

Mechanisms of Hip Fracture in Owerri, Nigeria, and its Associated Variables

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Abstract

Background: Hip fracture has been associated with various risk factors, including osteoporosis, excessive alcohol consumption, physical inactivity, visual impairment, aging, sex, rural/urban inhabitation, race and climatic variations. Mechanisms of hip fractures in many parts of the world have been documented, and include road traffic accident (RTA), gunshot injury, fall from heights and many others. There is paucity of such documentation in Owerri, Nigeria. **Aim:** This study was designed to investigate the mechanism of hip fractures in Owerri, Nigeria, and to determine its prevailing factors. **Materials and Methods:** The study was conducted in hospitals located in Owerri, Nigeria. Cases of hip fracture were identified from the medical register while data were sourced from the medical record department for hip fractures that occurred between 1st January 2002 and 31st December 2008 for patients resident in Owerri and aged between 10 years and above. **Results:** The study uncovered a total of 105 cases of hip fractures over the study period in 65% ($n=68$) males and 35% ($n=37$) females. Proportion of hip fractures as a result of fragility fracture mechanisms was significantly higher in females than in the males ($P < 0.001$), while the reverse was the case for RTA mechanisms. In the same vein, proportion of hip fractures as a result of moderate trauma mechanisms was significantly higher in the elderly than in the young patients ($P < 0.001$), while the reverse was the case for RTA mechanisms. **Conclusion:** Mechanism of hip fractures in Owerri, Nigeria, can be associated with gender and age. RTA had the largest single contributory mechanism of hip fractures in Owerri. Therefore, public health campaigns and promotions should be created to reduce the influence of RTA on hip fracture among this population. Among the elderly population, hip fracture was mostly sustained from fragility trauma mechanisms, suggesting that osteoporosis is a major contributory factor of hip fracture among this population.

Keywords: Fall from heights, Fall from standing heights, Falls, Hip fractures, Fracture mechanism, Nigeria, Owerri, Road traffic accident

Introduction

Hip fracture is the breaking of the proximal aspect of the femur. This fracture has been associated with many risk factors, some of which include osteoporosis, excessive alcohol consumption, physical inactivity, visual impairment, aging, gender, rural/urban inhabitation, race and climatic variation.^[1-7] These risk factors

are influenced by the mechanisms that bring about the fracture of the hip itself. Such mechanisms that bring about hip fracture include: Falls from standing heights (FFSH) (including falls from slips, from stumbling after hitting toes against obstacle), falls from elevated heights (FFH) (including falls from trees and buildings), road traffic accidents (RTAs) and other causes.^[6,8-11]

These fracture mechanisms depend on environmental factors, and vary from place to place depending on the level of development and regulations.^[12] Proper planning, monitoring and regulatory policies could be put into place to reduce the occurrence of the mechanisms and hence reduce hip fractures.

While reports of the various mechanisms of hip fractures are well documented in most parts of the world,^[3-11] there is paucity of such

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data in Owerri, Nigeria. Hence, it is the aim of the present study to identify the different mechanisms of hip fractures in Owerri, Nigeria, and its associative variables. Such knowledge could help in planning preventive actions against hip fractures in the future.

Materials and Methods

Owerri is located in Imo State, prided as the Eastern Heartland, and is in the South Eastern part of Nigeria, Sub-Saharan Africa. Its major language is Igbo (Owerri dialect), while its major occupants are the Ibos. Owerri is made up of three Local Government Areas: Owerri Municipal (the capital city of Imo State), Owerri North and Owerri West. The last two are predominantly rural, while the first is mostly urban.

Data for the study were collected from three hospitals in Owerri, namely Federal Medical Center Owerri, Christiana Specialist Hospital Egbu Owerri and Cottage Clinic Owerri. These hospitals provide orthopedic services for the entire Owerri and Imo states.

Hip fracture was defined as clinical and radiological evidence of proximal femoral fractures, cervical, trochanteric and subtrochanteric fractures. Patients that sustained hip fractures between 2002 and 2008 were identified from the medical register, while information on the variables like age, sex, date of fracture, area of residence, fracture mechanism and type were extracted from the medical records.

Cases of hip fractures within the time frame mentioned, for patients resident in Owerri and of ages ≥ 10 years, were included for the study. Fracture mechanism was classified as either moderate (for low-energy impact/trauma fracture) or severe (for high-energy impact/trauma fractures). Patients were termed young for those < 50 years and elderly for those ≥ 50 years.

Results

A total of 105 cases of hip fractures were extracted within the study period, 65% ($n = 68$) were males while 55% ($n = 37$) were females [Table 1]. Five fracture mechanisms were observed: FFSH, FFH, RTA, gunshots and collision with stationary objects (the last two were grouped as others). Their proportions have been shown in Figure 1. RTA had the highest proportion (almost half of all the cases), followed by FFSH and FFH.

Distribution by age

The mean age of the patients with fractures from severe trauma was smaller for both genders [mean age 38.6 (21.14)] compared with the mean age of patients with fractures from moderate trauma [mean age 67.7 (11.7)] (difference of means = -29.1; 95% CI = -35.4 to -22.7; $P < 0.001$). The mean age of patients with fractures from RTA was smallest for both genders [mean age: Males = 31.7 (15.9); females = 29.1 (11.4)], followed by the mean for fractures from FFH [mean age: Males = 60.8 (20.30); females = 49.5 (28.16)]. The mean ages of patients with fractures from FFSH was the largest [mean age: Males = 66.3 (16.0); females = 68.1 (9.6)].

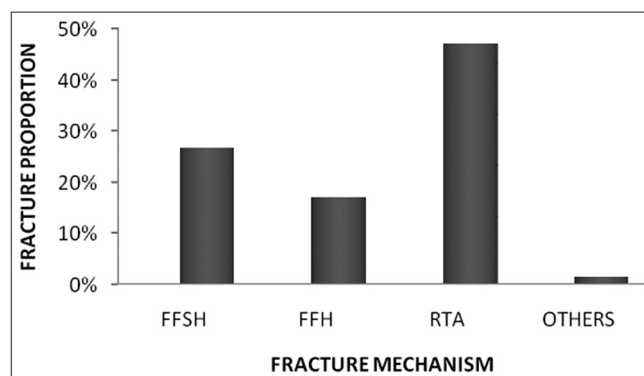


Figure 1: Distribution of hip fractures by fracture mechanism

Table 1: Summary of mechanism of hip fracture in Owerri, Nigeria

Mechanism	Moderate		Severe			Total
	FFSH	FFH	RTA	Others	Sum of severe	
Sex						
Male	9 (13%)	12 (18%)	44 (65%)	3 (4%)	59 (87%)	68
Female	21 (56%)	8 (22%)	8 (22%)	0 (0%)	16 (43%)	37
Both	30 (29%)	20 (19%)	52 (49%)	3 (3%)	75 (71%)	105
Mean age						
Male	66.33 (16.0)	60.83 (20.3)	31.77 (15.9)	46.67 (25.1)	38.44 (20.7)	
Female	68.19 (9.6)	49.50 (28.1)	29.13 (11.4)	-	39.31 (23.2)	
Both	67.69 (11.6)	56.30 (23.7)	31.37 (15.3)	-	38.63 (21.1)	
Age						
Young	1 (2%)	9 (16%)	46 (80%)	1 (2%)	56 (98%)	57
Elderly	29 (60%)	11 (23%)	6 (13%)	2 (4%)	19 (40%)	48
Place of occurrence						
Indoor	23 (86%)	2 (7%)	0 (0%)	2 (7%)	4 (14%)	27
Outdoor	7 (9%)	18 (23%)	52 (67%)	1 (1%)	71 (91%)	78

FFSH: Falls from standing heights, FFH: Falls from elevated heights, RTA: Road traffic accident

Almost all the hip fractures in the young individuals were from severe trauma mechanisms, with RTA being the highest, followed by FFH, and FFSH. Among the elderly individuals, FFSH contributed the highest proportion of hip fractures, followed by FFH and then RTA. Moderate trauma mechanism among these individuals was higher in proportion to severe trauma mechanisms.

Comparatively, hip fractures from the FFSH mechanism was more in the elderly individuals ($P < 0.001$), while hip fractures as a result of RTAs had a higher proportion in the young individuals than in the elderly ones ($P < 0.001$). Such significant difference was again not associated with FFH, which was higher in the elderly individuals.

Distribution by gender

Among the males, hip fracture occurred mostly from RTA and FFH, followed by FFSH. While among the females, fracture was mostly from FFSH, FFH and RTA had equal proportions each. However, more women sustained hip fractures through FFSH than males (risk difference = 44%; 95% CI = 25% to 61%; $P < 0.001$). Conversely, a higher proportion of hip fractures occurred in males from RTA than in females (risk difference = 43%; 95% CI = 26% to 60%; $P < 0.001$). However, an insignificant risk difference of 4% (95% CI = -16% to 20%) was found in the proportion of hip fractures from FFH between males and females.

Place of fracture occurrence

Moderate trauma mechanism yielded almost all the hip fractures that occurred indoors. In the outdoor occurrences, the highest proportion of hip fractures were from RTA, followed by FFH and then FFSH.

Distribution of the type of hip fracture

Hip fractures from the moderate trauma mechanism yielded 77/105 (73.3%) of cervical fractures, 28/105 (26.7%) trochanteric fractures and 0.0% sub-trochanteric fractures. On the other hand, hip fractures from the severe trauma mechanism yielded 42/105 (40%) subtrochanteric fractures, 25/105 (23.8%) trochanteric fractures and 38/105 (36.2%) cervical fractures.

Proportion of cervical fractures from moderate trauma was higher than those from severe trauma mechanisms (risk difference = 52%; 95% CI = 34% to 70%; $P < 0.001$). Subtrochanteric fractures were entirely from severe trauma mechanisms. No significant difference in proportion was found between trochanteric fractures as a result of moderate trauma and those as a result of severe trauma (risk difference = 4%; 95% CI = -5.4% to 13.4%).

Discussion

In the present study, there were a higher proportion of females that sustained hip fractures from fragility (FFSH) trauma than males, while the reverse was the case for the severe trauma

proportions, especially for RTA proportions. Statistical analysis showed that the result was significant. This could be due to an indication of gender variation in fracture mechanisms. This variation could be attributed to the differences in the level of physical activity between the genders. Seventy-eight percent ($n = 61$) of the fractures in males occurred outdoor, as opposed to 22% ($n = 17$) in females. On the other hand, 74% ($n = 20$) of fractures indoor occurred in females as opposed to 26% ($n = 7$) in males. This also shows that the males in Owerri are more physically engaged outdoors than their female counterparts. This could have exposed them to increased risks of RTA; hence, causing more hip fractures. RTA has been found to affect the males than the females.^[13-15] Conversely, higher outdoor physical activities in males could have enhanced their bone biomechanical properties thus further equipping their musculoskeletal system with properties that absorb the impact of fragility trauma than in the females. Physical inactivity has been documented as a risk factor of hip fracture.^[16,17]

Young individuals sustained hip fractures mostly from severe trauma, especially RTA mechanisms, while elderly individuals sustained hip fracture mostly from fragility trauma mechanisms, with almost 86% of the fragility fractures occurring indoors. This is in agreement with an earlier study conducted in Kuwait.^[11] Osteoporosis has been identified as the main risk factor of hip fracture among elderly individuals,^[16,18-20] and osteoporotic hip fractures have been found to occur with minimal trauma.^[10,16,21,22]

Although the present study does not have the data on osteoporosis on the patients for the two populations (young and elderly populations), we believe that osteoporosis could be responsible for the huge difference in proportion of hip fracture (58%) and the high risk ratio ($60.4/1.8 = 34.0$) of hip fractures from fragility trauma mechanism between the young and the elderly based on the above assertions.

On the other hand, studies have shown that young people are more likely to engage in RTA than the elderly ones,^[13,23,24] who are less likely to drive and engage in outdoor activities. This could therefore be responsible for the higher proportion of hip fractures from severe trauma mechanism in the young than in the elderly in our study.

Conclusion

The present study has attempted to associate variation in the mechanism of hip fractures in Owerri, Nigeria, to gender and age. RTA was the largest single contributory mechanism of hip fractures in Owerri, Nigeria, especially among the young and male populations. Therefore, reducing the incidence of RTA would most likely reduce hip fractures among the young and male population of Owerri. In addition, the ban of two wheeled motorcycles and the subsequent introduction of three wheeled ones (which are more stable) in Owerri could be expected to reduce hip fractures among this population.

Among the elderly population, hip fracture was mostly sustained from fragility trauma mechanisms, suggesting that osteoporosis could be a major contributory factor of hip fracture among this population.

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