Effect of the Living Environment on falls among the Elderly in Urmia

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Abstract

BACKGROUND: The living environment has an impact on the health of the elderly, and the safety of the house is one of the concerns of the elderly. Disregarding the safety concerns increases the falling.

AIM: This research was conducted with the aim of influencing the living environment on falls among elderly people in Urmia city.

METHODS: This is a cross-sectional (descriptive-analytic) study which 200 elderly people were selected by random cluster sampling. Data were collected by using a two-part questionnaire including demographic information, and home safety assessment checklist. Data were analysed by using chi-square test and logistic regression in SPSS v. 21 software.

RESULTS: The incidence of falling in the elderly was 30%. There was a significant statistical association with age, sex, marital status and history of chronic disease. Results of logistic regression showed non-safe stairs (OR = 1.1, p = 0.002), unsafe toilet/bath (OR = 1.3, p = 0.001), unsafe bedrooms (OR = 1.7, p = 0.05) unsafe living room (OR = 1.4, p = 0.02) increase the falls in the elderly, as well as male gender (OR = 1.14, p < 0.001) and living with other people (OR = 0.19, p = 0.002) reduce the falls in the elderly.

CONCLUSION: By identifying the risk factors of the physical space of the home, we can plan for implementing necessary interventions according to the risk factor or risk factors to prevent and reduce the falls in the elderly community.

Introduction

Elderly is a sensitive period in human life, in which elderly people are exposed to potential threats such as increasing of chronic illness, loneliness and isolation and lack of social support, and because of their physical and mental disabilities, their autonomy has been threatened in many cases, [1]. Considering that life expectancy has increased over the past decades in Iran, and this phenomenon has led to an increase of the population of the elderly [2], one of the most common and most serious problems is falling down in the elderly and It is the second reason for mortality of unintentional injuries in the world [3], falling is the unintentional and sudden change in physical condition, due to falling of a person at a lower level (on an object or floor) [4].

Elderly physical changes begin by entering into middle age. These changes have the greatest effect on muscle function by decreasing motor function, reducing muscle strength and muscle endurance. Thus, the physiological changes in the nervous and musculoskeletal system which occur during the ageing process and it affects on complex movements and causes the increasing of falls [5], [6], [7]. Fractures of the organs, strike on the skull and brain, fractures of the vertebrae and the rib, soft tissue and internal organs damages are common causes of falling, which they cause dependence, self-efficacy,

fear of falling, depression, immobility, daily activity limitation, hospitalization or resident in a nursing home. Falling is the result and imposing of the cost on the individual and the community [8], [9].

Falling is the result of a complex interference of several risk factors. These factors are divided into four main groups: biological risk factors (age, sex, diseases, cognitive abilities), economic social (literacy, income, habitation, public health, social isolation), behavioral (Fears of falling, lifestyle, Taking medicines at the same time, stopping sports activities, inadequate wearing) and peripheral (Building design, stairs, Corridors, carpets and Slippery floors, fences, baths, washrooms). Given that the elderly spend a long time at home, so more than half of the elderly falls are at home [10]. Hence, paying attention to the living environment is an important scope for the care of these individuals. Because of the variety of environments in different houses, it is necessary to consider the design of each component and objects in houses according to the ergonomic science [11], [12] based on the elderly living environments. Although, we usually consider our home as a safe place, many events may occur at home for the elderly. Considering the design of the house for the elderly leads to decrease the significant risks and accidents to achieve and promote the human-environment co-ordination in the elderly [13]. Several studies have shown that there is a relationship between domestic risks and falling. In the study of Chang and his colleagues, it is found that the elderly who live in a busy, dark and uncomfortable home were significantly at risk of falling [14]. Bemmel et al. showed that living at home with a high number of risks could increase the falls [15]. Thiamwong et al., found that slippery surfaces are one of the risk factors for fallings [16], but Gill et al., did not report the risk of falling and risk factors such as the laxity of the carpets, the sliding of the surfaces [17]. Due to differences in weather, culture, lifestyle, beliefs and different home environments in different societies, the falling factors of the living environment of the elderly are different.

Therefore, considering the above factors, the aim of this study was the study of the influencing of the living environment on the fallings among the elderly in Urmia.

Methods

In this descriptive-analytic study, the population of the study included the elderly people with over than 60 years old who referred to urban health centres of Urmia city in 2017. Informed consent was obtained from all individual participants included in the study. The Ethics committee of the Shahid Sadoughi University of Medical Sciences-Yazd approved this study (Ethic code: IR.SSU.SPH.REC.1395.126).

According to previous studies and estimation of elderly falls [18], [19], [20], [21], the sample size was chosen 200 elderly with 95% confidence level (d = 06, Z = 1.96, P = 0.3). The sampling method was in the following way, 10 health centres randomly selected through a lottery among the 35 urban health centres, and the elderly from each centre were randomly selected according to their population and if they were satisfied. Data collection tools in this research were a researcher-made questionnaire that included demographic characteristics including age, gender, marital status, history of falls in the last year, the place and time of falling and the home safety assessment checklist in 5 positions, bedrooms, toilets/baths, kitchens, living rooms, stairs. Content validity tests and Cronbach's alpha test were used for the validity and reliability of the home safety checklist. To determine validity, the checklist was sent to 10 health and epidemiology educators. According to the experts, the necessary corrections were applied to the checklist, and the validity of the checklist was more than 80%. In order to check the reliability of the checklist, a checklist for a pilot group of 30 elderly people were completed by using Cronbach's alpha test, which the reliability of coefficient of questions of stairs (internal and external) was 0.75, or bath/toilet was 0.72, of living room (Hall) was 0.71, of kitchen was 0.88, of bedroom, was 0.78. Home Safety Testing in the form of 37 questions that were presented as yes, no, and inapplicable options and one score were rated to Yes option and to inapplicable option, and zero scores were rated to No option. Checklist scores vary from zero to 37.

Questions of external stairs were 6 questions, for internal stairs were 8 questions, for the bathroom were 9 questions, for living room were 4 questions, for the kitchen were 5 questions, for bedroom were 5 questions. The elderly were invited to the relevant health centre by telephone, and the study objectives were explained to all participants in the study. The demographic information questionnaire was completed by the elderly. If the elderly were illiterate or unable to complete the questionnaire, the questionnaire was completed by a trained interviewer. Then the researcher, along with one Health environmental expert/professional, visited the house of the elderly, and the checklist was completed by observing 5 places, bedrooms, toilet/bathroom, kitchen, living room, stairs. 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

Sixty (30%) of the elderly had a history of falling over the last year, and the most cases of falling were at home, 36 elderly (60%) and 26 (43.3%) individuals have experienced fall in the morning. Most of the age group was from 75 to 80 (33%). Most of the elderly were housewives (42%) and married (56%). Also, the highest level of education was elementary education (33%). In economic terms, most of the elderly had a moderate economic situation (54%). The results of the Chi-square test showed that the rate of falls was higher in high age and this increase was statistically significant (p < 0.001).

Also, falling in alone elderly (divorced-widows) was higher than that of married elderly (p = 0.02). On the other hand, falling in women were more than men and were statistically meaningful (p = 0.02). Falling in people with chronic diseases were more than those without chronic illness (p = 0.04) (Table 1).

Table1: Frequency and percentage of distribution of basic characteristics of the elderly people and its relationship with falling (n = 200)

Variables		N (%)	With falls history Number (per cent)	Without falls history Number (per cent)	P-value
Age	60-65	36 (18)	4 (11.2)	32 (88.8)	P < 0.001*
	65-70	54 (27)	8 (14.9)	46 (85.1)	
	70-75	44 (22)	20(45.5)	24 (54.5)	
	80-75	66 (33)	28 (42.5)	38 (57.5)	
Sex	Male	104 (52)	28 (26.9)	76 (73.1)	P = 0.02*
	Female	96(48)	38(43.8)	58(56.2)	
Job	Housewife	84 (42)	30 (35.7)	54 (64.3)	P = 0.3
	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	Married	112 (56)	30 (26.8)	82 (73.2)	P = 0.02*
	Divorced	26 (13)	8 (30.7)	18 (69.3)	
	Widow /widower	62(31)	26(41.9)	36(58.1)	
Education	Illiterate	58 (29)	16 (27.6)	42 (72.4)	P = 0. 2
	Elementary	66 (33)	26 (39.4)	40 (60.6)	
	Junior	42 (21)	12 (28.6)	30 (71.4)	
	Diploma and Postgraduate	36(17)	7(20)	29(80)	
History of chronic diseases	Yes	149 (74.5)	49 (32.9)	100 (67.1)	P = 0. 04
	No	51 (25.5)	11 (21.6)	40 (78.4)	
The economic situation	Weak	36 (18)	11 (30.5)	25 (69.5)	P = 0. 1
	Moderate	108 (54)	31 (28.7)	77 (71.3)	
	Good	56 (28)	12 (21.4)	44 (78.6)	

* Significant p-value.

Regarding the results of the study of the elderly living environment, the lowest level of home safety was related to the location of bathroom/toilet and hall (living room), and the highest level of home safety was related to the stairs position (internal and external) (Table 2).

Table 2: Frequency and Percentage of the Living Environment of the Elderly in Five Places of the house (n = 200)

Variables		N (%)
External stairs	Proper	162 (81)
	Not proper	38 (19)
Interior stairs	Proper	158 (79)
	Not proper	42 (21)
Bathroom / toilet	Proper	80 (40)
	Not Proper	120 (60)
Living room	Proper	84 (42)
	Not Proper	116 (58)
Kitchen	Proper	155 (77.5)
	Not Proper	45(22.5)
Bedroom	Proper	134 (67)
	Not proper	66(33)

The variables, stairs (internal/external), toilets/bathrooms, bedrooms, living room/hall, kitchen were as the main variables and gender and lifestyle were as confounding variables which are entered the logistic regression model. The results showed that variables, stairs (internal/External), toilet/bathroom, bedroom, living room/hall, gender and lifestyle affected on the rate of falling in elderly so that non-safe stairs (OR = 1.1, p = .002, 95% CI = 1.05-1.3) , Non-safe toilet / bathroom (OR = 1.3, p = .001, 95% CI = 1.1-1.5), non-safe bedroom (OR = 1.7, p = .05; 95% CI = 0.99-1.39), non-safe living room (OR = 1.4, p = .02; 95% CI = 0.53-2.9) increase the falling in elderly. Also the male gender (OR = 1.14, p < 0.001; 95% CI = 1.07-1.2) and living with other people (OR = 0.19, p = .002; 95% CI = 0.59-2.72) decrease the falling in elderly.

Table 3: Prognostic variables of fallings in elderly people by using logistic regression test (N = 200)

Independent variables	ß (regression coefficient)	S.E	OR odds ratio)	P-value	95% confidence Interval for odds ratio Lower	Upper
Stairs (external-internal)						
Appropriate	-	-	1	-	-	-
Not Proper	1. 31	0.81	2.2	0.01	0.88	4.9
Toilet / Bathroom						
Appropriate	-	-	1	-	-	-
Not Proper	0.78	0.79	1.7	0.03	0.49	3.22
Bedroom						
Appropriate	-	-	1	-	-	-
Not Proper	0.67	0.48	1.3	0.04	0.49	2.07
Living Room / Hall						
Appropriate	-	-	1	-	-	-
Not Proper	0.81	0.61	1.4	0.02	0.53	2.9
The kitchen						
Appropriate	-	-	1	-	-	-
Not Proper	-0.07	0. 16	0.98	0.49	0.53	2.9
Gender						
Female	-	-	1	-	-	-
Male	-1.89	0.67	0.13	0.001	0.59	2.72
Living arrangements						
Alone	-	-	1	-	-	-
With a spouse, Children, Others	-1.51	0.57	0.19	0.002	0.59	2.72

Discussion

In this study, the prevalence of falls was 30% in the elderly, in Turkey was 28.8% [22], in Iran was 27% [21], in Swiss was31% [23], in Australia was 29% [24], 28.5%, in China 26/4 [19], which is similar to the result of this study. Also, the highest rate of falls was at home (60%). Considering that in Iran, elderly people often have a passive role in society and usually spend their time at home and do not work out, it can be one of the important reasons for increasing the amount of falling. In this study, the lowest rate of falls was reported at noon (26.7%), and the highest rate was in the morning (43.3%). Since the physical activity of the elderly is high during the active hours over day and night, so the probability of falling is increased during the active hours over day and night. In similar studies, the highest rate of falling of older

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adults was during the active hours [25], [26], [27]. Therefore, it is recommended that older adults should be taken care during the active hours over day and night. The results of the study showed that the rate of falling is increased by increasing the age of elderly people, the incidence of falling in the elderly increased, which It could be due to chronic diseases, visual impairment, cognitive impairment, physical weakness, motion, and other factors which are confirmed in various studies [25], [28], [29].

On the other hand, fallings more likely happen in elderly people who are living alone. These results are consistent with studies by Iranfar and his colleagues, which showed that a spouse could decrease the falls [30]. It seems that Single elderly face with more preventing barriers during the employing prevention of behaviour of falls, which we can remove barriers, improve and improve their lifestyle by good planning. Having chronic diseases can lead to disabilities and weaknesses, and then cause to fall the elderly. In the study, people with chronic illness have more chance of fallings than others. In other similar studies, the incidence of falling elderly was associated with chronic diseases [18], [26], [28], [29]. Considering the results of the study, the study of elderly's living environment showed that the bath/shower room and hall (living room) had the lowest level of home safety, and the highest level of home safety was related to the location of stairs (internal and external), related to the bath/shower room and hall (living room), and the highest level of home safety was related to the location of stairs (internal and external), which was consonant by the study of Ali Zazouli and Colleagues [31]. According to the researcher, the lower level of safety of bath/toilet can be attributed to the Iranian culture, which there are not any barriers in the walls in bathrooms and their financial inability in building or repairing the safety bath/toilet. Also, the level of awareness of households is relevant to this regard. Also, the high level of the safety of stairs among different parts of the house can be related to the greater attention of households and their high awareness of having standard stairs and shielded stairs. The places where elderly spend most of their time in those environments during the day include a living room, a bedroom, a kitchen, a bathroom/toilet, and stairs. It is expected that these places will have the most occurrence of daily accidents, such as fallings.

Prevention of accidents in these places, where the elderly lives in, can be done by identifying the risk factors. Therefore, in this research, the immune status of these five parts of the house was examined, and the results of logistic regression showed that non-safe stairs in the elderly increased the chance of falling 2.2 times. According to Stevens and Abolhassani et al., stairs and aisles have been mentioned as a risk factor for the falls of the elderly [32], [33] which was consistent with the findings of the present study. The risks of the physical space of the house can be reduced by the low amount of money and fencing the slippery stairs and lighting and can reduce the risk of falling off the elderly in each home. Sophonratanapokin referred to slippery surfaces as the first reason of fallings in houses, and reported that the chance of falling in bathroom and toilet, especially in the toilets in the courtyards, are more than other physical spaces in the house [34] which was consistent with the present study which showed that the chance of fallings is 1.7 in the unsafe toilets and baths. Camilloni and colleagues introduced safety devices such as bath flooring, non-slippery bathtubs and non-slippery shower trays as pre-incident prevention [35]. Promoting the culture of using special and non-slippery flooring, installing a protective bar in the walls of the bathrooms, and the use of public media and education can have a positive effect on preventing the fall of the elderly.

Fazing of furniture in the transit of room was reviewed in this study, and the results showed that the unsafe living room cause to increase the chances of fallings the elderly about 1.4 times. Therefore, it was identified as a risk factor. Iranfar in his study described the living room as a safe place that does not endanger the elderly [30], but Camilloni introduced the living room as the place where the fall occurred [35]. Sophonratanapokin reported a significant relationship between the incidence of falls and Floor Covering and carpets in bedrooms [34], which was consistent with the findings of the study that the non-safe bedroom has increased the chance of falling 1.3 times. The use of non-clamping rugs and smooth and slippery floorings seems to be unaffected which reduces slippery floors. Sadasivam, according to the view of elderly, reported the bedroom's light and a bright way from bed to toilets as risk factors [36], which was not consistent with the findings of the present study. Indirect electricity and lighting are used in Iranian homes, and almost all participants have enough light and brightness, especially in stairs, corridors and bathrooms in their homes.

The rate of falling off the elderly people were different in both genders, which the rate of falling in men was 0.87 times lower than that of women, which was associated with results of the study by Halil et al., [18], and the study by Jalali et al., [21], Zhang and Chen [28] in China, it is reported that falling rates of men was less than women. Iranian women have a lot to do in daily living activities such as housekeeping, shopping, taking care of grandchildren while older male after retirement tend to stay and rest, for example, in a normal day, they prefer to stay at home and perform religious duties or meet their friends. On the other hand, Elliott's study also reports that there is a great rate of falls in the number of elderly people who live alone [37], which is consistent with the findings of the study, which shows that the rate of chances of falling in elderly people living with other people is lower than alone elderly. Living with others, whether from a family or a nurse, can reduce the

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number and severity of fallings regardless of emotional and psychological influences in the old days. Today, the number of elderly people who alone seem to be increasing, which provides the basis for an inconvenient event of falls at home.

In conclusion, based on the results of this research to avoid falling at home, we can use a big doorknob, Installing a protective bar on bathroom walls, toilets, hallways and stairs, non-slippery floor coverings, removing every bumpy on the floor of the rooms, like carpet weaving. Especially paying attention to the structure of the stairs, which is one of the fear causes of falling in the elderly and it is an important factor in ensuring of the elderly in safety of life, and it is recommended that not to use spiral steps with high altitudes, with bluish colours, etc. Preferably stairs should be short and small and avoid placing any slippery covers or objects such as vases or decorative items that may eliminate elderly concentration while on the stairs. Also, the electric equipment wire should be assembled in the rooms and should not be in the way of the elderly.

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