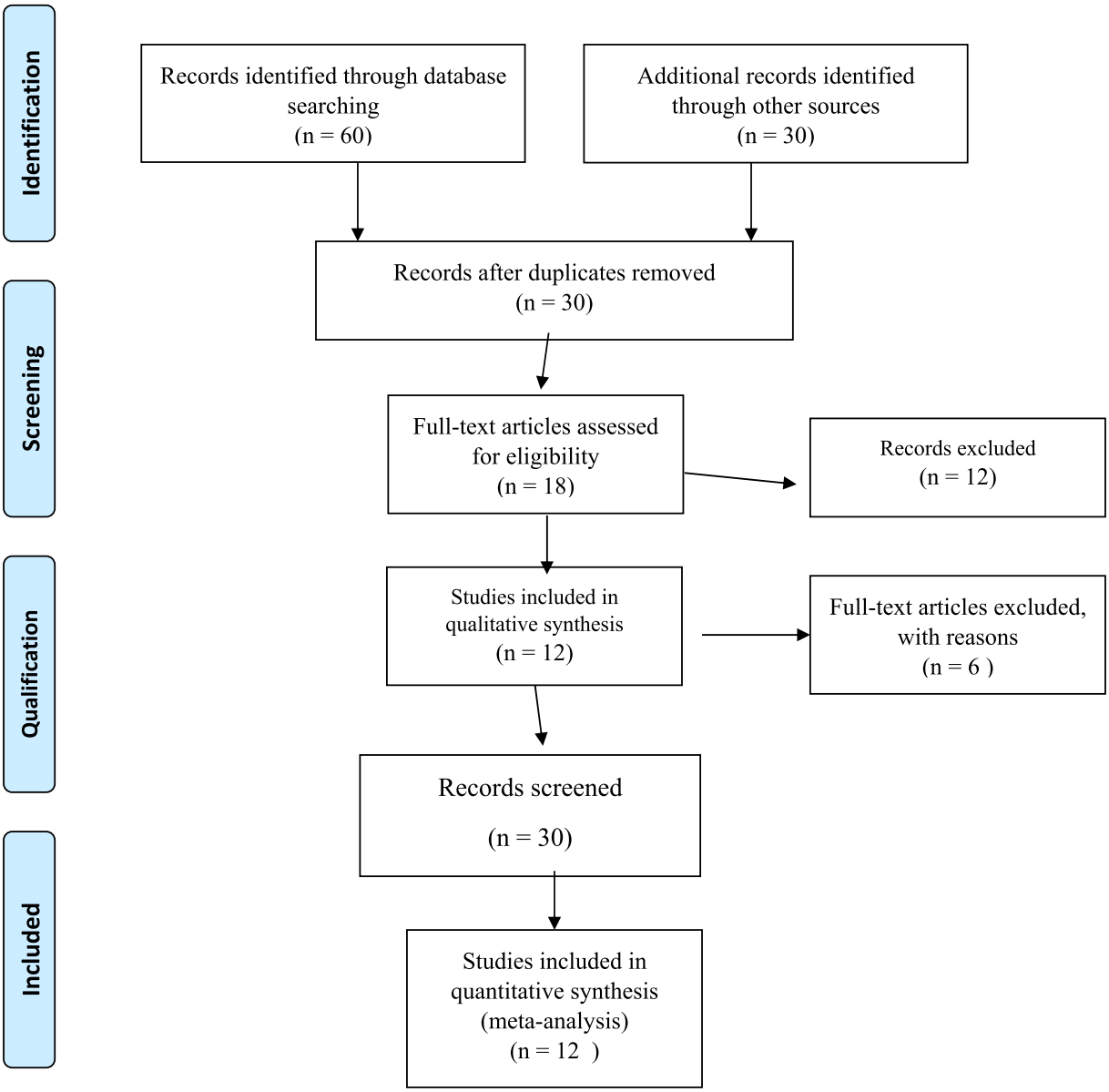

Fig. 1. The flow chart showing the search strategy and the number of studies included.

males, rates of falling in men and women, time and place of falling, place of residence, fear of fall recurrence, age groups, and risk factors of falling, and their subgroups.

The criteria intended by the researcher for final qualifying the studies included the sample size, year of study conduction, the rates of falling in men and women, day-night time of falls, fear of fall recurrence, location of falling, and elders' place of residence. All the studies evaluating and reporting these factors were finally approved. Ultimately, 10 qualified studies entered *meta*-analysis (Abbasi, Daniali, & Hazrati, 2017; Bastani, et al., 2016; Dadgari, et al., 2016; Jafarian, et al., 2013; Kamrani, Azadi, Foroughan, Siadat, & Kaldi, 2007; Morowatisharifabad, et al., 2017a; Nabavi et al., 2016; Najafi Ghezlcheh, et al., 2016a; Salehi, Shokrvash, Jamshidi, & Montazeri, 2014; Tanjani, Ainy, Akbarpuor, & Soori, 2015).

2.7. Statistical analysis

Normal distribution was used for calculating each study's variance. For synthesizing the fall rate, the mean weight was determined by giving each study a specific weight conversely correlated with its variance. As falling rates widely varied in the studies (i.e., heterogeneous studies, evidenced by a statistically significant heterogeneity index, I^2), we applied the random effects model for *meta*-analysis. The I^2 heterogeneity index represents a numerical value utilized as a substitute for the odds ratio to estimate the variance of heterogeneous studies. In this regard, $I^2 \leq 25$ shows low heterogeneity, while I^2 values of 26–50 %, 51–75 %, and 76–100 % indicate moderate, statistically significant, and high heterogeneities, respectively. In this study, the I^2 index was 98.141 %, showing high heterogeneity. For estimating the relationship between the fear of fall recurrence, sample size, and the year of study conduction, *meta*-regression was performed. The data were analyzed by STATA (version 14) software.

3. Results

The 12 finally included studies were conducted between 2007 and 2022. The total sample size was 4389, delivering a mean of 439 individuals per study. The studies' specifications are shown in Table 1. The mean age of the participants was 72.32 (68.24–76.39) years. Considering the education level, 80 % (73 %-87 %) of the participants were

Table 1
The characteristics of studies assessing the incidence of falls in elders.

First author	City	Year	Samples (n)	Men (n)	Women (n)	Mean (SD) age
Kamrani(Kamrani, et al., 2007)	Tehran	2007	76	–	–	76.9 (7.1)
Ghanbary (Ghanbary, Salehi Dehno, Moslemi Haghighi, & Torabi, 2013)	Shiraz	2012	750	341	409	67.32
Iranfar (Iranfar, Ainy, & Soori, 2013)	Tehran	2013	400	260	140	–
Jafarian (Jafarian, et al., 2013)	Babol	2013	350	201	149	70.1 (4.8)
Salehi(Salehi, et al., 2014)	Tehran	2014	180	49	131	65.9 (6.1)
Tanjani(Tanjani, et al., 2015)	Tehran	2015	1323	636	687	69.1 (7.37)
Dadgari	Shahrood	2016	1312	694	618	72.34 (5.21) (Dadgariet al., 2016).
Najafi(Najafi Ghezlcheh, Ariapour, & Jafari Oori, 2016)	Tehran	2016	160	30	130	67.36 (9.07)
Bastani (Bastani, et al., 2016)	Tehran	2016	200	97	103	76.89 (8.5)
Nabavi (Nabavi, et al., 2016)	Bojnoord	2016	288	156	132	70.42 (8.56)
Morowati(Morowatisharifabad et al., 2017b)	Esfahan	2017	300	115	185	83.7 (8.68)
Abbasi(Abbasi, et al., 2017)	Esfahan	2017	200	61	139	73.69 (8.31)

illiterate. As well, 75 % (69 %–81 %) had a history of cardiac diseases, and 35 % (32 %–38 %) were married. The overall rate of fall in the recent year was obtained as 1.9 (95 % CI: 1.15–2.64). Table 2 shows the variables associated with fall incidence in the elderly. As shown in Table 2, the rate of falling was equal between the two genders (29 %, 95 % CI: 26–32). The overall percentage of falls in the elderly during the recent year was obtained as 32 % (95 % CI: 32–39). Also, the overall rate of falling was 36 % (95 % CI: 32–39) in nursing homes, which was equal to the rate obtained at homes (36 %, 95 % CI: 30–34). Regarding the day-night time of falling, most falls occurred at night (25 %, 95 % CI: 0.21–0.29, $P = 0.12$). Furthermore, the stairs, aisle, and yard constituted the main places of falling (35 %, 95 % CI: 0.27–0.42, $P < 0.001$).

The forest plot for the percentage of fear of fall recurrence has been shown in Fig. 2. The overall rate of fear of fall recurrence was obtained as 41 % (95 % CI: 0.38–0.45, $I2 = 90.1$ %, $P < 0.001$). Fear of fall recurrence was obtained as 36 % (0.30–0.42) and 45 % (0.40–0.50, $I2 = 91.9$ %, $P < 0.001$) in elders living in personal homes and nursing homes, respectively.

Meta-regression analysis was performed to assess the relationship between the fear of fall recurrence among the elderly and the sample size (Fig. 3a). As shown, the fear of fall recurrence decreased with an increase in the sample size. Also, *meta*-regression analysis for the association between the fear of fall recurrence and the year of study conduction (Fig. 3b.) showed an increasing trend in the fear of fall recurrence from 2014 toward 2017.

The forest plot for the percentage of fall recurrence has been shown in Fig. 4. Fig. 5 shows publication bias in the data obtained. The symmetry observed in the funnel plot indicated no bias in these studies, where circle sizes exhibit the studies' weights (i.e., larger circles reflect bigger sample sizes and vice versa).

4. Discussion

The present study assessed the frequency of falling events, fear of fall recurrence, and their related factors among the Iranian elderly by systematic review and *meta*-analysis. According to our results, the mean frequency of fall events among elders was around 2 episodes per year, and 32 % of elders experienced falls during the recent year. Elders living in sanatoriums experienced more frequent falls compared to their counterparts residing in personal homes. In a study by Najafi *et al.*, the annual mean frequency of falls was reported as 2.6 in the elders residing in sanatoriums in Tehran city (Najafi Ghezlcheh, et al., 2016a). In another study by Gale *et al.* in the United Kingdom in 2016, about 29 % of elders experienced fall events within the past two years (C. R. Gale, Cooper, & Aihie Sayer, 2016), which shows a notably lower rate compared to the Iranian elderly. The different rates of falling reported in various countries may be due to the differences in the type of study or the duration of follow-up. The rapid growth of the elderly population in Iran in recent years raises concerns about their health consequences in the upcoming years. On the other hand, since in many studies, the reported fall rate is based on elders' self-report, there may be a considerable under-reporting of the frequency of the falling rate due to memory problems, which is an overriding concern about the actual fall rate (Kamrani, et al., 2007; Tanjani, et al., 2015).

In our study, there was no difference regarding the fall rate between men and women, which opposed the results of a number of previous reports, noting that older women were more likely to fall compared to men of the same age. Women were also more vulnerable to post-falling injuries (e.g., fractures requiring hospitalization) compared to men. One reason for the discrepancy between our study and others may be the low number of studies reporting falling rates in separate genders. One study in the United States highlighted that more than 70 % of unwanted falls occurred in women, and the likelihood of fractures following falls in women was twice as in men. Likewise, women were 80 % more likely to be hospitalized due to fall-related complications than men (Stevens & Sogolow, 2005).

A longitudinal study showed that higher levels of pain, the presence of comorbidities, and balance disorders could augment the risk of falls in men. On the other hand, depression, incontinence, and being single have been associated with the risk of falls in women (Catharine R. Gale, et al.,

Table 2
The variables associated with fall incidence among Iranian elders.

Variables	subgroup	Article (n)	Percentage	CI 95 %	I^2	p-value
Fall (based on gender)	Men	4	31	0.28–0.33	93.5	0.000
	Women	4	30	0.27–0.33	93	0.000
	Total	7	32	0.30–0.34	95	0.000
Fall (Based on residency)	home dwelling	4	30	0.30–0.34	75.7	0.023
	Nursing homes dwellings	3	36	0.32–0.39	49.5	0.138
Fall (Based on day-night time)	Morning	3	20	0.18–0.22	98.1	0.000
	Noon	3	5	0.04–0.05	98.7	0.000
	Night	3	25	0.21–0.29	52.8	0.120
Fall (Based on falling location)	Bedroom	2	14	0.12–0.16	96.5	0.000
	Bathroom	2	20	0.18–0.22	90	0.002
	Stairs, aisle, yard	2	35	0.27–0.42	94	0.000

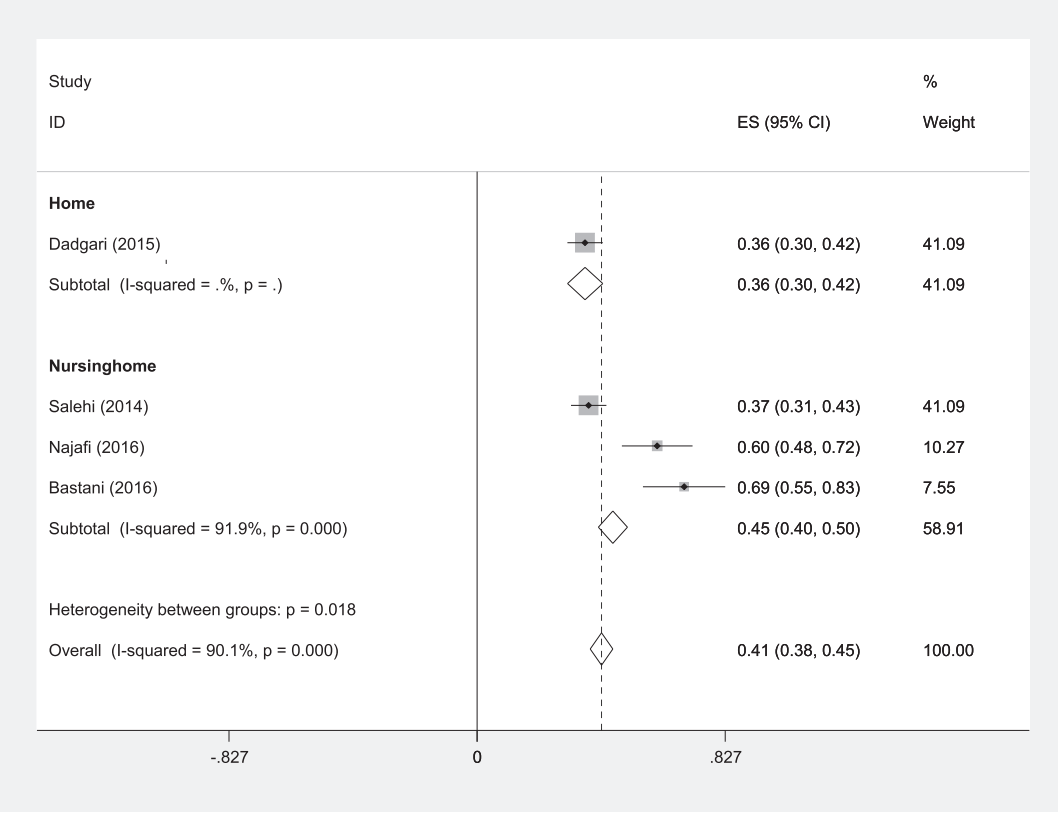

Fig. 2. Forest plot for the fear of fall recurrence. The middle point of each line represents the percentage of fear of fall recurrence in individual studies. The diamond shows the total confidence interval of fear of fall recurrence in all the studies.

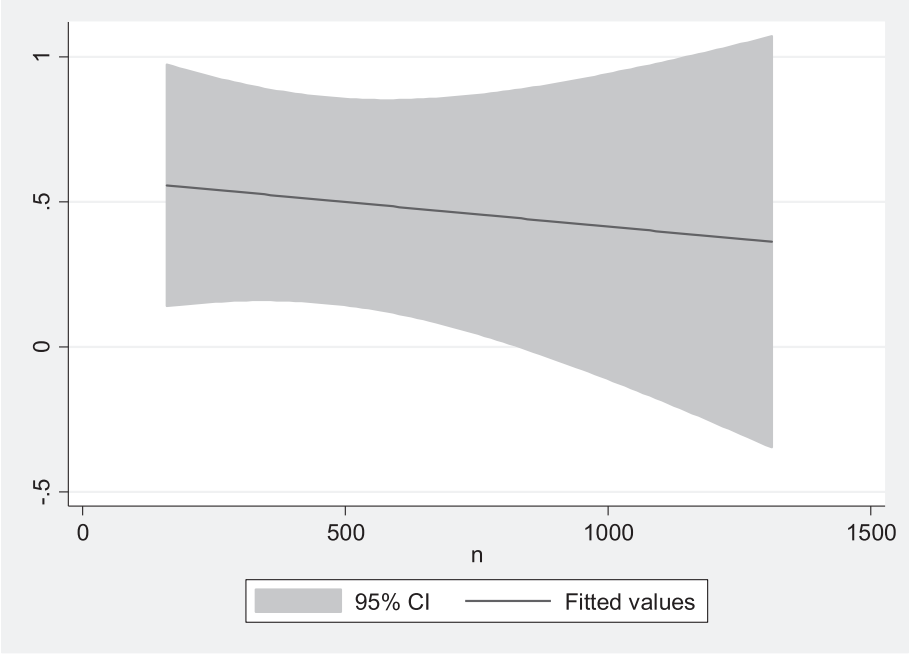

Fig. 3a. The *meta*-regression analysis of the relationship between fear of fall recurrence and sample size.

2018). In the study of Pereira *et al.* in Portugal, the incidence of falls was 10 % higher in women than in men; however, this risk was two folds higher in men than in women after adjustment for covariates such as comorbidities, fat mass, and balance disorders (Pereira, et al., 2013).

Our study revealed that the overall rate of fear of fall recurrence was 41 % among Iranian elders. Fear of fall recurrence was higher in elders living in sanatoriums respective to elders living at homes. Previous studies have stated that around half of the elders experiencing falling events will never retain their prior walking abilities and tend to have low mobility due to the fear of fall recurrence (Clemson, et al., 2015). A

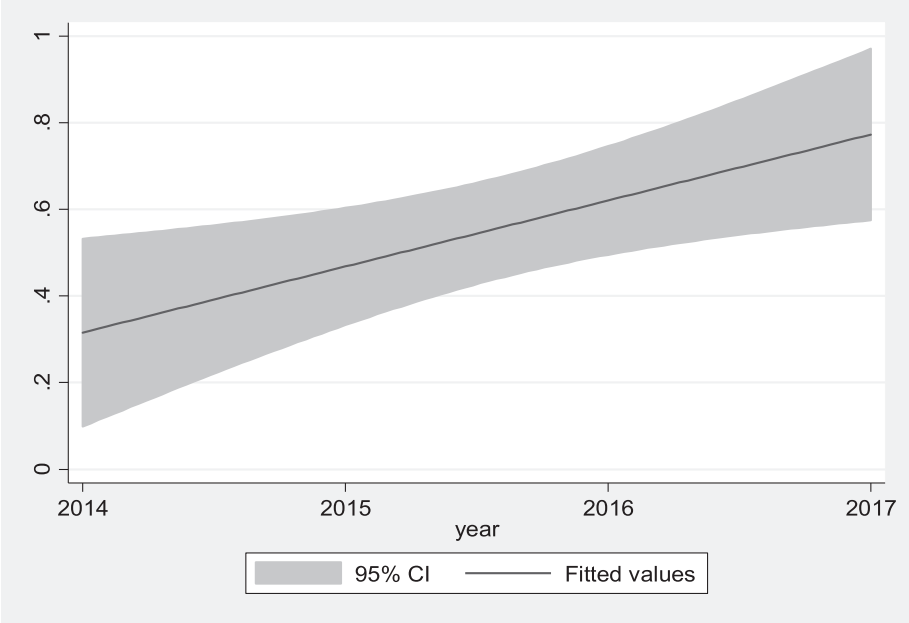

Fig. 3b. The *meta*-regression analysis of the relationship between fear of fall recurrence and the year of study conduction.

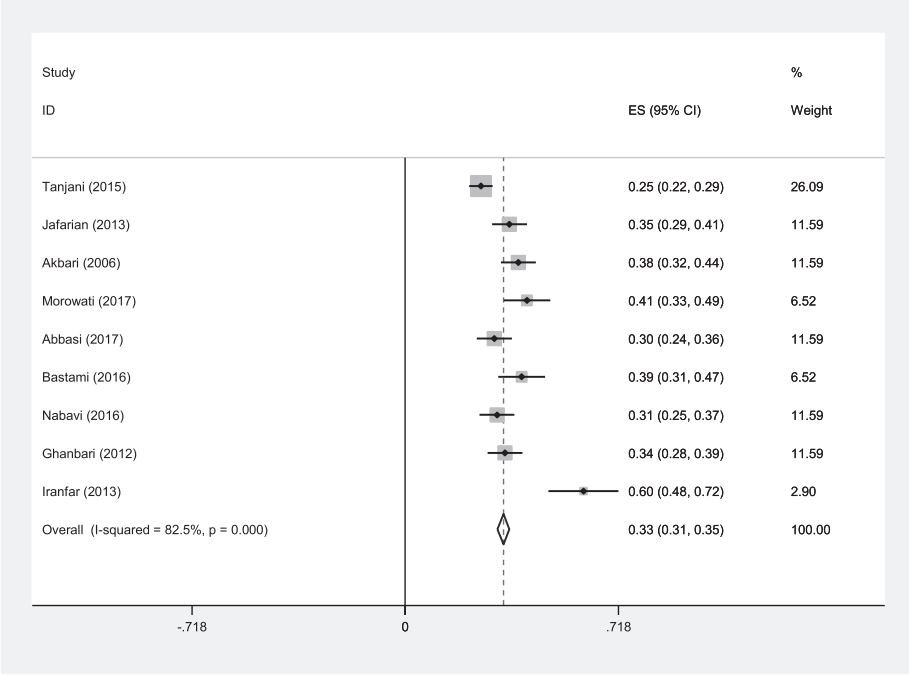

Fig. 4. Forest plot for the percentage of fall recurrence. The middle point of each line shows the percentage of fall recurrence in individual studies. The diamond shows the total confidence interval of fall in all the studies.

study by Marques *et al.* in 2014 demonstrated that the risk of falling in elders was associated with age, previous falling experience, pain, daily activities, clothing, wearing inappropriate shoes, as well as environmental risk factors (Marques, et al., 2014). Here, we were unable to investigate the association of fear of fall recurrence with factors such as age, gender, and history of previous falls because most of the studies assessed merely reported the overall rate of fear of fall recurrence.

Regarding the incident time, most falls in elders occurred at night, which was consistent with the reports of similar studies. According to a study by Sanders *et al.*, night-time falls rendered a 4.5-fold higher probability of hospitalization compared to daytime falls (Sanders et al., 2017). Another study revealed a higher likelihood of fractures in night-time falls (Berry & Miller, 2008). Therefore, it is recommended to carefully watch elders in their active day-night times to prevent them from falling.

Most falls in Iranian elders occurred on stairs, in the aisle, and in the yard. The stairs, bedroom, and bathroom should have adequate light. LaGrow *et al.* reported that 24.9 % of all falls occurred on stairs, and the most predisposing factor included the lack of safety bars or handles (La Grow, Robertson, Campbell, Clarke, & Kerse, 2006). Therefore, installing safety fences on walls (hand-rails) and in aisles, as well as on stairs and in the bathroom, can be effective in facilitating movements

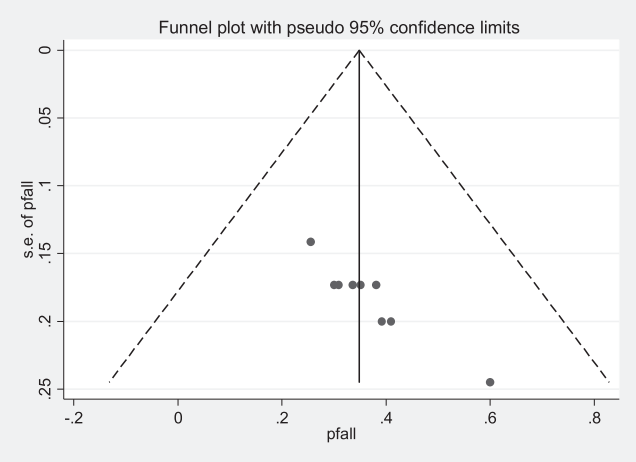

Fig. 5. Publication bias in studies regarding fall occurrence.

and reducing the risk of falling among elders.

According to our findings, the frequency of fall events was higher in the elderly inhabited in sanatoriums than those residing in homes. Other similar studies' reports were in line with this finding. This observation may be justified by inadequate training programs in sanatoriums, cognitive disorders, disabilities, and crowded spaces (Bastani, et al., 2016; C. R. Gale, et al., 2016; Nabavi, et al., 2016), as well as bedrooms with insufficient illumination, high-altitude beds, beds lacking fences, slippery rooms and floors, and lack of supporting handles in the bathroom (Iwarsson, Horstmann, Carlsson, Oswald, & Wahl, 2009). In the elderly residing in care facilities, important risk factors for falls were reported as the history of falls, cardiovascular diseases, heart attack, drug side effects, sleeping outside of the bed, sleeping on chairs, receiving antidepressant therapy, alcohol consumption, visual impairment, low motility, and the lack of regular physical activities (Baranzini et al., 2009; Kamrani, et al., 2007). As most of the studies analyzed in the present review did not explore the relationships between falls in the elderly and the risk factors associated with residing in sanatoriums, we could not identify such risk factors.

5. Limitations

Various studies have used different indicators to assess the frequency of falls and related risk factors, limiting the number of studies that could be included in the *meta*-analysis. Sampling was not random in most of the studies assessed, restricting the generalizability of the findings. In addition, the number of variables analyzed by the reviewed studies was limited. For example, some studies did not report the time, location, and cause of falls. Furthermore, the role of parameters such as gender, age, history of diseases, drug consumption, visual impairment, and marital status had not been investigated in most of the studies. Also, most of the studies did not comprehensively assess the consequences of falls, such as fractures and hospitalization. It is required to address these issues in future descriptive-analytic studies. In addition, we did not include the interventional studies addressing preventive measures to manage falls in older adults, and there is a need to examine the effects of these interventions on the frequency of falls and related complications in the elderly.

6. Conclusion

Regarding the rapid growth of population aging in Iran, falling should be considered a serious problem in the elderly in the near future, and policymakers and healthcare workers should pay attention to this issue. The frequencies of falls and fear of fall recurrence among Iranian older adults over the past year were 32 % and 41 %, respectively. The elderly predisposed to the risk of falls should be identified using reliable assessment tools, and specific interventions should be considered for those having medical conditions that may increase the risk of falls.

CRediT authorship contribution statement

Hamed Tavan: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation. **Arman Azadi:** Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Hamed tavan reports financial support was provided by Ilam University of Medical Sciences. Hamed tavan reports a relationship with ilam university of medical sciences that includes: funding grants. Hamed tavan has patent ilam university of medical sciences pending to Ilam University of medical sciences. no If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

This study was approved by Ilam University of Medical Sciences. The cooperation and financial assistance of the Research Deputy of Ilam University of Medical Sciences is gratefully appreciated. Moreover, I would like to deeply thank the healthcare centers affiliated to Ilam University of Medical Sciences.

References

Abbasi, M., Daniali, S., & Hazrati, M. (2017). Lifestyle of Fallen Elderly Patients Referred to Isfahan Hospitals. *Iran Journal of Nursing, 30*(107), 20-31. [In Persian, English abstract].

Almeida, S. T., Soldera, C. L., Carli, G. A., Gomes, I., & Resende Tde, L. (2012). Analysis of extrinsic and intrinsic factors that predispose elderly individuals to fall. *Revista da Associação Médica Brasileira, 58*(4), 427–433.

Anderson, L. A., Goodman, R. A., Holtzman, D., Posner, S. F., & Northridge, M. E. (2012). Aging in the United States: Opportunities and challenges for public health. *Amercian Jourtnal of Public Health, 102*(3), 393–395. https://doi.org/10.2105/ajph.2011.300617

Baranzini, F., Diurni, M., Ceccon, F., Poloni, N., Cazzamalli, S., Costantini, C., & Callegari, C. (2009). Fall-related injuries in a nursing home setting: Is polypharmacy a risk factor? *BMC Health Services Research, 9*, 228–237. https://doi.org/10.1186/1472-6963-9-228

Bastami, M., & Azadi, A. (2020). Effects of a multicomponent program on fall incidence, fear of falling, and quality of life among older adult nursing home residents. *Annals of Geriatric Medicine and Research, 24*(4), 252–258. https://doi.org/10.4235/agmr.20.0044

Bastani, F., Birjandi, M., Haghani, H., & Sobhan, M. (2016). Factors Associated with fear of falling and functional independence in older adults in iranian nursing homes. *Journal of Client-Centered Nursing Care (JCCNC), 2*(3), 135–144.

Berry, S. D., & Miller, R. R. (2008). Falls: Epidemiology, pathophysiology, and relationship to fracture. *Current Osteoporosis Reports, 6*(4), 149–154.

Buckinx, F., Rolland, Y., Reginster, J.-Y., Ricour, C., Petermans, J., & Bruyère, O. (2015). Burden of frailty in the elderly population: Perspectives for a public health challenge. *Archives of Public Health, 73*(1), 19–25. https://doi.org/10.1186/s13690-015-0068-x

Chang, N. T., Chi, L. Y., Yang, N. P., & Chou, P. (2010). The impact of falls and fear of falling on health-related quality of life in Taiwanese elderly. *Journal of Community Health Nursing, 27*(2), 84–95. https://doi.org/10.1080/07370011003704958

Clemson, L., Kendig, H., Mackenzie, L., & Browning, C. (2015). Predictors of injurious falls and fear of falling differ: An 11-year longitudinal study of incident events in older people. *Journal of Aging and Health, 27*(2), 239–256. https://doi.org/10.1177/0898264314546716

Dadgari, A., Hamid, T. A., Hakim, M. N., Mousavi, S. A., Dadvar, L., Mohammadi, M., & Amerian, N. (2016). The role of self-efficacy on fear of falls and fall among elderly community dwellers in Shahroud, Iran. *Nursing Practice Today, 2*(3), 112–120.

Eriksson, S., Gustafson, Y., & Lundin-Olsson, L. (2008). Risk factors for falls in people with and without a diagnose of dementia living in residential care facilities: A

prospective study. *Archives of Gerontology and Geriatrics, 46*(3), 293–306. https://doi.org/10.1016/j.archger.2007.05.002

Florence, C. S., Bergen, G., Atherly, A., Burns, E., Stevens, J., & Drake, C. (2018). Medical costs of fatal and nonfatal falls in older adults. *Journal of the American Geriatrics Society, 66*(4), 693–698. https://doi.org/10.1111/jgs.15304

Gale, C. R., Cooper, C., & Aihie Sayer, A. (2016). Prevalence and risk factors for falls in older men and women: the english longitudinal study of ageing. *Age and Ageing, 45*(6), 789–794. https://doi.org/10.1093/ageing/afw129

Gale, C. R., Westbury, L. D., Cooper, C., & Dennison, E. M. (2018). Risk factors for incident falls in older men and women: The English longitudinal study of ageing. *BMC Geriatrics, 18*(1), 117–125. https://doi.org/10.1186/s12877-018-0806-3

Ghaffari-Fam, S., Sarbazi, E., Daemi, A., Sarbazi, M., Riyazi, L., Sadeghi-Bazargani, H., & Allahyari, A. (2015). Epidemiological and clinical characteristics of fall injuries in East Azerbaijan, Iran; a cross-sectional study. *Bull Emerg Trauma, 3*(3), 104–110.

Ghanbary, A., Salehi Dehno, N., Moslemi Haghighi, F., & Torabi, M. (2013). The prevalence and correlates of falling down in the older adults Over 55 Years in Shiraz. *[research]. Salmand: Iranian Journal of Ageing, 8*(1), 64–70.

Iranfar, M., Ainy, E., & Soori, H. (2013). Fall Epidemiology in the Elderly Residents of Care Centers in Tehran–1390. *[applicable]. Salmand: Iranian Journal of Ageing, 8*(2), 30–38.

Iwarsson, S., Horstmann, V., Carlsson, G., Oswald, F., & Wahl, H. W. (2009). Person–environment fit predicts falls in older adults better than the consideration of environmental hazards only. *Clinical Rehabilitation, 23*(6), 558–567. https://doi.org/10.1177/0269215508101740

Jafarian, A., Zabihi, A., Aziznejad, R. P., Hosseini, S., & Bijani, A. (2013). Fall at Home and its Related Factors among the Elderly in Babol City Iran. *Journal of Babol University of Medical Science, 15*(5), 95-101. [In Persian, English abstract].

Kamrani, A. A. A., Azadi, F., Foroughan, M., Siadat, S., & Kaldi, A. R. (2007). Characteristics of falls among institutionalized elderly people. *Sālmand, 1*(2), 101–105 [In Persian].

La Grow, S. J., Robertson, M. C., Campbell, A. J., Clarke, G. A., & Kerse, N. M. (2006). Reducing hazard related falls in people 75 years and older with significant visual impairment: How did a successful program work? *Injury Prevention, 12*(5), 296–301. https://doi.org/10.1136/ip.2006.012252

Marques, E. A., Baptista, F., Santos, D. A., Silva, A. M., Mota, J., & Sardinha, L. B. (2014). Risk for losing physical independence in older adults: The role of sedentary time, light, and moderate to vigorous physical activity. *Maturitas, 79*(1), 91–95. https://doi.org/10.1016/j.maturitas.2014.06.012

Marschollek, M., Rehwald, A., Wolf, K. H., Gietzelt, M., Nemitz, G., Zu Schwabedissen, H. M., & Schulze, M. (2011). Sensors vs. experts - a performance comparison of sensor-based fall risk assessment vs. conventional assessment in a sample of geriatric patients. *BMC Medical Informatics and Decision Making, 11*, 48–54. https://doi.org/10.1186/1472-6947-11-48

Morowatisharifabad, M. A., Shakeri-Mobarakeh, T., Sharifabad, V., Akbar, A., Bidaki, R., Asgari-Shahi, M., & Rezaeipandari, H. (2017). Fear of falling and social participation in the elderlies in mobarakeh, isfahan province, Iran. *Elderly Health J, 3*(1), 42–49.

Mousavi, S. M., Haghi, M., & Gharasi Manshadi, M. (2015). Iran's health system and readiness to meet the aging challenges. *Iranian Journal of Public Health, 44*(12), 1716–1717.

Nabavi, S. H., Hatami, S. T., Norouzi, F., Gerivani, Z., Hatami, S. E., Monadi Ziarat, H., & Delbari, A. (2016). Prevalence of Fall and Its Related Factors Among Older People in Bojnurd in 2015. *Iranian Journal of Ageing, 11*(3), 466-473. [In Persian, English abstract].

Najafi Ghezlcheh, T., Ariapour, S., & Jafari Oori, M. (2016a). Epidemiology and relationship of fall and fear of falling in the elderly residing at Kamrani nursing home, Tehran, Iran. *Iran J Ageing, 10*(4), 152-161. [In Persian, English abstract].

Noroozian, M. (2012). The elderly population in iran: An ever growing concern in the health system. *Iran J Psychiatry Behav Sci, 6*(2), 1–6.

Patel, K. V., Phelan, E. A., Leveille, S. G., Lamb, S. E., Missikpode, C., Wallace, R. B., & Turk, D. C. (2014). High prevalence of falls, fear of falling, and impaired balance in older adults with pain in the United States: Findings from the 2011 National Health and Aging Trends Study. *Journal of the American Geriatrics Society, 62*(10), 1844–1852. https://doi.org/10.1111/jgs.13072

Pereira, C. L., Baptista, F., & Infante, P. (2013). Men older than 50 yrs are more likely to fall than women under similar conditions of health, body composition, and balance. *American Journal of Physical Medicine & Rehabilitation, 92*(12), 1095–1103. https://doi.org/10.1097/PHM.0b013e31829b49eb

Rau, C.-S., Lin, T.-S., Wu, S.-C., Yang, J.-C.-S., Hsu, S.-Y., Cho, T.-Y., & Hsieh, C.-H. (2014). Geriatric hospitalizations in fall-related injuries. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 22*, 63. https://doi.org/10.1186/s13049-014-0063-1

Salehi, L., Shokrvash, B., Jamshidi, E., & Montazeri, A. (2014). Physical activity in Iranian older adults who experienced fall during the past 12 months. *BMC Geriatrics, 14*, 115–120. https://doi.org/10.1186/1471-2318-14-115

Sander, M., Oxlund, B., Jespersen, A., Krasnik, A., Mortensen, E. L., Westendorp, R. G. J., & Rasmussen, L. J. (2015). The challenges of human population ageing. *Age and Ageing, 44*(2), 185–187. https://doi.org/10.1093/ageing/afu189

Sanders, K. M., Lim, K., Stuart, A. L., Macleod, A., Scott, D., Nicholson, G. C., & Busija, L. (2017). Diversity in fall characteristics hampers effective prevention: The precipitants, the environment, the fall and the injury. *Osteoporosis International (London), 28*(10), 3005–3015. https://doi.org/10.1007/s00198-017-4145-6

Sayehmiri, K., Shohani, M., Kalvandi, G., Najafi, R., & Tavan, H. (2019 Aug). Biochemical parameters of rickets in Iranian children: A systematic review and meta-analysis. *Journal of Research in Medical Sciences : The Official Journal of Isfahan University of Medical Sciences, 28*(24), 76. https://doi.org/10.4103/jrms.JRMS_354_18. PMID: 31523262; PMCID: PMC6734666

Sayemiri, K., Tavan, H., Shohani, M., & Valizadeh, R. (2021). Forms of Self-immolation in Iran: A Systematic Review and Meta-analysis. *Iran J Psychiatry Behav Sci., 15*(1), e83774.

Stevens, J. A., & Sogolow, E. D. (2005). Gender differences for non-fatal unintentional fall related injuries among older adults. *Injury Prevention, 11*(2), 115–119. https://doi.org/10.1136/ip.2004.005835

Tanjani, P. T., Ainy, E., Akbarpuor, S., & Soori, H. (2015). Study of characteristics of falls among Iranian elders. *Safety Promotion and Injury Prevention, 2*(4), 313-320. [In Persian, English abstract].

Tavan H, Azadi A, Veisani Y. Return to Work in Cancer Patients: A Systematic Review and Meta-analysis. Indian J Palliat Care. 2019 Jan-Mar;25(1):147-152. doi: 10.4103/IJPC.IJPC_114_18. PMID: 30820118; PMCID: PMC6388592.

Ungar, A., Rafanelli, M., Iacomelli, I., Brunetti, M. A., Ceccofiglio, A., Tesi, F., & Marchionni, N. (2013). Fall prevention in the elderly. *Clinical Cases in Mineral and Bone Metabolism, 10*(2), 91–95.