

**PATTERN, CAUSES AND DRUG MANAGEMENT OF CHILDHOOD FRACTURES AT
NNAMDI AZIKIWE UNIVERSITY TEACHING HOSPITAL, OBA, SOUTH-EAST,
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ABSTRACT

Background: A bone fracture is a medical condition in which there is damage in the continuity of the bone. Paediatric fracture remains a very significant cause of mortality and disability. **Aim:** The aim of this study is to look at the pattern of childhood fractures at the Nnamdi Azikiwe University Teaching Hospital (NAUTH), Oba. **Method:** The medical records of children between the ages of 2 and 14 who were admitted at the Orthopaedic unit of the NAUTH, Oba, between 1st day in January 2010 and 1st day in December, 2014 on account of fractures were retrieved. The sex of the child, cause and type of fracture were extracted from the case records. The first point of contact with healthcare providers where possible, was noted. Types of management at NAUTH were also noted. The data were analyzed using a one-way ANOVA. Chi square and student t-test where possible were used to determine the p-value. Results were presented as percentages while P-value ≤ 0.05 was adjudged significant. **Results:** A total of 174 children were admitted during the five year study period. The age range was 2-14 with a mean of 8.6 ± 3.8 years. There was a male predominance, 103(59.2%) against females, 71(40.8%)($P < 0.02$). The causes of the fractures were diverse but, road traffic accident was the commonest 67(38.5%)($P < 0.01$). Thirty-five (20.1%) children fell from various heights. 33(19%) of the fractures occurred during school sports compared with that of 27(15.5%) that occurred at home ($P < 0.02$). The most common site of injury was the femur (26%); this was followed by the tibia/fibula (16.5%), radius/ulna (16%) and humerus (14.2%). A good number of the cases 89(51.1%) presented fresh to NAUTH, 56(32.2%) presented initially to traditional bone setters (TBS), while 29(16.7%) was referred from private hospitals. Out of 174 cases under study, 118 presented first to medical facilities thus significantly, ($P < 0.01$) higher than that of TBS. There is therefore increasing awareness among the people on the first point of call. All patients received varying doses of antibiotics, analgesics and fluids resuscitations while reductions and fixations were the main surgical pattern of management employed. **Conclusion:** Road traffic accidents remained the most common cause of fractures in children. Fractures were commoner in young males with femoral fractures being the most frequent type. Antibiotics, analgesics and fluids resuscitations were used for all patients.

KEYWORDS: Childhood fractures, pattern, causes, Antibiotics, analgesics and fluids resuscitations Oba, Nigeria.**INTRODUCTION**

A bone fracture is a medical condition in which there is damage in the continuity of the bone (Marshall and Browner, 2012).

A bone fracture can be the result of high force impact or stress and are common during childhood; however, they can also be the presenting symptom of primary or secondary causes of bone fragility. The challenge is to identify those children who warrant further investigation. In children who present with multiple fractures that are not commonly associated with mild to moderate trauma

or whose fracture count is greater than what is typically seen for their age, an initial evaluation, including history, physical examination, biochemistry, and spinal radiography, should be performed (Harrington and Sochett, 2015).

Pediatric fractures represent a significant proportion of pediatric emergency department visits in the United States. Children between 10 and 14 years of age have the highest risk of having fractures (Naranje *et al.*, 2015).

Overall, forearm fractures were the most common pediatric fractures. Most pediatric fractures can be treated on outpatient basis, with only 1 of 18 fractures requiring hospitalization or observation (Naranje *et al.*, 2015).

It is essential to develop injury prevention and safety strategies as well as identify individual risk factors for fracture, including activity, sex, and key age transitions. Surveillance is imperative to advance our understanding of these fractures, and in the future may facilitate development of research prediction tools to anticipate or prevent injury (Shah *et al.*, 2015).

Small injuries in children are a very common reason of consultation in emergency departments or in primary care and most of them could be managed in ambulatory care, with the precondition of knowing the diagnostic red flags, which require a specialised advice or hospital surveillance (Lorton *et al.*, 2015).

Childhood chronic kidney disease poses multiple threats to bone accrual as children with chronic kidney disease have a high burden of fracture and regarding modifiable factors, higher average parathyroid hormone level was associated with greater risk of fracture, whereas phosphate binder use was protective in this cohort (Denburg *et al.*, 2015).

Serious illness in children and its therapy can cause osteoporosis, manifesting as vertebral and non-vertebral fractures, pain, skeletal deformity and temporary or even permanent loss of ambulation but in contrast to adults, skeletal growth in children offers tremendous potential to recover bone mineral density and to reshape fractured vertebral bodies, even without bone-targeted therapy, provided that bone health threats are transient and residual growth is sufficient (Högler and Ward, 2015).

A study done on the outcome of non-operative management of femoral shaft fractures in children by Akinyoola *et al.*, (2011) at the Obafemi Awolowo University Teaching Hospital Ile-Ife showed that out of the 134 patients treated for femoral shaft fractures, 53% were males with a mean age of 6.1 years and 47% females with a mean age of 6.5 years. These researchers concluded that the peak incidence in males was in the 2-5 year age group and 6-10 year age group in females while 57.7% of the male children and 44% of the females were of school age.

A study done in South Africa on the fracture rates in urban South African children of different ethnic origin by Thandrayen *et al.*, (2009), showed that more boys than girls sustained fractures 27.5% as against 16.3% throughout all age groups except in the first year of life while 64% of all fractures occurred in males and 10% in females.

In Nigeria, a study done in Enugu by Nwadinigwe *et al.*, (2006) on fractures in children showed that the causes of fractures were diverse. Road traffic accidents were the most common (51%), a great number (36.7%) of these resulted from unguarded children hit by motor vehicles while crossing the road but, (41.8%) of children fell from various heights while (30.6%) fractured while playing either at home or school. An incident of closed femoral fracture occurred probably from child abuse

In South Africa femoral shaft fractures in children was commonly due to a fall (39%) and eighty percent of falls occurred at home while motor vehicle accidents were responsible for 33.7% of fractures, of which 88% were pedestrians. Incidence of fractures was 1.6% from cycling while 11% of the patients were struck by falling objects ranging from falling roof shacks to collapsing gates and doors (Mughal *et al.*, 2013).

Non-accidental injury was the cause of 50(6.6%) fractures while sport related injuries were responsible for 35(4.5%) fractures (Mughal *et al.*, 2013).

In Switzerland a study on the epidemiological evaluation of paediatric long bone fractures showed that the leading cause for long bone fractures was falls while 90% of sports-related fractures occurred in males (Joeris *et al.*, 2014).

In Austria a study done to evaluate fractures in children and adolescents showed that a majority of fractures occurred in sports facilities 34.7%, followed by those at home 17.6% and outdoors 16.7%. The most frequent mechanisms were falls on level surface 41.9%, falls from a height < 3m 23.2%, and involuntary contact with persons or objects 18.2% (Schalamon *et al.*, 2012)

In Lagos a study on pattern and trauma of paediatric long bone fractures showed that the radius/ulna was the most fractured bone (29.6%) while the femur (9.9%) had the least frequency. Upper limb fractures accounted for 58% and the commonest mechanisms of injury were falls (62.1%) and birth injuries in (16.5%)(Akinyele *et al.*, 2008).

In Sagamu fracture occurred three times more in the upper limbs and the bones most frequently affected are the humerus, radius, and ulna in descending order (Olatunji and Thanmi, 2013). But, in South Africa, out of 307 cases of road traffic accidents, 130 (35.4%) were femoral fractures and 123 (33.5%) tibia/fibula (Pretorius and Firth, 2010).

A work done in Turkey on the Frequency and distribution of fractures in children presenting to the emergency service showed that the most common site of involvement was the distal radius 26%, followed by the elbow 19%, forearm 17%, hand-foot 12%, clavicle 9%, tibia 7%, and the femur 6%. The humerus 1% was the least affected site (Kalenderer *et al.*, 2006).

A work done in Sweden showed that the commonest site of fracture was radio-ulnar 32%(distal forearm[81%], forearm shaft[10%] and proximal forearm[9%]), tibia/fibular and clavicular 11% each, humerus 9% femoral 2% (Hedstrom *et al.*, 2010).

Method

Study area was Nnamdi Azikiwe University Teaching Hospital Trauma and Orthopaedic Centre Oba.

Oba is a town located in Idemili South local government area of Anambra state, Nigeria. It lies approximately 7 kilometers South of Onitsha along the old Owerri-Onitsha Trunk A road. To the North is the Idemili River and the neighboring towns of Nkpor and Umuoji. To the South is the Ekulu River and the towns of Oraifite and Akwu-Ukwu. To the East are the towns of Ojoto and Ichi and to the West is the Ose River and towns of Obosi and Odekpe (Wikipedia, 2015).

The Nnamdi Azikiwe University Trauma and Orthopaedic Centre is located along the new Nnewi-Oba road. The centre kicked off health service provision July 2005. The centre provides inpatient and outpatient care for trauma and orthopaedic cases. It is equipped with a theatre complex, 2 male surgical wards and 2 female surgical wards among others.

It's also a referral Centre for orthopaedic trauma cases from Nnamdi Azikiwe University Teaching Hospital Nnewi.

Study design: This was a retrospective study. The medical records of children between the ages of 2 and 14 who were admitted at the Orthopaedic unit of the NAUTH, Oba, between 1st day in January 2010 and 31st day in December, 2014 on account of fractures were retrieved. The sex of the child, cause and type of fracture were extracted from the case records. The first point of contact with healthcare providers where possible, was noted. Types of management at NAUTH were also noted.

Statistical analysis: Data was analysed with the IBM Statistical Package for Social Sciences (SPSS) software, version 20.0 using descriptive statistics, and cross-tabulation. The data were analyzed using a one-way ANOVA. Chi square and student t-test where possible were used to determine the p-value.

Results were presented as percentages and where possible as mean \pm standard deviation. P-value ≤ 0.05 was adjudged significant.

Limitations: The full potential of this study was limited by poor records keeping at the centre. Cases of missing patients' hospital folders abound.

RESULTS

A total of 513 children were admitted to the orthopaedic and trauma centre between 2010 and 2014 for various ailments. 197 were though cases of childhood fractures but, 174(89.69%) of folders were studied due to non-availability of folders and poor records keeping.

The studied age range of 2-14 had a mean age of 8.6 ± 3.8 years. There was a male predominance in childhood fractures 103(59.2%) against females 71(40.8%).

Rate of fractures was highest from 6years but, most fractures occurred in males($P < 0.02$) and more among age 6-10years (Table 1).

The commonest cause of fractures was RTA (38.5%) ($P < 0.01$) and 6-10 years (21.8%) also had the highest incident while birth injuries accounted for higher incident of fracture in the age group of 2-6years.

Fractures occasioned by RTA was followed by fall from heights (20.1%) while the least cause of childhood fractures was non accidental injury/assault (0.6%) (Fig 1 and Table 2). The most commonly fractured bone was the Femur (26%) followed by the humerus (14.2%) while the most common combined-bone fracture was Tibia/fibula fracture (16.5%) with radius/ulna bones following very closely (16%) (Fig 2). Simple fractures occurred more in children (70.6) while multiple fractures occurred slightly more on the right (Table 3).

A total of 89{51.1%) were brought to NAUTH as first point of presentation while 56(32%) were first taken to traditional bone setters before being brought to NAUTH after complications had occurred (Table 4).

A good number of the cases 89(51.1%) presented fresh to NAUTH, 56(32.2%) presented initially to traditional bone setters (TBS), while 29(16.7%) was referred from private hospitals. Out of 174 cases under study, 118 presented first to medical facilities thus significantly, ($P < 0.01$) higher than that of TBS. There is therefore increasing awareness among the people on the first point of call.

All patients received varying doses of antibiotics, analgesics and fluids resuscitations while reductions and fixations were the main surgical pattern of management employed.

Table 1: Sociodemographic distribution of the children.

Age Group in Years	Male	Female	Total	Percentage
2 – 5	26	15	41	23.5
6 – 10	39	27	66	38.0
>10	38	29	67	38.5
Total	103	71	174	100.0
Total Percentage	59.2	40.8	100.0	*

Table 2: Age ranges and Causes of fractures.

Age ranges	Causes of fractures						Total
	Fall from heights	Road traffic accidents	Domestic accidents	School/sporting accidents	Non accidental injuries/Assault	Birth injury	
2 – 6	11	0	13	7	0	10	41
6 – 10	9	38	7	12	0	10	66
10 – 14	15	29	7	14	1	1	67
Total	35(20.1%)	67(38.5%)	27(15.5%)	33(19.0%)	1(0.6%)	11(6.3%)	174(100%)

Table 3: Types of Fractures and Sides of Multiple Fractures.

Fracture Region	Multiple Fractures		Total
	Yes	No	
Right side	12	58	70(40.2%)
Left side	15	65	80(46.0%)
Both	22	2	24(13.8%)
Total	49(28.2%)	125(71.8%)	174(100%)

Table 4: First Point of Presentation.

First Point of Presentation	Frequency	Percentage
NAUTH Oba	89	51.1
Other Hospitals	29	16.7
Traditional Bonesetters	56	32.2
Total	174	100.0

DISCUSSION

Fracture is an important component of paediatric trauma, which is a leading cause of morbidity, mortality and disability in childhood. This study aimed at determining the pattern of childhood fractures at Nnamdi Azikiwe University Teaching Hospital Trauma and Orthopaedic Centre Oba.

The study showed that the peak age for fractures in childhood was 6-10years (38.5%). The mean age was 8.6 \pm 3.8 years. Most fractures occurred in males while most fractures were simple and occurred on the femur. Traditional bone setters play active part in management of fractures while complicated cases are brought to NAUTH.

An earlier work done by Ekenze *et al.*, (2009), in Owerri revealed that out of the 941 children (53.3%) of cases were boys and (42.7%) were girls and with a mean age of 8.7 years.

Another study done on Playing into injuries: Paediatric trauma in a Nigerian hospital in Ado-Ekiti showed that out of the 77 children with fractures, 23 were females and males were 54 with female: male ratio of 1: 2.4 and a mean age of 7.8 \pm 4.0 years (Ogunlusi *et al.*, 2009).

In Gombe State, North East Nigeria, childhood fractures occurred in 67.5% of boys and more than females 37(32.5%). Their mean age was 6.4 \pm 3.2 years and had higher incidence of simple than multiple fractures (Esin *et al.*, 2013).

Pediatric fractures represent a significant proportion of pediatric emergency department visits in the United States. Children between 10 and 14 years of age have the highest risk of having fractures (Naranje *et al.*, 2015).

A study done on the outcome of non-operative management of femoral shaft fractures in children by Akinyoola *et al.*, (2011) at the Obafemi Awolowo University Teaching Hospital Ile-Ife showed that out of the 134 patients treated for femoral shaft fractures, 53% were males with a mean age of 6.1 years and 47% females with a mean age of 6.5 years. These researchers concluded that the peak incidence in males was in the 2-5 year age group and 6-10 year age group in females while 57.7% of the male children and 44% of the females were of school age.

A study done in South Africa on the fracture rates in urban South African children of different ethnic origin by Thandrayen *et al.*, (2009), showed that more boys than girls sustained fractures 27.5% as against 16.3% throughout all age groups except in the first year of life while 64% of all fractures occurred in males and 10% in females.

Childhood fractures across the globe thus are more common among males than their females counterpart and also occur at lower mean age in males than females. In Nigeria however it occurred at lower mean age than the developed world and even in South Africa. Reasons for the lower mean age incidence may be deduced from the environment and non restrictive attitude of Nigerian family on wandering/astray playing of children. Most villages and towns of Nigeria, children are found roaming the streets unguarded by any adult. Males are generally more adventurous and active at out-door activities than female children thus accounting for more male fractures globally.

Our work showed no case of pathological fracture cum fragility unlike those in developed countries. It is disheartening to find that up to 15% of fractures were due to birth injuries and cut across all age group in our study. This is an unfortunate and unwarranted deformity especially for those of above 10-14years where bone healing may not be as active as in the younger age group.

Motor traffic accident accounts for over 60% of fractures in most parts of Nigerians based on literature and from the present study. Apart from the reason earlier discussed, motorcycle is a major means of transportation

and is ridden mainly by untrained youths who commonly give little or no regards to traffic rules and laws. But take for an instance in Malaysia a developing country like Nigeria, the pattern of childhood fractures were seen more at home (17.3%) and school (15.7%) than road traffic(9.2%)(Saw *et al.*, (2011).

A similar pattern was seen in developed countries like Italy (Valerio *et al.*, 2010).

In females the home represented the most frequent location at any age, while fractures in the playground and footpath or sports facility significantly decreased with age. No difference between genders existed in each age group, except in adolescents, in whom the playground and footpath was the location more frequently reported by males (33.0%) and the home was more frequently reported by females (43.8%) (Valerio *et al.*, 2010). Generally, poor adherence to traffic driving code of conduct may account for high RTA cases of fractures in Nigeria. This may also account for higher incidence of lower limb fractures seen in our present study unlike in developed countries where fractures commonly were due to falls.

A report by Onyemaechi *et al.*, (2015) on the Patronage of Traditional Bone Setters in Makurdi, North-central Nigeria showed a TBS attendance rate of 31.6%.

An earlier work done by Ogunlesi *et al.*, (2006) showed that 23(69.7%) out of 33 of the patients in their study attended TBS primarily from the site of injury and 6(18.1%) attended TBS after initial hospital treatment

A study done on the Utilization of traditional bone setters in the treatment of bone fracture in Ibadan North local government revealed that only 33% of respondents presented to a modern health facility following a fracture while 67% visited traditional bone setters (Owumi *et al* 2012)

A work done in India showed that about 36% of the children were treated by traditional means before presentation to the hospital (Tandon *et al.*, 2007).

But, in Malaysia patronage to traditional bone setters has dropped to as low as 1.2% in the past ten years (Saw *et al.*, (2011).

Apart from Malaysia, it can be generally stated that traditional bone setters still play active role in management of childhood fractures in the third world countries. Situations where fractured patients are withdrawn from hospitals to traditionalist care abound in Nigeria. Traditional practices are less formal, nearer the home-place, usually with no language or communications difficulties, less expensive and most importantly there is usually no surgeries. Traditional bone setting is however not uncommonly associated with complications especially from infections.

CONCLUSION

Motor traffic accidents remained the most common cause of fractures in children. Fractures were commoner in the young males with femoral fracture being the most frequent type. Antibiotics, analgesics and fluids resuscitations were used for all patients.

There is increasing awareness among the people on timely presentation to our hospital but, practice of TBS was preferred to private medical practice.

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