Factors Responsible for Falling in Senior Citizens, Living in Edhi Old Age Home and Heaven Old Age Home Lahore Pakistan

Sumaira Rashid[1], Hafiz Muhammad Asim[2], Hafiz Syed Ijaz Ahmed Burq[3]

Abstract: *The objective of the study is to determine the factors which are responsible for falling in community-dwelling elders. It was Case Control study that was conducted in Edhi old Age home and Heaven old age home. 320 subjects were studied, 160 with history of fall and 160 without history of fall, both male and female, aged 60 to 80 years was studied. The Data was analyzed using SPSS v20.Mean±SD was calculated for numeric variables i.e. age and BMI and frequency and percentage was shown with categorical variables e.g. Gender etc. Odds ratio was calculated to estimate the relative risk and to control the confounding variable; logistic regression was used.The study demonstrated that four factors which include difficulty in walking, lack of walking aid, muscle weakness and fear of fall were found to be the key factors which increase the probability of having fall.*

Keywords: Activities of Daily Living,BMI Body Mass Index, Edhi Old Age Home, Heaven Old Age Home, physical activity levels

1. Introduction

1.1 Definition of fall

1.2 Fall and Its Significance

The evidence of fall in old age is very common thus it is the major cause of independence of an individual in old age person to be threatened. In many geriatric syndromes, when impairments in multiple domains compromise the compensatory ability of the individual, falls usually occur [1]

Often, falls go without clinical attention due to many reasons: the patient never mentions the event to the doctor; fall was not injurious; the doctor fails to ask the patient about a history of falls; or either doctor or patient believes that falls are an inevitable part of the aging process. Often, the cause of fall is not investigated and is ignored while treating the injuries due to that fall [2]

Critical consequences of fall include injury, disability for a longer period of time, reduced level of activity and mobility, admission to hospital for long time, fear of falling again, decreases self-confidence in mobility, and even death[3]. Fear of falling is a worrisome result since fear can cause a process of mobility deterioration to get start, social isolation, and low quality of life, even if the fear is present without a fall.

20-30% of people with falling evidence suffer from moderate to severe injuries like bruises, hip bone fractures, or injuries to the head.[4] These injuries can affect the independent life of patients, and increase the chance of early death. Traumatic brain injuries (TBI) most commonly caused by falls.[4] In 2000, the rate of falls in patients with TBI was 46%.[5]. Falls cause fractures most commonly in older adults. The most common sites of fractures are spine, pelvis, hip, leg, ankle, upper arm, forearm and hand. Many people develop a fear of falling even if they do not suffer from injury after a fall. This fear may affect their activities of daily livings, which can cause in reduced physical activity

and physical fitness, and thus increases the actual risk of falling.

1.3 Rationale

To improve the overall quality of health in elderly people

1.4 Objective

The objective of study is to determine which socio-demographic, environmental and other physical factors are associated with falling in the people living in edhi and heaven old age home

2. Literature Review

2.1 Risk Factors for fall

Being such an important health problem among the elderly, many studies were carried out to identify the risk groups as well as the potentially modifiable fall-risks. Fall-risks were often stratified as intrinsic and extrinsic factors, or classified as environmental and non-environmental factors [6, 7]. Non-environmental factors were the main concern in this study.

2.2 Individual (Non-environmental) Risk Factors

2.2.1 Demographic factors
Falls were found to be more common among the female elderly[8]. Female elderly fallers were also at a higher risk of fall-related fractures[9], except for injury of the skull'. Among the older person, the risk of fall increased as age increased, such finding was especially prominent and consistent for the very old (>=8O year old)[10]. Falls were also more commonly re.ported among Caucasians as compared with Asians or African Americans[11].

2.2.2 Musculoskeletal problems and history of falls
A previous study on falls was one of the strongest predictors for falls[12]Those who have already fallen had a more risk of fall in that following year. In addition fallers were also at a higher risk of subsequent fall-related fractures'. Chronic

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arthritis, joint pain, old fractures as well as muscle weakness were shown by many studies as important risk factors for falls. Foot deformity and other foot problems also increased the risk of falls [13]

2.2.3 Sensory impairment

Vision was important in maintaining balance and visual problems increased the risk of falls among the elderly with moderate strength of association. Impairment might occur in visual acuity, contrast sensitivity or depth perception. These three areas of impairment were inter-related and impairment in one aspect often implied impairment in the others as well[14].

2.2.4 Mobility and functional impairment

Neumann et al conducted a study in 2013 to evaluate In-hospital fall-risk in geriatric patients from the LUCAS project and found that impaired mobility and cognitive status were closely associated to falls[15]

2.2.5 Mental problems

Falls occurred more commonly in the cognitively impaired elderly. The falls occurred in demented elderly more often resulted in serious injuries. Depression also increased the risk of falls in older age as well as the risk of fall-related fractures. The actual mechanism for a higher risk of falls among elderly with depression was not well understood. A recently published prospective cohort study showed that there might be common factors or mechanism that predisposed elderly at risk of both depression and falls, these factors included poor cognitive function and impaired ADL [16]

2.2.6 Drug-related factors

Use of psychotropic drugs, anti-depressants and sedatives were often identified as another substantial factor precipitating falls among the elderly. A meta-analysis revealed that there was a small but consistent association between the use of most classes of psychotropic drugs (including neuroleptics, antidepressants, sedative hypnotics and benzodiazepines), with an odds ratio ranged from 1.48 - 1.73[17]

2.2.7 Fear of fall

Anderse et al conducted a study in 2007 to identify that risk of fall of elderly people while moving and found that this risk can be minimized by the help of doctors work in primary health care centre and also by training and arranging the programs that improve their health..[18]

2.2.8 Multiple falls

Some studies demonstrated that the risk factors for single fallers were different from those for multiple fallers. However there were controversies on this. Several larger cohort studies found that many of the risk factors for single and multiple falls overlapped. On the other hand, Cummings, Tinnetti and Evans considered that risk factors for elderly sustaining multiple falls were more robust and were of stronger association as compared with those for single fallers, even though the risk factors might largely overlap[13]

2.3 Environmental Factors and Circumstances of fall

Environmental factors belonged to another important group of risk factors precipitating falls. It was one major aspect for intervention in the prevention of fallsamong the elderly. A systematic review on randomized controlled trials of home hazard assessment and environmental modifications showed that these measures were effective in reducing falls

3. Materials and Methods

3.1 Study Design

The present study is a case control study

3.2 Setting

The study was conducted in Edhi Old age Home and Heaven Old Age home Lahore Pakistan

3.3 Study Population

Male and female aged between 60 to 80 year with or without history of fall

3.4 Duration of Study

The study took 4 months from November 2013 to February 2014 after approval from advance research committee

3.5 Sample size

The sample size was calculated by the following formula keeping the power of study equal to 90% and level of significance equal to 5%. The sample size should be 127 in each group. In order to match the variables between cases and control sample size of 160 in each group was used.

$$n = \frac{\left(Z_{1-\alpha/2}\sqrt{2\overline{p}(1-\overline{p})} + Z_{1-\beta}\sqrt{p_1(1-p_1) + p_2(1-p_2)}\right)^2}{(p_1 - p_2)^2}$$

$$Where \quad \overline{p} = \left(\frac{p_1 + p_2}{2}\right)$$

(Sample Size determination in health studies version 2.0.21 WHO)
P1= Anticipated proportion of adults who took medicine and fell= 60%
P2= Anticipated proportions of adult who took medicine and did not fall= 40%[19]
p1 – p2 is the difference between proportions = 20%
Z 1 – β is the desired power of study = 80%
Z 1-α/2 is the desired level of significance = 05%, test Value of odds ratio=

3.6 Questionnaire

A meeting interview was used for filling in the questionnaire for both cases and controls. All interviews were conducted face to face by the researcher himself.

3.7 Eligibility

3.7.1 Case Group

3.7.1.1 Inclusion Criteria
- Being a member of Edhi old age home and Heaven old age home
- Have history of at least one fall in last 6 months
- Age 60 to 80 yr
- Both genders were equally inclusive

3.7.1.2 Exclusion Criteria
- Any disabling disease
- Not having history of fall
- Paralysis
- Severe (Grade 4) arthritis
- Blindness

3.7.2 Control Group

3.7.2.1 Inclusion Criteria
- Being a member of Edhi old age home and Heaven old age home
- Did not have history of fall in last 6 months
- Age 60 to 80 year
- Both genders were equally inclusive

3.7.2.2 Exclusion Criteria
- Any disabling disease
- Having history of fall in last six months
- Paralysis
- Severe (Grade 4) arthritis
- Blindness

3.8 Data collection

The study was conducted in Edhi old age home and heaven old age home which has about 950 residents out of which 45 refused to participate in the study and 28 were not available during the study. Remaining 877 old people were surveyed. From these 160 Cases(having history of fall) and 160 controls (having no history of fall)were selected by simple random sampling using random number table who were matched in gender, course of study and residence status

3.9 Ethical consideration

Ethical issue were considered and addressed. Information collected was kept confidential and clients were given informed choices to refuse the interviews. Only those participants were included in the study who signed the written consent. All the personal information of participants were kept hidden

3.10 Statistical Procedure

The data was analyzed using SPSS v20.Mean±SD was calculated for numeric variables i.e. age , frequency and percentage was shown with categorical variables e.g. Gender, age, and education. Odds ratio was calculated to measure the relative risk and to control the confounding variable, logistic regression was used. P value $\leq$ .05 was considered statistically significant

4. Results

4.1 Socio-Demographic Profile

Table 1: Socio-demographic Profile of Subjects

Variables	CASES History of Fall n=160	CONTROL No Fall n=160	P-value
Age (Mean±S.D)	67.71±6.015	68.66±9.584	0.289
Gender Male Female	45 95	45 95	>0.999
Education Metric Below	54 106	54 106	>0.999
Centre Edhi Home Heaven old age	50 30	50 30	>0.999

* p-value significant at or less than 0.05

Variables		Cases	Control	Total	OR(95%CI)	p-value
Dim Lights	Yes	89	78	167	1.318(.849-2.046)	0.218
	No	71	82	153		
Total		160	160	320		
Shoes without back	Yes	86	77	70	1.25(0.808-1.942)	0.314
	No	74	83	250		
Total		160	160	320		
Lack of Walking Aid	Yes	89	69	158	1.654(1.063-2.571)	0.025*
	No	71	91	162		
Total		160	160	320		
Carpet/Loose Mats	Yes	46	57	103	0.729(.455-1.168)	0.188
	No	114	103	217		
		160	160	160		

4.2 Physical and behavioral factors and falling

Table 2: Frequencies and Odds ratio with respective 95% Cl for variables related to Physical and behavioral factor

Variables		Cases	Control	Total	OR(95%CI)	p-value
More than 3 Medicine	Yes	77	72	169	1.13(0.734-1.763)	0.575
	No	83	88	151		
Total		160	160	320		
Sleeping Pills	Yes	72	66	138	1.165(0.748-1.814)	0.498
	No	88	94	182		
Total		160	160	320		
Anti Depressant	Yes	49	41	91	1.285(0.774-2.123)	0.320
	No	111	119	229		
Total		160	160	320		
Pain Medicine	Yes	89	80	168	1.254(0.808-1.954)	0.314
	No	71	80	152		
Total		160	160	320		
Vision Problem	Yes	89	101	190	0.732(.468-1.146)	0.172
	No	71	59	130		

Total		160	160	320		
Neurological Problem	Yes	66	71	137	0.884(.565-1.371)	0.572
	No	94	89	183		
Total		160	160	320		
Dizziness on Standing	Yes	105	97	179	1.244(0.783-1.951)	0.354
	No	55	63	141		
Total		160	160	320		
Fear of Fall	Yes	91	52	143	2.739(1.737-4.319)	<.001*
	No	69	108	177		
Total		160	160	320		
Walking Difficulty	Yes	90	67	156	1.783(1.144-2.781)	0.010*
	No	70	93	164		
Total		160	160	320		
Muscle Weakness	Yes	111	92	203	1.674(1.057-2.651)	0.027*
	No	49	68	117		
Total		160	160	320		
Foot Numbness	Yes	56	46	102	1.334(0.832-2.139)	0.233
	No	104	114	218		
Total		160	160	320		

4.3 Environmental factors and falling

Table 3 Frequencies and Odds ratio with respective 95% Cl for variables related to Environmental factors

4.4 Adjustment of variable

Table 4 Frequencies and Odds ratio adjusted for age, gender and education level with respective 95% Cl for variables related to physical and environmental factors

Variable		Cases Overweight/ obese	Control Normal	Total	Adjusted OR (95%CI)	p-value
Walking Difficulty	Yes	125	99	224	.2.603(1.286-4.135)	0.021*
	No	25	51	76		
Total		150	150	300		
Lack of Walking Aid	Yes	122	99	221	1.657 (1.043-2.633))	0.032*
	No	28	51	79		
Total		150	150	300		
Muscle weakness	Yes	120	95	215	2.218 (1.287-4.066)	0.043*
	No	30	55	85		
Total		150	150	300		
Fear of Fall	Yes	110	77	187	2.741 (1.728-4.914)	<0.001*
	No	40	73	113		
Total		150	150	300		

* p-value significant at or less than 0.05

A total of 15 potential confounding variables related to physical and environmental factors were studied. The four most significant variables were difficulty in walking, lack of walking aid, muscle weakness and fear of fall. A regression analysis technique was used and after allowing these four factors, all other differences were non-significant. Reanalysis of data introducing a greater number of confounding variables made no difference to the final conclusion

4.5 Model of Logistic Regression

Logit(falling)= 0.761-0.545(Walking difficulty)+0.505(not using walking aid)-.469(Muscle weakness)-.978(Fear of Fall)

5. Conclusion

The study demonstrated that four factors which include difficulty in walking, lack of walking aid, muscle weakness and fear of fall were found to be the key factors which increase the probability of having fall. Public health programs are warranted to increase awareness on these factors among these elderly to reduce the incidences of falling

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