

## **Presentation and Pattern of Paediatric Head Injury in a Nigerian Tertiary Care Centre: A 7-Years Experience**

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**Background:** Head injury is a public health concern that constitutes a significant cause of morbidity and mortality globally. Universally, this menace has not spared children of its catastrophic impacts on the quality of life. This study is designed to focus on the characteristics of head injuries among children.

**Methods:** A retrospective analysis of all the pediatric cases of head injury that were admitted into the wards from January 2007 till December 2013 was done. Data obtained were analyzed using SPSS 15.

**Results:** A total of 101 patients were studied: 61(60.4%) males and 40 females (39.6%). Children 6 to 12 years were most affected and Road traffic accidents were the most common cause. A significant change in the trend of etiologic factors was noted with a decline in the contribution of road traffic accidents over the years ( $P 0.036$ ). Mild head injuries were the most common form of head injuries seen.

**Conclusion:** The downward trend in road traffic accidents as a cause of head injury over the years is laudable as it portrays some progress in the development of safety measures. However, more efforts at generating strategies aimed at improving the safety of our roads for children are an imperative.

**Key words:** Presentation, Paediatric, Head injury, Nigeria

### **Introduction**

Trauma is a major global health menace which has been noted as the most common cause of death in children<sup>1,2,3</sup>. Head injury in this age group is the leading cause of mortality and morbidity and is noted to represent about 80% of the deaths that occur in children except infants.<sup>2</sup> Globally, the predominant cause of head injury in children has been documented as falls; however, data from our local environment suggest that the most common cause in Nigeria is still Road Traffic Accidents (RTAs)<sup>1,4</sup>. Overall, it has been documented that pediatric head injuries mostly result from a spectrum of conditions which consist mostly of Road Traffic Accidents, falls, assaults, recreational activities (sports, bicycle-related injuries) and child abuse.<sup>2,5,6</sup>

Due to variations in the parameters used in the definition of head injuries in studies, as well as the differences in ages used in childhood studies, it might be difficult for an adequate comparison of different demographics to be achieved. However, in the United States, it is estimated that over 1.5 million cases of childhood head injuries occur per annum and about 300,000 of these cases require hospitalizations<sup>7</sup>. It is also estimated that the annual incidence in the US is 200 per 100,000<sup>2</sup>. Interestingly, a bimodal incidence has been noted and is found to occur early in childhood and in mid to late adolescence<sup>2,8</sup>.

As a result of the variations between the brain of a child and that of an adult;<sup>3</sup> hence, differences in various aspects of head injury,<sup>9</sup> results gotten from studies in the adult population cannot be applied to the pediatric population. It is therefore important that more researches be performed on the pediatric age groups to ensure more specific management guidelines unique to this group.

This study was aimed at examining the pattern of paediatric head injuries that were admitted at a tertiary healthcare center with an attempt at defining the extent of the paediatric population involved and the characteristics of these patients with the goal of providing information that will guide the development of effective strategies that could aid in curtailing childhood head injuries.

### Patients and Methods

This was a retrospective study which spanned from January 1, 2007 to December 31, 2013. Children, less than 18 years, with a history of head trauma and clinical evidence of head injury; which ranged from changes in their level of consciousness and seizures to various other evidences of cranial neurological deficits', that were admitted into the wards were included in the study. Clinical diagnosis of basal skull fractures was made using presence of epistaxis, rhinorrhea, heamotympanum, otorrhea, periorbitalecchymosis and subconjunctivalhaemorrhage.

Using patient folders that were obtained from the Records Department, bio data, Glasgow Coma Score (GCS) at presentation, cause of injury, mode of presentation, mortality, follow-up and presence of neurological sequel were obtained. The Glasgow Coma scale at presentation was used to grade injuries into severe (GCS 3-8), moderate (GCS 9-12) and mild (GCS 13-15). Patients that were managed and discharged directly from the Accident and Emergency room were excluded.

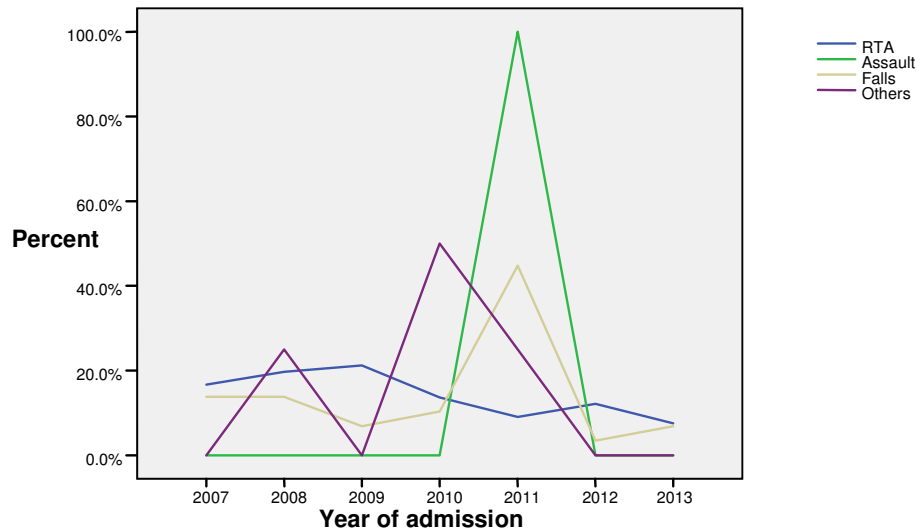
The data was analyzed using standard descriptive statistical calculations (mean, standard deviation and frequency distribution). Chi-squared test was performed with statistical significance level determined by a P value < 0.05.

### Results

Out of the 101 cases of paediatric head injuries that were attended to, 61 (60.4%) of them were males while 40 were females (39.6%), giving the male to female ratio of 1.5:1. The average age was 7.26 years (+/-4.71) with the youngest child attended to being a 3 month old child. Our study showed a unimodal age distribution with the peak at middle age childhood (6 to 12 years). Children in this age group constituted 43.6% of the cases seen; this was followed by those 3 to 5 years of age which made up 18.8%. The least represented age group was the infant age group which made up 5.9 % of the entire cases. The age distribution is shown in the Table 1. No significant differences were noted in the ages and sexual distribution over the years that were included in this study (*P* 0.5 and 0.8 respectively).

**Table 1.**The Age Distribution.

AGE	Frequency	Percent
<1 year	6	5.9%
1 to 2 years	16	15.8%
3 to 5 years	19	18.8%
6 to 12 years	44	43.6%
13 to 17 years	16	15.8%
Total	101	100.0%



**Figure 1.**The Trends in the Causes of Head Injuries over the Years

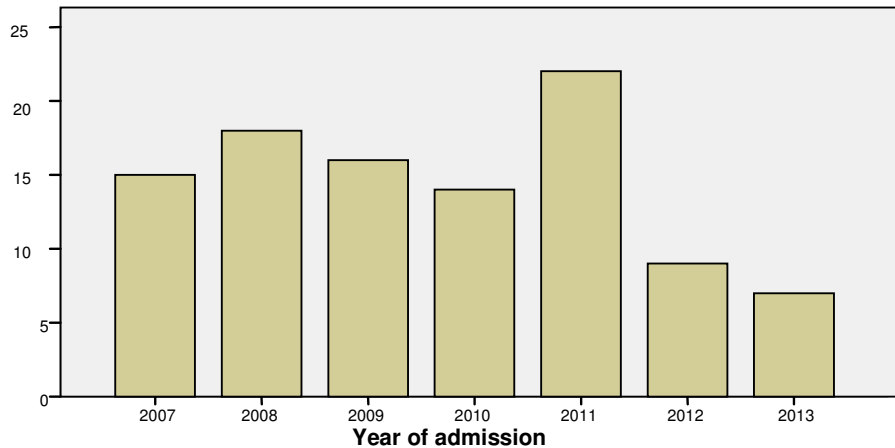
The commonest cause of injury was RTAs accounting for 66 (65.3%) of the cases seen, followed by falls (28.7%). Assaults were the least common. A group consisting of injuries due to falling objects and patients colliding with stationary objects constituted 4% of the cases.

The various causes of head injury showed an evolving pattern with RTAs noted to decline gradually over the years with a peak in 2009 and a trough in 2011. Falls, however, were noted to have features which mirrored that of RTAs with its peak in 2011 and its trough in 2009 (Figure 1). These changes which were noted in the etiological factors were observed to be significant ( $\chi^2=30.16$ ,  $df=18$ ,  $P 0.036$ ). Also, we observed that the frequency of head injuries over the years exhibited a bimodal distribution with peaks in 2008 and 2011. Despite the spike in the number of cases in 2011, there was an overall downward trend noted in the cases of head injuries per year (Figure 2).

The most common form of head injury encountered in our study was the mild form which made up 42.6%; it was followed by severe and moderate forms at 26.7% and 19.8% respectively. Data on the GCS of 11 of the patients were not available. 63 of the patients (62.4%) presented with a history of loss of consciousness and out of these, majority of them (26 patients) had severe head injuries; the proportion of cases with mild head injuries that had a history of loss of consciousness was the least. The above observed difference was statistically significant ( $\chi^2=49.19$ ,  $df=2$ ,  $P 0.000$ ).

Sixteen (15.8%) of the patients had a clinical diagnosis of Basal skull fracture with 4 (25%) presenting with a history of otorrhoea, 13 (81.3%) presented with rhinorrhoea/epistaxis while 6 (37.5%) had haemotympanum. A total of 21 (20.8%) of the cases seen had a history of post trauma seizures either prior to, during or after presentation and most cases were noted to occur within 24 hours of trauma. Of the 21, 8 (38.1%) had seizures that occurred after 24 hours but within a week of trauma. None was noted to occur after a week. Not surprisingly, more severe forms of head injuries were associated with seizures ( $\chi^2=7.894$ ,  $df=2$ ,  $P 0.019$ ).

Only 2 patients died during this period and both were cases of severe head injury. Also, both cases were due to RTAs although the observation was not statistically significant ( $P 0.781$ ). Two patients developed neurological sequel which included facial nerve injury and behavioral changes. 27 patients (26.7%) turned up for at least one follow up visit.



**Figure 2.** Bar chart showing the Annual distribution

**Table 2.** The duration of Hospitalization

Duration	Frequency	Percent
< 1 week	49	48.5%
1 – 4 weeks	34	33.7%
4 – 8 weeks	12	11.9%
> 8 weeks	6	5.9%
<b>Total</b>	<b>101</b>	<b>100.0%</b>

The average duration of hospital stay was 22.24 days (+/- 54.98). 49 (48.5%) of the cases were admitted for 1 to 7 days. There was a significant relationship between duration of admission and severity of injury as more severe forms of injury required longer hospital stay ( $\chi^2=13.258$ ,  $df=6$ ,  $P 0.039$ ). The distribution in the duration of hospital stay is presented in Table 2.

## Discussion

From our study, males were mostly affected as has been shown in other studies<sup>1,2,3</sup>. Our calculated male to female ratio of 1.5 to 1 is also very close to that which has been observed in our local environment<sup>1,10</sup>. Similarly, other studies in developed countries have shown ratios of 2 to 1 which are supportive of the data found in our region<sup>2,3,7</sup>. This high preponderance of males is most likely due to the high involvement of males in risky and adventurous ventures which expose them to various risk prone situations<sup>11</sup>.

The commonest cause of injury was RTAs which is consistent with other studies which have been done in our region. It contradicts, however, with some others in some developed countries where falls were most frequent. We did not ascertain if the accidents were pedestrian-vehicular or if the children involved were passengers in vehicles. This is an important demographic finding which can be explored in further studies. The high rate of street hawking and trading, as well as the use of foot as a means of transportation, among school children in addition to the large number of poorly licensed motorists could also contribute to the large cases due to RTAs<sup>11, 12</sup>. On the other hand, the decline in the proportion of RTAs over the years seems to reflect the

changes in traffic regulations, ban of motorcycle use in the densely populated city and improvements in the quality of roads. There were no reported cases of suspected abuse particularly in children less than 2 years which is the age group most vulnerable<sup>6,13</sup>. This observation could however reflect a low index of suspicion for abuse among medical personnel; this is because the inference as to whether an injury is inflicted is based on the “insufficiency of the history to explain the injuries”<sup>9</sup>.

Consistent with other studies, we observed that mild head injuries were the most common form of injuries seen. An interesting subgroup of this category are those that presented with a history of loss of consciousness: a group that has been associated with an increased risk of intracranial injury detectable on CT ranging from 2% to 5%<sup>3,14</sup>. It is therefore imperative in the management of these patients that proper care and monitoring be employed especially in resource poor areas where there is a lack of facilities for imaging that would help in the identification of this group with a potential need for neurosurgical intervention.

Mortality rate in our population was calculated to be 2%. This is similar to the rate observed by Shokunbi and Oluri<sup>10</sup>. It however differs greatly with that which was calculated by Emejulu and Shokunbi<sup>1</sup> where a higher value of 15.4% was calculated. This disparity noted could be explained by the exclusion, from our study, children that died prior to admission into the wards (those that died before presentation to the hospital and those that died at the emergency room). It is pertinent to mention that the high involvement of RTAs with the mortality which we observed was also noted in other studies<sup>1</sup>. In our study, however, the observation was not statistically significant ( $P 0.78$ ).

Following any form of head injury, there could be development of a variety of neurological sequel<sup>8, 11</sup>. The severities of these deficits are in direction proportion to the severity of the injury<sup>8</sup>; a finding that was also noted in our study. We had two patients that developed these deficits: one had facial nerve palsy while the other developed behavioral changes and was on follow up with the pediatric out patient service. This finding goes to buttress the fact that the deficits can affect any area of neurologic function ranging from cognition to behaviour<sup>8</sup>.

The poor turn up for follow up noted in this study is indeed a thing of worry as adequate follow up of these patients is necessary for detection and adequate treatment of the untoward sequel of traumatic head injuries. Although a higher proportion of patients with moderate and severe, than mild, injuries turned up for follow, this finding was not statistically significant ( $P 0.175$ ). Overall, 27 patients (26.7%) turned up for at least one follow up visit.

## Conclusion

Paediatric head injuries are still a menace that plague our society and affect males mostly of the middle age group. The changing trends which depict a decline in the proportion of RTAs as an aetiological factor suggest that some of the recent policies in place might already be playing some crucial roles in curtailing this danger, the predominance of RTAs in our study which correlates with other findings in our region still highlight the dire need for further review of our road use guidelines. Indeed, it behooves us that our roads are made a safe haven for children and all efforts must continue till this goal is attained. In addition, public health education on road use and adult supervision of children should be conducted for parents, teachers and children alike to reduce the incidence of preventable head injuries<sup>15</sup>.

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