

Relationship between Musculoskeletal Diseases and Risk of Falls in Elderly: A Survey in North-western Iran

Abstract

Background :Falling is a common and serious health-related issue in the elderly .On the other hand, the prevalence of several chronic diseases, including musculoskeletal disorders, increases with age. Therefore, the present study aimed to investigate the relationship between musculoskeletal diseases and falls in the elderly population of Urmia, located in north-western Iran.

Methods :The present study was a cross-sectional, descriptive-analytical study including 200 individuals older than 60 who were randomly selected using the cluster sampling method .Data collection was performed using a two-parted questionnaire, including demographics, data regarding musculoskeletal diseases ,and history of falls within the past year. Moreover, data analysis was performed using the SPSS21 , Chi-squared test, and logistic regression.

Results :According to our findings %30 ,of the participants had experienced falls in the past year. Moreover , there was a significant correlation between musculoskeletal diseases and the variables of age, gender, and marital status. According to the logistic regression results ,falls were 6.2 folds more prevalent in the participants with at least one musculoskeletal disease ,such as osteoarthritis, osteoporosis ,rheumatoid arthritis, or gout ,than those without musculoskeletal diseases) OR=6.2), which is significant (P<0.001.(

Conclusion :We found a relatively high prevalence of falls in the elderly population of Urmia, Iran, while the elderly with musculoskeletal diseases were significantly more likely to have experienced falls within the past year. Therefore, it is recommended to take effective preventive measures considering the fall risk factors in the elderly, such as musculoskeletal diseases.

Keywords: Falls, Musculoskeletal Diseases, Aged, Chronic Disease, Health Status

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Morad Ali Zareipour, PhD*; **Ahmad Sotoudeh, PhD****; **Mojtaba Fattahi Ardakani, PhD*****

*Health System Research Unit, Health Center of Urmia, Urmia University of Medical Sciences, Urmia, Iran

**Department of Public Health, Bushehr University of Medical Sciences, Bushehr, Iran

***Health Factors Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

Corresponding Author:
Morad Ali Zareipour

Email:
z.morad@yahoo.com

Introduction

Serious health-related issues in the elderly. This problem is especially of great importance in communities with a high elderly population⁽¹⁾. It has been shown that falls are more prevalent in the elderly, women, and those with the previous history of falls⁽²⁾. Birth control programs, implementation of disease control programs, and training promotion have led to the increased population of elderly, as well as their life expectancy and quality of life^(2,3). According to literature, 35%-40% of the elderly have experienced at least one fall annually, and about half of them have experienced recurrent falls⁽²⁾. Accidents are the fifth leading cause of mortality in the elderly, with falls being the most common cause of trauma in this age group⁽⁴⁾. Fall-related injuries may be fatal or non-fatal, and risk factors of falls in the elderly are usually classified into internal factors, external factors, and a combination of both, which is true for most cases.

Falls and related injuries may affect the quality of life in the elderly. The fear of recurrent falls in the elderly may lead to consequences, such as limited activities, social isolation, increased dependence, and economic problems. On the other hand, falls have significant impacts on the healthcare and economic systems of society^(5,6).

A fall is defined as a sudden and unintentional positional change causing an individual to land at a lower level, which can be an object, the floor, or the ground. Moreover, a fall must not be a consequence of the sudden onset of paralysis, epileptic seizure, or an overwhelming external force⁽⁷⁾.

The prevalence of falls is different in the elderly of different countries, being reported as 28.5%, 26.4%, 33.3%, 31%, 29%, 27.1%, 28.5%, and 27%-30% in Turkey, China, the Netherlands, Switzerland, Australia, Brazil, Argentina, and Iran, respectively^(8-14, 25). It is essential to identify the elderly at high risk for falls in order to establish primary preventive measures for falling. Given the high prevalence of falls in the elderly, neglecting the preventive measures might lead to serious consequences, such as fractures, abrasions, and compromised mobility.

Musculoskeletal diseases, such as osteoarthritis, can affect the intracapsular tissue and soft tissue surrounding the joints, including the ligaments, capsules, tendons, and muscles⁽¹⁵⁾. Therefore, these diseases might increase the risk of falls in the elderly. In fact, patients with musculoskeletal diseases also have decreased muscular strength and proprioception⁽¹⁶⁾, which can alter the muscle reflex responses, reduce the muscle spindle sensitivity, impair joint protection, and lead to articular instability⁽¹⁷⁾. Thus, these diseases may play a role in falls in the elderly. With this background in mind, the present study aimed to investigate the relationship between musculoskeletal diseases and falls in the elderly population of Urmia, Iran.

Methods

The present descriptive-analytical study included the individuals aged higher than 60 years who were presented to the healthcare facilities of Urmia, Iran, in 2017. Considering the sample sizes of previous similar studies, the rate of falls in the elderly^(8-10, 13), and a confidence interval of 95%, the sample size was calculated as 200 ($Z=10.96$, $P=0.3$, $d=06$). First, 10 out of 35 healthcare facilities were randomly selected using the cluster sampling method and lottery. The elderly were selected from each center using the simple random sampling method. The number of selected individuals was proportional to the elderly population. Data collection was performed using a two-parted questionnaire, including demographics, data regarding

musculoskeletal diseases (osteoarthritis, osteoporosis, rheumatoid arthritis, or gout), history of at least one fall in the past year, and time and location of each fall. The potential participants were invited to visit the healthcare facility via telephone calls. Then, those willing to participate filled the questionnaires. The questionnaires of the illiterate and less educated participants were filled by the researcher through interviews. The inclusion criteria were the age range of 60-80 years, the ability to walk without assistance, and residing in a nursing home. The exclusion criteria included a history of anticonvulsant use and death during the study.

Ethical Considerations

In this study, we adhered to the ethical principles in all the study stages. The study was approved by the Ethics Committee of the Yazd University of Medical Sciences. Moreover, all the participants were explained about the research objectives and stages before the study and gave written informed consent if willing to participate.

Results

According to our findings, the mean age of the participants was 71.42 ± 5.97 years, with the age group of 75-80 years being the most common age group (33%). The majority of participants were married (56%), and 42% of them were housewives. Regarding the level of education, the most common was the completion of elementary school (33%), and most of the participants belonged to the middle economic class (54%).

(%30) 60, had a history of falls in the past year, with most falls occurred at home ($n=36$, 60%) and in the morning ($n=26$, 43.3%). Furthermore, 114 participants (57%) were diagnosed with at least one musculoskeletal disease, such as osteoarthritis, osteoporosis, rheumatoid arthritis, or gout (Table 1).

Table 1. Distribution frequency and percentage of demographic characteristics of the participants (n=200)

Variable		N	%
Age	60-65	36	18
	65-70	54	27
	70-75	44	22
	75-80	66	33
Gender	Male	104	52%
	Female	96	48%
Occupational Status	Housewife	84	42%
	Self-employed	40	20%
	Retired	20	10%
	Unemployed	56	28%
Marital Status	Married	112	56%
	Divorced	26	13%
	Diseased spouse	62	31%
Level of Education	Illiterate	58	29%
	Primary school	66	33%
	Junior-high school	42	21%
	Diploma and higher degree	36	17%
Economic Status	Good	56	28%
	Moderate	108	54%
	Poor	36	18%
History of falls	Yes	60	30%
	No	140	70%
Place of falls	House	36	60%
	Outdoors	24	40%
Time of falls	Morning	26	43.3%
	Evening	16	26.7%
	Night	18	30%
Musculoskeletal diseases	Yes	114	57%
	No	86	43%

According to the chi-squared test results, there was a significant positive correlation between the frequency of falls and the age of the participants ($P > 0.001$). In addition, the falls were significantly more prevalent in women compared to men ($P=0.02$) and in those living alone, including divorced, widows, or widowers, compared to the married participants ($P=0.02$). Also, it was shown that those with musculoskeletal diseases, including osteoarthritis, osteoporosis, rheumatoid arthritis, or gout, experienced the significantly more falls than those without these diseases ($P > 0.001$) (Table 2).

All the significant variables were entered into the logistic regression model to investigate their predictive value. According to the results, 3 variables of age, gender, and musculoskeletal diseases could predict the falls in the participants. In fact, the risk of falls was 1.8 times higher in women than men ($OR=1.8$), which was significant. Moreover, the risk of falls was 2.2 times higher in the participants older than 75 compared to other age groups ($OR=2.2$). Finally, the musculoskeletal diseases were found to have the most significant predictive value for falls in the elderly compared to other variables investigated, with the risk of falls being 6.2 times higher in the elderly with at least one musculoskeletal disease, such as osteoarthritis, osteoporosis, rheumatoid arthritis, or gout, compared to those without these diseases ($OR=6.2$). (Table 3)

Discussion

According to the present study results, 30% of the elderly experienced at least one fall within the past year, while the previous studies performed in Turkey, China, the Netherlands, Switzerland, Australia, Argentina, and Iran have reported the rate of falls at 28.5%, 26.4%, 33.3%, 29%, 28.5%, and 27%-30%, respectively (4, 8-14, 18). In addition, most falls occurred at home (60%), which can be explained by the fact that the Iranian elderly often play a passive role in the community, spending most of their time at home. Also, falls were more prevalent in the morning (43.3%), while the least frequency of falls was at the noon times (26.7%). This higher incidence in the morning can be explained by the higher physical activity of the elderly at this time. Compatible with our results, some studies have reported a higher possibility of falls in the elderly during the active hours of the day.⁽²¹⁻¹⁹⁾ Therefore, it is recommended to pay more attention to the elderly at these active times of the day. Our study found a significant relationship between the risk of falls and age so that older individuals were more likely to experience falls. This can be explained by the age-related issues experienced by the elderly, such as chronic diseases, visual impairments, and physical weakness, which has been confirmed by various studies^(19, 22, 23).

Variable		A positive history of falls	A negative history of falls	P-value
Age	60-65	4 (6.7%)	32 (22.9%)	P< 0.001
	65-70	8 (13.3%)	46 (32.9%)	
	70-75	20 (33.3%)	24 (17.1%)	
	75-80	28 (46.7%)	38 (27.1%)	
Gender	Male	25 (24%)	79 (76%)	P= 0.02
	Female	35 (36.5%)	61 (63.5%)	
Occupational Status	Housewife	30 (35.7%)	54 (64.3%)	P= 0.3
	Self-employed	8 (20%)	32 (80%)	
	Retired	6 (30%)	14 (70%)	
	Unemployed	16 (28.6%)	40 (71.4%)	
Marital Status	Married	26 (23.2%)	86 (76.8%)	P= 0.02
	Divorced	8 (30.7%)	18 (69.3%)	
	Deceased spouse	26 (41.9%)	36 (58.1%)	
Level of education	Illiterate	16 (27.6%)	42 (72.4%)	P= 0.2
	Primary school	25 (37.8%)	41 (62.3%)	
	Junior high school	12 (28.6%)	30 (71.4%)	
	Diploma and higher degree	7 (20%)	29 (80%)	
Economic Status	Good	15 (26.8%)	41 (73.2%)	0.1
	Moderate	31 (28.7%)	77 (71.3%)	
	Poor	14 (38.9%)	22 (61.1%)	
Musculoskeletal diseases	Yes	38 (33.3%)	76 (66.7%)	P< 0.001
	No	22 (25.6%)	64 (74.4%)	

Independent variables	β (regression coefficient)	S.E	OR (odds ratio)	P-value
Age				
60-65	-	-	1	-
65-70	0.33	0.77	0.66	0.61
70-75	0.55	0.66	1.6	0.08
≤ 75	1.2	0.76	2.2	0.04
Gender				
Male	-	-	1	-
Female	0.7	0.74	1.8	0.05
Musculoskeletal diseases				
No	-	-	-	-
Yes	1.7	0.55	6.2	0.0001

In the current research, there was a difference between the male and female participants. In terms of gender, we found a significantly higher possibility of falls in women compared to men, which was

compatible with the findings by Halil et al.⁽⁸⁾ in Turkey and Jalali et al.⁽¹³⁾ in Iran. Moreover, Zhang and Chen⁽²²⁾ reported a higher rate of falls in female elderly compared to male elderly. This gender-related difference in our

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study can be explained by the fact that old Iranian women are more engaged in daily activities, especially housekeeping and shopping, while the old men are more likely to experience a sedentary lifestyle after retirement. A typical old Iranian man spends his day resting at home, performing religious duties, or meeting with friends.

of falls in married elderly living together compared to divorced individuals, widows, or widowers living alone. In fact, there are more barriers to establishing fall preventive behaviours in single old individuals. However, this can be resolved by proper planning, including lifestyle modification and eliminating obstacles in this respect. In a study by Lim et al. ⁽²⁴⁾, married individuals were more likely to adhere to health-promoting behaviours, which is compatible with our findings.

According to the results of the current study, finally, we found that musculoskeletal diseases were the most important predictive factors for falls in the elderly. In fact, the risk of falls in the elderly with a musculoskeletal disease, such as osteoarthritis, osteoporosis, rheumatoid arthritis, or gout, was 6.2 times higher than in those without these diseases. Other similar studies have also reported a relationship between the risk of falls and chronic diseases in the elderly ^(23, 22, 20, 8). Chronic diseases can probably lead to disability and weakness in the elderly, leading to subsequent falls. For example, osteoarthritis can affect the joints and surrounding tissues, such as tendons and muscles ⁽¹⁵⁾. Moreover, it can lead to proprioceptive impairments and muscular strength loss (16). (A study by Hanley et al. ⁽²⁵⁾ found a positive correlation between lower limb muscle weakness and problems such as impaired balance, falls, and related injuries. It is reported that impaired proprioception can alter the muscle reflex responses, reduce the muscular spindle sensitivity, decrease articular protection, and lead to joint instability ⁽¹⁷⁾. Therefore, it may play a role in falls in the elderly population.

The present study had some limitations as well. A significant limitation was that we did

not consider other chronic diseases usually found in this age group in our analyses, while these problems may also increase the risk of falls, thereby interfering with our analyses. These chronic diseases can be cardiovascular, neurologic, and ocular diseases. In addition, we did not separate the muscular diseases and diseases related to bones and joints. Therefore, we recommend considering these problems in future studies.

Conclusion

According to the present study results, the risk of falls was relatively high in the Iranian elderly population. Moreover, the elderly with musculoskeletal diseases were significantly more likely to experience falls. Therefore, it is suggested to take effective preventive measures considering the fall risk factors in the elderly, such as musculoskeletal diseases.

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