

Pediatric injuries: The etiology and associated factors as seen at a Mission Hospital in Aba, Southeast Nigeria

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ABSTRACT

Background: Pediatric injuries constitute a significant health burden, particularly in developing countries, including Nigeria. Comprehensive and case-specific management including a good database is largely unavailable in these countries. **Aim:** This study aims to determine the causes and associated factors of pediatric injury (PI) in Aba, Southeast Nigeria. **Materials and Methods:** This was a retrospective study conducted for a period of 3 years (January 1, 2015–December 31, 2017) in a Mission Hospital in Aba. Data were obtained from the case notes of children aged 16 years and below, who were seen for injuries at the accident and emergency department (AED). Information extracted from the case files included the sex, age, nature of injury, venue of injury, body areas involved, and outcome of treatment. **Results:** PI constituted 13% of all trauma cases seen in the AED during the study period. There were 54 males and 39 females, giving a male:female ratio of 1.4:1. The leading mechanisms of injury were road traffic accident (RTA), 36 (38.7%) and domestic accidents, 27 (29%), while gunshot wounds 3 (3.3%) constitute the least. RTA occurred most frequently in the age groups of 6–15 years, 24 (25.8%). Again, 91.7% of RTA occurred in the urban area and involved mostly pedestrians crossing the road (55.6%). Children aged 0–5 years, 34 (36.6%) were the most frequently involved in PI. Leading mechanisms of injury in this age group were domestic accidents, falls, and burns. There was a statistically significant association between age and mechanism of injury ($p=0.000$). Mortality rate was 2%. **Conclusion:** Pediatric injuries constituted 13% of all trauma cases in this study. Children aged 0–5 years were the most frequently involved in PI. RTA and domestic accidents were the leading causes of PI. Very young children at home and older children crossing the road were vulnerable to pediatric injuries.

Key words: Aba, Abia state, Nigeria, Pediatric injury

Pediatric injuries constitute a significant cause of morbidity and mortality all over the world, particularly in developing countries [1-3]. Accidental injuries often present as emergencies and are sometimes critical. They, therefore, require adequate preparedness by health-care facilities in terms of skilled personnel, equipment, and medications, among others, to handle cases promptly and effectively to minimize morbidity and mortality.

The prevalence and nature of the most common injuries vary from country to country and even in different areas of a country. For instance, road traffic accidents (RTAs) were reported as the most common pediatric trauma in hospital studies of Nigeria, Iran, and Ireland, whereas fall from height was the most common pediatric injury (PI) in studies from India, Uganda, and the U.S.A [4-7]. Burn was reported as a common cause of injury in Kenya [8].

Formulation of an effective policy to prevent and manage pediatric injuries can only be possible with information on epidemiology of childhood injuries in an area. To the best of our knowledge, such information is lacking in Abia state, Southeast, Nigeria. This study is, therefore, conducted to evaluate the etiology and associated factors of pediatric injuries as seen at a Mission Hospital in Aba, Southeast Nigeria.

MATERIALS AND METHODS

This was a retrospective study conducted over a 3-year period at a Mission Hospital, Aba, from January 1, 2015, to December 31, 2017. This is a Christian Mission Hospital founded in 1996 by The Living Word Ministries International. It is located in Aba, the major commercial city of Abia state, Southeast Nigeria. It caters for both adults and children. Scope of care includes both medical and surgical cases. The hospital has a 120-bed capacity with 28 beds in the surgical ward. It has an Accident and Emergency Department (AED), with 12 beds, which runs a 24 h/day services. Cases of injury coming to the hospital are received and managed initially at the AED. They are when necessary admitted usually for a maximum period of 48 h, thereafter discharged home or transferred to the surgical ward. Occasionally, severe cases may stay longer at the AED or are referred to centers more appropriately equipped to handle them.

Ethical clearance and permission to conduct the study were obtained from the institutional committee member of the hospital before the commencement of the study. Over the study period, admission registers of the AED and call duty report were perused

and cases of patients aged ≤16 years admitted for initial treatment of trauma were reviewed. Patients who had been on management elsewhere beyond the first aid, those with inadequate information and babies with birth injuries, were excluded from the study. A data collection pro forma was developed for this study. Information gathered included age, sex, cause of injury, venue of injury, part of the body involved, description of lesions, level of consciousness, and outcome of injury.

Data were analyzed using statistical software, SPSS version 20. Frequency tables and histogram were generated for all major variables of interest, while Chi-square test was used to compare variables. For all analyses, $p \leq 0.05$ was taken as statistically significant, within a confidence interval of 95%.

RESULTS

A total of 102 cases of PI were seen out of a total of 784 trauma cases (both adults and children) over the study period. This gave a prevalence rate of 13% for PI. Nine of the PI had incomplete data and were excluded from subsequent analysis. The remaining 93 cases were used for further analysis, of which 54 were male while 39 were female, giving a male-to-female ratio of 1.4:1.

Mean age of the patients was 8.2 years with a range of 4 months–16 years. The age groups 0–5 years, 34 (36.6%) followed by 6–10 years, 27 (29%) constituted the largest proportions of injured children. Significantly more males than females suffered injury in children aged 6–10 years ($p=0.02$) and those >15 years ($p=0.01$) as shown in Table 1.

Mechanisms of injury were RTA 36 (38.7%), domestic accidents 27 (29%), falls 10 (10.8%), burns 10 (10.8%), assaults 7 (7.5%), and gunshot wounds 3 (3.3%), in decreasing order of frequency. Table 2 shows that RTA occurred highest in the age groups of 6–10 years (33.3%), followed by the age groups of

11–15 years (33%), 0–5 years (19.4%), and >15 years (13.9%) in a descending order of frequency.

Furthermore, all the children aged 0–5 years involved in RTA (19.4%) were passengers on or beside their caregivers. Those aged 11–15 years (33.3%) and >15 years (13.9%) were all pedestrians, while among those aged 6–10 years, 8 (22.2%) were pedestrians while 4 (11.1%) were passengers inside a vehicle. Majority 33 (91.7%) of the RTA occurred in the urban area while 3 (8.3%) occurred on the outskirts of the city. Most, 20 (55.6%) of the RTA victims were pedestrians crossing the road, while 5 (13.9%) and 11 (30.5%) of the victims were standing by the roadside or being carried as passengers, respectively.

Domestic accident is the second most frequent mechanism of PI and it occurred significantly more in those aged 0–10 years (23.7%) compared to other age groups 5 (5.4%) ($p=0.000$). Children aged 0–5 years (36.6%) recorded the highest number of pediatric injuries in this study. The leading mechanisms of injury in this age group were domestic accidents (10.8%), falls (9.7%), and burns (8.6%) in a decreasing order of frequency.

Falls occurred significantly more in the age group of 0–5 years (9.7%) than in other age groups put together ($p=0.02$). Furthermore, significantly more children in 0–5 years age bracket (8.6%) had burns injury than among the other age groups (2.2%) ($p=0.03$). There was a statistically significant association between age and mechanism of injury ($p=0.000$).

The home represented the most common location of injuries (51.6%), while the least number of injuries (9.7%) occurred in the neighborhood. Table 3 demonstrates that there is a statistically significant association between age and body areas involved in pediatric injuries. There is a significant association between younger age bracket (0 and 10 years) and increased risk of injuries to the head and neck, face, and limbs ($p=0.000$). Two of the patients in the study died giving a mortality rate of 2%.

DISCUSSION

Pediatric injuries constituted 13% of all trauma cases in this study. This is comparable to the 14.2% reported from North-West Nigeria [7] and 16% reported from Cameroon [9] but much lower than 30.6% reported from Malawi [10] Southern Africa. The differences in prevalence may be affected by regional and environmental factors. Again, the prevalence of PI depends on

Table 1: Distribution of age groups by gender

Age (years)	Sex, frequency (%)			p value
	Female	Male	Total	
0–5	17 (18.3)	17 (18.3)	34 (36.6)	0.76
6–10	10 (10.8)	17 (18.3)	27 (29.0)	0.02
11–15	11 (11.8)	12 (12.9)	23 (24.7)	0.63
>15	1 (1.1)	8 (8.6)	9 (9.7)	0.01
Total	39 (41.9)	54 (58.1)	93 (100.0)	

Table 2: Distribution of mechanism of injury by age groups

Mechanism of injury	Age, frequency (%)				
	0–5 years	6–10 years	11–15 years	>15 years	Total
RTA	7 (7.5)	12 (12.9)	12 (12.9)	5 (5.4)	36 (38.7)
Domestic accident	10 (10.8)	12 (12.9)	5 (5.4)	0 (0.0)	27 (29.0)
Falls	9 (9.7)	0 (0.0)	0 (0.0)	1 (1.1)	10 (10.8)
Burns	8 (8.6)	0 (0.0)	2 (2.2)	0 (0.0)	10 (10.8)
Assault	0 (0.0)	2 (2.2)	3 (3.2)	2 (2.2)	7 (7.5)
Gun shot	0 (0.0)	1 (1.1)	1 (1.1)	1 (1.1)	3 (3.2)
Total	34 (36.6)	27 (29.0)	23 (24.7)	9 (9.7)	93 (100.0)

RTA: Road traffic accident

Table 3: Distribution of body parts involved in injury by age group

Part of the body involved	Age, frequency (%)				Total
	0–5 years	6–10 years	11–15 years	>15 years	
Head and neck	17 (18.3)	12 (12.9)	12 (12.9)	3 (3.2)	44 (47.3)
Face, ear, nose, and throat	6 (6.5)	2 (2.2)	3 (3.2)	0 (0.0)	11 (11.8)
Chest	2 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.2)
Abdomen	3 (5.2)	0 (0.0)	0 (0.0)	0 (0.0)	3 (3.2)
Limbs	6 (6.5)	13 (14.0)	4 (4.3)	3 (3.2)	26 (28.0)
Pelvis	0 (0.0)	0 (0.0)	2 (2.2)	3 (3.2)	5 (5.4)
Generalized	0 (0.0)	0 (0.0)	2 (2.2)	0 (0.0)	2 (2.2)
Total	9 (9.7)	34 (36.6)	23 (24.7)	27 (29.0)	93 (100)

the degree of the prevailing circumstances that determine the mechanisms of injury as well as the age limit taken as pediatric age by different researchers [11]. Generality of the previous reports from various parts of the world indicates a high proportion of pediatric morbidity from pediatric injuries [12-14].

The prevalence of PI was higher in males than in females. This is a widely acknowledged finding in the previous studies [7,10,15]. However, Adesunkanmi *et al.* observed a near equal male:female ratio in a study conducted in Southwest Nigeria [16]. Male children are generally more active, adventurous and have a greater tendency to exercise independence and explore their environment than their female counterparts. This predisposes them more to injuries, particularly in the absence of adequate supervision. Furthermore, during the teenage period, adolescent's exuberance and adventurous/risk-taking behaviors are exhibited more by the males than females; hence, their tendency to be more involved in PI.

The study also revealed that children in the age brackets of 0–5 years were the most frequently involved in pediatric injuries. Similar observations were also made in the previous reports [4,7,10]. These younger age groups are immature and usually do not appreciate where risks or danger exists during play, or other indoor or outdoor activities. All these predispose them more often to injuries than older children.

RTA and domestic accidents were the leading mechanisms of PI observed in this survey. RTA has been reported as the leading cause of pediatric injuries in Nigeria, Iran, and Ireland [7,17,18]. Even though RTA was reported as the most prevalent PI in Ireland, most of those accidents were due to the child being the car driver or passenger unlike our finding in which most of the victims were pedestrians. Majority of the RTA victims in this study being pedestrians could be explained by the fact that overwhelming proportion (91.7%) of the accidents occurred in the urban area and could have involved children whose capability to walk safely on the streets might not be guaranteed.

Hawking by the roadside by children who are often immature and unwary of road safety is a very common practice in our country. This is foisted on them by biological and foster parents in a bid to fetch more income to make ends meet in these austere times. Many of these children move about without supervision even as many road users are often impatient and drive recklessly. Zebra road signs are not provided on most roads and pedestrian

bridges are very few and often disregarded by pedestrians even when they exist.

All those aged 0–5 years involved in the RTA being passengers could be explained by the fact that they were quite young and tender and of necessity were either carried by their parents or caregivers, or sitting beside them. The practice of the use of passenger restraints to convey young children in moving vehicles is not common in our country. Despite the efforts of road safety personnel to enforce the use of safety belts by occupants of a moving vehicle, compliance is still poor.

Domestic accident is the second most frequent mechanism of pediatric injuries noted in this study and occurred most frequently in the age group of 0–5 years. Domestic accidents, falls, and burns being the predominant causes of injury in those aged 0–5 years have been reported previously [7,14,19]. In a hospital-based study carried out in North-West Nigeria recently, domestic injury was noted to be the most predominant cause of PI, occurring more in females than males [7]. In another community-based study conducted in Pradesh, India, in 2017, burns were observed to be the second most leading cause of PI and the most common cause of injury in children under 5 years of age [14].

Domestic accidents, falls, and burns occurring most frequently in age bracket 0–5 years could be explained by the fact that this is the age bracket most likely to be at home and most prone to exposure to hazardous environment without realizing danger. Overcrowding, inappropriate location of risky items, poor parental mental and physical health and marital disharmony, as well as poor child supervision which are common domestic phenomena in different parts of the world, are all contributors to high occurrence of domestic accidents in children 0–5 years of age.

Home was the most common venue of the occurrence of injury (51.6%) in our study. This is in consonance with the result noted in a study conducted in Malawi [10] but in contrasts with results of studies carried out in North-East Nigeria [19], and in India [14], where streets and high ways were observed to be the most common locations of injury. This disparity could be explained by the fact that the largest population of children involved in PI in the study in Northern Nigeria was 6–10 years age bracket who were mostly outdoors on the streets and highways as Almajiris, as opposed to 0–5 years age group being mostly involved in pediatric injuries in our study who were mostly at home with caregivers.

In many previous studies, body areas most frequently involved in pediatric injuries are the head, face, neck, and locomotor systems [7,10,14,19,20]. The observation in our study was in consonance with this finding. However, we also noted that the face, head, and neck were more significantly involved in the younger age groups. Predominant involvement of the head and neck in these young ones might be explained by the fact that the head constitutes a significant proportion of the child's body and is readily exposed to injuries. Again, there is virtual lack of mustering of personal support or defense by the child in impending danger, more so in younger children.

The mortality rate recorded among patients in our study was only 2% and these mortalities occurred on patients brought in unconscious, with multiple injuries. This is similar to the report from Cameroon and other studies where mortality rate among patients with PI brought to the emergency department has been reported to be very low [7,9,14]. It is, however, different from some reports from other parts of the world which indicate a high proportion of pediatric mortality from pediatric injuries [11-13].

Few recommendations of this study include:

1. Urgent preventive measures to reduce the occurrence of RTA such as the provision of pedestrian bridges, zebra road crossings, speed breakers, speed limits at strategic points, and stringent enforcement of traffic laws.
2. Educational programs to propagate the awareness and understanding of child safety, injury prevention at home and away from home, should be carried out regularly in the community and incorporated into school curriculum.
3. Training of social welfare officers, environmental health officers, and health workers on child safety and injury prevention.
4. The aforementioned officers should educate the public, counsel parents and caregivers, and do home visitations to ensure environmental safety for children.
5. Trauma centers equipped with child-sized facilities and trauma registries should be established in at least all the senatorial zones of the country.

Hospital-based reports might not illustrate the true position of morbidity and mortality secondary to pediatric injuries in the society because many cases are managed at home and by traditional healers including other inappropriate places due to poverty, ignorance, and traditional beliefs.

CONCLUSION

Pediatric injuries constituted 13% of all trauma cases in this study. Children aged 0–5 years were the most frequently involved

in PI. RTA and domestic accidents were the leading causes of PI. Majority of the RTA victims were pedestrians crossing the road. Home was the most common venue of PI.

REFERENCES

1. Peden M, Oyebite K, Ozanne-Smith J, Hyder AA, Bianche C, Rahman AF, *et al.* World Report on Child Injury Prevention. Geneva: WHO and UNICEF; 2008.
2. Solagberu BA, Adekanye AO, Ofoegbu CP, Udoffa S, Abdur-Rahman LO, Taiwo JO. Epidemiology of trauma deaths. *West Afr J Med* 2003;22:177.
3. Nordberg E. Injuries as a public health problem in sub-Saharan Africa: Epidemiology and prospects for control. *East Afr Med* 2000;77:21-43.
4. Ekenze SO, Anyanwu KK, Chukwuemam DO. Childhood trauma in Owerri (South-Eastern) Nigeria. *Niger J Med* 2009;18:79-83.
5. Etebu CN, Ekere AU. Pediatric accidental deaths in Port Harcourt, Nigeria: A 10 year retrospective study. *Niger Med J* 2004;13:140-3.
6. Ngambi T, Borgstein ES. Epidemiology of pediatric trauma admissions at queen Elizabeth central hospital, Balantyre, Malawi. *Malawi Med J* 2005;17:5-6.
7. Oboirien M. Pattern of pediatric trauma in Sokoto, North West Nigeria. *Afr J Paediatr Surg* 2013;10:172-5.
8. Gome DL, Mutiso VM, Kimende K. Pediatric trauma at Kenyatta national hospital, Nairobi, Kenya. *East Cent Afr J Surg* 2005;10:33-6.
9. Chichom-Mefire A, Fokou M. Epidemiology of pediatric injury in low income environment: Value of hospital-based data prior to the institution of a formal registration system. *Afr J Paediatr Surg* 2013;10:265-70.
10. Kiser MM, Samuel JC, Mclean SE, Muyco AP. Epidemiology of pediatric injury in Malawi: Burden of disease and implications for prevention. *Int J Surg* 2012;10:611-7.
11. Mathur A, Mehra L, Diwan V, Pathak A. Unintentional childhood injuries in urban and rural Ujjain, India: A community-based survey. *Children* 2018;5:E23.
12. Nwomeh B, Ameh E. Pediatric trauma in Africa. *Afr J Trauma* 2003;1:6-13.
13. Bickler S, Rode H. Surgical services for children in developing countries. *Bull World Health Organ* 2002;80:829-35.
14. Meel B. Mortality of children in the Transkei region of South Africa. *Am J Forensic Med Pathol* 2003;124:141-7.
15. Hulme P. Mechanisms of pediatric trauma at a rural hospital in Uganda. *Rural Remote Health* 2010;10:1376.
16. Adesunkanmi AR, Oginni LM, Oyelami OA, Badru OS. Road traffic accidents to African children: Assessment of severity using the injury severity score (ISS). *Injury* 2000;31:225-8.
17. Shahrok Y, Hossien H, Ahmad A, Ali K, Masoumeh A, Haniyeh M. Pediatric unintentional injuries in North Iran. *Iran J Pediatr* 2008;18:267-71.
18. Smith E, Finn S, Fitzpatrick P. Epidemiology of pediatric traumatic and acquired nontraumatic spinal cord injury in Ireland. *Top Spinal Cord Inj Rehabil* 2017;23:279-84.
19. Esin IA, Alabi S, Lawal OA. Childhood injuries in a tertiary institution in North East Nigeria. *Afr J Paediatr Surg* 2013;10:367-70.
20. Gome DL, Mutiso VM, Kimende K. Pediatric trauma at KNH, Nairobi Kenya. *East Cent Afr J Surg* 2005;10:33-6.

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