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Preventing falls of the elderly at home: Applying the precaution adoption process model

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Abstract:

BACKGROUND: Falling in the elderly causes a variety of issues such as dependence, decreased self-efficacy, depression and limitation in daily activities, hospitalization and imposition of costs on the individual and society. The aim of this study was to investigate the prevention of falls in the elderly at home by applying the Precaution Adoption Process Model.

MATERIALS AND METHODS: In this quasi-experimental study, 200 elderly people participated, 100 of whom were in the intervention group and 100 in the control group. The sample was provided via stratified random sampling. The data collection instruments were a researcher-made questionnaire including demographic details, as well as the Precaution Adoption Process Model (PAPM) questionnaire. Educational intervention was performed during four 45-minute sessions, following which the data was analyzed through SPSS 20 software and was evaluated based on the Chi-squared, Mann–Whitney *U*, Wilcoxon, and Fisher's exact tests.

RESULTS: Investigating the distribution of participants in the phases of the PAPM indicated that most participants of both the intervention and control groups were in the passive fall prevention phase before treatment. However, after the intervention, most participants of the intervention group were in the active phases of fall prevention, while there were not any significant changes in the control group. Moreover, comparing the mean of the structures of knowledge, sensitivity, severity, benefits, perceived self-efficiency, and the cues to action in terms of preventing falls after the intervention, showed a significant increase in these structures in the intervention group compared to the control group ($P < 0.001$). Eventually, the findings of the study showed a significant decrease in the percentage of falls of the participants of the intervention group compared to that of the control group after the intervention ($P = 0.004$).

CONCLUSIONS: Educational intervention on the basis of the PAPM promoted the elderly precaution from passive phases to active phases of preventing falls, thereby resulting in a decrease in the number of falls of elderly people.

Keywords:

Elderly, home, PAPM, prevention of falls

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Introduction

The annual increase in the population of the elderly due to the falling mortality rate, as well as rising life expectancy has led to the ageing of the world population.[1] Regarding the demographic developments of the world, the health-related problems of elderly people are increasing. The physiological, cognitive and physical changes which occur through the process of aging cause the vulnerability of the elderly and the incidence of injuries, thereby affecting the performance of complicated movements, leading to incidents like falls.[2] Falling is defined as a sudden unintentional change in the position because the individual descends to a place lower or the same as

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the ground.[3] Falling down and its consequent injuries can increase dependency, depression, anxiety, lower the hope for life, physical weakness, being afraid of falling and decrease in self-efficiency, limited activities, reduction in the quality of life, and imposition of cost to the person and society.[4] Falling is one of the common problems among the elderly and about one-third to half of the elderly fall every year, while half of them fall down frequently. At least one out of three elderly over 65 has experienced falls in the last year, which is increased to 50% at the age of 80.[5] One of the common places of elderly fall is the home. Home-related factors make up 30% to 50% of the causes of falls in the elderly.[6] Elderly fall at home is a serious problem, as it accompanies considerable consequences and death rates, and most of the time, results in the reduction of physical and mental function.[7] Thus, the physical environment of the home plays a critical role in most falls. Prevention of falls mostly includes the precise assessment of the risks caused by falls at home and their correction. The changeable risk factors at home include the design of the building, the carpets and floor covering, the fence, the stairs, the slippery hallways and grounds, the bathroom and toilet, and the lighting of the stairs and bathroom.[8] It seems that just correcting the home environment in order to prevent or decrease the times of falls is not negligible.[9] Educating the safety correction of the home is a relatively new factor in the prevention and precaution of falls. Taking into account the available evidence, in order to take care of elderly people, an educational intervention can be implemented with the aim of improving home safety in various sectors.[10] Numerous studies have shown that risk evaluation at home forms an important part of fall prevention programs of the elderly living at home. Karlsson *et al.* revealed that 50%–80% of the elderly people referring to the emergency ward fell because of the risk factors relevant to home safety.[11] Ali *et al*.[12] showed that living at home along with its environmental risks increases the risk of falling down. Moreover, through a meta-analysis, Clemson *et al.* realized that ecological intervention at home reduced the risk of falling down to 21%. Precise evaluation and fixing of the risks of falling can reduce the number of falls.[13] Although many studies focus on the education to prevent falls, emphasizing fixing the home environment in order to prevent falls, it is excessively overlooked in Iran. Using health education models as a framework for educating as well as for changing behavior and its perdurability in the group is helpful. The Precaution Adoption Process Model (PAPM) is one of the significant models in terms of behavior change, which was proposed and devised by Weinstein in 1992. PAPM is a stage theory of behavior change that investigates the precaution adoption process of the involvement of individuals in behavior change. Initially, the focus of this model is on the stages that the individuals go through while initiating the health determinant behavior: (a) unaware, (b) unengaged, (c) undecided, (d) decided not to act, (e) decided to act, (f) acting, and (g) maintenance. Then, the focus is on indicating the variables of perceived sensitivity, perceived severity, perceived benefits, perceived barriers, perceived self-efficiency, and cue to action which result in the movement of the individual from one stage to the other.[14,15]

The stage of unawareness seems to have an impact on the media and educational interventions in awareness, and the stage of unengaged people with the subject perceived sensitivity and perceived severity in involving people. In the decision to act perceived benefits, perceived barriers, and perceived self-efficiency, individuals can influence the decision. It seems that between the stages of beliefs and perceptions of people's health, such as perceived sensitivity. perceived severity benefits, barriers, and self-efficiency are essential for action. People who are in the action and continuity stages often change their behavior, and cue to action probably plays a key role in these stages based on their experiences and based on people's perceptions. This model has been used in studies on osteoporosis prevention, cancer screening, hepatitis B vaccination, home radon test, smoking cessation and red meat consumption.[14,15]

In the scope of elderly falls, there has been no study done on the basis of the educational models in Iran so far. Regarding the fact that there might be a lot of problems and difficulties in behavior change, the educational patterns are responsible for the diagnosis and recognition of these factors and their compatibility with the available social and cultural structures. Furthermore, studies have shown that these models can be used as precautionary education about unhealthy behaviors. Considering the above-mentioned issues, the present study was conducted with the purpose of preventing falls of the elderly at home by implementing precautionary measures in Urmia.

Materials and Methods

Study design and setting

This was a quasi-experimental study that was conducted to investigate prevention of falls of the elderly at home, by applying the PAPM in 2019 in Urmia.

Study participants and sampling

The statistical sample of the present study was all the elderly people over 60 years old in Urmia, involving all 37 health centers in Urmia. Multi-stage random sampling was applied throughout the study, as 37 health centers in northern and southern areas were regarded as the classifications, and 10 health centers were selected by simple random sampling. The health centers were categorized

randomly into five groups of intervention and control. Twenty individuals were selected via simple random sampling according to the lists of the cases. In case of participants' disqualification, the simple random sampling was continued until the intended sample size was met.

The sample size was calculated using the following formula and comparison with the pre- and post-intervention phases: $n_{per} \geq \frac{\left(Z_{1-\frac{\alpha}{2}}(\varphi+1)+Z_{1-\beta}\sqrt{(\varphi+1)^2-(\varphi-1)^2\pi_{Dacordant}}\right)^2}{(\varphi-1)^2\pi_{Dacordant}}$ and by taking: $\beta = 0.20 \rightarrow Z_{1-\beta} = 0.85$ with the rate of 27% of the elderly falls in the conducted studies.[16] It is expected that after the intervention, there is an 11% reduction in elderly falls. The sample size was estimated to be 96 participants, which was entirely set to be 100 participants for each group.

$$\varphi = \frac{\pi_A(1-\pi_B)}{\pi_B(1-\pi_A)}$$

$$\pi_{Dacordant} = \pi_A(1-\pi_B)+\pi_B(1-\pi_A)$$

Data collection tool and technique

At the beginning of the study, the researchers referred to 10 health centers that had been selected through simple random sampling and according to the population of the elderly, chose 200 people via the same method; they were divided into two groups of control (100 persons) and intervention (100 persons) in each health center. Then phone calls were made with the elderly persons. After introducing the researchers and stating the purposes of the study, their consent was provided, then the demographic questionnaires and the PAPM (unaware, unengaged, undecided, decided not to act, decided to act, acting, maintenance) and the structures of knowledge, perceived sensitivity, perceived severity, self-efficiency, perceived benefits and barriers were completed for the selected sample.

Intervention

Before training, we divided the intervention group into four groups of 25 people. Then, 45-minute educational classes were held for four sessions for each intervention group of 25 people in one month. The approaches of lecturing, group discussion, brainstorming, memory telling, asking and answering were applied in these classes. No educational intervention had been done in the control group. The content of the educational classes is summarized in Table 1.

All elderly people in the intervention group were classified according to the initial evaluation of their place in the stages of the model:

1. Unaware and unengaged: In these two stages of the intervention, the media, information provided, perceived sensitivity, and perceived severity were considered in action for the prevention of elderly fall. The participants of this group took part in four educational sessions.

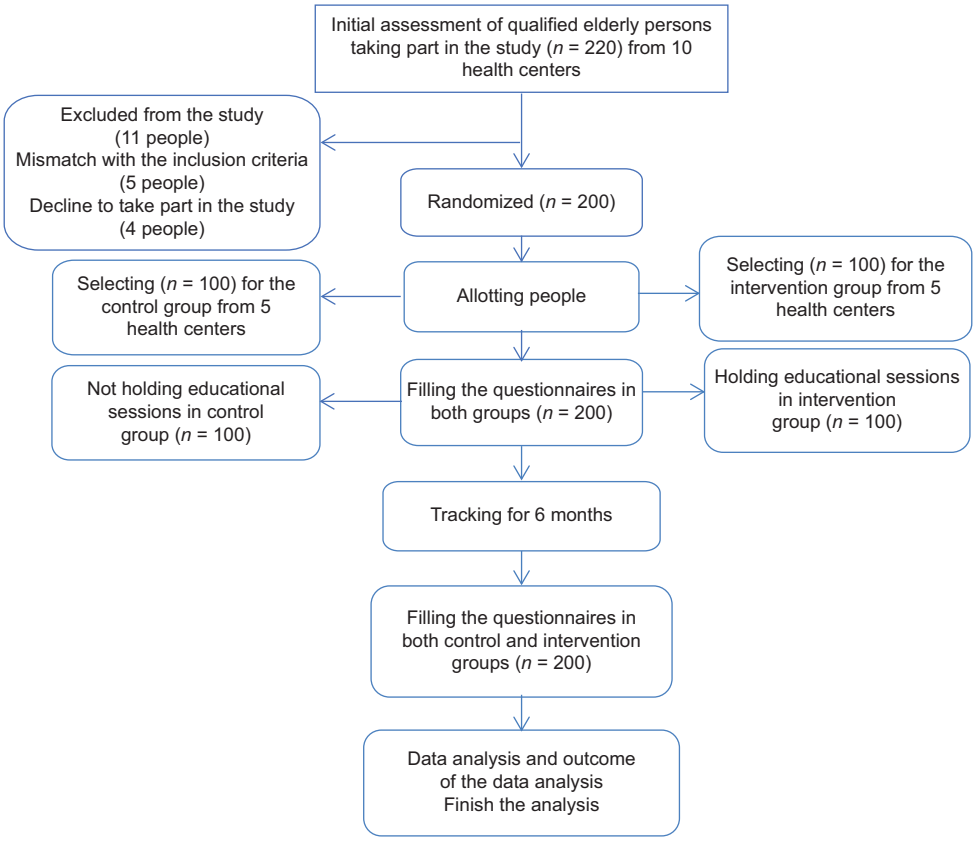

Figure 1: CONSORT chart of the stages of the study

Table 1: The educational content according to the positioning in the stages of the Precaution Adoption Process Model

Steps of Change	Structure and Variable	Compiled and Administered Intervention
Unaware, unengaged	Knowledge	Introduction and explanation of the project, knowing the elderly persons, falls in the elderly, the causes of the falls; knowing the safety conditions; causes of the falls, backgrounds and factors of falls at home; ways to prevent falls at home, ways to promote safety conditions at home
	Perceived sensitivity	Elderly falls at home statistics; physiological-physical changes occurring in the elderly and the increased risk of falling; feeling threatened of falling at home; safety condition of the home; feeling the need to correct the situation at home
	Perceived severity	Expression of physical, mental, social, economic (bankruptcy, losing confidence, being home-bound, inability of fulfilling responsibilities, treatment and maintenance costs) complications of falling; the how of creating complications in short-term and long-term; highlighting the severity of the consequences of falls
Decided not to act, decided to act	Perceived self-efficiency	Defining the meaning of self-efficiency, its importance in preventing falls; verbal encouragement to improve the feeling of being empowered; ways to improve self-efficiency like simplifying behavior; providing experienced people who correct the condition of their home; providing ways to control time, stress, and their importance in providing the feeling of empowerment and efficiency
	Perceived benefits	Expressing the benefits and the applicability of the correction of the home safety situation; expressing the positive effects of home safety condition on each mentioned consequences of falls; reduction in the treatment costs; preventing disability, danger and breaking; capability of attending social gatherings; preventing being confined to the home; ability to perform daily activities and entertainment activities
	Perceived barriers	Trying to persuade the reduction of perceived costs to correct the safety condition of the home; holding speeches, discussions and exchange of ideas about the perceived costs to correcting the condition of the home, and providing educational ways to minimize the perceived costs; counselling and talking with the heads of families about the perceived costs; having time to correct and change the condition of the home
Acting, maintenance	Cues for action	Following the advice of health experts to prevent falls at home; following the advice of children and family members to prevent the risk factors of falls at home; following the advice of peers to prevent the risk factors of falls at home; in the meeting, participants with background of falls were asked to express their experiences

Table 2: Comparison of the research units in terms of demographic features in intervention and control groups

Variable	Treatment frequency *n* (%)	Control frequency *n* (%)	*P**
Years of Age			
60-65	14 (14)	22 (22)	0.33
65-70	28 (28)	26 (26)	
70-75	26 (26)	18 (18)	
75-80	32 (32)	34 (34)	
Gender			
Male	46 (46)	58 (58)	0.1
Female	54 (54)	42 (42)	
Job			
Homemaker	48 (48)	36 (36)	0.13
Freelance	18 (18)	22 (22)	
Retired	12 (12)	8 (8)	
Jobless	22 (22)	34 (34)	
Education			
Illiterate	32 (32)	26 (26)	0.1
Elementary	26 (26)	40 (40)	
Secondary	26 (26)	16 (16)	
Diploma and higher	16 (16)	18 (18)	

2. Decided not to act, and deciding to act, and decision for action or preparation: In these stages, self-sufficiency, perceived benefits and barriers were considered for the decision-making for acting to prevent falls. The participants of this group participated in three educational sessions.
3. Acting and maintenance: In these two stages, the previous experiences of the elderly and cues for action, were considered for acting to prevent elderly falls. The participants of this group participated in one educational session.

Six months after finishing the educational intervention, the assessment (including that of the participants' position in the stages of the PAPM, studied structures, and the frequency of falls) was done for both groups.

Measures

The instruments of data collection in this study were the researcher-made questionnaire including demographic data of the particiapants, such as age, gender, marital status, elderly falling background in one year, and the questionnaire on the basis of the PAPM. In order to meet the reliability and validity of the PAPM questionnaire, the methods of content validity, test–retest and Cronbach alpha test were utilized. To determine the validity, the questionnaire was sent to experts in health education and elderly science, following which necessary modifications were made to the questionnaire according to the opinions

of the experts. The validity was estimated to be over 80%. The reliability of the questionnaire was approved by the questionnaire being filled by a pilot group of 30 elderly people and using the test–retest method after two weeks with $r = 1$. For the reliability of the investigated structures through filling the questionnaire by a pilot group of 30 elderly people using the Cronbach alpha test, the reliability coefficient of questions of awareness was 0.79, perceived sensitivity 0.84, perceived severity 0.82, perceived barriers 0.76, cues for action 0.80, perceived benefits 0.81, and perceived self-efficiency was 0.76. To determine the rank of participants posited in different stages of the model, seven Yes/No questions were used, each representing the individual's status in terms of the action to prevent falls. Knowledge assessment was done through eleven questions in the choices of Yes, No, I don't know, where the answer Yes received 2 points, I don't know 1 point, and No had no point. The scores on the questionnaire of knowledge ranged from 0 to 22. The questions and points of the other structures were made according to a five-point Likert scale (strongly agree, agree, no idea, disagree, strongly disagree), where strongly agree received 5 points and strongly disagree received 1 point. Each structure was represented in five questions with a minimum score of 5, and a maximum score of 25.

Ethical consideration

This study is the result of a research project with the code of ethics IR.SSU.SPH.REC.1395.126 in the Research Ethics Committee of Shahid Sadoughi University of Medical Sciences. A conscious consent was obtained from all human participants orally. The authors certify that all data collected during the study are as presented in this manuscript, and no data from the study has been or will be published elsewhere separately.

Data analysis

The data gathered were entered into the Statistical Package for the Social Sciences (SPSS), version 20 and analyzed using Chi-squared test, Mann–Whitney *U* test, Wilcoxon test, and Fisher's exact test; following this, the index of number needed to treat (NNT) was calculated. The NNT index is one of the most applicable intervention utility evaluation indices, which indicates the number of people who should receive the new treatment in comparison to the standard therapy, placebo, or control, as a way to describe the results of a clinical trial, as well as to introduce the number of the patients receiving the new treatment, in order to gain more satisfactory results in comparison with the previous treatment, in terms of improving the disease or saving one more person from a lethal disease being examined.[17]

Results

In the present study, 200 people were examined in two groups: the intervention (100 people), and the control groups (100 people). The mean and standard deviation of the age of the participants in the intervention and control groups were 71.42 ± 5.97 and 70.66 ± 5.75, respectively. The statistical test indicated that there was no significant difference between the intervention and control groups in terms of age, gender, education status, and job as well [Table 2].

The findings of examining the distribution of the participants being investigated in the stages of the PAPM in both groups before intervention revealed that 44% of the treatment group and 43% of the participants in the control group were in the stages of unaware and unengaged. These were people who had never heard of the prevention of elderly falls, or they had heard, but had not taken any action yet. The findings related to the distribution of participants in the stages of acting and maintenance showed that there were 10% and 8% of participants in the intervention and control groups in the above-mentioned stages, respectively. After administering the education program, the intervention group showed improvement in the PAPM stages compared to the control group, as 54% of participants were added to the number of participants in the stages of acting and maintenance [Table 3].

The results of the Wilcoxon test revealed that the average score of awareness, perceived sensitivity, perceived severity, perceived self-efficiency, perceived benefits and cues for action in the intervention group was significant after the intervention ($P < 0.05$), as the average score of the people increased, while the results of this test showed no significant difference, before and after intervention in the control group ($P > 0.05$). The Mann–Whitney *U* test that there was no significant difference in the intervention and control groups before the intervention, but the difference was significant after the intervention [Table 4].

Regarding the results of the background of elderly falls before and after the intervention, the findings indicated a decrease in the falls of elderly people six months

Table 3: The position of the elderly participants in the stages of the Precaution Adoption Process Model in the intervention and control groups, before and after intervention

The Stages of the Precaution Adoption Process Model	Intervention Group		Control Group	
	Before	After	Before	after
Unaware	33 (33)	-	25 (25)	16 (16)
Unengaged	11 (11)	-	19 (19)	18 (18)
Undecided	24 (24)	10 (10)	22 (22)	21 (21)
Decided not to act	8 (8)	7 (7)	18 (18)	19 (19)
Decided to act	14 (14)	19 (19)	8 (8)	16 (16)
Acting	6 (6)	36 (36)	6 (6)	7 (7)
Maintenance	4 (4)	28 (28)	2 (2)	3 (3)

Table 4: Comparing the mean and standard deviation of the studied structures in the intervention and control groups, before and after the intervention for 6 months

Steps of Change	Group	M±SD		*P**
		Before Intervention	After Intervention	
Unaware, unengaged				
Knowledge	Intervention	12.82±3.80	16.94±2.60	*P*<0.001
	Control	12.54±3.14	13.34±4.11	0.2
	*P***	0.57	*P*<0.001	
Perceived sensitivity	Intervention	15.62±3.39	17.95±3.11	*P*<0.001
	Control	15.52±3.52	16.02±3.58	0.49
	*P***	0.83	*P*<0.001	
Perceived severity	Intervention	15.62±3.41	18.2±2.77	*P*<0.001
	Control	15.48±2.82	15.76±2.22	0.087
	*P***	0.37	*P*<0.001	
Decided not to act, decided to act				
Perceived self-efficiency	Intervention	15.48±3.48	19.18±3.53	*P*<0.001
	Control	15.1±3.51	15.84±3.51	0.2
	*P***	0.16	*P*<0.001	
Perceived benefits	Intervention	15.29±3.35	18.56±2.83	*P*<0.001
	Control	15.40±3.24	16.44±3.79	0.04
	*P***	0.12	*P*<0.001	
Perceived barriers	Intervention	16.21±3.15	19.16±3.83	*P*<0.001
	Control	16.50±3.22	16.41±3.15	0.07
	*P***	0.22	*P*<0.001	
Acting, maintenance				
Cues for action	Intervention	14.71±2.31	18.52±3.99	*P*<0.001
	Control	14.34±2.79	15.76±3.4	0.01
	*P***	0.3	*P*<0.001	

**P* value in row-wise based on Paired *t*-test, ***P* value in column-wise based on *t*-test

after the intervention in the intervention group, as statistically, the difference was significant; but in the control group, there was no significant difference after the intervention [Table 5].

Considering Table 3 of the study, before the intervention, 34% of the elderly people in the intervention group had experienced falls during the past six months.

Discussion

The findings of examining the distribution of partipants in the stages of the PAPM in both groups before intervention revealed that 40% of the participants in the control and intervention groups were in the stages of unaware and unengaged. According to what Weinstein claimed, people in this stage were unaware of their unhealthy consequences, didn't know about thinking about the topic and investigating and studying the consequences of unhealthy behaviors and talking about it.[14]

After administering the education program, the intervention group showed improvement in the stage of change, compared to the control group. Increasing the number of participants in the stage of deciding, acting and maintenance can be relevant to the educational

Table 5: Comparing the frequency of falls in control and intervention groups in the studied sample, before and 6 months after the intervention

Variable	Intervention group Frequency *n* (%)	Control group Frequency (%)	*P**
Falling experience before intervention			
Has	34 (34)	26 (26)	0.06
Does not have	66 (66)	74 (74)	
All	100 (100)	100 (100)	
Falling experience after intervention			
Has	16 (16)	32 (32)	0.004
Does not have	84 (84)	68 (68)	
All	100 (100)	100 (100)	
P	0.006	0.28	

*Exact Tests

approaches being used. This was in line with the studies conducted by Delara *et al*.,[18] as well as Bahmani *et al*.[19]

The findings of the present study indicated that although falls in the elderly were a severe predicament, most elderly people had less awareness and engagement in the issue of falling down; therefore, increasing the awareness can lead to the diagnosing the places of falls and immediate action to prevent falls, which can

greatly decrease the negative and harmful economic, intellectual, emotional and social consequences of the elderly.

The distribution of participants in the stages of deciding, deciding not to act, and deciding to act indicated that most elderly people were in this stage. A study done by Emely *et al.* revealed that more than half of the participants were in stages of 3 to 5,[20,21] which is in line with the present study. After the intervention, the distribution of the participants changed from 3 to 5, indicating the efficiency of the intervention administered in the promotion of the participants to higher stages. In the study done by Novak, using the PAPM in decreasing the falls of the elderly, it was concluded that participants of the group were more likely to promote to the higher stages of the model, and finally claim the positive effect of the intervention in this regard,[22] which were in accordance with the findings of the present study. The distribution of the participants in the stages of acting and maintenance showed that the number of people in these stages increased after the intervention, which represented the effect of the educational intervention on the improvement of the prevention of falls in the elderly. Jassempour *et al.* showed that after the educational intervention, the number of participants in the stage of acting increased in the intervention group with no difference in the control group.[23]

Investigating the structures revealed a significant increase in the average score of awareness among the elderly in the intervention group, indicating the positive effect of the education intervention; this was in line with a study by Ghasemi *et al.* who observed that elderly education had a significant impact on the awareness level of the participants and the performance of the elderly people.[24]

Regarding the principle that awareness is the initial part of any adoption, awareness of how people got into the problem and the way of preventing that problem can significantly affect the promotion of health of the elderly people. The studies by Bahmani *et al*.,[19] and Karimi *et al*.[25] emphasized the importance of increasing awareness of the participants after the education. Therefore, increasing awareness can play a role in preventing falls, which can greatly decrease their negative and harmful economic, mental, emotional and social consequences. Thus, the role of awareness in changing health behaviors is very remarkable.

In the part of the structures being studied, in the intervention group, all structures after educational intervention reflected significant differences. The mean score of the perceived sensitivity after the intervention increased in the intervention group. The increase in the mean score of the perceived sensitivity after intervention was reported in several studies. The findings of a study done by Zareipour *et al.*[26] showed that hypertensive patients with higher perceived sensitivity performed better at controlling their blood pressure. Also, Jassempour *et al.* stated that after educational intervention, the perceived sensitivity in the intervention group increased significantly compared to the control group,[23] which was in line with the present study. But in the study by Ameri *et al*.,[27] perceived sensitivity did not increase. The use of different models and different environments are the causes of the contradiction.

Taking into account that perceived sensitivity indicated the risk of elderly falls, any increase in the score of this structure after intervention in the intervention group would be effective in preventing falls in elderly people. Perceived severity is an estimate of the severity of the consequences that emerge after elderly falls.[28] Being aware of the seriousness of the risks such as injury to organs, injury to the skull and mind, breaking of the spine and ribs, injury to the soft tissue and internal organs, resulting in the dependency, reduction in self-efficiency, fear of falls, depression, motionlessness, restriction in daily activities, hospitalization or admission to nursing homes can be regarded as important factors to improve prevention behavior. The present study indicated a significant increase in the mean score of the perceived severity of the intervention group participants after educational intervention, which is in line with the studies done by Ahn *et al*.[29] and Cardoso *et al*.[30] The mean score of perceived barriers after the educational intervention between the two groups indicated the positive effect of education on eliminating the perceived barriers in the intervention group. The findings of this study were in line with the study done by Keshavarz *et al*.,[31] but not in congruence with the study conducted by Maseudi *et al*.,[32] which didn't show any significant change in the perceived costs scores after intervention. The reason for not changing the costs, in contrast with the present study, could be attributed to the difference in the nature of the perceived barriers in terms of two behaviors, as occasionally, the perceived barriers can be eliminated through educational interventions as well as some simple measures, while for some behaviors, reducing the costs arising from a behavior would not be in the control of the researcher. Regarding the fact that perceived barriers are the potential deterrent factor from adopting any preventive function, it is essential that the elderly do some analysis about the benefits of acting against the costs, risks, consequences and time, then accordingly, follow the appropriate health behavior.

Adoption of any action to prevent falls or to act upon a disease depends on its perceived benefits. In the present study, after the intervention, the mean score

of the perceived benefits of the elderly people in the intervention group increased significantly compared to the control group, which was in line with the study conducted by Ardakani *et al*.[33] who concluded that the perceived benefits play an important role in the adoption of behavior.

Furthermore, the mean score of cues for action was not significant before intervention in the two groups, but after the intervention, it increased in the intervention group. The findings of a study by Punlomso *et al*.[34] indicated that the score of cues for action in the stage after the intervention increased significantly. The increased score of cues for action in the stage after intervention reflects the fact that the participants of the intervention group had proper outward cues and stimuli to adopt the preventive behavior from falling.

In the present study, the mean score of self-efficiency increased after intervention in the intervention group. Studies done by Zareipour[26] and Avci[35] highlighted the role of self-efficiency in predicting health behavior. Self-efficiency is defined as the belief that a person has on himself in performing a behavior successfully, expecting the desired results arising, considered as an important prerequisite of the behavior, effective on the person's motivation, making him/her to have attempt and consistency in the behavior. Noticing this structure has a high value in promoting the preventive behavior of the elderly falls. The present study indicated that educational intervention and providing information on possible changes, and face-to-face education in the facilitation of doing necessary modifications at home would be effective on elderly falls.

There were a number of limitations in the present study. The follow-up course after the intervention was short; if it had been longer, there could have been more desired results. One of the other limitations of the study was the large sample size, which made planning the exact practical program or personal counseling with families impossible. It is recommended that personal counseling and family interview be taken into account. On the other hand, the nature of the modifying the basic surrounding risks at home is costly and should be taken into consideration in the next studies of financing.

One of the strengths of the present study was that thus far, no intervention study has been conducted with the PAPM in the prevention of falls in the elderly. This was done in this study, and the results showed the effectiveness of this model in preventing falls in the elderly.

Conclusion

By planning and implementing interventions based on the Precaution Adoption Process Model for elderly people, people can be promoted from inactive stages to active stages of preventing falls. By taking into account the importance of awareness, perceived sensitivity, perceived severity, perceived self-efficiency, perceived benefits and cues for action in preventing elderly falls in the present study, it is recommended to pay special attention to these structures in the planning and development of the intervention in order to have higher efficiency. In order to develop policies and health programs for the elderly in the country, it is suggested that the results of this study be used as a guide for managers and policymakers in order to prioritize issues and problems related to falling of the elderly and provide the data needed to promote the health of the elderly in Iran.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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