

## Incidence of Fall Related Hip Fractures among the Elderly Persons in Owerri, Nigeria

<sup>1</sup>Ekezie Jervas, <sup>1</sup>C.K. Onwukamuche, <sup>2</sup>G.E. Anyanwu and <sup>3</sup>A.I. Ugochukwu

<sup>1</sup>Department of Prosthesis and Orthopaedics Technology, School of Health Technology, Federal University of Technology, Owerri, Nigeria

<sup>2</sup>Department of Anatomy, College of Medicine, University of Nigeria, Enugu Campus, Nigeria

<sup>3</sup>Department of Anatomy, Surgery College of Medicine, Enugu State University of Science and Technology Enugu, Enugu State, Nigeria

**Abstract:** The study aims at investigating the incidence of fall related hip fractures among the elderly populations of Owerri, Nigeria and circumstances surrounding it. Falls are a major public health problem among the elderly persons in most communities. One of these problems is hip fractures. Hip fractures among elderly persons vary from place to place and also within places. In Africa hip fracture incidence is very low and osteoporosis is assumed uncommon. Data were collected from three (3) hospitals that offer orthopaedic services in Owerri, Nigeria for patients greater than 50 years who sustained hip fractures from falls between 2002 and 2008. Hip fracture types were limited to cervical and trochanteric fractures. 105 cases for all age group, gender, fracture mechanism and fracture type were uncovered. 40% (n = 42), hip fractures occurred due to falls. 90% (n = 38) of the later were falls among the elderly patients. Incidence was about 1.7 times higher in the women than in the men (RR: 1.74; 95% CI: 0.88 to 3.44; p = 0.056). Fracture from low energy falls (FFSH) was higher in females (84%) than in the males (67%); while fracture proportion from high energy falls (FFH) was higher in males (33%) than in females (16%) (Chi square, p<0.001). Furthermore, proportion of elderly females that sustained hip fractures indoor were more than that of the elderly males by a difference of 44% (Risk Difference: 44%; 95% CI: 13% to 75%; p = 0.0091) while more elderly males sustained hip fractures outdoor than elderly females by the same proportional difference. Of the fractures sustained indoors, 54% occurred in those that are married and living with their spouse. While 46% occurred in those that are single, divorced or widowed and hence not living with their spouse. The corresponding proportion for fractures outdoors were 71% and 29% (Chi Square, p<0.001). Though an increase was shown from the earlier study by Adebajo for Ibadan Nigeria, incidence is still low. This could be due to the low life expectancy and absence of most extrinsic factors that cause high incidence in Europe and America.

**Key words:** Falls, hip fractures, incidence, Nigeria, Owerri

### INTRODUCTION

Falls among the elderly constitute a major source of morbidity and mortality (Baker and Harvey, 1985; Tideiksaar and Kay, 1986). Falls are mostly common in children and elderly persons than in other age groups. However, compared to children, older persons are more likely to be hospitalized and die as a result of falls (Fuller, 2000). Many studies have identified risk factors of falls in the elderly and have classified them into intrinsic and extrinsic factors like bone mineral density, age, sex, environmental conditions (Rubeinstein and Josephson, 2002; Bekibele and Gureje, 2010).

Cases of falls usually come to the attention of the health care system only when injuries are involved; some of these injuries include cuts, fractures and head injuries (Amuyunzu *et al.*, 1997; Tinetti, 2003). Susceptibility to

injury from falls is more increased in the elderly due to osteoporosis and weak musculoskeletal system. One of the extreme cases is hip fractures.

Majority of fall related hip fractures in the elderly result in much less significant injury in the younger persons whose musculoskeletal system are still intact. Swift (2001) reported that falls are the leading cause of injury-related hospitalization in the elderly. Lord *et al.* (2001) reported that rates of injuries secondary to a fall varies between 22-60%; out of this, 15% of the elderly persons sustain serious injuries; 2-6% are fractures while 0.25-1.5% are hip fractures.

Older women sustain fall related injuries, especially hip fractures at rates 40-60% higher than older men. Some studies have posited that this difference could be related to the difference in the level of physical activities and osteoporosis among others (Greenspan *et al.*, 1994).

Several studies have been conducted on hip fracture incidence among the elderly individuals in Europe, America and Asia. In Africa, studies on hip fractures are sparse. In Nigeria (Ibadan), incidence was 2.1 per 100,000 in men and 2.0 per 100,000 in women  $\geq 50$  years (Adebajo *et al.*, 1991). Other studies in Africa have documented incidences less than 90 per 100,000 persons (Schnaid *et al.*, 2000; Zebaze and Seaman 2003, El-Maghraoui *et al.*, 2004). This is very low compared to findings for Europe and Asia.

However, Cooper *et al.* (1992) had predicted that hip fracture incidence in Africa, South America and Asia will be very high by 2050. We therefore intend to investigate the incidence of hip fracture among the elderly in Owerri, Nigeria and circumstances surrounding it within the study period and to compare it with the aforementioned statement.

## MATERIALS AND METHODS

The study was conducted in Owerri, the capital city of Imo state of Nigeria. It covered a period of eight months from June to December 2009. Owerri is a mixed urban/rural community in Nigeria. It is located in Imo State and serves as the States capital. Imo State is located in the South Eastern part of Nigeria. In 2006, the total population of individuals aged  $\geq 50$  years in Owerri was about 38,591. This is only about 9.60% of the entire population of owerri. There are three Local Government Areas (LGAs) in Owerri. Owerri Municipal is predominantly urban while Owerri North and West are mostly rural. Medical services in Owerri comprise of a General Hospital (which does not have an orthopaedic unit), a Federal Medical Center and a number of private hospitals and clinics. There are also the traditional centers like the Traditional Bone setters.

The study was conducted at the Federal Medical center, Owerri, Cottage clinic and Christina Specialist Hospital, Egbu Owerri. The latter two are private hospitals with functional orthopaedic units. One other private orthopaedic hospital refused to participate.

Data for the study were collected for residents of Owerri aged  $\geq 50$  years who were admitted at these hospitals for cases of hip fractures secondary to falls between 2002 and 2008. Hip fractures were classified as cervical (intracapsular) or trochanteric (extracapsular). Subtrochanteric fractures were excluded. Falls were defined as accidentally coming to rest on the ground or surfaces of lower height with or without loss of consciousness.

The medical registers of these hospitals were used to track down all patients that were diagnosed of hip fractures. The resulting cases were studied from their medical folders where fall related hip fractures were isolated and studied. We included all patients from Owerri who were admitted to these hospitals while non-residents of Owerri were excluded.

Table 1: Age specific incidence of hip fractures in Owerri, Nigeria

	Population	Fracture	Incidence	95% CI	
<b>Males</b>					
50-59	8116	2	3.52	0.88 to 14.07	
60-69	5146	1	2.78	0.39 to 19.74	
70-79	2969	5	24.06	10.01 to 57.81	
$\geq 80$	989	4	57.78	21.69 to 153.95	
Total	17220	12	10.00	5.68 to 17.61	
<b>Females</b>					
50-59	9864	7	10.14	4.83 to 21.27	
60-69	6781	8	16.85	8.43 to 33.69	
70-79	3493	7	28.63	13.65 to 60.06	
$\geq 80$	1233	4	46.34	17.39 to 123.47	
Total	21371	26	17.38	11.83 to 25.53	
Both gender					Female/Male
50-59	17980	9	7.15	3.72 to 13.74	2.88
60-69	11927	9	10.78	5.61 to 20.72	6.06
70-79	6462	12	26.53	15.07 to 46.71	1.19
$\geq 80$	2222	8	51.43	25.72 to 102.85	0.80
Total	38591	38	14.07	10.24 to 19.83	1.74

Population records for Owerri were taken from the National Population commission and the Bureau for Planning, Research and Statistics (BPRS) in Owerri.

Data were analyzed with chi-square and student t-test,  $p < 0.05$  were considered significant. All calculations were conducted in Microsoft Excel 2007 for windows.

## RESULTS

Our search for hip fractures yielded 105 cases for all age group, gender, fracture mechanism and fracture type. 40% ( $n = 42$ ) were cases of hip fractures due to falls. 90% ( $n = 38$ ) of the later were cases of hip fractures from falls among the elderly patients. Fractures due to falls occurred in 68% ( $n = 26$ ) elderly females with mean age of  $67.50 \pm 9.73$  and in 32% ( $n = 12$ ) elderly males with mean age of  $69.00 \pm 10.00$ . The mean age for cervical fractures was  $67.63 \pm 9.81$  and  $71.00 \pm 10.82$  for trochanteric fractures. The mean age of fractures in the urban areas was  $64.75 \pm 8.43$  while it was  $71.86 \pm 10.47$  in the rural areas.

Table 1 and Fig. 1 shows the age specific fall related hip fracture incidence among the elderly individuals for our study, adjusted to the 2006 Nigerian Census result. Incidence was about 1.7 times higher in the women than in the men (RR: 1.74; 95% CI: 0.88 to 3.44;  $p = 0.056$ ). A near exponential increase in incidence with ageing was found for the women. From chart 1, each and both genders experienced a steady increase with ageing down the age group. Highest incidence was recorded for patients  $\geq 80$  years for each and both genders.

Fractures sustained from Falls From Standing Heights (FFSH), either due to slipping or stumbling was higher in females (84%) than in the males (67%); while fracture proportion from Falls From elevated Heights (FFH), e.g. trees, buildings, bicycle, bed etc., was higher in males (33%) than in females (16%) (Chi square,  $p < 0.001$ ).

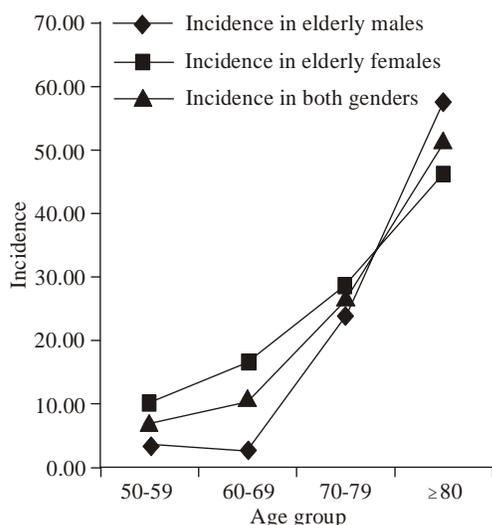


Fig. 1: Showing an increase in incidence with ageing in both and each gender

Proportion of cervical fractures was more in each of the genders (58% in men; 65% in women) compared to those of trochanteric fractures (42% in men; 35% in women). Of the fractures sustained from FFSH, 72% resulted to cervical fractures while 28% resulted to trochanteric fractures. The corresponding proportions for fractures from FFH were 33% (cervical fractures) and 67% (Trochanteric fractures) (Chi Square;  $p < 0.001$ ).

Furthermore, proportion of elderly females that sustained hip fractures indoor were more than that of the elderly males by a difference of 44% (Risk Difference: 44%; 95% CI: 13 to 75%;  $p = 0.0091$ ) while more elderly males sustained hip fractures outdoor than elderly females by the same proportional difference. Of the fractures sustained indoors, 54% occurred in those that are married and living with their spouse. While 46% occurred in those that are single, divorced or widowed and hence not living with their spouse. The corresponding proportion for fractures outdoors were 71 and 29% (Chi Square,  $p < 0.001$ ).

67% men and 88% women had good pre-fracture ambulation ability while 33% men and 12% women were using mobility aids e.g. walking frames, walking stick, etc before fracture.

## DISCUSSION

In Owerri, Nigeria and Africa as a whole, people still consult traditional medicine practitioners e.g. Traditional Bone setters for health services. This could be due to the high cost, low accessibility, etc of medical health services as shown by the high population per physician and population per hospital bed figures for Nigeria (WHO, 2011).

Consequently, since our search was for cases that were presented to hospitals, our results could have been under estimated if we consider that most of the patients did not report to hospitals on sustain hip fractures but choose to consult traditional bone setters.

Our study show a nine fold increase for women and a fivefold increase for men when compared to an earlier study conducted in the last two decades for Ibadan, Nigeria (Adebajo *et al.*, 1991). Schnaid *et al.* (2000) posited that hip fractures among blacks have doubled in the last decade.

Our incidence is lower than those reported by similar studies for Europe (Blanco *et al.*, 2006; Chevalley *et al.*, 2007, Jaatineen *et al.*, 2007), America (Lauderdale *et al.*, 1998) and Asia (Memmon *et al.*, 1998; Rowe *et al.*, 2005). It was still lower than that of Black Americans (Lauderdale *et al.*, 1998). Hip fracture incidence has been reported to be lowest among blacks and highest in the whites, with intermediates among Hispanics (Lauderdale *et al.*, 1998) and many intrinsic and extrinsic factors have been associated with it.

In Africa, our incidence was still lower than those reported for Morocco (El-Maghraoui *et al.*, 2004). However, our result is comparable with that for the blacks of South Africa (Schnaid *et al.*, 2000) and Cameroon (Zebaze and Seeman, 2003). These studies however document incidences that are generally lower than those reported for Europe and America.

Life expectancy in Nigeria and Africa in general is low while it is high in developed countries in Europe and America. Finsen (1988) associated incidence of hip fractures with life expectancy. Therefore, our low incidence could be as a result of the low life expectancy in Nigeria. Also, environmental factors like snow, ice, inadequate sunlight etc which are prevalent in these regions of Europe and America, but are absent in most regions of Africa could be a factor responsible for not only our low incidence, but also that for Africa as a whole. Hip fractures have been found to occur more during snowing periods than during the summer (Holmberg and Thorngren, 1987). Also, it is assumed that osteoporosis is uncommon in Africa. Osteoporosis is one of the major risk factors of hip fractures. Therefore, its low level of occurrence in Africa could also be responsible for the low incidence in these regions compared to other parts of the world.

In our study, incidence of fall related hip fractures for the elderly females was almost twice that of the elderly males. Even after the difference between populations of the genders was noticed, the difference was almost double. In most parts of Africa, incidence of hip fractures in men approximates that of women (Hough, 2006). However, other studies posit findings similar to ours (Zebaze and Seeman, 2003). Earlier studies have associated this difference to lower bone density and body size of women compared to men (Enrud *et al.*, 1997). Our

study does not have enough data to explain the higher incidence in women. Rather, we found that men significantly sustained hip fractures outdoors more than women while the reverse was the case for indoor fractures. This could mean that men are actively involving in physical activities outdoors than women, thus making the men to maintain sufficient muscle coordination to prevent falls and also improve bone quality than in women. Earlier studies have shown that low level of physical activities among the elderly individuals could be a risk factor for hip fractures (Paganin *et al.*, 1991; Marks *et al.*, 2003). Also, men have been reported to fall less frequently than women (Bekibele and Gureje, 2010).

### CONCLUSION

Our result shows that hip fracture incidence is still low in Nigeria, but could have increased from the last study conducted in South West Nigeria. Low incidence could be attributed to the low life expectancy in Nigeria. Further increases should be expected with increase in life expectancy in the future. Women are more at risk from our study and should be focused on more in order to put incidence to check.

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### REFERENCES

Adebajo, A.O., C. Cooper and J.G. Evans, 1991. Fractures of hip and distal forearm in West Africa and the United Kingdom. *Age Age*, 20(6): 435-38.

Amuyunzu, M.K., L.W. Muniu, L.W. Mwara and M.N. Katsivo, 1997. Aetiology and implications of domestic injuries in the elderly. *East Afr. Med. J.*, pp: 614-617.

Baker, S.P. and A.H. Harvey, 1985. Falls in the elderly. *Clin. Ger. Med.*, 11(3): 501-508.

Bekibele, C.O. and O. Gureje, 2010. Fall incidence in a population of elderly persons in Nigeria. *Gerontology*, 56(3). DOI: 10.1159/000236327.

Blanco, J.F., A.D. Alvarez, J.A. De-Pedro, D. Borrego, J. Pino and J. Cortes, 2006. Incidence of hip fractures in Salamanca, Spain. *Osteoporosis Int.*, 1: 7-12.

Chevalley, T., E. Guillely, F.R. Hermann, P. Hoffmeyer, C.H. Rapin and R. Rizzoli, 2007. Incidence of hip fractures over a 10 year period (1991-2000). *Reversal Secular Trend. Bone*, 40(5): 1284-1289.

Cooper, C., G. Campion and J. Melton, 1992. Hip fractures in the elderly. A worldwide projection. *Osteoporos Int.*, 2: 285-89.

El-Maghraoui, A., B.A. Koumba, I. Jroudi, L. Achemial, A. Bezza and M.A. Tazi, 2004. Epidemiology of hip fractures in 2002 in Rabat. *Osteoporos Int.*, 16(6): 597-602.

Enrud, K.E., R.C. Lipschutz, J.A. Cauley, D. Seely, M.C. Nevitt, S. Jean, E.S. Orwoll, H.K. Genant and S.R. Cummings, 1997. Body size and hip fracture risk in older women: a prospective study. Study of osteoporotic fractures research group. *Am. J. Med.*, 103(4): 274-280.

Finsen, V., 1988. Improvements in general health among the elderly: A factor in the rising incidence of hip fractures? *J. Epidemiol. Commun. Health*, 42(2): 200-203.

Fuller, G.F., 2000. Falls in the elderly. *Am. Fam. Phys.*, 61: 2159-2174.

Greenspan, S.I., E.R. Myers, L.A. Maitland, N.M. Resnick and W.C. Hayes, 1994. Falls severity and bone mineral as risk factors for hip fractures in ambulatory elderly. *JAMA*, 271: 128-33.

Holmberg, S. and K.G. Thorngren, 1987. Statistical analysis of femoral neck fractures based on 3053 cases. *Clin. Orthop.*, 218: 32-41.

Hough, S., 2006. Osteoporosis in South Africa. In: Steyn, K., J. Fouries and N. Temple, (Eds.), *Chronic diseases of Lifestyle in South Africa since 1995-2005. Technical Report.* Cape Town: South African Medical Research Council, pp: 186-194.

Jaatteen, P.T., J. Panula, P. Aarnio and S. Kivela, 2007. Incidence of hip fractures among the elderly in Satakunta Finland. *Scan J. Surg.*, 96: 256-260.

Lauderdale, D.S., S.J. Jacobsen, S.E. Furner, P.S. Levy, J.A. Brody and G. Jack, 1998. Hip fracture incidence among elderly Hispanics. *AJPH*, 88: 1245-1247.

Lord, S.R., C. Sheriton and H.B. Menz, 2001. Epidemiology of Falls and Fall Related Injuries. In: *Falls in Older People. Risk Factors and Strategies for Prevention.* Cambridge University Press, Cambridge, pp: 3-16.

Marks, R., J.P. Allengrante, M.C. Ronald and J.M. Lane, 2003. Hip fractures among the elderly: Causes, consequences and control. *Age. Res. Rev.*, 2(1): 57-93.

Memmon, A., W.M. Pospula, A. Tantawy, S.A. Gbafar and A. Suresh, 1998. Incidence of hip fracture in Kuwait. *Int'l J. Epi.*, 27: 860-865.

Paganini, H.A., A. Chao, R.K. Ross and B.E. Henderson, 1991. Exercise and other factors in the prevention of hip fractures: the leisure world study. *Epidemiology*, 2: 16-25.

Rowe, S.M., E.K. Song, J.S. Kim, J.Y. Lee, Y.B. Park, B.Y. Bae and C. Hur, 2005. Rising incidence of hip fractures in Gwangju city and Chonnam Province, Korea. *J. Korean Med. Sci.*, 20: 655-658.

- Rubeinstein, L.Z. and K.R. Josephson, 2002. The epidemiology of falls and syncope. *Clin. Geriatr. Med.*, 18: 141-158.
- Schnaid, E., A.P. Macphail and M.B.E. Sweet, 2000. Fractures of the neck of femur in black patients. A retrospective study. *J. Bone Joint Surg (Br.)*, 82(6): 872-875.
- Swift, C.G., 2001. Falls in late life and their consequences - implementing effective services. *BMJ*, 322: 855-857.
- Tideiksaar, R. and A.D. Kay, 1986. What causes falls? A logical diagnostic procedure. *Geriatrics*, 41(12): 32-50.
- Tinetti, M.E., 2003. Preventing falls in elderly persons. *N. Engl. J. Med.*, 348: 42-49.
- WHO, 2011. World Health Organization; [www.who.int](http://www.who.int).
- Zebaze, R.M.D. and E. Seeman, 2003. Epidemiology of hip and wrist fractures in Cameroon, Africa. *Osteoporos Int.*, 14: 301-305.