



■ Original Article

Unintentional Injuries among the Elderly in Rural Areas and Their Related Behaviors

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Background: Although the role of unintentional injuries as a cause of death in adults is known, there is limited knowledge about such adults' behaviors. This study aims to investigate the frequency of and factors affecting unintentional injuries among the elderly living in rural areas and their related behaviors.

Methods: A cross-sectional study was carried out in the rural areas of Hamadan County, Iran, in 2016. The sample consists of randomly selected 445 adults aged 60–75 years. Data collection was conducted through face-to-face interviews, using questionnaires.

Results: One hundred and forty-three participants (34.7%) experienced 166 injury occurrences. The injuries occurred more in females than in males. There were more mild and severe injuries (48.2% and 31.3%, respectively) than moderate ones (20.5%). The most frequent mechanism of injuries was accidental falls (64.5%). There was a significant relationship between using aid devices and injuries ($P=0.001$). Among the most applied injury preventive measures as reported by the elderly, crossing streets safely and the use of proper lighting at night had the highest percentages (81.5% and 69.7%, respectively). However, the use of protective handles and plastic flooring in bathrooms in order to prevent slipping had the lowest percentages (less than 1.0%).

Conclusion: The injuries among the elderly in this study were important health concerns. Injury-related factors should be considered in the development of injury prevention programs.

Keywords: Aged; Prevention; Health Promotion; Iran

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INTRODUCTION

Injuries are considered to be a global health concern affecting all age groups. They are the cause of 9% of deaths in the world.¹ Based on the World Health Organization and global burden of disease, approximately 90% of injuries occur in low and middle income countries.^{1,2} Among the different age groups, more attention has been focused on the elderly owing to their rapid increase in society.³ Trauma is one of the causes of mortality in this population.⁴ Traumatic injuries in the elderly, although believed to be minor, involve one part or system of the body and consist of complicated injuries in different organs.⁵ In Iran, injuries are a great challenge to the health system.⁶ Based on the Iran statistics bureau in 2016, the population of rural areas is 25.9% of the total population. Although majority of admissions in emergency departments consist of injured patients in urban areas, the rate of injury related mortality is considerable in rural area patients.⁷ It is worth mentioning that in Iranian villages, the primary health care is offered in health houses by health workers known as Behvarz.⁸ Each health house caters to the health needs of people in one or two villages and is supervised by a health center.⁹ Several studies indicate that the incidence of injuries is greater than what is reported in hospitals.¹⁰ The hospital-based data do not express the reality of non-fatal injuries, which are more common than fatal ones and have greater effects on the affected families.¹⁰ The vast part of non-fatal injuries are unintentional injuries,^{7,11} including traffic injuries, accidental falls, burns, drowning, poisoning, cuts, and so forth.¹²

There are different factors affecting the incidences of injuries among the elderly such as impaired functions,¹³ cognitive and visual problems,¹⁴ slippery places,¹⁵ lower functional independency,^{16,17} lighting in streets and alleys,¹⁸ and the use of seat belts.¹⁹ There are certain studies on injuries in the rural areas of Iran.^{9,18,20} However, there are

not enough studies focusing on injuries among the elderly in rural areas. With regards to the increase in the number of the elderly in Iran and region-dependent injuries, an examination of such injuries and the behaviors affecting them could play an important role in developing suitable approaches for injury prevention. The present study investigates the frequency of and factors affecting unintentional injuries among the elderly in rural areas and their related behaviors.

METHODS

1. Design and Participants

A cross-sectional study was carried out in the rural areas of Hamadan County, west part of Iran, in 2016. The participants were the elderly aged 60–75 years in catchment areas of health centers in Hamadan County. Data on age and sex of population were obtained from records of the Hamadan health center statistics office. Random sampling was used in this study. Out of 22 rural health centers of Hamadan county, the number of 8 rural health centers were randomly selected. Also in each selected rural health center, the random sampling method was used. The sampling was in proportion to the total population of people aged 60–75 years in the catchment areas of these selected rural health centers. Data were collected through face-to-face interviews with the elderly by five trained interviewers for 17 days, from July 23 to August 8, 2016, in the participants' homes. Oral informed consent was confidentially obtained from the participants and the study objectives were explained to them. In this study, 412 of 445 older adults aged 60–75 years responded to the interview questions (92.6%). The rest were excluded owing to their absence from the village at the time of data collection or unwillingness to participate in the study (7.4%).

This study was approved by the Hamadan University of Medical Sciences ethics committee with the reference number: IR.UMSHA.

Table 1. Demographic characteristics of the participants (N=412) and the injured people (n=143)

Characteristic	Injury		Total	P-value
	No Injury	Injured people		
Sex				
Female	136 (56.9)*	103 (43.1)*	239 (58.0) [†]	<0.001
Male	133 (76.9)	40 (23.1)	173 (42.0)	
Age group (y)				
60–64	123 (68.7)	56 (31.3)	179 (43.4)	0.438
65–69	71 (62.3)	43 (37.7)	114 (27.7)	
70–74	75 (63.0)	44 (37.0)	119 (28.9)	
Marital status				
Married	211 (69.9)	91 (30.1)	302 (73.3)	0.005
Widows/widowers	57 (52.8)	51 (47.2)	108 (26.2)	
Others [‡]	1 (50.0)	1 (50.0)	2 (0.5)	
Use of aid device				
No need for aid devices	238 (69.2)	106 (30.8)	344 (83.5)	0.001
Use of walking stick	27 (46.6)	31 (53.4)	58 (14.1)	
Use of walker	3 (33.3)	6 (66.7)	9 (2.2)	
Use of wheelchair	1 (100.0)	0	1 (0.2)	

Values are presented as number (%).

*The percentage is calculated in each row. [†]The percentage is calculated in each column. [‡]One single male and one divorcee.

REC.1395.95.

2. Measures

Data collection was conducted through a three-part questionnaire. The first part consisted of 'demographic information' including age, sex, marital status, use of aid devices, existence of impairment or disease, medication details, housing, and the need for assistance with personal chores. The second part consisted of 'injury characteristics' including mechanisms of injuries, such as falls, traffic related, burns, stabs/cuts, poisoning, animal attacks, electricity shock, severity of injuries, place, time, season and nature of injury, and injury consequences. The third part consisted of 'the elderly behaviors' in preventing injuries classified in three items of never, sometimes, and always.

The questionnaire was designed from scientific resources.²¹⁻²³ The health education and promotion experts' views were used to verify its validity. It took half an hour to answer the questions.

Regarding the severity of injuries in this study, it should be mentioned that the injuries that occurred among the elderly were classified in three categories: mild, moderate and severe injuries, obtained via three related questions: (1) occurrence of an injury requiring any care or action in the house and/or health house during the past month (as mild injury); (2) occurrence of an injury requiring outpatient care for less than 24 hours in health/medical centers during the past three months (as moderate injury); and (3) occurrence of an injury requir-

ing hospital care and hospitalization for more than 24 hours in the last year (as severe injuries).^{20,24,25}

3. Data Analysis

To analyze the data, descriptive statistics were used. Further, to establish the relationships between variables, a chi-square test was used at a significance level of 5% using IBM SPSS ver. 20.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Of the 412 participants in this study, 239 (58.0%) were females and 173 (42.0%) were males, with a mean age of 66.02 (standard deviation=4.55). There was a significant relationship between injury and sex ($P<0.001$).

As shown in Table 1, most participants were between 60 to 64 years old (43.4%), married (73.3%), and did not need any aid devices (83.5%). The elderly in need of aid devices mostly used walking sticks (14.1%). Among the nine individuals using walkers, six of them suffered from injuries (66.7%). There was a significant relationship between using aid devices and injuries ($P=0.001$).

As shown in Table 2, 186 participants (45.1%) stated that they had visual problems. Further, 166 participants (40.3%) reported that they suffered from different chronic conditions/diseases such as diabetes,

Table 2. The number and percentage of injured people by variables

Characteristic		Injury		Total	P-value
		No injury	Injured people		
Impairments & chronic conditions/diseases					
Vision impairments	No	148 (65.5)*	78 (34.5)*	226 (54.9) [†]	0.927
	Yes	121 (65.1)	65 (34.9)	186 (45.1)	
Hearing impairments	No	168 (64.4)	93 (35.6)	261 (63.3)	0.605
	Yes	101 (66.9)	50 (33.1)	151 (36.7)	
Heart diseases	No	208 (68.9)	94 (31.1)	302 (73.3)	0.011
	Yes	61 (55.5)	49 (44.5)	110 (26.7)	
Balance problems	No	261 (66.2)	133 (33.8)	394 (95.6)	0.057
	Yes	8 (44.4)	10 (55.6)	18 (4.4)	
Other diseases	No	170 (69.1)	76 (30.9)	246 (59.7)	0.048
	Yes	99 (59.6)	67 (40.4)	166 (40.3)	
On medication					
For treating chronic diseases	No	132 (69.5)	58 (30.5)	190 (46.1)	0.099
	Yes	137 (61.7)	85 (38.3)	222 (53.9)	
For chronic pain relief	No	130 (69.5)	57 (30.5)	187 (45.4)	0.100
	Yes	139 (61.8)	86 (38.2)	225 (54.6)	
Need of help to do activity					
Shopping	No	238 (71.0)	97 (29.0)	335 (81.3)	<0.001
	Yes	31 (40.3)	46 (59.7)	77 (18.7)	
Bathing	No	245 (68.2)	114 (31.8)	359 (87.1)	0.001
	Yes	24 (45.3)	29 (54.7)	53 (12.9)	
Toileting	No	258 (66.2)	132 (33.8)	390 (94.7)	0.121
	Yes	11 (50.0)	11 (50.0)	22 (5.3)	
Walking	No	262 (65.7)	137 (34.3)	399 (96.8)	0.378
	Yes	7 (53.8)	6 (46.2)	13 (3.2)	

Values are presented as number (%).

*The percentage is calculated in each row. [†]The percentage is calculated in each column.

hypertension, musculoskeletal disorders, and tremor. Hearing impairment and heart diseases were reported by 151 (36.7%) and 110 participants (26.7%), respectively. The rates of the elderly on medication for chronic diseases and pain (such as musculoskeletal pain) relief, were 53.9% and 54.6%, respectively. Eighteen cases of balance problems were reported in this study, of which 10 cases (55.6%) were due to injuries. The elderly mostly stated to need assistance in shopping and bathing (18.7% and 12.9%, respectively). More than half of these participants had experienced some sort of injury (59.7% and 54.7%, respectively). There was a significant relationship between the injuries and need for assistance in shopping ($P<0.001$) as well as bathing

($P=0.001$).

In the present study, 269 participants (65.3%) had experienced no injuries, of whom 133 (49.4%) were males and 136 (50.6%) were females. One hundred and forty-three participants (34.7%), of whom 40 (28.0%) were males and 103 (72.0%) were females, had experienced 166 incidences of injury. Of the 103 injured females, 88 (85.4%) were injured once, including a variety of severe, moderate, or mild injuries, and 15 (14.6%) were injured more than once. Of the 40 injured males, 34 (85.0%) were injured once, and six (15.0%) were injured more than once.

Table 3 shows the characteristics of the 166 injury occurrences. In

Table 3. Characteristics of the occurred injuries (n=166)

Characteristic	Female	Male	Total	P-value
Mechanisms of injury				0.048
Fall	82 (68.9)	25 (53.3)	107 (64.5)	
Traffic	12 (10.1)	8 (17.0)	20 (12.1)	
Burn	8 (6.7)	7 (14.9)	15 (9.0)	
Stab/cut	11 (9.3)	1 (2.1)	12 (7.2)	
Poisoning	3 (2.5)	5 (10.6)	8 (4.8)	
Animal attack	2 (1.7)	1 (2.1)	3 (1.8)	
Electricity shock	1 (0.8)	0	1 (0.6)	
Severity of injury				0.177
Mild injury	52 (43.7)	28 (59.6)	80 (48.2)	
Moderate injury	27 (22.7)	7 (14.9)	34 (20.5)	
Severe injury	40 (33.6)	12 (25.5)	52 (31.3)	
Nature of injury				0.033
Bruise or superficial injury	32 (26.9)	12 (25.5)	44 (26.5)	
Fracture	25 (21.0)	13 (27.7)	38 (22.9)	
Sprain/strain	27 (22.7)	6 (12.8)	33 (19.9)	
Cut, bite, or other open wound	24 (20.2)	4 (8.5)	28 (16.9)	
Burn	8 (6.7)	7 (14.9)	15 (9.0)	
Poisoning	3 (2.5)	5 (10.6)	8 (4.8)	
Areas of occurred injury				0.313
Rural	102 (85.7)	43 (91.5)	145 (87.3)	
Urban	17 (14.3)	4 (8.5)	21 (12.7)	
Season of injury				0.001
Spring	12 (10.1)	14 (29.8)	26 (15.7)	
Summer	69 (58.0)	21 (44.7)	90 (54.2)	
Fall	2 (1.7)	4 (8.5)	6 (3.6)	
Winter	36 (30.2)	8 (17.0)	44 (26.5)	
Time of injury				0.371
Day	117 (98.3)	47 (100.0)	164 (98.8)	
Night	2 (1.7)	0	2 (1.2)	
Place of injury				0.007
Home	63 (52.9)	22 (46.8)	85 (51.2)	
Street	42 (35.3)	14 (29.8)	56 (33.8)	
Farm	7 (5.9)	3 (6.4)	10 (6.0)	
Road/high way	2 (1.7)	3 (6.4)	5 (3.0)	
Work places	0	5 (10.6)	5 (3.0)	
Public places	4 (3.4)	0	4 (2.4)	
Place for sports and recreation	1 (0.8)	0	1 (0.6)	
Consequences of injury				0.756
Complete recovery	90 (75.6)	38 (80.9)	128 (77.1)	
Partial recovery	25 (21.0)	8 (17.0)	33 (19.9)	
Disability	4 (3.4)	1 (2.1)	5 (3.0)	

Values are presented as number (%).

terms of severity of injury, the number of mild, severe, and moderate injuries were 80 (48.2%), 52 (31.3%), and 34 (20.5%), respectively. Majority of the injuries were related to bruises or superficial injuries and fractures (26.5% and 22.9%, respectively). Majority of the injuries occurred at home (51.2%). Injuries occurred mostly in summer (54.2%), followed by winter (26.5%), and also mostly in the day time (98.8%).

Falls were the most common injuries among the elderly (64.5%). Majority of the falls (55.1%) were at ground level and (39.3%) were related to falling down the stairs. After falls, road traffic injuries and burns were the second and third causes of injuries among the elderly (12.1% and 9.0%, respectively). In females, after falls, majority of injuries were related to road traffic injuries and cuts. In males, after falls, majority of injuries were related to road traffic injuries and burns. The highest rate of traffic injuries involved pedestrians (75.0%). Burns were mostly caused by hot liquids (46.7%) and burning firewood (40.0%). Burns occurred more in the kitchen (73.3%) and while working at home (80.0%). There was a significant difference between males and females regarding the mechanism of injury ($P=0.048$), nature of injury ($P=0.033$), season of injury ($P=0.001$), and place of injury ($P=0.007$).

Majority of the affected injured parts of the body were hands and legs (81.4%). Majority of injury consequences were complete recovery (77.1%). A few individuals had disabilities (3.0%) as consequences of the injuries. Among the injured people, the most common health care seeking behavior was referral to hospitals (41.6%). Eleven individuals went to health centers, nine referred to private doctors and two were treated by local practitioners. Further, twenty individuals (12.0%) treated their injuries at home and one went to a health house. Fifty-four individuals (32.6%) did not undergo any specific treatment.

Table 4 shows a summary of the reported injury preventive measures among the elderly. Among the injury preventive measures as reported by the elderly, safe crossing of streets and the use of proper lighting at night had the highest percentages (81.5% and 69.7%, respectively). However, surprisingly, the use of protective handles and plastic flooring in bathrooms in order to prevent slipping had the lowest percentages (less than 1.0%).

DISCUSSION

This study indicated that falls and road traffic injuries were the first and second, respectively, most experienced injuries in both sexes among the elderly. According to the participants, homes and streets were the places where most injuries occurred. With regards to injury severity, the rates of mild and severe injuries were higher compared to moderate injuries. Another important point to note is the non-referral to health houses for injuries by the elderly.

Injuries were more in females than in males. The results differ in several studies. Certain studies indicated that females experienced more injuries than males,²²⁾ while in other studies, males experienced more injuries than females.^{7,23)}

Based on the results of this study on the severity of injury, the rates of mild and severe injuries were higher than moderate ones. According to Saadat et al.,¹⁰⁾ majority of the injuries were mild injuries. However, for Afshari et al.,²³⁾ majority of the injuries were moderate. A study of Afshari et al.²³⁾ was based on hospital information; however, in their case, the elderly experienced mild injuries without seeking treatments from health centers and hospitals. More than half of the people with balance problems experienced injuries. Other studies have also established that balance problems can be the causes of falls among the elderly.²⁶⁾ There were significant relationships between injuries and the need for assistance in shopping and bathing. According to Moeini,¹⁷⁾ the reduction of certain functional independence in daily activities of older adults was more related to bathing. Besides, there was a significant relationship between injury and the use of aid devices like a walking stick and walker for movement by the elderly. It seems that reduction of functional independence is one of the known risk factors for injuries.²⁶⁾ Fall was the first mechanism of injury and its rate in females was more than in males.^{26,27)} Regarding the fall injuries preventive measures in this study, the elderly reported that they usually do not consider safety measures, such as using protective handles and plastic flooring in bathrooms, which could be important in preventing accidental falls. In this study, the rate of proper lighting use at night was more than 50%, causing a reduction in injury occurrence at night. The rate of application of other fall preventive measures was not as high as

Table 4. Injury preventive measures among the elderly (N=412)

Preventive measures	Never	Sometimes	Always
Use of proper lighting at night	26 (6.3)	99 (24.0)	287 (69.7)
Using bathroom protective handle	409 (99.3)	0	3 (0.7)
Using plastic flooring in bathroom	410 (99.5)	2 (0.5)	0
Using ladder while climbing and coming down	79 (19.2)	139 (33.7)	194 (47.1)
Lack of use of small rugs at home	195 (47.3)	57 (13.8)	160 (38.9)
Using seat belts	84 (20.4)	120 (29.1)	208 (50.5)
Crossing the street safely	18 (4.4)	58 (14.1)	336 (81.5)
Avoiding carrying hot dishes and boiling water	81 (19.7)	110 (26.7)	221 (53.6)
Not using electrical or gas heater in bathroom	227 (55.1)	83 (20.1)	102 (24.8)
Keeping chemicals such as cleaners and pesticides in their original containers	73 (17.7)	105 (25.5)	234 (56.8)
Medication according to the physicians' prescriptions	87 (21.1)	85 (20.6)	240 (58.3)

Values are presented as number (%).

reported by the participants (all were less than 50%). The fracture rates in females were more than in males.¹⁵⁾ This could be due to decreased bone density in older females which may cause variations in falls as compared to males.²⁶⁾ In general, Iranian carpets and rugs are used to cover room floors and staircases. It was assumed that to reduce the risk of injuries in the adults' homes, larger size carpets should be used as much as possible to avoid disruption of the elderly's balance. It is necessary to raise the awareness of using fall protective devices and other relevant protective measures among the elderly.

In this study, road traffic injuries were the second highest mechanisms of injury among the elderly. More than half of the participants reported to use seat belts and to cross streets safely. The highest frequency of traffic injuries was among males and the pedestrians were both men and women. Despite the rather appropriate performance of the elderly in safely crossing streets, there were other related factors including environmental factors, like the lack of traffic signals and cross walks in the streets and rural roads. Such factors could be effective in preventing traffic injuries.²⁹⁾ Other important additional factors in street crossing safety include visual, cognitive, and motor abilities.¹⁴⁾

Certain risk factors among the elderly such as vision, hearing and balance problems, pain relief drugs consumption, and other medications for chronic diseases were pointed out as potential factors that could influence the occurrence of injuries. In this regard, the use of eyeglasses and hearing aids, cataract surgery,³⁰⁾ training in relation to physical activity in order to correct balance problems, monitoring medications by physicians as well as training on the knowledge of side effects of medications, and taking drugs according to the physicians' prescription are required among the elderly. The current study indicated that the common place for injury occurrence was in homes. This result is consistent with the results of certain studies.²³⁾ However, according to Haji Aghajani et al.,⁷⁾ homes were the second most common places for occurrence of injuries.

Summer was the season with the highest number of injuries as consistent with the results of certain studies.^{7,23)} This is due to the increase in movement by the elderly as most activities are done outdoors, therefore, increasing the likelihood of injury occurrence. This study indicated that the elderly in need of medical services visited physicians in the most convenient places depending on the severity of the injury.⁷⁾ The highest referral of the elderly after injury was to hospitals in this study. For a significant number of mild injuries, either no specific action was taken or sufficient domestic treatment was provided. Health centers for the care and treatment of moderate injuries were considered favorable while visiting hospitals for severe injuries was inevitable.

One of the strengths of this study was the favorable cooperation from the elderly as the response rate was high. Further, besides assessing the injury related factors, we attempted to examine injury preventive measures by the elderly in detail. These details could be helpful and should be given more attention in developing an appropriate interventional program in order to educate the elderly on protective measures and also to promote their quality of life. The self-report data

and possibility of recall bias, especially as the participants were older adults, could be pointed as the limitations of this study. To control this limitation, injuries were considered according to their severity in three levels. The mild injuries, which are usually less remembered, were studied in a month. The moderate and severe injuries that required inpatient treatment and reduced the error rate of recall were studied in three months and a year, respectively.

In conclusion, this study indicated that there was a high frequency of injuries among the elderly. The dependency of the elderly on others in doing certain activities and also their chronic diseases could make them more vulnerable to injury. These findings indicate that more attention should be focused on safety promoting activities among the elderly. The participants in this study were not aware of certain injury preventive measures and were underperforming with regards to such safety measures. The expertise of health workers (known as Behvarz) in health houses of rural areas with continuous face to face training of the elderly and their families in the field of injury prevention and making homes secure, is noticeable. Therefore, developing systematic health education and promotional programs in the field of injury prevention in rural areas could be of great assistance.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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REFERENCES

1. World Health Organization. Injuries and violence: the facts 2014. Geneva: World Health Organization; 2014.
2. World Health Organization. The global burden of disease: 2004 update. Geneva: World Health Organization; 2008.
3. Watts J. Report urges swift action on global ageing "crisis" Lancet 2001;358:731.
4. Siram SM, Sonaike V, Bolorunduro OB, Greene WR, Gerald SZ, Chang DC, et al. Does the pattern of injury in elderly pedestrian trauma mirror that of the younger pedestrian? J Surg Res 2011;167:14-8.
5. Richmond TS, Kauder D, Strumpf N, Meredith T. Characteristics and

- outcomes of serious traumatic injury in older adults. *J Am Geriatr Soc* 2002;50:215-22.
6. Jafari N, Abolhassani F, Naghavi M, Pourmalek F, Moradi Lakeh M, Kazemeini H, et al. National burden of disease and study in Iran. *Iran J Public Health* 2009;38(Suppl 1):71-3.
 7. Haji Aghajani M, Haddadi M, Saadat S. Epidemiological pattern of injuries in Iran; a nationwide review of seven million emergency department admissions. *Emerg (Tehran)* 2017;5:e10.
 8. Shadpour K. Primary health care networks in the Islamic Republic of Iran. *East Mediterr Health J* 2000;6:822-5.
 9. Rezapur-Shahkolai F, Afshari M, Moghimbeigi A, Hazavehei SM. Home-related injuries among under-five-year children and mothers' care regarding injury prevention in rural areas. *Int J Inj Contr Saf Promot* 2017;24:354-62.
 10. Saadat S, Mafi M, Sharif-Alhoseini M. Population based estimates of non-fatal injuries in the capital of Iran. *BMC Public Health* 2011;11:608.
 11. Xiang W, Ding ZY. Prevention of unintentional child injuries. *Zhonghua Er Ke Za Zhi* 2003;41:876-9.
 12. Doris Schopper D, Lormand JD, Waxweiler R. Developing policies to prevent injuries and violence: guidelines for policy-makers and planners. Geneva: World Health Organization; 2006.
 13. Lester BD, Sager LN, Dawson J, Hacker SD, Aksan N, Rizzo M, et al. Pilot results on forward collision warning system effectiveness in older drivers. *Proc Int Driv Symp Hum Factors Driv Assess Train Veh Des* 2015;2015:345-51.
 14. Zito GA, Cazzoli D, Scheffler L, Jager M, Muri RM, Mosimann UP, et al. Street crossing behavior in younger and older pedestrians: an eye- and head-tracking study. *BMC Geriatr* 2015;15:176.
 15. Rosen T, Mack KA, Noonan RK. Slipping and tripping: fall injuries in adults associated with rugs and carpets. *J Inj Violence Res* 2013;5:61-9.
 16. Balzer K, Bremer M, Schramm S, Luhmann D, Raspe H. Falls prevention for the elderly. *GMS Health Technol Assess* 2012;8:Doc01. <https://doi.org/10.3205/hta000099>.
 17. Moeini B, Barati M, Jalilian F. Factors associated with the functional independence level in older adults. *Bimon J Hormozgan Univ Med Sci* 2012;15:318-26.
 18. Rezapur-Shahkolai F, Naghavi M, Shokouhi M, Laflamme L. Unintentional injuries in the rural population of Twiserkan, Iran: a cross-sectional study on their incidence, characteristics and preventability. *BMC Public Health* 2008;8:269.
 19. Sadeghi-Bazargani H, Ayubi E, Azami-Aghdash S, Abedi L, Zemestani A, Amanati L, et al. Epidemiological patterns of road traffic crashes during the last two decades in Iran: a review of the literature from 1996 to 2014. *Arch Trauma Res* 2016;5:e32985.
 20. Rezapur-Shahkolai F, Naghavi M, Vaez M, Shokouhi M, Laflamme L. Injury incidence, healthcare consumption and avenues for prevention: a household survey on injury in rural Twiserkan, Iran. *Public Health* 2009;123:384-9.
 21. Sethi D, Habibula S, McGee K, Peden M, Bennett S, Hyder AA, et al. Guidelines for conducting community surveys on injuries and violence. Geneva: World Health Organization Geneva; 2004.
 22. Alptekin F, Uskun E, Kisioglu AN, Ozturk M. Unintentional non-fatal home-related injuries in Central Anatolia, Turkey: frequencies, characteristics, and outcomes. *Injury* 2008;39:535-46.
 23. Afshari M, Gholam-Aliei B, Norian R, Kangavari M. Related factors with injuries caused by accidents in the elderly referred to hospital of Tuyserkan city in 2013. *Sabzevar Univ Med Sci J* 2015;22:123-31.
 24. Cheraghi P, Poorolajal J, Hazavehei SM, Rezapur-Shahkolai F. Effect of educating mothers on injury prevention among children aged <5 years using the Health Belief Model: a randomized controlled trial. *Public Health* 2014;128:825-30.
 25. Poorolajal J, Cheraghi P, Hazavehei SM, Rezapur-Shahkolai F. Factors associated with mothers' beliefs and practices concerning injury prevention in under five-year children, based on health belief model. *J Res Health Sci* 2012;13:63-8.
 26. Ambrose AF, Paul G, Hausdorff JM. Risk factors for falls among older adults: a review of the literature. *Maturitas* 2013;75:51-61.
 27. Gale CR, Cooper C, Aihie Sayer A. Prevalence and risk factors for falls in older men and women: the English Longitudinal Study of Ageing. *Age Ageing* 2016;45:789-94.
 28. Daly RM, Rosengren BE, Alwis G, Ahlborg HG, Sernbo I, Karlsson MK. Gender specific age-related changes in bone density, muscle strength and functional performance in the elderly: a 10 year prospective population-based study. *BMC Geriatr* 2013;13:71.
 29. Zhang L, Zhou JH, Qiu J, Zhang XZ, Yuan DF, Gao ZM, et al. Comparative analysis of characteristics and risk factors of traffic injury in aged people from urban and rural areas in Chongqing. *Chin J Traumatol* 2012;15:27-31.
 30. Zhang XY, Shuai J, Li LP. Vision and relevant risk factor interventions for preventing falls among older people: a network meta-analysis. *Sci Rep* 2015;5:10559.