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Epidemiological Profile of Hip Fractures: A Case-Control Study in a Tertiary Care Teaching Hospital of Bihar.

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ABSTRACT

Background: Hip fractures have become an important cause of morbidity and mortality among adults all over the world. The objective of this study was to study epidemiological profile of hip fractures and assess the risk factors responsible for hip fractures in patients attending orthopaedics department of a tertiary care hospital in Bihar and to compare these factors with healthy control population. **Methods:** The present study was a retrospective case-control study conducted in a tertiary care hospital in Gaya, Bihar. Forty cases and forty controls were selected. **Results:** BMI was found to be statistically lower in the fracture group (p=0.035) as compared to controls. 67.5% of fractures were extra-capsular and 32.5% were intra-capsular. Overall, age 60-69 years showed the maximum burden of hip fractures. Fractures taking place indoors (62.5%) were higher than those occurring outdoors (37.5%). Physically active in the past (p=0.036) and alcohol usage (OR, 4.75; p= 0.045) were the factors which were significantly associated with the hip fracture. **Conclusion:** Hip fractures in Indian population are on a rising trend. Efforts should be made to reduce morbidities associated with hip fractures.

Keywords: Hip fracture, Osteoporosis, Risk factors, Physical activity scoring, Bihar.

INTRODUCTION

Hip fractures have become an important cause of morbidity and mortality among adults all over the world. It is also common due to osteoporosis in elderly population. Hip fractures are also becoming very common in Asia and its incidence is increasing day by day in almost every country in the continent.[1,2]

The incidence of hip fractures is expected to double to 2.6 million by 2025 and to 6.25 million by 2050. The Asian region itself account for over half of hip fractures by the end of 2050.[3] There are many risk factors for hip fractures. Vitamin D and calcium deficiency, alcohol consumption, smoking, reduced physical activity and obesity are important risk factors.[4]

Hip fractures pose serious problems for both the patient as well as health care providers. Also, increased life span leads to increased morbidity, decreased quality of life, potential risk of further falls and subsequent fractures. There is diminished quality of life (QOL) due to impaired balance and mobility along with reduced functional and social independence among patients after recovery. This indicates that many do not return to their pre-fracture lifestyle.[5]

There is paucity of literature related to hip fractures in this part of Bihar. The purpose of this study was study epidemiological profile of hip fractures and analyze the risk factors responsible for hip fractures in patients attending orthopaedics department of a tertiary care hospital in Bihar and to compare these factors with healthy control population.

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MATERIALS AND METHODS

The present study was a retrospective case-control study conducted in a tertiary care hospital in Gaya, Bihar. The period of study was from January 2018 to December, 2018. Twenty men and twenty women aged 40 years and above admitted with radiologically detected fractures of femur were included as cases. Sample size calculation was done using a prevalence rate of 150-400 fractures per 100,000 populations at a confidence interval of 95% and keeping α error at 0.05 and both controls and cases were selected accordingly.[6] The patients having femur shaft fractures, pathological fractures and road traffic accident cases with multiple fractures were excluded from the study population.

Controls were selected in an equal number to cases and matching was done with respect to age and sex. Relatives of patients attending various OPD's of hospital were selected as controls. Matching of age was done within ± 2 years of the age of the cases. The study was started after taking clearance from Institutional ethical committee.

All the physiological parameters were recorded like height, weight, and body mass index (BMI; kg/m2) of cases and controls were measured. Other variables were also noted like place and time of fracture, place of the occurrence of the trivial trauma which led to the fracture, whether it was indoors or outdoors, if it had happened in the room or bathroom, in the market, road or the stairs, timing of the trauma if it had happened during morning, day, evening or night hours. Mode and cause of fracture was also noted which included following parameters: mode of fall, from standing, sitting, lying down position or from a height, cause of fall if it was due to a blackout, loss of balance or slipping. History of loss of weight, significant enough to loosen their clothes, in the last one year period before the trauma, was also noted.

Te nature of physical activity like walking, sitting, standing, squatting, and running/jogging was also noted. The response to each activity was scored according to time imparted daily towards that activity. Daily walking was graded as none=0, 1-4 hours=1, 5-8 hours=2, 9-12 hours=3, and >12 hours=4, whereas sitting was graded as >12 hours=0, 9-12 hours=1, 5-8 hours=2, 1-4 hours=3, and none=4. Daily standing, squatting, and running/jogging were each graded as none=0, 1-30 minutes=1, 30-60 minutes=2, and >60 minutes=3. Scores for each activity were added. The total scores for the ages 20-30 and 30- 40 were added and named 'total past physical activity score' (TPaPAS). Likewise, scores for each activity in the present were added and this total was doubled to match TPaPAS, the final value being named 'total present physical activity score' (TPrPAS). Tertiles of respectively the TPaPAS and the TPrPAS of the controls were determined and according to the tertile values both cases and controls were grouped into 6 categories, past inactive, past active, past very active, present inactive, present active, and present very active. History of chronic illness, drug history, hormone replacement therapy (HRT) was also was also noted. Participants were enquired about their smoking and alcohol intake history in the last 1 year.

Data was entered in MS excel and analyzed by using SPSS version 16.0 which is freely available online. Univariate logistic regression analysis was done to determine the odds of having hip fractures. A p value of less than 0.05 was taken to be significant.

RESULTS

The study population consisted of 40 cases and 40 controls with equal male female ratio of 20:20 in both cases and controls. The demographic data related to age, sex, weight, height and BMI are tabulated in [Table 1]. BMI was found to be statistically lower in the fracture group (p=0.035).

According to types of fractures, out of 40 cases 27 (67.5%) were extra-capsular and 13 (32.5%) were intra-capsular. [Table 2] represents age and sex distribution of cases with respect to types of fractures. Overall, age 60-69 years showed the maximum (35%) burden of hip fractures. The average age for the intracapsular fractures was 62.11 ± 11.2 years and that of extracapsular fractures was 61.33 ± 12.1 years. In males, 75% (15/20) were extracapsular fractures and 25% (5/20) were intracapsular, while in females, 60% (12/20) were extracapsular and 40% (8/20) were intracapsular.

[Table 3] shows place, cause, mode, and timing of fractures among 40 cases. Fractures taking place indoors (62.5%; 25/40) were higher than those occurring outdoors (37.5%; 15/40). Falls occurring in indoors were reported to have occurred more commonly in the room (57.5%; 23/40) than in the bathroom (42.5%; 17/40). Slipping was the more common cause of fall among indoor injuries (64%; 16/25) in contrast to loss of balance (53.3%; 8/15) in outdoor injuries. Chance of fall due to loss of balance increased with age and was greatest in the ages more than 80 (50%). Fall from standing position remained the more common mode of fall throughout the ages.

[Table 4] shows application of logistic regression and the various factors under study to estimate the odds of having hip fracture. There was no significant difference in the history of weight loss in the past year (odds ratio [OR], 2.59; p=0.121) and medical therapy for chronic diseases like diabetes (OR, 1.267; p=0.734) and hypertension (OR, 0.756; p=0.645). Calcium supplements taken in past 3 months was associated with a potential negative association (OR, 0.872; P=0.795) and smoking history in the past had a potential positive association (OR, 2.24; p=0.137) but both did not reach statistical significance. Physically active in the past (p=0.036) and alcohol usage (OR, 4.75; p= 0.045) were the factors which were significantly associated.

Table 1: Demographic data of the study population

Variable	Cases (n=40)	Control (n=40)	p value
Age (in years)	61.01±10.16	58.02±12.12	0.212
Sex ratio (Male:female)	20:20	20:20	
Height (cm)	158±0.87	160±0.32	<0.001
Weight (kg)	57.12±6.91	60.42±6.51	0.004
BMI (kg/m2)	21.12±3.05	22.9±2.33	0.035

Table 2: Age and sex distribution of cases with respect to types of fractures.

Age Group	Males		Females		Total (%)
	Extra-capsular	Intra-capsular	Extra-capsular	Intra-capsular	
40-49 yrs	5 (33.33%)	2 (40%)	0 (0)	1 (12.5%)	8 (20.0%)
50-59 yrs	3 (1.33%)	0 (0)	1 (8.33%)	1 (12.5%)	5 (12.5%)
60-69 yrs	2 (13.33%)	2 (40%)	6 (50%)	4 (50%)	14 (35.0%)
70-79 yrs	4 (26.67%)	1 (20%)	4 (33.33%)	2 (25%)	11(27.5%)
≥80 yrs	1 (6.67%)	0 (0)	1 (8.33%)	0 (0)	2 (5%)
Total	15 (100%)	5 (100%)	12 (100%)	8 (100%)	40 (100%)

Table 3: Distribution of cases according to place and cause of fracture

Cause	Place of fracture	
	Indoor (%)	Outdoor (%)
Slip	16 (64%)	5 (33.3%)
Loss of balance	8 (32%)	8 (53.3%)
Blackout	1 (4%)	2 (13.4%)
Total (% of cases)	25 (62.5%)	15 (37.5%)

Table 4: Logistic regression analysis of various variables under the study

Variable	Cases (% of total)	Controls (% of total)	OR (95% CI)	p value
Weight loss	18 (45%)	11 (27.5%)	2.59 (0.914-7.342)	0.121
Past physical activity				
Very active	12 (30%)	14 (35%)	0.433 (0.168- 1.117)	0.145
Active	11 (27.5)	17 (42.5%)	0.334 (0.131-0.853)	0.036
Inactive	17 (42.5)	9 (22.5)	1	
Present activity level				
Very active	13 (32.5%)	17 (42.5%)	0.463 (0.071- 1.345)	0.312
Active	14 (35%)	15 (37.5%)	0.547 (0.289- 1.456)	0.186
Inactive	13 (32.5%)	8 (20%)	1	
History of chronic diseases				
Diabetes	4 (10%)	3 (7.5%)	1.267 (0.377- 4.126)	0.734
Hypertension	9 (22.5%)	11 (27.5%)	0.756 (0.367- 1.775)	0.645
History of drug usage				
Taking some medication	23 (57.5%)	18 (45%)	1.612 (0.745- 3.256)	0.251
Drugs for hypertension	7 (17.5%)	11 (27.5%)	0.587 (0.267- 1.384)	0.345
Drugs for heart disease	1 (2.5%)	4 (10%)	0.231 (0.034- 1.512)	0.198
Drug for diabetes	4 (10%)	2 (5%)	1.758 (0.499- 2.256)	0.451
Anti-tubercular therapy	4 (10%)	2 (5%)	1.758 (0.499- 2.256)	0.451
Calcium tablets	8 (20%)	9 (22.5%)	0.872 (0.467-3.123)	0.795
Addiction				
Smoking	15 (37.5%)	8 (20%)	2.4 (0.878- 6.556)	0.137
Alcohol	8 (20%)	2 (5%)	4.75 (0.940- 23.897)	0.045

DISCUSSION

Hip fractures are a major cause of disability and morbidity in developed countries and now they are increasingly being recognized a huge cause of increased health burden and disability even in developing countries.

The mean age of the fractures was 61.01±10.16 years. Most fractures in males occurred in ages less than 60 years while in females maximum fractures occurred in ages more than 60 years. In females, the bone mineral density (BMD) starts falling with increasing age and it may or may not be associated with osteoporosis. Postmenopausal women lose the protective effect of estrogen on bone mineralization and thus they become more susceptible to osteoporosis. Externally derived estrogen in the form of hormone replacement therapy (HRT) may protect against fractures but its use is mostly restricted to urban women. However in India, low awareness and lack of acceptance of HRT among postmenopausal women can be a significant contributory factor to increasing fragility fractures.[7,8]

In this study, it was found that maximum prevalence of hip fractures was in age group 40-49 years. Similar findings were seen by Amin et al who explained that osteoporetic fractures in males occur in early age due to low serum levels of protective hormone, estrogen. Men with low estradiol levels are at increased risk of getting a hip fracture. It is also known that there is a positive correlation between low estrogen levels and low BMD in elderly men.

In this study, it was found that most common place of fracture was indoors while cause of fractures differs in relation to place of fracture. The most common cause in indoor fractures was slipping but in outdoor fractures, loss of balance was most common cause of fracture. There have been many studies on the various factors leading to falls and subsequent fractures in the elderly. Most hip

fractures are caused by stumbling and tripping indoors at a level ground. There are a number of factors in elderly people which contribute to falls including neurological impairment, poor balance, diminished vision, multiple drug therapy. Rehabilitation after hip fractures play an important role in restoring premorbid functions, with patients mobilized as early as possible after surgery.[10,11]

Our study found that weight loss was found more among cases as compared to controls. The relationship between weight change and risk of hip fracture is still controversial. A metaanalysis included eight prospective studies and suggested that weight loss may be a risk factor for hip fracture and that weight gain may be a protective factor for hip fracture.[12]

Present and past physical activities have an impact on hip fractures as shown in this study. Lagerros et al showed that daily household activities and leisure time physical activity may independently decrease the risk of hip fracture in those aged 50 and over.[13]

History of chronic diseases also predispose to hip fractures as shown in this study. Past history of chronic diseases and usage of medications for such diseases over a prolonged time may be associated with an increased risk of undiagnosed osteoporosis. Glucocorticoids, androgen therapy for prostate cancer, calcineurin inhibitors, antiretroviral drugs, selective inhibitors of serotonin reuptake, anticonvulsants, loop diuretics, heparin, oral anticoagulants, and proton pump inhibitors are some of the drugs which have been implicated to increase the risk of osteoporosis.[14,15]

Smoking has been associated with increased risk of fractures in many previous studies. In the present study, again there is a potential positive relation with hip fractures, but not found significant (p=0.137). In a study by Baron et al. it has been seen that smoking is associated with a direct increase in fracture risk and that too related to the duration of smoking and not to the amount of smoking.[16] The understanding of the effect of alcohol intake on fracture risk is incomplete. Baron et al. showed that moderate alcohol drinking seemed to increase BMD. The work by Yin et al. also showed that ingestion of red wine prevented bone resorption in older men, while the same was true with beer drinking among women.[17] The current study revealed that alcohol drinking was significantly associated with an increased risk of fractures (OR=4.75; $p < 0.05$). A similar association has been observed by Jha et al. but not significant.[18]

CONCLUSION

Hip fractures in Indian population are on a rising trend due to a number of factors both hereditary and acquired like smoking, alcohol, low physical activity in present and past, chronic medication or illness. It was observed in this study that slipping was most common cause of fracture in indoors while disbalance was more common in outdoors. There is an urgent need to propagate various preventive measures to reduce the prevalence of osteoporosis and reduce the burden of hip fractures in whole population's especially elderly ones. Efforts should be made to reduce morbidities associated with hip fractures.

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