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Original Article

The Relationship Between Fear of Falling and Physical Activity among Older Adults

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Introduction: Physical activity (PA) improves balance, walking, and muscle strength and reduces the prevalence of falls among the elderly. Fear of falling (FOF) is the most common fear among older adults and a major health problem among them. Therefore, this study was conducted to determine the relationship between FOF and PA among older adults in Iran.

Methods: This cross-sectional study was conducted on 687 elderly people aged ≥ 60 years in Yazd province, Iran using cluster sampling method. The data collection tools were The Falls Efficacy Scale International and the Physical Activity Scale for the Elderly. The data were analyzed by describing frequency distribution, Mann-Whitney, Spearman correlation tests and Hierarchical regression under SPSS software.

Results: The mean score of FOF and PA were 27.08 ± 12.30 (range 16-64) and 86.87 ± 79.15 (range 0-494), respectively. There was an inverse significant correlation between PA and FOF($r = -0.304$) and with increasing age, PA of the elderly decreases, and the FOF increases. Demographic variables (age, gender, living status, and retirement status) which were entered into the model in the first stage, predicted 10.9 % of the variance of PA ($p < 0.001$). In step 2, chronic diseases predicted 3.5 % which was statistically significant and in step 3, FOF also significantly predicted 2.8% of the variance of PA ($p < 0.001$).

Conclusion: The level of PA among older adults is very low, so it is very important to know the factors influencing that, to take action to prevent the occurrence of these factors, and also to eliminate them. Considering that demographic variables and FOF can predict changes in PA, therefore, it is possible to improve the PA of older adults by performing appropriate interventions on these issues.

Keywords: Physical Activity, Fear of Falling, Aged

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Introduction

Falling is one of the common problems of old age such that reported its prevalence in the age group over 65 is between 25% and 37% per year (1). One of the most important and common risk factors of falling in older adults is the fear of falling (FOF) (2). Also, FOF and avoiding physical activity (PA) due to fear, as the most common psychological consequences of falling, have a high prevalence and cause a wide range of negative effects among older adults (3).

Tinetti & Powell (1993) define FOF as a constant worry about falling that can lead to a person avoiding activities they are still able to do (4). The prevalence of FOF in elderly people has been reported between 20% and 80% in various studies (5, 6). The FOF is the most common fear among elderly people and is a major health problem among them those who live in the community (7) and its consequences can be limiting and avoiding daily living activities, creating limitations in mobility and independence, reducing the individual's satisfaction in returning to the community, physical performance and the quality of life of older adults (3, 8-10). One of the factors of falling and creating multiple disabilities and dependence among older adults is an imbalance, and this imbalance and FOF cause immobility (11, 12).

PA improves balance, walking, and muscle strength and reduce the risk of falls among older adults (12). Studies show that PA reduces movement and functional limitations as well as prevents or delays balance disorders (13, 14). According to the report of the World Health Organization, at least 60% of the world's people do not do the recommended amount of PA that is needed for health benefits (15).

Various studies have shown that with increasing age due to disorders that occur in various systems, especially due to movement limitations, the dependence of a person on others in doing daily tasks increases. These factors can cause many negative effects on the feeling of well-being and consequently on the lifestyle of elderly people. One of the things that may have been able to play a major role in increasing life expectancy and improving the lifestyle of older adults is regular and continuous PA (16). Regular PA is an important health-enhancing behavior that prevents and delays various chronic diseases and premature mortality and its importance has been suggested as a tool for maintaining independence in aging (17). Studies in Iran have shown that the level of PA of elderly aged ≥ 60 years is low, which has caused a decrease in the health related quality of life- (18). Also, surveys conducted in Iran show that about 65% of elderly people are inactive in terms of PAs (19).

It seems that the FOF, which leads to a decrease in their self-confidence and self-efficacy, can be lead to reduced PA level in older adults. Since the proper PA during old age is one of the main factors of successful aging (20), the aim of this study investigated the relationship between FOF and PA among older adults to provide healthcare providers with educational support and help for older adults, their families, and caregivers to plan and design appropriate interventions in this regard.

Methods

Study design and participants

This cross-sectional study was conducted on 687 elderly people aged 60 and over in Yazd province, Iran in 2020. Data collection was done using standard questionnaires by a trained interviewer. The sample size was calculated based on conducting a pilot study on 20 elderly people, taking into account the confidence level of 95%, r = 0.12, and β-1 = 0.8, 544 people, including dropouts, 687 elderly people were included in the study.

First, five cities were randomly selected from among the cities of Yazd province, and the urban areas of each city were divided into several clusters according to the population, and the addresses of these clusters were determined. According to the elderly population of each city, the sample size for each city was selected in the following order: Yazd (377 people), Bafq (70 people), Taft (60 people), Ardakan (110 people), and Mehriz (70 people). (It should be noted that the city of Yazd was divided into 8 clusters and 47 people from each cluster were included in the study. Bafq city was divided into 5 clusters and 14 people from each cluster, Taft into 4 clusters and 15 people from each cluster, Ardakan into 5 clusters and 22 people from each cluster, and Mehriz into 4 clusters and 18 people from each cluster was included in the study). Then the trained interviewers would refer to the address of the clusters and start his/her work from the first house. Questionnaires were completed from each cluster according to the selected sample size.

The inclusion criteria included being 60 years old and older, living in urban areas of selected cities, speaking Persian, and being willing to participate in the study (informed consent). Elderly people with hearing and speech impairments such a way that they are not able to communicate and suffering from cognitive disorders (according to the AMTS questionnaire score) and also suffering from chronic physically debilitating diseases were not included in the study.

Instruments

The questionnaires used in this research include:

1- The demographic characteristics questionnaire included age, gender, level of education, occupation, housing, diseases, and common problems.

2- The Falls Efficacy Scale International: has 16 items related to doing activities in daily life, which was created by Yardley et al., (2005). Each item asks the "level of worry about falling" while performing each of these activities, on a four-point scale from "not at all worried" to "extremely worried". The score range is between 16 and 64. A higher score means more FOF or lower self-efficacy (21). The psychometrics of this tool in Iran was carried out and confirmed by Khajavi et al., (22).

3- Physical Activity Scale for the Elderly (PASE): This scale has three parts:

The first part is related to leisure time (6 questions); the second part is related to home activities (3 questions); the third part is related to the work-related activity (1 question) and higher scores indicate more PA. In this section, there are questions about activities such as walking, resting in bed, activities that require sitting,

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sports and recreational activities, and activities at home, etc. From this point of view, people are divided into three groups low activity, moderate activity, and high activity based on the score of the standard questionnaire for measuring PA in the elderly. The total PASE score is calculated by multiplying the amount of time a person spends in each activity (hours/days during the last 7 days) or participates in the activity (yes/no) by the PASE weight, and finally the total PASE score. The PASE score in the elderly may be between zero and 494 or higher (23). The validity and reliability of this scale among Iranian elderly people were approved by Hatami et al., (24).

Data analysis

The Kolmogorov-Smirnov test was performed to check the normality of the data. Data are presented as mean ± standard deviations and descriptive statistics were calculated for demographic information. The Mann-Whitney U test was used to compare differences of FOF and PA scores in term of diseases and Spearman's rank correlation measures the strength and direction of association between FOF and PA. Hierarchical linear regression analysis was used to determine the factors explaining the variance of PA. All statistical analyses were performed with SPSS software.

Ethical considerations

Before collecting information, while explaining the purpose of this research, the studied elderly were assured that their information will remain completely confidential. Then written informed consent for participation was obtained and they were informed that participation in the study is completely voluntary. This study has been approved by the Ethics Committee of Shahid Sadoughi University of Medical Sciences, Yazd, Iran. (Code of ethics: IR.SSU.SPH.REC.1396.100)

Results

The mean age of the participants in the study was 69.78 ± 7.97. Among them, 54.9% were women. Most of the participants were married and regarding the level of education, the highest frequency was related to the elementary level. (Table 1)

Of all participants, 51.5% had joint pain and about 50% suffered from high blood pressure.

The mean and standard deviation of the FOF score was 27.08 ± 12.30 (range of 16-64). The biggest concern of the older adults was going up and down a ramp (20.7%). Also, 74% of the participants were not worried at all about falling due to putting on and taking off clothes. (Table 2)

In terms of PA status, 93% of the participants had never done any exercises specifically to increase muscle strength and endurance, such as lifting weights or pushups, etc. Also, 84% had not done strenuous sports and recreational activities. During the last 7 days, 31% had done sitting activities such as reading, watching TV, or doing handicrafts and 21% had walked outside the house or in the yard.

The mean score of the PA was 87.87 ± 79.15 (0-494). The mean and standard deviation of the dimensions of PA were 21.27 ± 35.71 for leisure time activities (0-289), 41.47 ± 47.93 for domestic activities (at home) 57.00 (0-171), and then activities related to work/occupation 87.87 ± 79.15 (0-289), respectively.

A statistically significant relationship was observed between FOF and PA with chronic diseases. (Table 3) There was an inverse significant correlation between FOF and PA. Moreover, with increasing age, PA decreases, and the FOF increases. (Table 4)

Results of the Hierarchical regression analyses are displayed in Table 5. In step 1, demographic variables (age, gender, living status, retirement status and type of housing ownership) predicted 10.9% of the variance of PA ($p < 0.001$). In step 2, chronic diseases predicted extra 3.5 % of variance in PA which was statistically significant. In step 3, FOF predicted 2.8% of the variance of PA and was a statistically significant predictor of PA ($p < 0.001$). The total variance explained by final model was 17.3 %. In the last model, variables of age, gender, living status, retirement status, depression and FOF remained as significant predictors of PA in the model.

Table 1. Demographic information of participants

Variables	n (%)
Age	
60-69	369 (57.3)
70-70	223 (32.5)
>80	95 (13.8)
Gender	
Male	310 (45.1%)
Female	377 (54.9%)
Educational level	
Illiterate	221 (32.2%)
Primary school	290 (42.3%)
Secondary school	65 (9.5%)
High school diploma	61 (8.9%)
Academic degree	49 (7.1%)
Retirement status	
Retired	315 (47%)
Not retired	357 (53%)
Living status	
With spouse	418 (61.1%)
With spouse & children	73 (10.7%)
With only unmarried children	36 (5.3%)
With only married children	58 (8.5%)
Living alone	99 (14.5%)
Type of housing ownership	
Owner	610 (93.3%)
Rental	29 (4.4%)
Children's housing	37(2.2%)
Others	11 (1.6%)

Table 2. Frequency distribution of The Falls Efficacy Scale International Items

FES-I item	Not at all concerned		Somewhat concerned		Fairly concerned		Very concerned	
	N	%	N	%	N	%	N	%
1.Cleaning the house	442	64.3	148	21.5	52	7.6	45	6.6
2. Getting dressed/undressed	512	74.5	102	14.8	49	7.1	24	3.5
3. Preparing simple meals	515	75	104	15.1	38	5.5	30	4.4
4. Taking a bath or shower	490	71.3	122	17.8	43	6.3	32	4.7
5. Going to the shop	476	69.3	113	16.4	52	7.6	46	6.7
6. Getting in or out of a chair	490	71.3	113	16.4	49	7.1	35	5.1
7. Going up or down stairs	322	46.9	202	29.4	82	11.9	81	11.8
8. Walking around outside	480	69.9	110	16	51	7.4	46	6.7
9. Reaching up or bending down	422	61.4	162	23.6	59	8.6	44	6.4
10. Answering the telephone	478	69.6	117	17	50	7.3	42	6.1
11. Walking on a slippery surface	235	34.2	163	23.7	152	22.1	137	19.9
12. Visiting a friend/relative	446	64.9	113	16.4	78	11.4	50	7.3
13. Going to a place with crowds	360	52.4	168	24.5	84	12.2	75	10.9
14. Walking on an uneven surface	216	31.4	139	28.1	155	22.6	123	17.9
15. Walking up or down a slope	223	32.5	179	26.1	143	20.8	142	20.7
16. Going out to a social event	467	68	112	16.3	57	8.3	51	7.4

Table 3. Mean scores of fear of falling and physical activity according to some diseases in the participants

Diseases	Yes		No		p	Yes		No		p
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Cardiovascular diseases	28.96	12.90	26.27	11.86	0.003	72.62	71.07	93	81.51	0.001
Visual impairment	35.07	14.15	25.65	11.38	0.001	68.04	67.05	90.34	80.74	0.010
Joint's pain	31.03	13.51	22.82	8.98	0.001	82.92	77.65	91.08	80.92	0.200
Osteoporosis	34.11	14.52	23.49	9.04	0.001	68.21	65.36	97.03	84.43	< 0.001
Hypertension	29.37	13.08	24.66	10.76	0.001	76.98	68.19	97.52	87.71	0.010
Urinary incontinence	38.30	16.08	25.91	11.14	0.001	55.69	64.23	90.31	79.86	0.001
Diabetes	28.75	13.03	26.09	11.59	0.012	83.30	76.06	89.25	80.78	0.501
Sleep disorder	29.00	12.03	26.48	12.35	0.001	71.06	66.97	91.95	82.12	0.009
Imbalance	37.67	15.07	25.39	10.83	0.001	62.86	56.40	90.99	81.41	0.005
Depression	29.33	11.53	26.54	12.20	0.001	58.63	63.22	93.16	76.80	< 0.001

Table 4. Correlation between Age, physical activity, and fear of falling

	Age	Physical activity	Fear of falling
Age	1		
Physical activity	-0.250*	1	
Fear of falling	0.379*	-0.304*	1

$p < 0.001$*

Discussion

Falling and the fear of it, leads to a decrease in the elderly's satisfaction with returning to the community, a decrease in PA and his/her health status. PA plays an important role in improving balance, walking, and muscle strength and reducing the incidence of falls among older adults. Therefore, this study was conducted to determine the relationship between FOF and PA among older adults.

The results showed a low level of FOF in elderly people. Also, the elderly participants did not have a suitable level of PA. Demographic variables, especially age, gender, marital status, and living status, suffering from some common diseases and FOF, were significant predictors of PA. Also, the FOF predicted 2.8% of the variance of changes in PA. The results showed a low level of FOF among older adults so that 9.5% had a high FOF, but more than 70% expressed a little FOF. The most worried elderly people were about falling, going up, and down a slope and walking on an uneven surface (for example, uneven and rocky ground or uneven sidewalk). Also, most of them were not afraid of falling while dressing and undressing, showering or bathing, and sitting or getting up from a chair.

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Table 5. Hierarchical regression analysis of physical activity

Variable / Step	β (p-value)		
	Step 1	Step 2	Step 3
Outcome variable: Physical activity			
1) Age	-0.26 (<0.001)	-0.23 (< 0.001)	-0.17 (<0.001)
Gender (female)	-0.23 (< 0.001)	-0.18 (0.001)	-0.16 (<0.001)
Education level (literate)	0.05 (0.18)	0.03 (0.37)	0.03 (0.41)
Living status (alone)	0.04 (0.27)	0.03 (0.35)	0.05 (0.13)
Retirement status (no)	0.10 (0.01)	0.10 (0.01)	0.11 (0.006)
Type of housing ownership (owner)	-0.02 (0.57)	0.002 (0.95)	0.005 (0.90)
2) Cardiovascular diseases (no)		0.05 (0.12)	0.05 (0.14)
Visual impairment (no)		-0.05 (0.15)	-0.06 (0.07)
Joint's pain (no)		-0.06 (0.14)	-0.07 (0.09)
Osteoporosis (no)		0.09 (0.03)	0.05 (0.21)
Hypertension (no)		0.04 (0.21)	0.04 (0.29)
Diabetes (no)		-0.01 (0.74)	-0.01 (0.68)
Urinary incontinence (no)		0.06 (0.08)	0.04 (0.28)
Sleep disorder (no)		0.03 (0.34)	0.03 (0.30)
Depression (no)		0.09 (0.01)	0.09 (0.01)
Imbalance (no)		0.02 (0.47)	-0.01 (0.80)
3) Fear of falling			-0.21 (< 0.001)
R^2	0.109	0.035	0.028
Cumulative R^2	0.125	0.144	0.173
p value	**< 0.001**	**0.003**	**< 0.001**

The level of FOF among older adults was lower compared to other studies (3, 6, 25, 26). A systematic review study showed that the level of FOF in elderly people who live in the community ranges from 3 to 85% (10). FOF depends on various factors such as age, history of falling, the presence of many diseases and disorders, and environmental factors. It seems because that the majority of the studied samples were young seniors (60-69 years old) and this group has fewer disorders and problems than older seniors and also that they probably have not had a history of falling, so they have less fear. Also, the difference in setting and studied samples can be another reason for this difference. The FOF is not due to injury and physical disability, but due to the lack of belief in the ability to maintain balance in elderly people, and since independence is emphasized as a desirable approach for active aging (26), therefore, it seems that having self-confidence based on the ability to be independent in doing daily life tasks has been effective.

FOF can play a protective role among older adults because it makes them take more care of themselves. But if the FOF leads to a person's limitation and also a decrease in self-confidence in the elderly, it is considered a risk factor. As a result, the FOF is useful as long as it does not limit the elderly. But since the FOF usually arises with increases in age, it is considered a risk in most cases, which should be considered in the education and counseling of older adults. The FOF is influenced by factors such as a person's previous experiences of falling, unsafe living conditions, unavailability of support facilities, etc. The increase of this fear and limitation in performing activities leads to irreparable complications for elderly people (27).

The results showed that older adults do not have a suitable level of PA. Among the three categories of PA, performing household activities (at home) with an average of 57.41 received the highest score. Hosseini et al.'s study in Babol showed that 95% of elderly people did not have proper PA (28). In the study of Ishaghi et al., 86% of elderly people did not have regular PA (29). A study conducted in Yazd in 2016, it showed that the rate of physical inactivity was 68% (30). In other countries, the rate of inactivity among the elderly population is high, such that in Brazil (80.7%) (31) and Australia (67.7%) (32). In England, 27% of the elderly aged 65-74 and 75% of the elderly over 80 are inactive (33). The prevalence of inactivity among Americans aged 65 to 74 reaches 27% and increases to more than 35% for people over 75 years old (34).

Most of the conducted studies indicate that the level of PA among elderly people is inappropriate. It seems that the lack of sufficient motivation, suffering from several chronic and debilitating diseases, FOF, fear of being in the community, and the presence of environmental barriers can lead to a decrease in the level of PA. The results showed that with increasing age, the amount of PA decreases and the FOF increases. Also, the FOF had an inverse and significant correlation with PA, so as the score of FOF increased, the score of PA decreased, which was similar to the findings of other studies regarding the role of FOF in reducing PA among older adults (20, 35, 36).

The results showed that demographic variables (including age, gender, retirement status, and living status), suffering from some common diseases, and FOF together predicted the PA among older adults, which the amount was significant. FOF predicted 2.8 % of the variance of changes in PA.

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Increasing age and female gender leads to a decrease in PA in the elderly while living alone, currently being employed and not being depressed leads to increased PA. FOF also leads to a decrease in PA. All these variables in total explained only 17.3% of the changes in PA, which indicates that there is a sedentary style and lack of adequate PA level, widely in the entire society, and factors such as demographic variables and diseases don't play a very effective role in this regards.

As the age increases due to some disabilities and physical problems, the elderly are not able to perform PA as before. Elderly women also have less PA than elderly men due to the existence of some obstacles such as lack of suitable environment, lack of proper access, low motivation. Also, most of the items used in the questionnaire are considered to be a type of male activity, and this is further explained. Men are more active than women due to their physical and mental condition. Also, due to the fact that elderly women are usually housewives and therefore are less active, but men are usually more active due to either being employed or being more present outside the home environment. On the other hand, according to the existing culture in the elderly society of Yazd, elderly women are less present in the social environment and participate less in sports and PA such as walking, climbing and other sports. Living alone may be an increasing variable for PA because the elderly who live alone are less busy with work and mind and therefore have more time to devote to PA.

In various studies, age (8, 37) gender (38-41), chronic disease (9, 37, 42), and living status (43, 44) were significant predictors of PA in elderly people. Several studies have shown that the FOF leads to a reduction and limitation in PA (20, 35, 45, 46). Although the FOF was significantly related to the reduction of PA, it explained only 2.8% of the variance in PA, which indicates that the elderly in Iranian society have chosen an inactive lifestyle and should look for the reasons and barriers to PA among them. The results of the regression analysis of Bertera et al.'s study (47) showed that FOF, female gender, and age over 75 years were predictors of restriction in performing activities. FOF may lead to interruption of activities, immobility, and functional dependence, and is also a psychological variable that leads to a decrease in PA among older adults. Meanwhile, it seems that positive changes in the number of PA can reduce the risk of chronic diseases and increase the quality of life of elder people. It also increases the efficiency and independence of elderly people and helps them control the many complications of old age and its various treatments. As a result, removing the barriers of PA, especially the FOF, should be considered in health promotion programs for older adults (20).

Conclusion

FOF and PA were low among older adults. Some demographic variables, some common diseases, and FOF predict PA in this age group. Considering the low level of PA and the fact that the FOF can lead to the limitation and reduction of PA, knowing the factors affecting it, and taking action to prevent the occurrence of these factors, and also their elimination is important. Therefore, psychological and counseling interventions in older adults with FOF should be considered.

Study limitations

This study had limitations that should be interpreted with caution. The different socio-economic backgrounds of the study participants may have influenced the results. Self-reporting of the collected data is another limitation. The participants in the study were selected from the elderly living in the community, and the elderly living in nursing homes were not included. Another limitation of the present study is the lack of examination of the previous history of falls, as well as the environmental factors related to the FOF and PA.

Conflict of interest

The authors declare that they have no competing interests.

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Authors' contributions

HR, and NK designed research; HR, NK, FCH, MSH, and PT conducted research; HR, and AD analyzed data; All authors contributed to the writing and approved the final manuscript.

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