

Circumstances of Fall in Geriatric Patients With Hip Fractures

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Abstract:

Background: In elderly people (aged ≥ 65 years), among lower limb fractures, hip fractures are common, but lead to a lot of disabilities, sometimes even death and their incidence keeps rising with age exponentially. Among these hip fractures, Falls contribute to about 80-90% in elderly people. There are very few studies in India discussing the risk factors and circumstances of these fall related injuries.

Aim: The purpose of this study is to assess the circumstances of fall in geriatric patients with hip fractures thereby proposing preventive methods in reducing these fall related injuries.

Materials and Methods: Our study is a retrospective and prospective type of observational study conducted at Sri Ramachandra Institute of Higher Education and Research (SRIHER), Porur, Chennai, between November 2018 to April 2020. The inclusion criteria were geriatric patients (age ≥ 65 years) presented with hip fractures (neck of femur and intertrochanteric fractures) who are willing to take part in the study and the exclusion criteria were patients who were not willing to take part in the study, who were not reachable or from whom complete information was not be able to obtain. Total of 215 elderly patients with hip fractures were enquired using a questionnaire regarding the detailed history about the fall - Activity during fall, Mode and duration of fall, Environmental factors / Prodromal symptoms pertaining to fall, failure of protective responses, Medications / alcohol intake and Chronic medical conditions pertaining to fall. We also assessed Parker's new mobility score prior to injury and postoperatively, Date / mode of postoperative mobilization and Life style changes after the episode. Finally, all the above data were analyzed and results were made.

Results: After analyzing the data, we found that most of the patients fell from standing, over the side having direct impact over hip. Mostly the falls happened in evening between 2PM to 8PM followed by night and mostly due to slip by wet floors in bathroom followed by low furniture /objects on floor in living spaces. Most common cause of failure of protective responses pertaining to fall is sudden onset of fall due to slippery surfaces. Most of the patients didn't have any prodromal symptoms pertaining to fall. Common medications intake are Oral hypoglycemics (OHA's), anti-hypertensives, thyroid medications, anti-anginal medications and sedatives. Common co-morbidities pertaining to fall are diabetes, hypertension, knee arthritis, dementia, cataract, CAD/Angina and refractory errors. Average Parker's new mobility score prior to injury is 7.65. Also, most of the patients not on any active physiotherapy and rehabilitation exercises.

Conclusion: From our study, we concluded that hip fractures occurring in elderly patients due to falls can be effectively reduced by the use of a multimodal approach containing a variety of preventive strategies which include weight reduction programs and proper diet control; Giving extra care and importance for elderly people; Use of special equipments like outdoor gait stabilizing devices and adequate padding around the hip; Various environmental modifications like appointing visiting nurses for regular home-visiting programs, eliminating potential tripping hazards and promoting preventing strategies to avoid those hazards; Encourage regular consultations regarding medications intake and withdrawal of psychotropic medications; Adequate treatment for underlying comorbidities; Undergoing regular psychiatric counselling and deaddiction programs and finally promoting long term exercise programs for both normal elderly individuals and postoperative patients.

Keywords: Circumstances of fall; Geriatric patients; Hip fractures; Preventive strategies

Date of Submission: 24-01-2022

Date of Acceptance: 06-02-2022

I. Introduction

In elderly people (aged ≥ 65 years), among lower limb fractures, hip fractures are common, but lead to a lot of disabilities, sometimes even death and their incidence keeps rising with age exponentially [1,2]. Among hip fractures, we are more concerned about the proximal femoral fractures which are anatomically subdivided

into intracapsular and extracapsular types. When the fracture line is proximal to the capsular insertion i.e., neck of femoral fractures are grouped into intracapsular fractures and in those the fracture line is distal to the capsular insertion i.e. intertrochanteric fractures are grouped into extracapsular fractures. [3] Approximately 30% of hip fractures occur in men with a life-time risk being 5–6% [4,5] and comparatively women found to have a 2 to 4-fold increase in risk of hip fractures [6]. Hence hip fracture is becoming an important public health concern because of the above-mentioned reasons and the rising number and proportion of the aged population. Among these hip fractures, Falls contribute to about 80-90% in elderly people [7,8]. Other factors like severe osteoporosis, sudden transmission of shearing or torque-like forces through the hip from a misstep, contribute to less than 10% of hip fractures [9]. It's been already proposed that the characteristics of the fall influences the anatomical type of hip fractures in elderly patients. For example, twisting injuries to hip mostly predisposes to intracapsular fractures of the proximal femur and a fall directly onto the greater trochanter mostly predisposes to extracapsular fractures [10,11]. However, there are no clear evidences for supporting any of these theories.

Also, approximately 30% of community-dwelling elderly people aged over 65 years and 50% of those over 85 years of age will fall [12-14]. And among the above, those having a fall-related injury will be around 12% to 42% [15-16]. But the location, age, and living arrangements of the elderly population will affect their rates of fall. Although the risk factors of falls in these elderly people were not clearly understood, various intrinsic and extrinsic risk factors have been proposed. Among the risk factors, those related to the health, demographic, and physical status of the individual are considered as intrinsic factors, which include medical and medication risks, psychosocial risks, demographic risks, dependence and activity level risks [17-18]. And those related to the physical and socio-economic environment are considered as extrinsic factors which include tripping hazards, balance and slip hazards, and vision hazards [19-21].

In SRIHER, from 2015, each year approximately 240 elderly patients aged over 65 years getting admitted due to hip fractures. [Table 1]

(Data acquired from MRD)

| YEAR | NOF | IT | TOTAL |
|------|-----|-----|-------|
| 2015 | 98 | 106 | 204 |
| 2016 | 126 | 115 | 241 |
| 2017 | 120 | 117 | 237 |
| 2018 | 117 | 153 | 270 |
| 2019 | 119 | 140 | 259 |
| 2020 | 27 | 40 | 67 |

Table No.1 Year wise and Fracture wise distribution of patients

More than 90% of these hip fracture cases are associated with falls. There are very few studies in India like Kaustubh Ahuja et al. in 2017 [22] discussing the risk factors and circumstances of these fall related injuries. Hence, we don't know clearly about the mechanisms of fall, duration of fall, predisposing factors and circumstances pertaining to fall in detail among these elderly patients of Indian population. The purpose of this study is to assess the circumstances of fall in geriatric patients with hip fractures thereby proposing preventive methods in reducing these fall related injuries.

II. Materials And Methods

Our study was a retrospective and prospective type of observational study conducted at Sri Ramachandra Institute of Higher Education and Research (SRIHER), Porur, Chennai, Tamil Nadu between November 2018 to April 2020. The inclusion criteria were all geriatric patients (age \geq 65 years) who presented with hip fractures - neck of femur and intertrochanteric fractures, willing to take part in the study. Those patients who were not willing to take part in the study and who were not reachable or from whom complete information was not be able to obtain, were excluded from the study. Assuming that 95% of the subjects in the population have the factor of interest, our study would require a minimum sample size of 203 for estimating the expected proportion with 3% absolute precision and 95% confidence. Hospital Ethics committee clearance was obtained before the start of study. Informed valid consent was obtained from the individual before the start of study in the language they can understand. This study included both elderly male and female patients (age \geq 65 years). The patients who satisfied the inclusion criteria were selected and detailed history regarding the fall will be taken using a questionnaire.

MODE OF ENQUIRY: If the detailed description about the fall was available in the case sheet, we retrieved them; If the patient was in hospital, we directly went and collected the detailed history regarding fall; If not, we personally called and spoke either to the patient directly or the attender with the patient nearby.

PARAMETERS ASSESSED:

1. Patient demographic data including BMI were obtained.
2. History regarding prior fall with or without fractures and recent weight loss in the past 1 year were obtained.
3. Detailed history about the fall was obtained which included activity at the time of fall, mode of fall, date and time of fall, place of fall, environmental factors which led to the fall, failure of protective responses (if present), any prodromal symptoms prior to fall, any medications or alcohol intake in relation to fall and chronic medical conditions pertaining to fall.
4. Parker's new mobility score prior to injury [Figure 1].
5. X-ray pelvis with both hips AP view and hip traction internal rotation view to assess the presence of Neck of femur or Inter-trochanteric fractures.
6. Fracture diagnosed with classification.
7. Treatment with date: Conservative / Cannulated Cancellous Screws / Dynamic Condylar Screw / Dynamic Hip Screw fixation / Proximal Femoral Nailing / Plating / Hemiarthroplasty / Total Hip Replacement.
8. Date and mode of mobilization (Full Weight Bearing / Partial or Protected Weight Bearing).
9. Postoperative parker's new mobility score.
10. Life style changes after the episode.

ACTIVITY AT THE TIME OF FALL: It included whether the fall was from standing/ sitting/ lying positions, falls from a height and Road Traffic Accidents.

MODES OF FALL: It included whether the fall was on the side having direct impact over the hip; on the front with or without outstretched hand having indirect impact over the hip; on the back / slipped and sit on the floor having indirect impact over the hip.

ENVIRONMENTAL FACTORS PERTAINING TO FALL:

1. Living spaces (hall / bedrooms / kitchen / corridor / balcony) – It included falls from bed, due to low furniture and objects like cords or wires on the floor, due to inadequate lighting, from staircase which were whether irregular or without handrails, due to wet floors.
2. Bathrooms – It included falls due to wet floors and inadequate lighting, due to absence of floormats or grab bars near bathtub/ toilet/ shower, from Indian type or low seated western type toilets.
3. Outdoors: It included falls while walking outdoors to fetch water in wells, feed pets, farm, etc., due to cracked sidewalls / steps, due to untrimmed shrubberies along the pathway, due to inadequate lighting or wet floors.

PROTECTIVE RESPONSES PERTAINING TO FALL:

The onset of a fall initiates several types of reflexes and postural responses that can prevent a fall, change the orientation of the faller, or reduce the energy of a fall if it occurs. Such protective responses include grabbing nearby objects slows the rate of falling; by quickly extending the arms, the faller can absorb the energy of the fall with the arms and hands and minimize the force of impact on the hip or other parts of the body; quick stumbling movements of the feet might decrease the downward velocity of the fall and thus decrease its potential energy. [23]

During falls, there is a critical threshold time for protective reactions; responses delayed beyond that threshold will be too late to reduce the energy or change the direction of a fall. [23]

Failure of protective responses occurs in the following situations/conditions:

- Slow reaction time in upper and lower extremities (response and movement times)
- Muscular weakness
- Sedation (alcohol, sedative drugs)
- Syncope or impaired consciousness during fall
- Disorientation, dementia
- Sudden onset of fall (slippery surfaces)
- Delayed recognition of falling (peripheral neuropathy, impaired vestibular function)

We assessed whether any of the above situations / conditions occurred at the time of fall.

PRODROMAL SYMPTOMS PERTAINING TO FALL: We assessed the presence of any of the following symptoms prior to fall – Headache, Giddiness, Fatigue, Chest discomfort, Palpitation, Breathlessness.

MEDICATIONS / ALCOHOL INTAKE PERTAINING TO FALL: We assessed whether the patients were actively taking any of the following medications/ drugs.

1. Psychotropic – Anti-depressants, Anti-psychotics, Anxiolytics, Sedatives / Tranquilizers, Mood

stabilizers

2. Cardiovascular – Anti-hypertensives, Anti-arrhythmics, Anti-anginal, Diuretics, Renal medications
3. CNS – Anti-parkinsonism, Anti-epileptics
4. Insulin and oral hypoglycemics
5. Hormonal - Thyroid drugs, Hormone replacement therapy
6. Steroids
7. Alcohol and Smoking
8. Others – ATT, HAART, Antibiotics, Anticancer drugs

CHRONIC MEDICAL CONDITIONS (CO-MORBIDITIES) PERTAINING TO FALL: We assessed whether the patients were having any of the following chronic medical conditions.

1. Postural instability
2. Musculoskeletal – Gait disorders, Hip / Knee / Ankle arthritis, Lower limb deformities, prior lower limb bony injuries or surgeries
3. Neurological – Stroke, Spinal cord injuries / pathologies
4. Visual disturbances – Refractory errors, Cataract, Glaucoma
5. Psychiatric illness – Depression, Bipolar, Anxiety, Psychosis, Dementia
6. Cardiopulmonary illness – MI / Angina, Arrhythmia, CCF, COPD, Asthma
7. Hypertension and Diabetes
8. Chronic infections

The New Mobility Score (0-9 points).

| Mobility | No difficulty and no aid | With a walking aid | With help from another person | Not at all |
|--|--------------------------|--------------------|-------------------------------|------------|
| Able to get about the house (indoor walking) | 3 | 2 | 1 | 0 |
| Able to get out of the house (outdoor walking) | 3 | 2 | 1 | 0 |
| Able to go shopping (walking during shopping) | 3 | 2 | 1 | 0 |

Kristensen MT, Hvidovre Hospital. Updated from Parker & Palmer [17] following personal communication with Dr. Martyn Parker, Peterborough, England, December 2009.

Fig. No.1 Palmer and Parker New Mobility Score

CASE EXAMPLE:

CASE 1:

Name: ----- Hospital Id no: ----- Age/Sex: 73/F
 BMI: 25.5 Date of Admission: 30/11/2020 Date of fall – 28/11/2020

The patient had no previous history of falls or fractures and recent weight loss. The patient was trying to sit in a low-lying furniture in the hall at around 10pm in night while falling. The patient fell from sitting position and fell on side having direct impact over the hip. The patient was having a slow reaction time in upper extremities at the time of fall. The patient didn't have any prodromal symptoms prior to fall. No alcohol intake prior to fall. The patient was a known case of Coronary Artery Disease and on anti-anginal medications. The patient didn't have any other known co-morbidities and not on any other known medications. Parker's new mobility score prior to injury was 9. The patient was diagnosed with Intertrochanteric fracture - Boyd and Griffin type 1 [Figure 2]. The patient underwent Proximal Femoral Nailing on 12/04/2021. The patient was mobilized full weight bearing on 5th postoperative day. Postoperative Parker's new mobility score was 7. The patient was not on any active physiotherapy or rehabilitation exercises.



Fig. No.2 X-rays Pelvis with both hips AP view and Right hip traction-internal rotation view of case example 1

III. Data analysis and Results

As per the mode of enquiry discussed earlier, a total of 606 patients were enquired. Of which 560 patients were enquired through phone calls. Among the phone calls made, about 180 patients (32.1%) were dead; 136 calls (24.3%) were unanswered / couldn't reach. 70 patients (12.5%) were not willing to take part in survey or have given inappropriate data. So total data obtained by enquiring through phone calls was 174 (31%). Also 46 patients' data were obtained through direct enquiry i.e., by taking history directly from the patient in the hospital. Finally, a total of 220 patients' data (33.2%) were obtained out of 606 patients enquired.

Out of 220 patients, 76 patients (34.5%) were in the age group between 65-69 years; 59 patients (26.8%) were in the age group between 70-74 years; 40 patients (18.2%) were in the age group between 75-79 years; 45 patients (20.5%) were in the age group of 80 and above years. The average age of patients was 72.6 years. Out of 220 patients, 97 patients (44.1%) were males and 123 patients (55.9%) were females. Average BMI of the patients was 23.9. Only around 9 patients (4.3%) had a history of recent weight loss during the past 1 year. Among 220 patients, only 45 patients (21%) had previous history falls without fractures and 18 patients (8.60%) had previous history falls with fractures. We didn't mention about the type of fractures as some of the enquiries are conducted through phone calls. The remaining 147 patients (70%) never had a previous history of falls or fractures. [Figure 3]

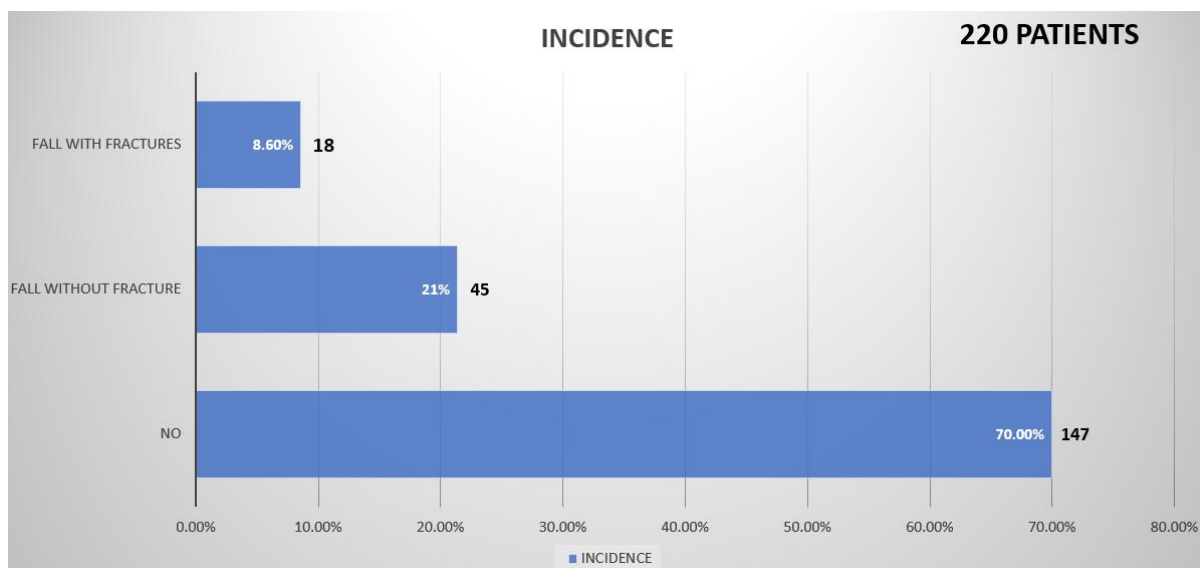


Fig. No.3 Bar chart showing prior history of fall and fractures among patients (N=220)

Among 220 patients, 150 patients (68.2%) had a fall from standing posture; 28 patients (12.7%) had a fall from sitting posture; 29 patients (13.2%) had a fall from lying posture. Other than these 5 patients (2.3%) had a fall from height at outdoors and 8 patients (3.6%) had RTA. [Figure 4]

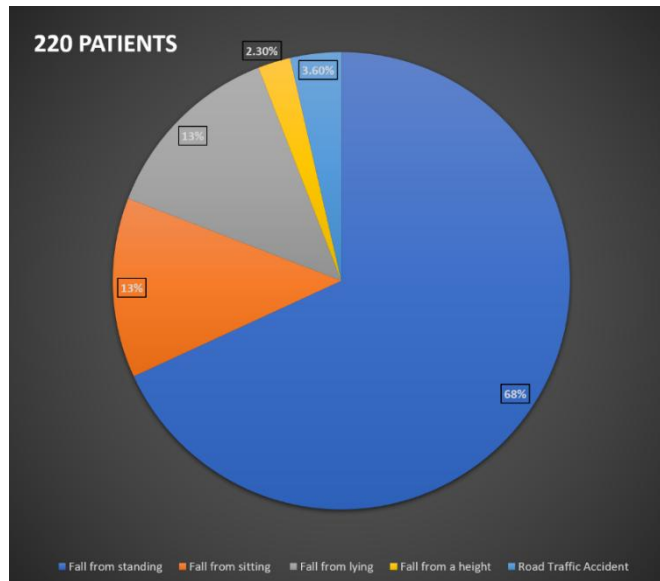


Fig. No.4 Pie chart showing activity of patients at the time of fall (N=220)

Among 220 patients, the above mentioned 13 patients who had a fall from height at outdoors (5) and RTA (8) were excluded as they were not able to clearly recollect their mode of fall. So, among the remaining 207 patients, 116 patients (56.3%) had a fall on their sides having direct impact over their hips; 71 patients (34.5%) had a fall on back or slipped and sit on the floor having indirect impact over hip; 20 patients (9.66%) had a fall on front or fall with outstretched hand having indirect impact over hip. [Figure 5]

207 PATIENTS

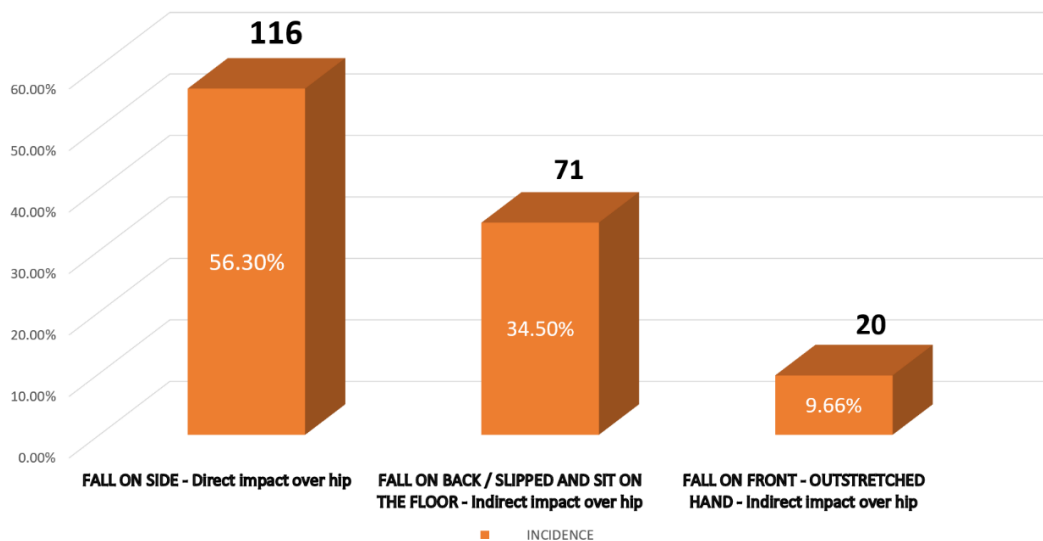


Fig. No.5 Bar chart showing modes of fall among patients (N=207)

Among 220 patients, 71 patients (32.2%) had fall between 2PM to 8PM; 54 patients (24.5%) had fall between 8PM to 2AM; 48 patients (21.8%) had fall between 8AM to 2PM; 47 patients (21.4%) had fall between 2AM to 8AM. Hence, most of the fall happened between 2PM to 8PM with maximum clusters in evening (5.30 to 8PM) followed by night. [Figure 6]

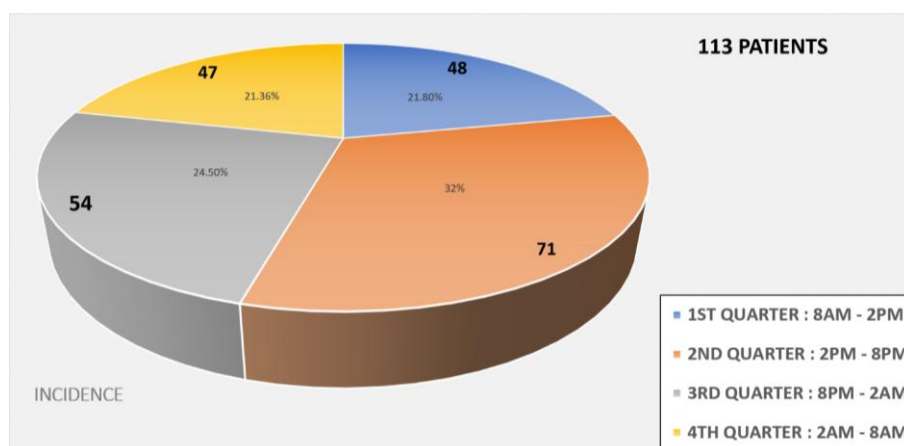


Fig. No.6 Pie chart showing distribution of duration of fall among patients (N=220)

| | |
|--|--|
| LIVING SPACES – 107 (48.6%) (Hall / Bedrooms / Kitchen / Corridor / Balcony) | Low furniture and objects on floor – 37 (16.8%) |
| | Fall from bed – 29 (13.2%) |
| | Staircase – 26 (11.8%) |
| | Inadequate lighting – 24 (10.9%) |
| | Wet floors – 15 (6.8%) |
| BATHROOMS – 77 (35%) | Wet floors – 66 (30%) |
| | Inadequate lighting – 22 (10%) |
| | Indian type or low seated western type – 11 (5%) |
| OUTDOORS – 36 (16.4%) | Walking on the road – 14 (6.4%) |
| | Steps – 7 (3.2%) |
| | Inadequate lighting – 10 (4.5%) |
| | Walking outdoors for personal works – 5 (2.3%) |

Table No.2 Distribution of environmental factors pertaining to fall among patients (N=220)

From the above table, it is evident that among 220 patients, majority of the falls happened in living spaces (hall/bedrooms/kitchen/corridor/balcony) which accounted for 107 patients (48.6%). In these living spaces, the common environmental factors pertaining to fall include low furniture and objects on floor (16.8%), followed by fall from bed (13.2%) and fall from staircases (11.8%). About 77 patients (35%) fell in bathrooms, mostly due to wet floors (30%). [Table 2]

Among 36 patients (16.4%) who fell outdoors, 14 patients (6.4%) fell while walking on the road and 7 patients (3.2%) fell from steps at the entrance of the house. Inadequate lighting is the commonest factor accompanied with other environmental factors in living spaces, bathrooms and outdoors. Among 220 patients, only 102 patients (46.4%) were able to recollect and provide a reliable history regarding failure of protective responses pertaining to fall. Among those 102 patients, majority i.e., 62 patients (28.2%) had a sudden onset of fall or fall due to slippery surfaces; 25 patients (11.3%) had slow reaction in extremities during fall; 10 patients (4.5%) were having dementia and 5 patients (2%) were on sedatives. Hence, from the above data it is obvious that, sudden onset of fall or fall due to slippery surfaces is the most common factor causing failure of protective responses pertaining to fall. Among 220 patients, majority i.e., 176 patients (80%) didn't have any prodromal symptoms pertaining to fall. Of the remaining, 24 patients (10.9%) had giddiness; 16 patients (7.3%) had headache; 4 patients (2%) had fatigue. [Figure 7]

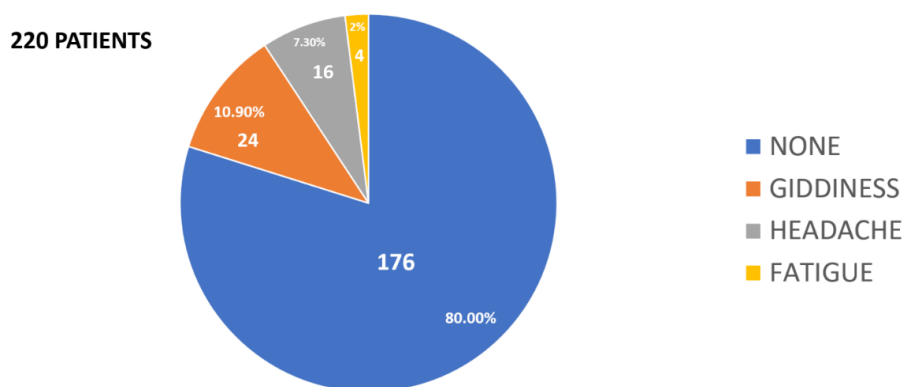


Fig. No.7 Pie chart showing incidence of prodromal symptoms pertaining to fall among patients (N=220)

It is evident from the below table that, among 220 patients, 113 patients (51.4%) were on oral hypoglycemic agents (OHA's); 109 patients (49.5%) were on anti-hypertensives; 46 patients (20.9%) were on thyroid medications; 35 patients (15.9%) were on anti-anginal medications; 32 patients (14.5%) were on sedatives. Other common medications used by the patients were renal medications (7.7%), insulin (4.5%), anti-retroviral agents (2.8%), anti-tubercular drugs (1.8%), anti-cancer drugs (2.7%), anti-rheumatoid drugs (2.8%), steroids (2.8%), anti-parkinsonism (1.4%) and anti-epileptic agents (1.4%). And it is also evident that around 44% of patients were not taking any medications pertaining to fall. [Table 3]

| | |
|--------------------------------------|--|
| A) PSYCHOTROPIC MEDICATIONS | None – 182 (82.7%) |
| | Sedatives – 32 (14.5%) |
| | Anti-depressants – 6 (2.7%) |
| B) CARDIOVASCULAR MEDICATIONS | None – 112 (50.9%) |
| | Anti-hypertensives – 109 (49.5%) |
| | Anti-anginal – 35 (15.9%) |
| | Renal medications – 17 (7.7%) |
| C) CNS MEDICATIONS | None – 214 (97.3%) |
| | Anti-parkinsonism – 3 (1.4%) |
| | Anti-epileptics – 3 (1.4%) |
| D) HYPOGLYCEMICS | None – 97 (44.1%) |
| | Oral hypoglycemics (OHA's) – 113 (51.4%) |
| | Insulin – 10 (4.5%) |
| E) HORMONAL AND STERIODS | None – 169 (76.8%) |
| | Thyroid drugs – 46 (20.9%) |
| | Steroids – 5 (2.8%) |
| F) OTHERS | None – 200 (90.9%) |
| | Anti-cancer drugs – 6 (2.7%) |
| | HAART – 5 (2.8%) |
| | ATT – 4 (1.8%) |
| | DMARDS – 5 (2.8%) |

Table No.3 Medications intake pertaining to fall among patients (N=220)

Among 220 patients, only 17 patients (8.1%) were active smokers and 8 patients (3.6%) had alcohol intake pertaining to fall. The rest 92% of patients were not having any history of smoking or alcohol intake. It is evident from the below table that, among 220 patients, 126 patients (57.3%) had diabetes; 111 patients (50.5%) had hypertension; 100 patients (45.6%) had knee arthritis; 95 patients (43.2%) had cataract; 64 patients (29.1%) had dementia; 58 patients (26.4%) had refractory errors and 47 patients (21.4%) had CAD / Angina. Other common co-morbidities the patients had were stroke (4.5%), prior lower limb surgeries (4.5%), depression (3.2%), Tb and HIV (2.7%), malignancies (2.3%), lower limb deformities (2.3%), parkinsonism (1.4%), asthma (1.4%) and epilepsy (0.9%). And it is also evident that around 35.5% of patients were not having any chronic medical conditions (co-morbidities) pertaining to fall. [Table 4]

| | |
|--------------------------------------|--|
| A) POSTURAL INSTABILITY | None |
| B) MUSCULOSKELETAL CONDITIONS | None – 114 (51.8%) |
| | Knee arthritis – 100 (45.6%) |
| | Prior lower limb surgeries – 10 (4.5%) |
| | Malignancies – 5 (2.3%) |
| | Lower limb deformities – 5 (2.3%) |
| | Parkinsonism (gait disorders) – 3 (1.4%) |
| C) NEUROLOGICAL CONDITIONS | None – 208 (94.5%) |
| | Stroke – 10 (4.5%) |
| | Epilepsy – 2 (0.9%) |
| D) VISUAL DISTURBANCES | None – 111 (50.5%) |
| | Refractory errors – 58 (26.4%) |
| | Cataract – 95 (43.2%) |
| E) PSYCHIATRIC ILLNESS | None – 149 (67.7%) |
| | Dementia – 64 (29.1%) |
| | Depression – 7 (3.2%) |
| F) CARDIOPULMONARY ILLNESS | None – 170 (77.3%) |
| | CAD / angina – 47 (21.4%) |
| | Asthma – 3 (1.4%) |
| G) HYPERTENSION AND DIABETES | None – 78 (35.5%) |
| | Hypertension – 111 (50.5%) |
| | Diabetes – 126 (57.3%) |
| H) CHRONIC INFECTIONS | None – 214 (97.3%) |
| | Tb and HIV – 6 (2.7%) |

Table No.4 Co-morbidities pertaining to fall among patients (N=220)

Average Parker's new mobility score prior to injury (0-9) – 7.65. Among 220 patients, 110 patients (50%) had neck of femur fracture and 110 patients (50%) had intertrochanteric femur fracture. Among neck of femur fracture patients, majority (76%) of the patients had Garden type 4 and among intertrochanteric fracture, majority (62%) of the patients had Boyd and Griffin type 2. Among the patients who had neck of femur fracture (110 patients), 60 patients (27.3%) underwent THR and 50 patients (22.7%) underwent

hemiarthroplasty. None of the patients with neck of femur fracture, whom we enquired, underwent cannulated cancellous screws fixation or treated with conservative methods.

Among the patients who had intertrochanteric femur fracture (110 patients), 87 patients (39.5%) underwent PFN and 21 patients (9.5%) underwent hemiarthroplasty; the remaining patients were managed with either DCS or conservative methods. Most of the patients (88%) underwent surgery within 3-5 days of admission. Very few patients underwent surgery after 5 days – 1 week because of underlying medical issues. In both the group of patients who underwent surgeries for neck of femur fracture and intertrochanteric femur fracture, the period of mobilization varied from 1st postoperative day up to over 3 months, depending on the stability of the fracture site after fixation and integrity of the surrounding soft tissues.

Among 220 patients, majority of the patients, 69 patients (31.4%) were being mobilized during the period of 4-6 weeks; 47 patients (21.4%) mobilized within 1 week; 33 patients (15%) mobilized during 2nd week; 27 patients (12.3%) mobilized during 3rd week. Only about 12 patients (5.5%) were being mobilized during the period of 6 weeks to 3 months and about 16 patients (7.3%) mobilized after 3 months. The exact cause for delayed mobilization in these patients was unknown. Very few patients (<5%) underwent in bed mobilization or not mobilized at all; most of them had underlying medical conditions like stroke and malignancies. The average week of mobilization among neck of femur fracture group was around 4 weeks and among intertrochanteric fracture groups was around 2 weeks. Among 220 patients, 147 patients (66.8%) underwent partial / protected weight bearing (PTWB) mobilization and 65 patients (29.5%) underwent full weight bearing mobilization. Very few patients (<5%) underwent other modes of mobilization like non weight bearing and in-bed mobilization.

Average postoperative Parker's new mobility score (0-9) – 4.25. Among 220 patients, majority of the patients, 173 patients (78.5%) were not on any active physiotherapy or rehabilitation exercises except for initial few weeks following surgery. Most of them discontinued their rehabilitation exercises once they started mobilizing at around 4-6 weeks. The rest 33 patients (15.2%) were on active hip, knee or back strengthening exercises and 14 patients (6.3%) were on in-bed mobilization exercises as advised by the surgeon and physiotherapist.

IV. Discussion

In elderly people (aged ≥ 65 years), among lower limb fractures, hip fractures are common. Among these hip fractures, Falls contribute to about 80-90% in elderly people [7,8]. Approximately 30% of community-dwelling elderly people aged over 65 years and 50% of those over 85 years of age will fall [12-14]. But the location, age, and living arrangements of the elderly population will affect their rates of fall.

Although the risk factors of falls in these elderly people were not clearly understood, various intrinsic and extrinsic risk factors have been proposed. Among the risk factors, those related to the health, demographic, and physical status of the individual are considered as intrinsic factors, which include medical and medication risks, psychosocial risks, demographic risks, dependence and activity level risks [17-18]. And those related to the physical and socio-economic environment are considered as extrinsic factors which include tripping hazards, balance and slip hazards, and vision hazards [19-21].

Steven R. Cummings et al. in 1989 proposed that four potential contributing factors for hip fractures in elderly patients, associated with falls include: (a) the impact of the fall should be nearer to the hip (b) failure of protective responses (c) poorer local soft tissues around hip thereby absorbing less energy of the impact than needed (d) the strength of the proximal femur should be lesser compared to the residual energy of the impact it underwent. [23]

James A. Hopkinson-Woolley et al. in 1998 proposed a study verifying the theories about the relationship between the anatomical site of hip fracture in elderly and the characteristics of a fall. They assessed the nature of their fall, degree of activity during the fall, direction of fall and part of the body first impacted on the ground at the time of fall. Concluded that fall over the affected side lead to majority of intracapsular fractures and rotational forces i.e., twisting injuries over the hip significantly associated with extracapsular fractures. [24]

Nguyen et al. in 2005 assessed the association between hip fractures and falls-related factors in elderly men and women, and concluded that hip fractures occurring among elderly men and women have the following risk factors: prior history of falls and fractures, quadriceps weakness, postural instability, low femoral neck bone mineral density. [25]

Kaustubh Ahuja et al. in 2017 proposed a retrospective case-control study to assess the mechanism of injuries leading to hip fractures in elderly Indian population and assessed the following factors: mode and occurrence of the fracture, history of medications intake, past medical history, past physical activity, smoking, alcohol intake and supplements. [26]

In our study, we assessed and found that there are several other potential risk factors for hip fractures in elderly patients associated with falls, which include: (a) average BMI of the patients (b) prior history of fall and factors (c) history of recent weight loss (past 1 year) (d) past physical activity by Parker’s mobility score (e) activity at the time of fall (f) modes of fall (g) duration of fall (h) environmental factors pertaining to fall (i) failure of protective responses (j) prodromal symptoms pertaining to fall (k) medications intake in relation to fall (l) smoking and alcohol intake (m) chronic medical conditions pertaining to fall. [Table 5]

We also assessed the fracture distribution, treatment modality received, period and mode of mobilization, postoperative Parker’s mobility score, life style changes after the episode.

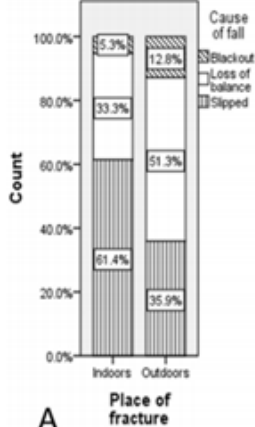
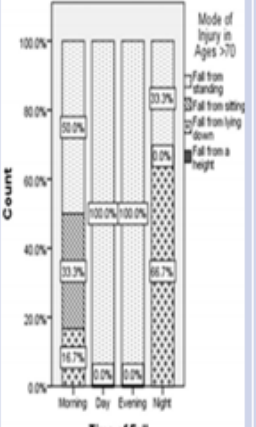
| <p>A HYPOTHESIS – THE CAUSES OF HIP FRACTURES Steven R. Cummings et al. (1989)</p> | <p>RISK FACTORS AND EPIDEMIOLOGICAL PROFILE OF HIP FRACTURES IN INDIAN POPULATION: A CASE-CONTROL STUDY Kaustubh Ahuja et al. (2017)</p> | <p>OUR STUDY</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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Bone strength</td> <td> <ul style="list-style-type: none"> Osteoporosis (reduced mineral density) Osteomalacia Qualitative microscopic abnormalities (microdamage, crystal size) Architectural weakness (loss of major trabeculae, thinned cortices, thin bone diameter) </td> </tr> </tbody> </table> | Step | Potential Contributing Factors | 1. Orientation of fall | <ul style="list-style-type: none"> Slow gait speed Fall during bed and chair transfers Fall during descent of stairs or curbs | 2. Protective responses | <ul style="list-style-type: none"> Slow reaction time in upper and lower extremities (response and movement times) Muscular weakness Sedation (alcohol, sedative drugs) Syncope or impaired consciousness during fall Disorientation, dementia Sudden onset of fall (slippery surfaces) Delayed recognition of falling (peripheral neuropathy, impaired vestibular function) | 3. 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Bone strength | <ul style="list-style-type: none"> Osteoporosis (reduced mineral density) Osteomalacia Qualitative microscopic abnormalities (microdamage, crystal size) Architectural weakness (loss of major trabeculae, thinned cortices, thin bone diameter) | <table border="1"> <thead> <tr> <th>Variable</th> <th>Cases (n = 41)</th> <th>Controls (n = 41)</th> <th>Odds ratio (95% CI)</th> <th>P-value</th> </tr> </thead> <tbody> <tr> <td>Last weight in the past 1 yr, yes</td> <td>17</td> <td>11</td> <td>1.82 (0.88-4.11)</td> <td>0.163</td> </tr> <tr> <td>Past activity level</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Very active</td> <td>13</td> <td>15</td> <td>0.43 (0.168-1.117)</td> <td>0.146</td> </tr> <tr> <td> Active</td> <td>12</td> <td>18</td> <td>0.33 (0.139-0.832)</td> <td>0.045</td> </tr> <tr> <td> Inactive</td> <td>16</td> <td>8</td> <td>1</td> <td></td> </tr> <tr> <td>Present activity level</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Very active</td> <td>14</td> <td>18</td> <td>0.45 (0.171-1.206)</td> <td>0.311</td> </tr> <tr> <td> Active</td> <td>13</td> <td>16</td> <td>0.37 (0.205-1.438)</td> <td>0.184</td> </tr> <tr> <td> Inactive</td> <td>12</td> <td>7</td> <td>1</td> <td></td> </tr> <tr> <td>History of chronic diseases</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Diabetes, yes</td> <td>5</td> <td>4</td> <td>1.26 (0.399-4.134)</td> <td>0.734</td> </tr> <tr> <td> Hypertension, yes</td> <td>10</td> <td>12</td> <td>0.76 (0.342-1.715)</td> <td>0.619</td> </tr> <tr> <td> Epilepsy, yes</td> <td>3</td> <td>1</td> <td>3.18 (0.456-21.877)</td> <td>0.128</td> </tr> <tr> <td>History of long term drug usage</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Taking some sort of medication, yes</td> <td>34</td> <td>19</td> <td>1.63 (0.765-3.442)</td> <td>0.21</td> </tr> <tr> <td> Drugs for hypertension, yes</td> <td>8</td> <td>12</td> <td>0.36 (0.248-1.34)</td> <td>0.306</td> </tr> <tr> <td> Drugs for heart disease, yes</td> <td>1</td> <td>4</td> <td>0.23 (0.035-1.511)</td> <td>0.199</td> </tr> <tr> <td> Drugs for diabetes, yes</td> <td>5</td> <td>3</td> <td>1.79 (0.489-6.206)</td> <td>0.461</td> </tr> <tr> <td> Antibacterial therapies, yes</td> <td>5</td> <td>3</td> <td>1.79 (0.489-6.206)</td> <td>0.461</td> </tr> <tr> <td> Alternative therapy, yes</td> <td>10</td> <td>3</td> <td>4.86 (1.269-11.951)</td> <td>0.045</td> </tr> <tr> <td> Calcium tablets taken in past 3 mo, yes</td> <td>9</td> <td>10</td> <td>0.72</td> <td>0.794</td> </tr> <tr> <td> Smoking, yes</td> <td>16</td> <td>9</td> <td>2.24</td> <td>0.111</td> </tr> <tr> <td> Alcohol, yes</td> <td>9</td> <td>2</td> <td>5.84</td> <td>0.017</td> </tr> </tbody> </table>   | Variable | Cases (n = 41) | Controls (n = 41) | Odds ratio (95% CI) | P-value | Last weight in the past 1 yr, yes | 17 | 11 | 1.82 (0.88-4.11) | 0.163 | Past activity level | | | | | Very active | 13 | 15 | 0.43 (0.168-1.117) | 0.146 | Active | 12 | 18 | 0.33 (0.139-0.832) | 0.045 | Inactive | 16 | 8 | 1 | | Present activity level | | | | | Very active | 14 | 18 | 0.45 (0.171-1.206) | 0.311 | Active | 13 | 16 | 0.37 (0.205-1.438) | 0.184 | Inactive | 12 | 7 | 1 | | History of chronic diseases | | | | | Diabetes, yes | 5 | 4 | 1.26 (0.399-4.134) | 0.734 | Hypertension, yes | 10 | 12 | 0.76 (0.342-1.715) | 0.619 | Epilepsy, yes | 3 | 1 | 3.18 (0.456-21.877) | 0.128 | History of long term drug usage | | | | | Taking some sort of medication, yes | 34 | 19 | 1.63 (0.765-3.442) | 0.21 | Drugs for hypertension, yes | 8 | 12 | 0.36 (0.248-1.34) | 0.306 | Drugs for heart disease, yes | 1 | 4 | 0.23 (0.035-1.511) | 0.199 | Drugs for diabetes, yes | 5 | 3 | 1.79 (0.489-6.206) | 0.461 | Antibacterial therapies, yes | 5 | 3 | 1.79 (0.489-6.206) | 0.461 | Alternative therapy, yes | 10 | 3 | 4.86 (1.269-11.951) | 0.045 | Calcium tablets taken in past 3 mo, yes | 9 | 10 | 0.72 | 0.794 | Smoking, yes | 16 | 9 | 2.24 | 0.111 | Alcohol, yes | 9 | 2 | 5.84 | 0.017 | <ol style="list-style-type: none"> BMI Recent weight loss Previous fall and fractures Time of fall Activity during fall Mode of fall Environmental factors Prodromal symptoms Protective responses Medications Alcohol and smoking Co-morbidities Pre-op and post-op Parker’s mobility score Treatment and Mobilization Life style changes |
| Step | Potential Contributing Factors | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Orientation of fall | <ul style="list-style-type: none"> Slow gait speed Fall during bed and chair transfers Fall during descent of stairs or curbs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Protective responses | <ul style="list-style-type: none"> Slow reaction time in upper and lower extremities (response and movement times) Muscular weakness Sedation (alcohol, sedative drugs) Syncope or impaired consciousness during fall Disorientation, dementia Sudden onset of fall (slippery surfaces) Delayed recognition of falling (peripheral neuropathy, impaired vestibular function) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Local shock absorbers | <ul style="list-style-type: none"> Weakness or atrophy of muscles surrounding the hip Reduced fat around hip and buttocks Hard impact surface | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Bone strength | <ul style="list-style-type: none"> Osteoporosis (reduced mineral density) Osteomalacia Qualitative microscopic abnormalities (microdamage, crystal size) Architectural weakness (loss of major trabeculae, thinned cortices, thin bone diameter) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Variable | Cases (n = 41) | Controls (n = 41) | Odds ratio (95% CI) | P-value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Last weight in the past 1 yr, yes | 17 | 11 | 1.82 (0.88-4.11) | 0.163 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Past activity level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Very active | 13 | 15 | 0.43 (0.168-1.117) | 0.146 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Active | 12 | 18 | 0.33 (0.139-0.832) | 0.045 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Inactive | 16 | 8 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Present activity level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Very active | 14 | 18 | 0.45 (0.171-1.206) | 0.311 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Active | 13 | 16 | 0.37 (0.205-1.438) | 0.184 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Inactive | 12 | 7 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| History of chronic diseases | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Diabetes, yes | 5 | 4 | 1.26 (0.399-4.134) | 0.734 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hypertension, yes | 10 | 12 | 0.76 (0.342-1.715) | 0.619 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Epilepsy, yes | 3 | 1 | 3.18 (0.456-21.877) | 0.128 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| History of long term drug usage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Taking some sort of medication, yes | 34 | 19 | 1.63 (0.765-3.442) | 0.21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drugs for hypertension, yes | 8 | 12 | 0.36 (0.248-1.34) | 0.306 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drugs for heart disease, yes | 1 | 4 | 0.23 (0.035-1.511) | 0.199 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drugs for diabetes, yes | 5 | 3 | 1.79 (0.489-6.206) | 0.461 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antibacterial therapies, yes | 5 | 3 | 1.79 (0.489-6.206) | 0.461 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alternative therapy, yes | 10 | 3 | 4.86 (1.269-11.951) | 0.045 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calcium tablets taken in past 3 mo, yes | 9 | 10 | 0.72 | 0.794 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Smoking, yes | 16 | 9 | 2.24 | 0.111 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alcohol, yes | 9 | 2 | 5.84 | 0.017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table No.5 Comparison of parameters assessed in the study conducted by Steven R. Cummings et al., Kaustubh Ahuja et al. and our study

By assessing the above-mentioned factors, we’ve found the following facts among the elderly population we assessed:

- Average BMI of the patients was 23.9.
- Around 9 patients (4.3%) had a history of recent weight loss during the past 1 year.
- 147 patients (70%) never had a previous history of falls or fractures. 45 patients (21%) had previous history falls without fractures and 18 patients (8.60%) had previous history falls with fractures.
- Most common activity at the time of fall – Fall from standing (68.2%) followed by fall from sitting posture (12.7%).
- Most common mode of fall – Fall on side having direct impact over hip (56.3%) followed by fall on back or slipped and sit on the floor having indirect impact over hip (34.5%).
- Most common time of fall – 2PM to 8PM (32.2%) with maximum clusters in evening (5.30 to 8PM) followed by night - 8PM to 2AM (24.5%).

- Most common environmental factor pertaining to fall – Slipped due to wet floors in bathroom (30%) followed by low furniture and objects on floor in living spaces (16.8%).
- Most common cause of failure of protective responses pertaining to fall – Sudden onset of fall due to slippery surfaces (28.2%) followed by slow reaction in extremities during fall (11.3%).
- Most of the patients (80%) didn't have any prodromal symptoms pertaining to fall. Only about 10.9% had giddiness and 7.3% had headache.
- Common medications intake are Oral hypoglycemics (OHA's) (51.4%), anti-hypertensives (49.5%), thyroid medications (20.9%), anti-anginal medications (15.9%), and sedatives (14.5%).
- 92% of patients were not having any history of smoking or alcohol intake. 8.1% were active smokers and 3.6% had alcohol intake pertaining to fall.
- Common co-morbidities pertaining to fall are diabetes (57.3%), hypertension (50.5%), knee arthritis (45.6%), cataract (43.2%), dementia (29.1%), refractory errors (26.4%), CAD / Angina (21.4%).
- Average Parker's new mobility score prior to injury is 7.65.
- 50% patients had neck of femur fracture and 50% patients had intertrochanteric fracture.
- Among the patients who had neck of femur fracture, 27.3% patients underwent THR and 22.7% patients underwent hemiarthroplasty. Among the patients who had intertrochanteric femur fracture, 39.5% patients underwent PFN and 9.5% patients underwent hemiarthroplasty. Most of the patients (88%) underwent surgery within 3-5 days of admission.
- 31.4% patients were being mobilized during the period of 4-6 weeks and 21.4% patients mobilized within 1 week. The average week of mobilization among neck of femur fracture group was around 4 weeks and among intertrochanteric fracture groups was around 2 weeks.
- 66.8% patients underwent partial / protected weight bearing (PTWB) mobilization and 29.5% patients underwent full weight bearing (FWB) mobilization.
- Average postoperative Parker's new mobility score (0-9) – 4.25.
- Most of the patients (78.5%) were not on any active physiotherapy and rehabilitation exercises. Only around 15.2% patients were on active hip, knee or back strengthening exercises and 6.3% patients were on in-bed mobilization exercises.

Judy A. Stevens et al. from 1988 to 1996 studied elderly women ageing over 65 years and concluded that multifaceted approaches that include various combinations of education, exercise, medication assessment, risk factor reduction, environmental modifications and secondary prevention strategies like reducing the amount of energy transferred to the hip are needed to prevent hip fracture when falls occur. [27]

Medical Advisory Secretariat - Ontario Ministry of Health and Long-Term Care, Canada in August 2007 proposed an evidence-based meta-analysis for preventing falls and fall-related injuries in elderly people. They concluded that various preventive strategies like use of outdoor gait-stabilizing devices for mobile seniors, withdrawal of psychotropic medications, long-term exercise programs, interventions for visual and hearing problems, calcium and vitamin D supplementation in elderly women, environmental modifications like prevention of tripping / slipping hazards in living areas / bathrooms, adequate lighting, use of hand rails may effectively reduce fall-related injuries in elderly population. [28]

From our study, we concluded that hip fractures occurring in elderly patients due to falls can be effectively reduced by the use of a multimodal approach containing a variety of preventive strategies which include:

1. Weight reduction programs and proper diet control.
2. Extra care and importance should be given to those individuals who had a previous history of fall or fractures.
3. Prevention of impact over hip or reducing the amount of energy transferred to the hip by the use of special equipments like outdoor gait stabilizing devices and adequate padding around the hip.
4. Monitoring the elderly people carefully especially during the peak hours of fall like evening and night.
5. Environmental modifications:
 - Regular home-visiting programs using visiting nurses can be helpful to identify potential fall hazards and corrective them intime before fall occurs.
 - Identify and eliminate various potential tripping hazards like throw rugs, wet floors, low lying furniture, objects like wires or cords on floor, irregular staircase or staircase without handrails, inadequate lighting in living rooms and washrooms, Indian type or low seated western type toilets, bathtub/ toilet/ shower without floormats and grab bars, cracked sidewalls / steps in outdoors and untrimmed shrubberies along the pathway.
 - Promoting various preventive strategies like providing increased attention to individual resident needs, routine use of nonslip floor surfaces like high friction tiles, improving lighting, adding stair railings, obtaining wheel locks for beds, using raised toilet seats, installing floormats and grab bars in bathrooms,

trimming the shrubberies along the pathway.

- Residents can be provided with checklists so that they can assess various personal and environmental risks effectively and take appropriate preventive actions in time, including behavioral changes.
- 6. Encourage regular consultations regarding the usage of medications and dose adjustments; Daily regular BP and sugars monitoring; Withdrawal of psychotropic medications.
- 7. Deaddiction programs to stop smoking and alcohol intake.
- 8. Adequate treatment for underlying comorbidities like diabetes, hypertension, CAD, arthritis and deformities. Correction of visual and hearing problems. Appropriate gait training exercises.
- 9. Regular visit to psychiatrist and counselling programs to prevent depression and loneliness related issues.
- 10. Promote long term exercise programs for both normal elderly individuals and postoperative patients either by appointing individual physiotherapist or by regular visits can effectively reduce falls and fall-related injuries in elderly people.

Descriptive statistics using bar charts and pie charts were used to describe the demographic profile of the study population and the distribution of various risk factors pertaining to fall among patients.

V. Conclusion

From our study, we concluded that hip fractures occurring in elderly patients due to falls can be effectively reduced by the use of a multimodal approach containing a variety of preventive strategies which include weight reduction programs and proper diet control; Giving extra care and importance for elderly people; Use of special equipments like outdoor gait stabilizing devices and adequate padding around the hip; Various environmental modifications like appointing visiting nurses for regular home-visiting programs, eliminating potential tripping hazards and promoting preventing strategies to avoid those hazards; Encourage regular consultations regarding medications intake and withdrawal of psychotropic medications; Adequate treatment for underlying comorbidities; Undergoing regular psychiatric counselling and deaddiction programs and finally promoting long term exercise programs for both normal elderly individuals and postoperative patients.

LIMITATIONS OF THE STUDY

1. Limited sample size.
2. Our study is an observational, questionnaire type of study and we didn't have any control group for comparison. Hence, we are not able to establish a statistical analysis like odd's ratio or logistic regression analysis for proving the association between various risk factors and falls.
3. We were not able to measure bone mineral profile for all the patients and hence, we were not able to comment regarding osteoporosis, bone mineral density and fragility fractures. Also, we were not able to comment regarding the use of calcium and vitamin D supplementation while proposing preventive strategies.
4. We proposed various preventive strategies at the end of the study for reducing falls in elderly people, but further longitudinal studies are needed to prove the effectiveness of these strategies.

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CONFLICTS OF INTEREST

Dr. Karthikeyan S, or any member of his or her immediate family, has no funding or commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article.

- I agree and confirm this statement as true.

ETHICAL REVIEW COMMITTEE STATEMENT

The Institutional Ethics Committee (for Medical PG Students), SRIHER (DU), Thank you for submitting the above proposal which was discussed by the committee decided to approve the proposal.

ACKNOWLEDGEMENT

It is my distinct honour and privilege to have worked and done this study under the guidance of my esteemed teacher Dr. Srinivasan Rajappa, Professor, Department of Orthopaedics, Sri Ramachandra Institute Of Higher Education And Research. I would also like to express my acknowledgement and gratitude to the other professors of our department, Prof and HOD, Dr. P. Gopinath Menon, Prof. Dr. P. V. Vijaya Raghavan, Prof. Dr. M. Mohan Kumar, Prof. Dr. D. Gokul Raj, Prof. Dr. R. Dorai Kumar, Dr. Giriraj Harshavardhan. J. K., Prof. Dr. U. Thyagarajan, Prof. Dr. B. Mohan Choudhary for giving practical suggestions and support for my study. I take this opportunity to express my cordial gratitude to my parents, family, my beloved wife **Dr. Madhavi Lakshmanan**, my colleagues, **Dr. Sabari Manokaran**, **Dr. Muhammed Niyas** and my friends **Dr. Shibusumanth**, **Dr. Pavithra**, **Dr. Pranay**, **Dr. Vidarshana**, **Dr. Sibi Sanjay**, **Dr. Pentala Harikrishna**, **Dr. Bharath Chand** for their constant support and encouragement in preparing this dissertation.

I thank my ethics committee for permitting me to do this study. Finally, no study is possible without the participation of patients. I express my sincere and heartfelt gratitude to them.