

Epidemiological Profile of Fall-Related Injuries Among Elderly Population in the Eastern Mediterranean Region

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Abstract

Older people frequently fall. This is a serious public health problem, with a substantial impact on health and healthcare costs. A few research studies on the size of the problem and associated factors in developing countries are available. The objectives will be to review the available data in the Eastern Mediterranean Region regarding falls epidemiology among elderly. Search on the internet was conducted for all types of the available research conducted in the Eastern Mediterranean Region (EMR) by using the following key words: fall(s), accidental falls, injuries, fracture, elderly, aged, older, and senior. Individual name of the EMR countries was included in the search inquiry. Iran and Lebanon have specific studies about the falls subject, while some other countries (Egypt, Saudi Arabia, and Syria) have injuries' studies. Web pages of the CDC and WHO, and medical journals as Bulletin of the WHO, and Eastern Mediterranean Health Journal were also electronically Searched. Injurious fall events coming to acute medical attention in Iran in 2003 are 143.1, 336.7, 848.3 per 100.000 person-years among males, and 190.2, 416.8, and 854.7 per 100.000 person-years among females of the age groups 60-69, 70-79, and 80+ respectively. Incidence rates of fall-related hip fracture are 38.0, 135.8, and 501.9 per 100.000 person-years among males, and 67.3, 214.7, and 564.6 per 100.000 person-years among females of the age groups 60-69, 70-79, and 80+ respectively. The most common place of a fall was in the home in 63.5% of the male hip-fracture cases, and in 80.6% of the female hip-fracture cases. The available data from some countries of the Eastern Mediterranean Region refer to the potentially high importance of the problem in the region as a whole. More research is needed to investigate circumstances, causes and risk factor.

Keywords

Falls, Accidental Falls, Injuries, Fracture, Older Persons, Elderly, Aged, Senior, Prevention, Epidemiology, Middle East, Eastern Mediterranean

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1. Introduction

A fall can be defined as a sudden, unintentional change in position causing an individual to land at a lower level, on an object, the floor, or the ground, other than because of sudden onset of paralysis, epileptic seizure, or overwhelming external force. [1]

Each year, millions of older persons, particularly those over 80 years of age, frequently fall. In the United States, one of every three older adults falls. Falls are one of the most common geriatric syndromes and can cause moderate to severe injuries, such as hip fractures and head traumas. Of those who fall, 20%-30% sustain moderate to severe injuries [2] that reduce mobility and threaten independence of older persons together with significant losses in quality of life, for

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the older person and their immediate care taker [3] Fall-related injuries are more common among older persons and are a major cause of pain, disability and loss of independence, and falls are the leading cause of such injuries. [4]

The most prevalent fall-related injuries among older adults are fractures of the hip; spine; upper arm; forearm; and bones of the pelvis, hand, and ankle. Of these, the most serious injury is hip fracture, a leading cause of morbidity and excess mortality among older adults. During 1988-1996, the estimated number of hospital admissions for hip fracture increased from 230,000 to 340,000. In 1996, 80% of the admissions for hip fracture occurred among women. From 1988 to 1996, hip fracture hospitalization rates for women aged ≥ 65 years increased 23%. [5]

Older persons' falls also have serious repercussions on health care service utilization and costs. Older adults are hospitalized for fall-related injuries five times more often than they are for injuries from other causes, and women are nearly three times more likely than men to be hospitalized for a fall-related injury. [2]

Falls can increase the risk of early death. [5] They are the leading cause of accidental or unintentional injury deaths worldwide. In 1997, nearly 9,000 persons aged ≥ 65 years died from falls. [2] Each year an estimated 424000 individuals die from falls globally of which over 80% are in low- and middle-income countries. Adults older than 65 suffer the greatest number of fatal falls. 37.3 million falls that are severe enough to require medical attention, occur each year. [6]

This is a serious public health issue, with a substantial impact on health and healthcare costs. Fortunately, falls are a public health problem that is largely preventable.

One half to two thirds of falls occur in or around the patient's home. Most falls result from a complex and interactive mix of biological or medical, behavioral and environmental factors, many of which are amenable to intervention. [7] There is a growing body of international evidence of best-practices for the prevention of falls and fall-related injuries among older persons. An ever-growing number of falls prevention interventions are being implemented. These initiatives are concentrated in developed countries, including Canada, Australia, the United States and European nations.

Publication on the issue has recently increased reflecting the magnitude of the problem of falls. This is not the case in developing countries. This paper is concerned with investigating eastern Mediterranean publications on this issue and summarizing their findings. The key to targeting resources for the prevention of falls and related injuries is enhanced knowledge of their scope and nature and of the

best-practice evidence. Thus, it is critical to support decision-makers, health service providers, the research community, older persons and stakeholders in all countries, and especially in the developing world, to increase the production, dissemination and use of knowledge on older adult falls.

2. Objective

To review the available data in the Eastern Mediterranean Region regarding fall-related injuries epidemiology among elderly.

3. Methods

Internet search was conducted for all types of the available research works that were conducted in the Eastern Mediterranean Region (EMR) by using the terms fall(s), accidental falls, injuries, fracture, elderly, aged, older, and senior. Individual name of the EMR countries was included in the search inquiry. Iran and Lebanon have specific studies about the falls subject, while some other countries (Egypt, Saudi Arabia, and Syria) have injuries' studies.

web pages of the, CDC, WHO medical journals as Bulletin of the World health Organization, and Eastern Mediterranean Health Journal.

All available research works of EMR are recent studies, so the 10-years Limit for the search was automatically applied.

Research on the multiple aspects of ageing, clinical biological and social is limited in the EMR region.

For inclusion, all available regional studies about the subject of falls and injuries were included. Those studies were reviewed, summarized and presented according to the following sequence:

- Incidence of falls
- Circumstances: place, height, activity
- Related morbidity, mortality and other consequences

4. Findings

4.1. Incidence

The fall incidence among elder people was 25.5% (23/3% in men, 28% in women. (About 21.36% were bone fractures. The difference between two groups (those who fall, those who no fall) was statistically significant in Insomnia, Imbalance, Visual impairment, pain, Alzheimer. And there was no significant difference in mean of age and gender groups. [8]

The Iranian multi-center study conducted 2003 is the most important study that talk about falls incidence that relates the

incidence to the population. The following table is derived from this study:

Table 1. Incidence rate (per 100000 person years) of injurious fall events coming to medical attention.

Age group	Male				Female				F:M Ratio
	No.	Population	Rate	95% CI	No.	Population	Rate	95% CI	
60-69	128	241465	143.1	133.9-152.3	147	208653	190.2	178.8-201.6	1.3
70-79	181	145143	336.7	318.5-354.9	200	129559	416.8	395.4-438.2	1.2
80+	120	38192	848.3	792.2-904.5	109	34432	854.7	795.4-914.1	1.0

Source: Iranian Multicenter Study on Accidental Injuries, 2003 [9]

The fall rate falls in institutionalized persons (Kahrizak Charity Foundation) was 22.7 subjects per 100 participants per year. [10]

4.2. Circumstances

Several studies mentioned the place of fall, and the falling mechanism but in relatively different percentages. It is falling while in the bath in 36% in the pakistani study, [11] while the bath was the place when falling in only 13.0% in one Iranian study. Table 2 explains other falling mechanisms in this study. [12]

Indoors was the main place counting for 68.2% for males, and 84.9% for females. Fall on the ground in 69.9 for males and 79.6 for females. [13]

Table 2. Distribution of cases according to falling mechanism.

	No.	%
Falling from hight	60	26.1
Falling outdoors	39	17.0
Slipping	62	26.9
Geeting out of bed	12	5.2
Bathing	30	13.0
Changing clothes	8	3.5
Ankles sprain	4	1.7
stumbling	15	6.5

Source: (Jamebozorgi A. et al., 2013)

The time of fall is also relatively different among studies. It is in the morning in 56% of cases in the pakistani study. [11]

Table 3 shows the circumstances around falls among older persons in the EMR. It was found that the place of falls was outdoors in 36.5% of males and 19.4% of females, the hight of falls was above standing level in 43.8% of males and 30.2% of females, and the activity during fall was being on stairs in 18.2% of males and 22.3% of females.

Table 3. Circumstances around falls among older persons of 50+ years of age.

circumstances	Gender	Middle east
Place of fall (outdoors)	Males	36.5
	Females	19.4
Height of fall (> Standing)	Males	43.8
	Females	30.2
Activity during fall (On stairs/steps)	Males	18.2
	Females	22.3

Source: (Jamebozorgi A. et al., 2013)

Slipping was the most prevalent mechanism of falling with the rate of 26.9% followed by falling from height and falling outdoors. [12]

4.3. Multivariate Analysis of the Circumstances

Table 4 shows the multivariate analysis. The odds ratio of hip fractures occurrence for different risk factors in older persons (50+ years of age) based on multivariate logistic regression analysis were 0.78 for male gender (vs. female), 1.07 for Urban residence (vs. rural), 0.61 for Married (vs. single or widowed), 1.70 for Falling at home (vs. other places), 1.14 for Indoor falling (vs. outdoor), 2.67 for Standing or less height of fall (vs. over standing), 1.71 for Walking during fall (vs. other activities), 1.73 for Falling on stairs (vs. none), and 0.47 for Falling from ladder (vs. none).

Table 4. Odds ratio of hip fractures occurrence for different risk factors in older persons (50+ years of age) based on multivariate logistic regression analysis.

	Odds ratio	95% CI
Male gender (vs. female)	0.78	0.59-1.05
Urban residence (vs. rural)	1.07	0.82-1.39
Married (vs. single or widowed)	0.61	0.45-0.83
Falling at home (vs. other places)	1.70	1.06-2.74
Indoor falling (vs. outdoor)	1.14	0.71-1.81
Standing or less height of fall (vs. over standing)	2.67	1.03-6.90
Walking during fall (vs. other activities)	1.71	1.23-2.38
Falling on stairs (vs. none)	1.73	1.25-2.37
Falling from ladder (vs. none)	0.47	0.30-0.71

Source: Inranian Multicenter Study on Accidental Injuries, 2003 [9]

High-risk situations that can cause or contribute to falls are use of an assistive device, visual deficit, arthritis, impaired activities of daily living, depression, cognitive impairment, and age older than 80 years. [14]

Depression, fear from fall, using anti anxiety medication, internal displacement may lead to falls the relation was statistically significant in an Iraqi study (p < 0.001). [15]

4.4. Related Morbidity, Mortality and Other Consequences

Table 5 explains falls related hip fracture. It increases with age, and it's more in females than males.

Table 5. Fall-related hip fracture.

Age groups (years)	Gender	Hip fracture rate per 10000
		EMR
60-69	M	1.4
	F	2.4
70-79	M	5.0
	F	7.9
80+	M	18.6
	F	20.9

Source: Inranian Multicenter Study on Accidental Injuries, 2003 [9]

The "non-communicable disease mortality rates using the verbal autopsy in a cohort of middle aged and older populations in Beirut, Lebanon during wartime, 1983-93" showed that the ten year cause (falls and fractures) specific mortality rate among people aged 50 years and above at start of follow-up, Beirut 1983-1993/4 was 0.68 per 1000 person years (0.71 for men and 1.27 for women). [16]

The available costing study in the EMR (Lebanon) showed that": The mean medical cost per injury was higher for women than men, but the compensation cost was higher for men. The medical cost per injury was almost twice as high among older workers (those aged ≥ 50 years) (US\$ 348.70 per injury) than for those in any other age group, and the cost of compensation gradually increased with age [14] Cost per injury was highest among older workers and for injuries that involved falls and vehicle incidents.

5. Discussion

Scarcity of studies in the region about falls and injuries in the older persons made it difficult to have enough sources for every section. The reasons for this may be the lack of interest among governments and donors on the multiple dimensions of the ageing process. Instead there is ongoing focus on Mental Health and Reproductive Health. In addition, and as to why so few studies and research are available- researchers do not have a culture of sharing materials and reports that may have valuable information but are not published.

As a result the few available studies were analyzed in order to present what's available under all sub-titles of this paper and draw a picture of the situation in the region.

Estimated rate of falls per 100000 person years of the population in EMR has increased by age and it was more in females than in males till the age 80+ when it was almost the same.

Incidence rate of elderly fall in the Middle East reflects acceptable rates which was not quite high, this finding different from other study finding the western countries which shows, One out of three older adults (those aged 65 or older) falls each year [2] but less than half talk to their healthcare providers about it. The explanation for this finding

is related to the social care about elderly as the Middle East culture (Islamic culture) extremely focus on elderly care. [2, 17]

The current study showed as well that fall events increase with age and this finding comes in agreement with the study of the Center for Disease Control and Prevention, National Center for Injury Prevention and Control. [18]

Current study showed male elderly are less born to have fall Comparing female and finding is similar to the finding in other study [19] as it was stated that Rates of fall-related fractures among older women are more than twice those for men.

The place of falls was outdoors in 36.5% of males and 19.4% of females, the hight of falls was above standing level in 43.8% of males and 30.2% of females, and the activity during fall was being on stairs in 18.2% of males and 22.3% of females. Both sexes are involved to a different range in all circumstances. Outdoors, above the level of standing, and being on stairs are important factors that should be taken into account when planning for prevention programs. in Taiwan (2009) nearly half of falls among the elderly happen in their house. The bathroom, living room, and bedroom are is most likely place for stumbles and falls; out of the house, the elderly often fall in the street, followed by the garden of agricultural land, a park, or playground. [20]

The odds ratio of hip fractures occurrence for different risk factors in older persons (50+ years of age) explain that the predictors are being female, not married, being at home, over standing, walking during fall, falling on stairs, falling from ladder.

The main cause of fall in the international research is unintentional, accidental which was shown in about third of total fall event and this come in agreement with (Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. In 2013, about 25,500 older adults died from unintentional fall injuries. [18]

Environmental hazards are the leading cause of falls, accounting for about 25 to 45 percent in most studies. Gait disturbance and muscle weakness also are common causes. Dizziness, vertigo, drop attacks, postural hypotension, visual impairment, and syncope also are known to cause falls. [7]

Lower extremity muscle weakness is a significant risk factor for falls, increasing the odds of falling fourfold. A history of fall and gait or balance deficits increases the risk threefold. [5]

Use of four or more medications has been strongly associated with an increased risk of falls. In particular, use of psychotropic medications, cardiac drugs including class 1A antiarrhythmic agents, digoxin, diuretics, and anticonvulsants

have been implicated in increasing the risk of falls. In a recent study of nursing home residents followed for one year, starting a new benzodiazepine or antipsychotic medication was associated with a very high risk (odds ratio = 11) for falls. Careful selection in prescribing, continual review, and withdrawal of unnecessary medications may reduce the risk of falls.

There is a positive correlation between increased risk of falling and the number of risk factors. Among a cohort of community-dwelling older adults, during one year of follow-up, the risk of falling increased from 8 percent for persons with no risk factor to 78 percent for persons with four or more risk factors. [3]

The current study showed that Hip fracture showed increasing rate by age in the eastern Mediterranean region and it's more in females than males in all ages., this study is similar to another study. [21]

Among older adults, falls are the leading cause of both fatal and nonfatal injuries. In 2013, 2.5 million nonfatal falls among older adults were treated in emergency departments and more than 734,000 of these patients were hospitalized. [17, 18]

In terms of severity, the current finding kept within the international standards, Twenty to thirty percent of people who fall suffer moderate to severe injuries such as lacerations, hip fractures, and head traumas.5,6 These injuries can make it hard to get around or live independently, and increase the risk of early death. [22, 23]

Regarding the mortality among elderly falls, current study showed that specific mortality rate of elderly fall was 0.68/1000 person years, which is less than international figures equal 1% as reflected by the report released by learn not to fall on how often falls occur. [24]

As for the cost of injuries related falls in the Eastern Mediterranean region, current study showed high among older workers (those aged >50 years) (US\$ 348.70 per injury) which was higher than international study stated that The average hospital cost for a fall injury is \$35,000. [25]

Limitations

Scarcity of falls and injuries studies in the older persons in the region made it difficult to present homogeneous data. All available studies were chosen regardless of the study design.

6. Conclusions

It seems that falls in older persons in developing countries is a major under studied issue particularly regarding incidence at the community level. It has largely failed to be address at the level of policy and targeted public health intervention.

The accurate size of the problem and its economic impact is not completely clear but the evidence from countries where there is information suggests a looming crisis ahead unless health information systems (to understand and address its scale) and the management of falls is addressed.

The size of the problem, and the procedures for prevention and control of falls and subsequent morbidity and mortality in old age in developing countries urgently need to be understood and addressed. due to shortcomings in studies, information, and health system procedures.

Since 95% of hip fractures are the result from falls, minimizing fall risk is a practical approach to reducing these serious injuries and their serious economic, social and cultural impacts. Primary prevention of fall-related injuries involves reducing the occurrence of falls; secondary prevention of fall-related injuries involves preventing injuries when falls occur.

Further Research work on the problem of falls in older persons, and prevention of falls in older persons and interventions within eastern Mediterranean region.

Eastern Mediterranean Regional strategy to diagnose and manage this problem.

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