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Prevention Determinants of Falling in the Elderly Citizens: a Precaution Adoption Process Model (PAPM) Carried-out in Urmia, Iran

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Abstract

Health damages caused due to the falling are some of the acute common health problems of the elderly, which causes disability and increase the mortality rates and the cost to the individuals and society. This research is a cross-sectional (descriptive-analytic) study conducted on 200 elderly people by randomly selected cluster sampling method. Data were collected using a two-part questionnaire; i) demographic information, history of falling elderly people and ii) the questionnaire based on the Precaution Adoption Process Model (PAPM). The results showed that there was a significant statistical correlation between falling and age, sex, marital status and history of chronic disease. Also, the results of logistic regression showed that the likelihood of the preventive action of falling can increase by increasing of proper knowledge, perceived benefits, cues to action. Also, the likelihood of the preventive action of falling can decrease by the increasing of perceived barriers and age. Based on the results, it could be suggested that the design of the PAPM can play an important role in the prevention of falling among the elderly people, so it is recommended that appropriate and effective preventive interventions should be proposed in subsequent studies based on this model.

Introduction:

Falling down and getting injured is one of the major health problems of elderly people (Boffin *et al.*, 2014). The prevalence of falling is higher in elderly people, women, and people with the previous history of falling (Zhou *et al.* 2013). Birth control, implementation of disease control and also the promotion of training cause to increase the life expectancy and quality the proportion of the elderly in communities (Zhou *et al.*, 2013; Mazloomymahmoodabad *et al.*, 2014). About 35-40% of the elderly people have experienced the falling in over a year and about half of them have been experiencing falling frequently (Zhou *et al.* 2013). In the United States, falling is the fifth cause of the death of the elderly and is also the most common cause of trauma in this aging group (Hartholt *et al.*, 2011). A falling can result in lethal or non-lethal consequences which it could be caused by internal and external factors. The consequences of the falling in the elderly people not only affect their lives and cause various complications such as fear of re-falling, limitation in activities, social isolation, increasing dependence on others and economic problems, but also it

induces important effects on the health community and health systems (Bell *et al.*, 2000, Stevens *et al.*, 2006). The prevalence of falling varies among the elderly people in different countries, these rates were reported as 28.5% in Turkey (Halil *et al.*, 2006), 27% in Iran (Jalali *et al.*, 2015), and 29% in Australia (Morris *et al.*, 2004). In order to identify early interventions for preventing falls, it is necessary to identify the factors that cause to increase the risk of falling in the elderly people, as the falling in elderly people is high and it can cause complications such as fractures, scratches, impairment of mobility, loss of self-confidence in performing tasks and fear of falling into these individuals. Considering these issues, the risk factors of the falling as the baseline and necessary to evaluate the cause, select and provide the appropriate solution. Following such facts, creating appropriate interventions seems necessary to prevent falling in this group. The uses of health training models are helpful as a framework for training and modifying behaviour and survival in this group. One of the important models in the field of behaviour change is the precaution adoption process model (PAPM) which was

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developed and presented by Winstin & Sandman (1992a).

This is a step-by-step approach to change the health-related behavior. Precaution adoption process is related to the process of engaging an individual in changing his/her behaviour. The way of making a decision of an individual holds an important role in acting and the way of its converting into acting of factors of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived self-efficacy and cues to action. The focus of this model is, firstly, on the steps that a person do it to initiate the determinant of health behaviour (stages 1 – unaware 2 - unengaged 3 - undecided 4 - decided not to act 5 - decided to act 6 - acting 7 - maintenance) and secondly identifying the mentioned variables that lead to the person moving from one stage to another. (Weinstein & Sandman, 1992b; Weinstein & Rothman 2005). Unfortunately, to date, no study has been conducted on the falling of elderly people based on educational models in Iran. Perhaps, there may be many barriers and problems for changing behaviour, and the educational patterns are responsible for identifying these factors and their adaptation to cultural- social structures. Also, studies have shown that these models can be used as non-sanitary behaviour prevention training. According to the mentioned cases, we aimed here to determine the prevalence of falling in the elderly people, based on the Precaution Adoption Process Model in Urmia city of Iran.

Methodology:

In the descriptive-analytic study, the population of the study was consist of elderly adults, over 60 years old who were referred to urban health centers of Urmia City in the year 2017. According to previous studies and estimation of elderly falls)Stalenhoef et al., 2002, Halil et al(2006, the sample size was chosen 200 elderly with 95% confidence level ($d=0.6$, $Z=1.96$, $p\geq 0.3$). The Cluster sampling method was used to select 10 centers from among the 35 urban health centers and the satisfied older adults from each center were randomly assigned to the population. Data collecting tools in this research was a researcher-based questionnaire which included demographic characteristics including age, gender, marital status, history of the elderly falling in a recent year, the place and time of falling, and the questionnaire was based on a precaution adoption process model. Validity and reliability of the questionnaire of the precaution adoption process model were determined by using content validation methods, test-re-test and Cronbach's alpha. To determine the validity of the questionnaire, they were sent to 10 health and epidemiology educators. According to the experts' opinions, the necessary corrections were made in the questionnaire. The validity of the questionnaire was more than 80%. The reliability of the questionnaire was verified by completing questionnaire by a group of 30 elderly people by using a test-re-test in two weeks intervals with $r=1$. And

for reliability of the studying constructs, reliability coefficient of knowledge was calculated and determined 0.79, the reliability coefficient of perceived sensitivity was 0.84, for Perceived severity was 0.82, for perceived barriers was 0.76, for the cues to action was 0.8, for perceived benefits was 0.81, for perceived self-efficacy was 0.76 by completing questionnaire by a group of 30 elderly people and by using Cronbach's alpha test.

To determine the stages of placing people in the different levels of the model, seven numbers of questions with yes/no options were used. Each of them indicated the status of an individual in the field of the prevalence of falling. The assessment of relevant knowledge was in the accessed by providing 11 questions, having "3 options"; yes, No, I do not know. The "Yes" option was rated 2, the "I do not know" option was rated 1, and the "No" option was rated as zero. Knowledge score, scores range was from zero to 22. Questions and scores of the rest of the structures were based on the Likert Five Options (I fully agree, agree, I do not have any idea, disagree, fully disagree) the score of totally agree option was 5 and the score of totally disagree was 1. Each structure was evaluated by five questions and the minimum and maximum score was respectively, 5-15. The elderly adults were invited telephonically to the relevant health center, and the objectives of the research were explained to all participants. The questionnaires were completed by themselves. In the case of illiteracy or low literacy of the individuals, the questionnaire was completed by a trained person by using an interview method. The inclusion criteria were consist of being in an age group of 60 to 80 years old, non-use of anticonvulsants, able to walk without any helping tool, not being in the nursing home, and the Exclusion criteria consisted of dissatisfaction, or death of the research cases or being unable to gait during the study.

Results:

The mean age of the elderly patients was 71.42 ± 5.97 years, where most individuals were in 75 to 80 years old age group (33%). Most of the elderly were housewives (42%) and married (56%). The highest level of their education was elementary (33%). In economic terms, most of the elderly were in a moderate economic situation (54%). Sixty (30%) of the elderly had an experience of falling over the last year, most of the fallings, 36 individuals have experienced at home (60%) and 26 individuals in the morning, (43.3%). The results of chi-square test showed that by increasing the age, the rate of falling was increased which showed a significant difference ($p<0.001$). Also, the ratio for falling in women was more than men which also differed statistically ($p<0.02$). On the other hand, falling in the single and lonely living elderly (divorced-wife or widows) was also seen to be higher than the married elderly ($p<0.02$). People with chronic diseases, such as diabetes, hypertension, arthritis, were more at risk of falling to individuals without chronic disease ($p<0.04$) (Table-1).

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Table-1: Frequency and percentage distribution of basic characteristics of the elderly people and its relationship with falling (n = 200)

Variables	N(%)	Without falls history N(%)	With falls history N(%)
✓Age groups (p<0.001)			
60-65	36 (18)	4 (11.2)	32 (88.8)
65-70	54 (27)	8 (14.9)	46 (85.1)
70-75	44 (22)	20 (45.5)	24 (54.5)
80-85	66 (33)	28 (42.5)	38 (57.5)
✓Gender (p<0.02)			
Male	104 (52)	28 (26.9)	76 (73.1)
Female	96 (48)	38 (43.8)	58 (56.2)
✓Job profile (p≥0.3)			
Housewife	84 (42)	30 (35.7)	54 (64.3)
Self-employed	40 (20)	8 (20)	32 (80)
Retired	20 (10)	6 (30)	14 (70)
Out of work	56 (28)	16 (28.6)	40 (71.4)
✓Marital status (p<0.02)			
Married	112 (56)	30 (26.8)	82 (73.2)
Divorced	26 (13)	8 (30.7)	18 (69.3)
Widow /widower	62 (31)	26 (41.9)	36 (58.1)
✓Education (p<0.2)			
illiterate	58 (29)	16 (27.6)	42 (72.4)
Elementary	66 (33)	26 (39.4)	40 (60.6)
Junior	42 (21)	12 (28.6)	30 (71.4)
Diploma & PGraduate	36 (17)	7 (20)	29 (80)
✓History of chronic diseases (p<0.04)			
Yes	149 (74.5)	49 (32.9)	100 (67.1)
No	51 (25.5)	11 (21.6)	40 (78.4)
✓The economic situation (p≥0.1)			
Weak	36 (18)	11 (30.5)	25 (69.5)
Moderate	108 (54)	31 (28.7)	77 (71.3)
Good	56 (28)	12 (21.4)	44 (78.6)

The results of the present study, based on the Precaution Adoption Process Model (PAPM), indicated that 29% of elderly people did not know even about the preventing act for falling. Only 15% of elderly people heard about preventing act for falling of elderly, but they did not do anything yet, and 23% Elderly people were undecided to do preventing act for falling. Total 13% of elderly people were not prepared to do preventing act for falling. However, 11% of elderly people were prepared to do preventing act for falling. 6% of elderly people were taking action to do preventing act for falling and 3% of them did it continuously.

Variables such as Knowledge, Perceived susceptibility, Perceived severity, Perceived self-efficacy, Perceived benefits, Perceived barriers, Cues to action, acting guide were as model variables and age and sex were considered as the confounding variables in the Backward Method in Logistic Regression test. Finally, the variables, knowledge, Perceived benefits, Cues to action; Perceived barriers, age were revealed as effective variables in preventing the falling of the elderly in the Model. So, the likelihood of preventing act of falling in the elderly people would be increased by

increasing of knowledge (OR = 1.1, p = .002; 95% CI = 1.05-1.3), perceived self-efficacy (OR = 1.3, p = .001; 95% CI = 1.1-1.5), the cues to action (OR = 1.7, p = .05; 95% CI = 0.99-1.39). And the likelihood of preventing act of falling in the elderly people will be decreased by increasing of perceived barriers (OR = 0.8, p = .02; 95% CI = 0.69-0.97) and age (OR = 1.14, p <0.001; 95% CI = 1.07-1.2) (Table-2).

Table 2: Prognostic Variables of falling in Elderly people by Using Backward Method in Logistic Regression test (N = 200)

Independent Variables	β (reg. coeff.)	S.E.	OR*	P-value	C.I. 95% Lower	EXP(B) Upper
knowledge	0.15	0.05	1.1	0.002	1.05	1.3
Perceived self-efficacy	0.25	0.08	1.3	0.001	1.1	1.5
Perceived barriers	-0.2	0.87	0.82	0.02	0.69	0.97
Cues to action	0.16	0.08	1.77	0.05	0.99	1.39
Age	0.13	0.03	1.14	<0.001	1.07	1.22

*OR- Odd Ratio; reg. coeff.- regression coefficient

Discussion:

The results of the study showed that the cases of falling have a significant relationship with age where falling was seen to increase with the age of elderly people. A high rate of falling in elderly people could be due to the chronic diseases, visual impairment, Cognitive, physical, motor, and other factors which are confirmed in various studies (Lehtola *et al.*, 2006; Coimbra *et al.*, 2010). The results of this study showed that the rate of falling off the elderly people was differing for both the genders, which resembles the results of Halil *et al.* (2006); Jalali *et al.* (2015) and Zhang & Chen (2008). Iranian women have a lot to do for daily living activities such as housekeeping, shopping, taking care of grandchildren while older male after retirement tends to stay and rest. For example, on a normal day, they prefer to stay at home and perform religious duties or meet their friends. On the other hand, falling in married elderly was less than who were living alone. Single elderly have more barriers in using falling prevention behaviors such, barriers could be eliminated by proper planning which can also improve their lifestyle. These results were associated with the study of Lim and colleagues (Lim *et al.*, 2010), which showed that a spouse can promote healthy behaviours. Also, falling in elderly people with a history of chronic diseases was more while compared with the older people who did not have a history of diseases. Our finding supports the studies conducted elsewhere Halil *et al.* (2006); Zhang & Chen (2008); Corsinovi *et al.* (2009); Coimbra *et al.* (2010). In fact, chronic diseases can lead to disability and weakness and resulting in the fall in the elderly. In this study, the frequency of the falling in the elderly was 30%, whereas 31% was reported from Switzerland (Crow *et al.*, 2018), 29% in Australia (Morris *et al.*, 2004), 28.8% in Turkey (Hartholt *et al.*, 2011), 26.4 % in China (Chu *et al.*, 2008), which are almost similar to the result of our study. Also, most of the fallings were reported to be at home (60%). As older adults

often have a passive role in society and usually spend their time at home and do not work outside, it can be the important reasons for increasing the rate of falling down at home. In this study, the lowest rate of falling was at noon (26.7%) and the highest rate was in the morning (43.3%). Since the physical activities of the elderly are high at night, so the probability of falling is high at night. In similar studies, the highest rate of falling of older adults was during the active hours in one day (Bergland *et al.*, 2003; Lehtola *et al.*, 2006; Corsinovi *et al.*, 2009). Thus, it could be recommended that older adults must be taken care of themselves in the active hours over a day. The results of this study, based on the Precaution Adoption Process Model (PAPM) steps, showed that 44% of elderly people did not have proper knowledge about the preventive acting of falling and have not engaged in this field. It is expressed that about 50% of falling in the elderly people could be prevented by providing proper knowledge and information about the causes of falling, the preventive methods of falling, and the complications of falling. The logistic regression results revealed that the possibility of prevention of falling in the elderly with a high knowledge was 1.1 times more than others. A study by Poormuhamad & Jalili (2017) reported that there was a significant correlation between knowledge and self-care behavior of elderly people with hypertension. An effective step can be taken to prevent falling by increasing knowledge of predisposing factors of falling and changes in health behaviors. However, studies had shown that just by increasing self-knowledge the self-care behaviours cannot be increased. So attitudes and motivation of individuals are more important than knowledge in order to achieve long-term self-care (Oldroyd *et al.*, 2006; Imai *et al.*, 2008). Another determinant factor in preventing of falling is perceived barriers, which reduces the rate of falling in the elderly people. Perceived barriers are defined as cases which an elderly person who considers them as an obstacle to preventing falling behavior. Chao *et al.* (2005) in their study reported a reverse relationship between perceived barriers and health behaviors, in other words, the possibility of leading health behaviors would increase by less perceived barriers. Robinson (2012) also showed that perceived barriers were as the strongest predictor of self-care behaviors in elderly people with hypertension. Efficiency of a person's judgment is about his/her ability to prevent from falling. In the present study, high self-efficacy seen to improve the prevention behavior of falling. Courtney *et al.* (2000) reported self-efficacy in their study as an important precondition for self-management in behavior change, and they believed that its increase could promote the self-care behaviours. Conn (1998) asserted that self-efficacy was the most important predictor of physical activity in the elderly people. Elderly nurses should improve the self-efficacy of the elderly in order to adopt prevention behaviors of falling. The results

of our study indicated that there was a significant relationship between the guide predictor for acting and the prevention behaviour of falling. If the amount of received guide for a person is high for acting, he or she can have more control over falling. The results of this study were consistent with the study of Poormuhamad & Jalili (2017). The limitations of our research was the using of the questionnaire and a self-reporting method. It is recommended that qualitative research should be used in future studies for accepting more precise results. Another limit was related to the cooperation of authorities and the reluctance of a number of samples.

Concludingly on the basis of the results of our study, it could be suggested that accurate educational planning for the elderly must be based on the Precaution Adoption Process Model (PAPM) on knowledge constructs, perceived self-efficacy, perceived barriers and cues to action, which were a strong predictor of preventing falling. So that, we can prevent the complications of falling in the elderly people in the long term.

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