

Falls in Geriatric Population- A Cross Sectional Study for Assessment of the Risk Factors

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ABSTRACT

Objective: To assess the risk factors for falls in geriatric population of aged 60 and above

Method: A cross-sectional study was conducted from September to December 2012 on geriatric population of age 60 and above. A total of 100 participants were selected through consecutive sampling technique. Personal interviews were conducted. Chi square test was applied as the test of significance for finding association between falls and risk factors. P value less than 0.05 was taken as significant.

Results: A total of 100 participants were included in the study, male and female ratio was 2:3. A large portion of participants had a history of fall as 45% said they had also fallen previously while the remaining 55% gave no history of fall. Fractures were the outcome of 51% of the falls that were included into this study. Majority fractures observed were in the lower limb (59%), Majority of the participants, 51% gave slipping or tripping over some object as the reason of their fall only one third 33% were in the affirmative that physiotherapists can bring a change in their lifestyle. The time of fall as mentioned by the participants was for the majority in the morning as 56% falls occurred before noon.

Conclusion: Approximately fifty percent of the falls had resulted in fractures especially of the lower limb. Life style modifications that can help in minimizing the risk of falls should be incorporated in daily life to avert harmful consequences.

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INTRODUCTION

Geriatric population is a fast growing age bracket worldwide. In Pakistan the demographic transition has begun since the 1990s. The evidence shows a consistent decline in mortality with a resultant rise in life expectancy and a reduction in total fertility rate in recent years.¹⁻³ As a result, the proportion of elderly population is expected to increase in the years to come. Based on UN (2002) projection estimates, the proportion of population 60 years and above in Pakistan will increase from 5.8% in the year 2000 to 7.3% in 2025 and 12.4% in 2050.⁴ The latest update from population reference bureau confirms 4% of the total population of Pakistan as being 65+.⁵

Falls are one of the giants of geriatric medicine. Journal of American Geriatric Society defines falls as,

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“Unintentional coming to rest on the ground, floor or other lower level”⁶ or “An unexpected loss of balance resulting in coming to rest on the floor, the ground or an object below knee level”.⁷ These are the second leading cause of accidental or unintentional injury deaths worldwide. Of those who fall, 20% to 30% suffer moderate to severe injuries⁸⁻¹⁰ that reduce mobility and independence, and increase the risk of premature death.¹¹⁻¹⁴ Older adults are hospitalized for fall related injuries five times more often than they are for injuries from other causes.⁸ Each year an estimated 424,000 individuals die from falls globally of which over 80% are in low and middle income countries. Adults older than 65 suffer from the greatest number of fatal falls.¹⁵

Osteoporosis is one of the major problems facing older people of both sexes. A tremendous amount of research has been done to address this global epidemic so as to devise preventive strategies and employ timely interventions.¹⁶⁻²¹ The most common fall related injuries are osteoporotic fractures. These are fractures of the hip, spine, or forearm. For the year 2000, there were an estimated 9 million new osteoporotic fractures, of which 1.6 million were at the hip, 1.7 million were at the forearm and 1.4 million were clinical vertebral fractures. Europe and the Americas accounted for 51%

of all these fractures, while most of the remainder occurred in the Western Pacific region and Southeast Asia.²² Nearly 75% of hip, spine and distal forearm fractures occur among patients 65 years old or over.²³ It is projected that more than about 50% of all osteoporotic hip fractures will occur in Asia by the year 2050.^{24,25} In Pakistan, osteoporosis seems to be a significant problem due to major nutritional issues as well as limited and underutilized diagnostic facilities.²⁶ Analysis of hip fracture cases from a single center over 5 years showed that female: male ratio was 2, and that the average age at fracture was 61 years,²⁷ which is lower than that in Europe and North America, but comparable to that reported from India.²⁸

Other than osteoporosis, there are many other risk factors that can be grouped into an Intrinsic and extrinsic categories.²⁹ Intrinsic factors include but are not limited to balance and gait abnormalities, medications such as polypharmacy, sedatives and cardiovascular drugs, conditions leading to visual impairment such as glaucoma, macular degeneration, and retinopathy, cognitive problems such as dementia, and cardiovascular causes that include orthostatic hypotension, postprandial hypotension, carotid sinus syndrome, cardiac arrhythmias and neuro-cardiogenic syncope. Extrinsic factors include poor lighting, stairs, lack of equipment, rugs and footwear.²⁹ Previous studies have revealed that intrinsic causes are responsible for 39-53% of the falls among elderly population; extrinsic causes have been found for 41-55%.^{30,31} Intrinsic precipitating causes are more likely to result in falls and are easier to identify, for example, using procedures to evaluate gait and monitoring various medications intake.³² A prospective cohort study published in the Journals of Gerontology suggested diabetes as an independent fall risk factor among elderly.³³ Similar study revealed orthostatic hypotension as another independent risk factor for recurrent falls in old age group.³⁴ Numerous published studies have sought to establish an association between medication use and risk of falling. The importance of optimizing psychotropic drugs as an essential component of fall prevention among elderly can not be over emphasized.³⁵ Recent data has suggested that multiple risk factor intervention strategy may provide with a significant reduction in the risk of falling among elderly persons.^{36,37}

Cost of hospitalization and treatment of fall related injuries in elderly is another predicament faced by many countries worldwide. Out-of-pocket expenses, fee associated with hospital care, physician and other professional services, rehabilitation, the use of medical equipment, and prescription drugs constitute the direct treatment cost of various fall related injuries. These

direct costs do not account for the long-term consequences of these injuries, such as disability, decreased productivity, or reduced quality of life.³⁸

METHODOLOGY

A cross sectional study was conducted on geriatric population aged 60 and above. A total of 100 participants were included in the study. Sample size was calculated on the basis of 5% proportion of people aged 60 and above in the Pakistani population as referenced by WHO. The actual sample size was 73 participants which was calculated by using the standard formula for calculating sample size on the basis of prevalence.

$$n = \frac{(Z)^2 \times P(1-P)}{d^2}$$

The bound of error was taken at 5% with 95% confidence interval. The sample size was inflated to 100 to exclude non-response and poorly filled questionnaires.

Sampling technique was consecutive sampling technique. Every patient fulfilling the inclusion criteria was taken in the sample after taking the consent. Personal interviews were conducted by the researcher themselves and afterwards counseling was done for prevention of falls in the future. Patients were explained the rationale and nature of research. Sample was selected based on the criteria that the participants were 60 and above with a history of fall and those who gave the consent. Data was collected from the emergency units of orthopedic and tertiary care hospitals in Karachi. Personal interviews were conducted and variables related to demographic profile, previous history of fall, medical and drug history, living conditions, type of housing were taken into account. Data was entered on SPSS version 20 and after cleaning and editing of data, analysis was done. Frequencies and percentages were taken out for categorical variables. Chi square was applied as test of significance for finding association between gender and risk factors. *P value* less than 0.05 was taken as significant.

RESULTS

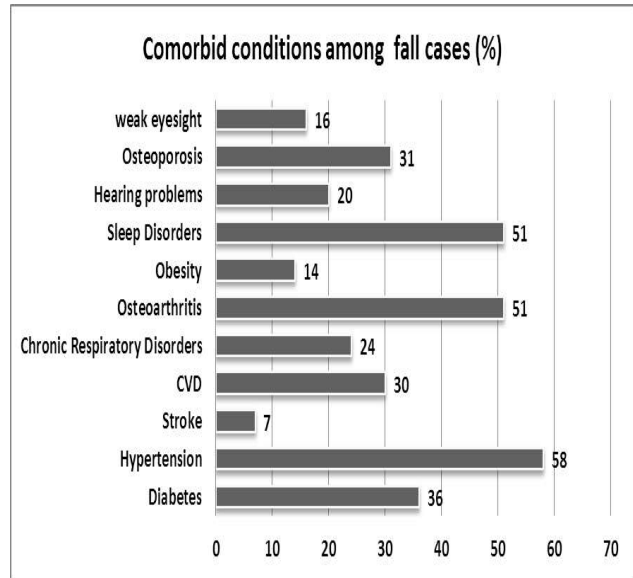
The study was conducted on geriatric population aged 65 and above to assess frequency of falls and associated risk factors. A total of 100 participants were included in the study, male and female ratio was 2:3. Sample was selected based on the criteria that the participants had a positive history of fall. Fractures were the outcome of 51% of the falls that were included into this study. Majority fractures observed were in the lower limb (59%).

Table: Risk factors of falls

Risk factors of falls		n=(100) %
Gender	Male	41
	Female	59
Time of Fall	Morning	56
	Evening	17
	Night	27
Place of fall	Bathroom	36
	Bedroom	27
	Stairs	15
	Outside	22
Presence of Fracture	Yes	51
	No	49
Have you ever had a fall before	Yes	45
	No	55
Someone with you all the time	Yes	63
	No	37
Assistance Required in Daily Activities	Yes	42
	No	58
Emergency Plan in Case of fall	Yes	13
	No	87
Type of floor in Your House	Concrete	21
	Tiles	51
	Carpets	5
	others	23
Do you have a Well Lighted Room	Yes	91
	No	9
Modified your House to Prevent Falls	Yes	26
	No	74
Do You Drink Milk?	Yes	66
	No	34
Do You take Calcium Supplements?	Yes	43
	No	57
Did you ever had your Vitamin D Levels Checked	Yes	23
	No	77
Ever attended awareness program for Fall Prevention	Yes	9
	No	91
Have You ever Heard About Physical Therapy	Yes	82
	No	18
If Yes, can Physical Therapist help in changing your life style?	Yes	33
	No	67

The time of fall as mentioned by the participants was for the majority in the morning as 56% falls occurred before noon. Another 27% said that the incident occurred at night. Thirty six percent participants had fallen in the washroom while 27% reported their bedroom and another 36% had fallen outside their homes while 15% stated that they had fallen from the stairs. Majority of the participants had a history of fall as 45% said they had also fallen previously while the remaining 55% gave no history of fall.

Graph: Comorbid conditions seen among fall cases



Majority of the participants, 51% gave slipping or tripping over some object as the reason of their fall. While 18% complained of lightheadedness and 18% complained of loss of balance. Obstacles were the cause of 6% of fall cases whereas chronic diseases accounted for 7% of falls.

When asked about the home environment 97% lived with their families. Majority of the participants 63% were accompanied by some household members throughout the day. Nearing half the participants 42% required some assistance in daily living. Ninety one percent lived in well lighted rooms with half of the participants having tiles as flooring, whereas concrete flooring was present in 21% houses and merely 5% had fully carpeted homes. When asked if they have a fear of fall significant difference was observed between genders, females being more apprehensive, as 67% replied in the affirmative compared to 33% males who denied ($p=0.049$). Only 13% had actually an emergency plan for fall and another 26% had made changes in their houses to prevent falls. When inquired if they have attended any awareness programs for prevention of falls only 9% had attended any such seminars. When inquired whether they will revert to their old life style after recovery only 16% said that they are going to make changes in their lifestyles or in their environment to prevent future falls.

When participants were inquired about the frequency of routine doctor visits, 37% said they never visited doctors; another 30% visited doctors every three months whereas the remaining visited doctors either yearly or half yearly.

Co-morbid conditions were common among the participants with majority of the conditions co-existing.

Fifty eight percent were suffering from hypertension while 36% were suffering from diabetes. Only 16% participants suffered from short sightedness. Significant difference was observed between genders in diseases associated with bones. 90.3% females had osteoporosis as compared to 9.7% males ($P < 0.000$). Sixty nine percent females suffered from osteoarthritis as compared to 31% males ($P < 0.046$). Similar significant difference was observed in obesity as out of the total obese all were females ($p < 0.001$).

When participants were inquired whether they were cognizant regarding the services of Physiotherapy, 82% replied in the affirmative. However, only one third 33% were in the affirmative that physiotherapists can bring a change in their lifestyle.

DISCUSSION

Falls are extremely common among older adults. Numerous studies have been published on this topic. Discrepancies in research methodologies and using different definitions to define fall explain some of the differences in the results. Recall bias is also involved in using a volunteer sample and this must be considered when comparing the results of the present study with others that used representative samples.³⁹

The percentage of women who fell was higher than that of men and several previous studies have reported rates similar to ours.⁴⁰⁻⁴³ In those who fall approximately 49% of women and 29% of men fall inside their usual residence. 78% of falls occurred at home and most of them were in the most frequently used rooms-bathroom, bedroom and stairs. A similar study published by British Geriatric Society showed the same results.⁴⁴ Data suggests that most falls occur during the day with approximately 27% occurring during the night. Similar results were seen in an international study.⁴⁴

Our study suggests that falls most often occur while elderly are walking on uneven surfaces and it is also consistent with previous studies.⁴⁵ The observation that trips and slips were the most prevalent cause of falls goes in accordance with the previously published results of other studies.⁴⁶⁻⁴⁹ Recovery foot striking an obstacle in its path during the swing phase of gait leads to tripping during walking.⁵⁰ Older people may or may not be aware of the presence of dangerous obstacles which could cause a trip.^{51,52} A variety of predisposing factors include illumination, distractions and attention. Some age related changes are more responsible than others in causing increased prevalence of trip-induced falls among older adults' e.g. gait changes experienced by many older adults and age related visual field impairment. Reduction in the height of the recovery

foot during the swing phase of gait⁵³ increases likelihood of tripping, particularly on uneven surfaces.⁵⁴ Visual impairment and field constriction in elderly is well documented.⁵⁵⁻⁶¹ Primary causes include cataracts, glaucoma and macular degeneration. Obstacles blocked from view by visual impairment such as constriction of the visual field could result in trips.^{62,63}

Arthritis is the most common chronic condition among elderly. As observed in the study 69% females suffered from osteoarthritis as compared to 31% males. The relationship between the arthritis and falls is most likely due to gait disturbance and weakness associated with the disease.

Incidence of falls almost gets doubled⁶⁴ in individuals having cognitive impairments and other neurological conditions. Dementia can increase falls by impairing judgment and visuospatial perception.

Risk of falling associated with medication use can't be over emphasized and has been examined in multiple studies. A meta-analysis found a significantly increased risk of falling after use of psychotropic medication, class 1a antiarrhythmic medication, digoxin and diuretics.^{65,66}

There is also a strong relationship between the use of three or more medications and risk of falls.⁶⁷⁻⁷⁰ In our study 21% participants were taking medicines related to chronic diseases like diabetes, hypertension and asthma.

Diabetes is considered as an independent risk factor and women with diabetes have an increased risk of falling. People with diabetes are more likely to have other risk factors for falls too.⁷¹ Our study showed 36% of the participants having diabetes as a comorbid condition.

Older people are usually under the fear of falling too, being hurt or hospitalized, not being able to get up after a fall, loss of independence and social embarrassment. It was observed in a recent study⁷² that 19% of community-dwelling older adults acknowledge that they avoid certain activities because of fear of falling. Women with greater physical dependency are more likely to report fear of falling.⁷³ Our study results confirm this with 67% of women reporting a fear of fall as compared to males in which 33% denied.

Our study observed the fracture rate of 51%. Higher fracture rate among women as compared to that of men is in agreement with the study findings of Sattin et al.⁷⁴ Lifelong nutritional imbalances, lack of exercise, and menopausal changes might play a role in the occurrence of fall-related injuries in women. Fall related injuries are more common in recurrent fallers as compared to first time fallers.⁷⁵ Nearly half of the

participants in our study had a history of recurrent falls. Study findings dictate that besides physical injuries, a fall can have a significant effect on the functional status of an individual. Falls can reduce the level of independence and quality of life. They can also result in “post-fall syndrome” that includes confusion, loss of confidence, dependence, and loss of autonomy, depression, and immobility.

As this was a cross sectional study, temporal association between risk factors and falls leading to fractures could not be ascertained. Majority of the participants in the study belonged to the middle socioeconomic class of the society so the results cannot be generalized on other socioeconomic groups. Though the sample size was calculated on the basis of proportion of aged population in Pakistan yet we had taken only those patients who were coming to the hospitals that could have lead to selection bias. Primary investigator herself conducted personal interviews from each and every participant. Recall bias was minimized as majority interviews were conducted in the emergency units.

CONCLUSION

Approximately fifty percent of the falls had resulted in fractures especially of the lower limb. Life style modifications that can help in minimizing the risk of falls should be incorporated in daily life to avert harmful consequences.

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