

## Original Research Article

# Incidence of pediatric long bone fractures at the university college hospital Ibadan

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### ABSTRACT

**Background:** Individuals within the paediatric age group sustain different types of fractures, as such the need to determine the incidence and pattern of long bone fractures among patients 16 years and below admitted through the different wards of admittance of the university college hospital Ibadan.

**Methods:** This was a retrospective hospital-based study involving patients 16 years and below admitted through the accident and emergency department, the children emergency department, the neonatal ward and labour ward of the hospital between January 2013 and December 2018 at the university college hospital Ibadan. Using a proforma completed from the electronically stored data that captured the patient's history, examination findings, X-ray film and treatment offered which was collected on a weekly basis.

**Results:** 25.13% of the patients reviewed within the study period were paediatric patients. A total of 337 paediatric patients were reviewed. There were 124 female and 213 males with ratio (F:M-1:1.7). The fractures were mostly secondary to fall and road traffic crash accounting for 68.54% and 23.15% respectively. 65.12% of the fractures involve the bone of the upper limbs while 34.98% occur in the bones of the lower limbs. The radius and the ulnar bones are the most affected. Transverse fracture is the most common pattern observed.

**Conclusions:** More than 20% of the reviewed population was in the paediatric age group and the radius and ulnar bones were the most commonly fractured bone in this age group. They usually follow trivial falls.

**Keywords:** Paediatric, Fractures, Fall

### INTRODUCTION

Trauma is a major factor involved in childhood morbidity and mortality.<sup>1,2</sup> It is the leading cause of death in children after the first year of life in the united states of America, accounting for 50% of mortality, with an injury occurring every 4 minutes and death every 6 minutes.<sup>3</sup>

Landin in his study on epidemiology of children's fracture found that 10% to 25% of all pediatric injuries occurring in childhood are fractures and they are a leading cause of

emergency presentation in pediatric age group.<sup>4</sup> It account for 9% of healthcare presentation in children.<sup>5</sup>

Fracture is the most common category of unintentional injuries according to the world health organization by children below 15 years who require hospital admission in developing countries.<sup>6</sup> It has been observed that fractures have significant physical, psychosocial and financial strain on the victims and their parents.<sup>7</sup>

Childhood fractures commonly result from falls and road traffic injuries. Falls in and around the home account for

most pediatric fractures in developed countries while fractures from road traffic crashes according to Elachi et al is said to predominate in Nigeria.<sup>8-11</sup>

The risk of injury in children have been observed to be due to their lack of understanding of risk, and more if such children are allowed to play unsupervised. Humel in his study found that unsupervised play is the main reason that children are injured in falls.<sup>12</sup>

In many low-income and middle-income countries, children are exposed to injuries for reasons which include street hawking by the children, also because the road is a shared space for playing, working, walking, cycling and driving.<sup>13,14</sup>

**Objectives**

The objective of the study was to determine the incidence of fracture among patients in the paediatric age group between first day of life and 16 years admitted through the accident and emergency department, the children emergency department, the neonatal ward and labour ward of the university college hospital Ibadan. Determine the pattern of fractures among patients in the paediatric age group that presented at the accident and emergency department, the children emergency department, the neonatal ward and labour ward of the university college hospital Ibadan.

**METHODS**

**Study design**

The study was a retrospective hospital-based study to determine the incidence and the pattern of limb fracture in patients 16 years and below who got admitted through the accident and emergency department, the children emergency department, the neonatal ward and labour ward of the university college hospital Ibadan.

**Study setting**

The university college hospital Ibadan is 850 beds teaching hospital. It is located in Ibadan, the capital of Oyo state, southwest Nigeria. It is also a referral centre for hospitals in the neighboring states.

**Eligibility criteria**

Patients who are 16 years and below with radiologically diagnosed long bone fractures who presented through the accident and emergency department, the children emergency department, the neonatal ward and labour ward of the hospital between January 2013 and December 2018 were involved in the study.

Data was obtained using a predesigned proforma which was completed from the electronically stored data at the Department of Orthopaedic Surgery, University College

Hospital, Ibadan. Data retrieved included the patient’s history, examination findings, X-ray film and treatment offered which was collected on a weekly basis from these parts of the hospital and presented at the weekly fracture forum of the department of orthopedic surgery and trauma of the university college hospital Ibadan.

Other information retrieved with the proforma also included the biodata, mechanism of injury, distribution of the fractures by the bone involved and the fracture pattern and treatment modality. The data was collected over a 6 years period extending from year January 2013 to December 2018.

Fractures in patients with age above 16 years were excluded from the study. Fractures in patients above the stated age group were excluded from the study as well as fractures involving the skull, spine, the ribs and other non-long bones. The data was entered and analyzed using statistical package for the social sciences version 15. The approval of the ethics committees of the department of orthopaedic surgery and trauma was obtained.

**Ethical approval**

Obtained from the ethics committee of the Department of Orthopaedic Surgery and Trauma of the University College Hospital, Ibadan.

**RESULTS**

A total of 1341 fractures presented within the study period of which 337 occurred in individuals of the pediatric age group, which is about 25.13%. There were 213 male (63.20%) and 124 females (36.80%) with a male to female ratio of 1.7:1 (Table 1). Falls and road traffic crash accounted for majority of the mechanisms of injury at 68.54% and 23.15% respectively (Figure 1).

**Table 1: Gender, side affected and fracture type.**

Variables	Number	Percentage
<b>Gender</b>		
Male	213	63.20
Female	124	36.80
Total	337	100.00
<b>Side affected</b>		
Right	171	50.74
Left	166	49.26
Total	337	100.00
<b>Type of fracture</b>		
Open	26	7.71
Closed	311	92.29
Total	337	100.00

Most of the fractures involved the upper limbs at 65.12% while 34.98% occurred in the lower limbs (Table 2). In the upper limbs more fractures occurred in the fore arm involving the radius and the ulnar bones than the humerus

while in the lower limbs the femur bone was more affected than the tibia and fibula (Table 2).

Other forms of injury observed include dislocation of joints, pelvic fracture and some of the fractures are pathologic in nature.

There is almost an equal involvement of both the right and the left half of the body at ratio 1:1.03 (Table 1). The most common fracture pattern was transverse fracture (Figure 2). Most of the fractures were closed (Table 1) and majority of them also had a non-operative management (Figure 3).

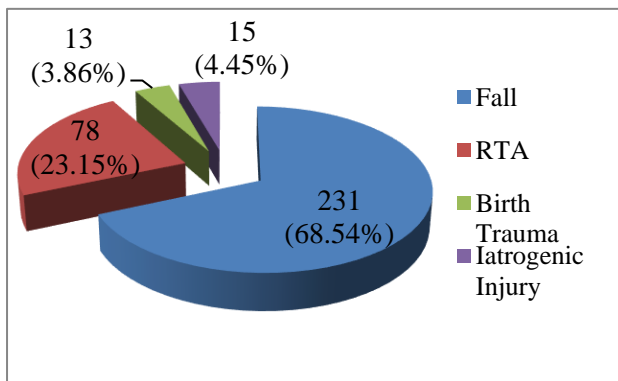


Figure 1: Mechanisms of injury.

Table 2: Fracture distribution based on the limb and bone involved.

Limb/bone	Number	Percentage
<b>Upper limb</b>		
Humerus	96	62.31
Radius and ulnar	114	
Total	210	
<b>Lower limb</b>		
Femur	70	34.13
Tibia and fibula	45	
Total	115	
<b>Others</b>	12	3.56
<b>Total</b>	<b>337</b>	

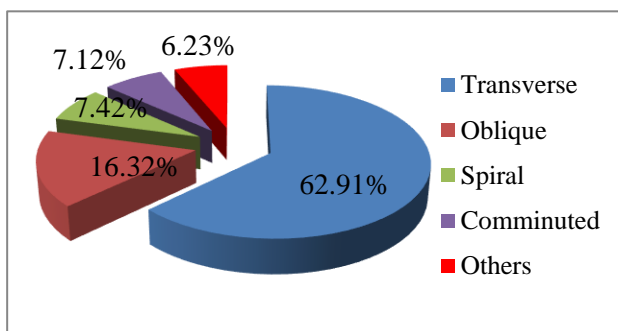


Figure 2: Fracture patterns in percentages.

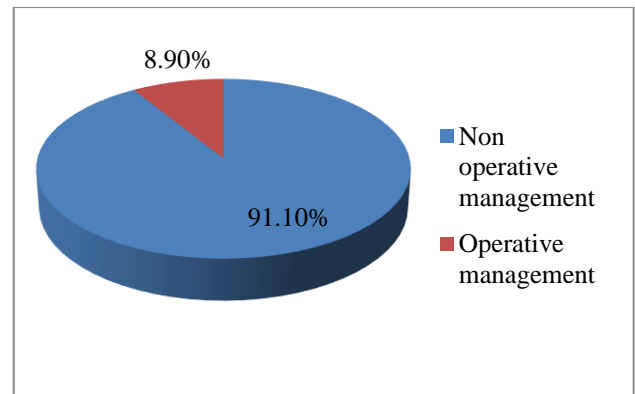


Figure 3: Modality of management in percentage.

DISCUSSION

Pediatric long bone fracture is a common occurrence in Nigeria. It accounted for 25.13% of the fractures observed in this study. The study done in university of Benin teaching hospital on the pattern and outcome pediatric surgical admissions showed that 9.22% are orthopaedic admissions while a multi-center and multi country study done by Bradshaw et al on epidemiology of pediatric trauma showed 29% involvement of pediatric fractures.<sup>15,16</sup> Some of the reasons for this may be due to lack of understanding of risks as well as children being allowed to play unsupervised.<sup>12</sup> The peculiarity of Nigeria as a low/middle income country also exposed young children to street hawking which further predispose them to trauma.<sup>11</sup>

The male to female ratio in this study is ratio 1.7 to 1. This is similar to the outcome of the study done by Valerio et al in Italy as well as the study by Tandon et al in India with a ratio of 1.2:1.<sup>17,18</sup> Hyperactivity of male children, active behavior, higher exposure level and the tendency for male children to be involved in more physical activities may be accountable for male children being involved in fracture.<sup>17,18</sup>

The most common mechanism of injury in this study is fall 68.54%. Some of this occurred at the playfield around the school and at home. Other studies have also shown that fall is the most common cause of fractures in young people however previous study done in Nigeria by Elachi et al and Nwadinigwe et al showed that road traffic crash is the main cause of fracture.<sup>9,11,20</sup> The observation in our study may be due to the fact that most of our patients are below the age of ten years and at this stage of their development they want to explore their environment which may predispose them to falls.<sup>20</sup> Also, in developing countries, most parents go to work and leave their younger children (infants and toddlers) under the care of their elder siblings as such they become predispose to the incidence of falls.<sup>18</sup>

Road traffic crash accounted for 23.15% of the fractures. They followed pedestrian and passenger motorbike and motor vehicle crashes. Street hawking among children due

to poverty in order to support the family financially have been observed to further predispose them to road traffic crash.<sup>21</sup> Also non-availability of side walk and appropriate playground allow children to stray to the road where they could be victims of road traffic crash. Failure of the use of appropriate restraint for children during vehicular transportation expose them to more severe injuries when such vehicle is involved in road traffic crash. Birth trauma accounted for some of the fractures especially during difficult labor and delivery.<sup>22</sup>

Most of the fractures involve the bones of the upper limbs with the distal forearm being the most affected especially the distal radius and ulnar bones. The reason for this may be due to the attempts at breaking the falls in such children.<sup>20</sup> This observation is different from the outcome of the study done in Enugu and Makurdi both in Nigeria which showed femur fracture and tibia fracture respectively as the most commonly fractured bones in children. Valerio et al and Agarwal in their study found that the distal radius was most commonly fractured bone.<sup>17,23</sup>

Most of the fractures in the pediatric age group in our study are closed fractures. This may be due to the fact that the most commonly observed cause is fall which occurred at home or in the school and not road traffic crash as only about 7.71% of the studied population had open fracture as such the energy transfer may not be as significant to also cause open injury. Elachi et al in the study on characteristics and outcome of pediatric long bone fractures also observed a higher preponderance of closed fractures in this age group.<sup>20</sup>

The most common fracture pattern is transverse fracture. Peter warlock and his colleague found green stick fracture and epiphyseal injury as the most common fracture patterns in their study.<sup>8</sup>

Most of the children in this studied population had non-operative treatment of their fractures using cast application after manipulation where necessary. Non-operative fracture treatment was also observed to be the most common modality of fracture management in similar studies done.<sup>11,24,25</sup> Operative intervention involved the use k-wire, external fixator where such are extensively opened and plates for mid shaft fractures in long bones. The availability of newer imaging devices needed to assess fracture reduction and fracture treatment in children will make surgical treatment of pediatric fractures more common subsequently.

## CONCLUSION

Long bone fractures in the paediatric age accounted for more than 20% of the total patient reviewed within the study period. The radius and the ulnar bones were the most commonly fractured bones. They usually follow trivial falls and road traffic crash. Provision of safe environment for children with adequate and appropriate supervision as

well prevention of children in street hawking will reduce the risk of long bone fractures in this age group.

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