Profile of non-accidental childhood injury at a tertiary hospital in south-west Nigeria

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SUMMARY

Background: Injury threatens children lives worldwide. Most studies from Nigeria have been on accidental injuries in children.

Objectives: To study the profile of non-accidental injuries among children receiving care at a tertiary hospital in Nigeria.

Methods: Children with non-accidental injuries were serially recruited and studied. The Paediatrics Trauma Score (PTS) was tested against the outcome.

Results: Non-accidental injuries accounted for 0.84% of all 5264 patients and 21.3% of the 207 injured. The case fatality rate was 6.8%. Physical abuse, sexual assault, drowning/near drowning, gunshot, poisoning and human bite caused the injuries in 68.2, 13.6, 6.8, 4.5, 4.5 and 2.3%, respectively. One-way analysis of variance and Tukey post hoc analysis showed that the mean PTS score of patients who died was significantly lower than the scores of those who were either discharged home or who discharged against medical advice (p < 0.001).

Conclusion: The burden of non-accidental childhood injuries was high in the study area.

KEYWORDS: non-accidental injury, childhood deaths, south west, Nigeria.

INTRODUCTION

Injury remains an important cause of childhood morbidity and mortality worldwide [1]. The World Health Organization (WHO) projects that the potential life years lost to injuries will equal those from infectious diseases and malnutrition-related problems in many parts of developing countries by the year 2020 [2]. Whereas majority of global injury deaths in children occur in the developing world, paediatric health care in these countries are mainly focused on the prevention and control of communicable diseases and malnutrition, with little attention given to childhood injury [3].

Non-accidental or intentional childhood injury connotes injuries sustained by a child as result of deliberate self-harm or injuries deliberately inflicted by parents or caregivers for disciplinary, traditional and therapeutic interventions purposes, the latter two are especially common in the developing world [4, 5]. These injuries may lead to physical, emotional and
psychological harm to the child [4–6]. Their occurrence is also against the global best practices, which uphold the best interest of the child as the fundamental guiding principles on issues concerning children [7]. The practice of inflicting injuries on children intentionally is believed to be more rampant in the developing world but a complex interplay of factors continues to downplay its recognition and reportage [4–6].

Though some literature exists on childhood injury in Nigeria, [4, 6, 8–11] only a few commented on non-accidental injury [4–6], and only one of the papers was entirely dedicated to the subject [4]. The paper’s scope was limited to non-accidental injuries sustained from home treatment and traditional therapeutic interventions for convulsion in children [4]. This affirms the observations by the WHO and United Nations’ Children’s Fund (UNICEF) that too few medical practitioners are showing interest in childhood injury prevention and that too little research is conducted on the condition [3]. We examined the profile of non-accidental injuries among children brought for care at a tertiary care facility in south-west Nigeria with the aim of determining its burden, pattern and outcome. Information from the current study will help to update childhood injury data in Nigeria and raise the awareness of care providers in the country about the reality and existence of the condition.

PATIENTS AND METHODS

Setting
This was a prospective study conducted on cases of childhood injuries reported at the Ekiti State University Teaching Hospital Ado Ekiti, Ekiti State in south-west Nigeria between 1 November 2012 and 31 March 2014.

The hospital receives referrals from public and private hospitals within the state and from neighbouring towns in other adjoining states like Ondo, Osun, Kogi and Kwara. Paediatric patients are usually first seen at the paediatric out-patients’ department (POPD) before being triaged and sent to the Children emergency ward (CEW) where they would be managed. The CEW has 6 doctors and 15 nurses. They include 5 paediatric registrars, 3 paediatric nurses, 12 nurse-midwives and a supervising consultant paediatrician.

Data collection and instrument
After careful history, all children with injuries were categorized into two: accidental or non-accidental injury based on the mechanism of injury. All childhood injury cases identified as being non-accidental were consecutively recruited. Information about the patients’ bio-data, physical examination findings and circumstances of the injury, pre-hospital interventions, hospital interventions and outcome were recorded in a pro forma designed for the study. The severity of the injury in each case was assessed using the Paediatric Trauma Score (PTS) [12]. The PTS is a validated instrument used in assessing the severity of injuries in children. It uses six parameters, each of which are weighted. The scores for each parameter range from 0 to 2, and adding the scores on each parameter together gives the total score of each patient. The maximum obtainable score is +12 while the minimum obtainable score is −6. There is a linear relationship between decreases in PTS and the mortality risk (the lower the PTS, the higher the mortality) [12]. Ethical approval was obtained for the study from the Ethics and Research Committee of the Ekiti State University Teaching Hospital, Ado Ekiti.

Data analysis
Data analysis was done with IBM SPSS statistics version 20. The distribution and patterns of injury was analysed using simple descriptive statistics. There are many outcome measures in trauma research which include outcome of treatment (discharge rate, survival, etc), complication rates and economic effects (cost of treatment, income loss due to injury, etc). We looked at the effect of severity of injury as measured by the PTS, on the outcome of treatment in the hospital using analysis of variance (ANOVA) including post hoc test to investigate the relationship (Shapiro–Wilk test of normality showed that the PTS was normally distributed (p > 0.05)).

RESULTS
In total, 44 cases were seen during the study period. This is equivalent to 0.84% of the 5264 new patients
seen and 21.3% of the 207 cases of injury consultations within this period at the POPD. They comprised 24 of 44 (54.5%) boys and 20 of 44 (45.5%) girls aged between 1 and 14 years. The median age was 6.5 years. Most of them, 18 (40.9%) were aged 5 years or less, while 15 (34.1%) and 11 (25.0%) belonged to the 6–9 and 10–14 year age groups, respectively. Of the 44 participants, the largest proportion of the cases, 27 (61.4%), occurred at home followed by 9 (20.5%) at school, 1 (2.3%) on the farm and the rest (15.9%) took place elsewhere within the children’s neighbourhood.

More than two-third of the injuries, i.e. 30 of 44 (68.2%), were caused by physical abuse, and 23 of 30 (76.7%) of the physical abuse cases resulted from treatments given by traditional caregivers or parents themselves. Some of the underlying ailments for which injury was incurred when treated by traditional healers and parents included febrile convulsions in 14 of 23 (60.9%), animal bites (dog and snake) in 6 of 23 (26.1%) and teething problems in 3 of 23 (13.0%). The remaining 7 of 30 (23.3%) cases of physical abuse resulted from corporal punishments for disciplinary purposes (Table 1). The implement used to inflict the physical injuries included razor blades, blunt objects, koboko (horse whip), canes and electric cables.

Out of 44 cases, 6 (13.6%) were cases of sexual assault, 1 (16.7%) was associated with nonfatal strangulation in a 13-year-old girl by a fellow student. Two other 13-year-old girls (33.3%) were assaulted by gangs of their male school friends, while the remaining three cases (50.0%) involving a 12-, 10- and a 9-year-old were perpetrated in each case by total strangers. One of these occurred during an armed robbery incident.

Of the 3 of 44 (6.8%) cases of drowning, two (66.7%) occurred at school while the children were being coerced to swim in a river by school mates and a case of near-drowning occurred at home in a manner similar to the school cases. Of the 2 of 44 (4.5%) cases of gunshot injuries (GSI), one occurred at home when the patient’s elder sibling was playing with the father’s dane gun—a locally made gun, similar to a shotgun. The other patient was shot during a hunting expedition by a hunter who claimed to have mistaken the child for an animal (Table 1).

The two cases of poisoning were attempted suicide by adolescent girls aged 13 and 14 years, who had ingested sodium hypochlorite solution (bleaching agent) and a rodenticide (pesticide), respectively, following disagreement with their parents. The case of human bite occurred as a result of domestic violence (Table 1).

Injuries affected the skin most commonly, in 31 of 44 (70.5%) of the patients, and these included bruises, scarification marks, lacerations, burns, indurations and swellings. The extremities were involved in 23 of 44 (52.3%) cases of physical abuse resulted from corporal punishments for disciplinary purposes (Table 1).

Table 1. Causes and perpetrators of injuries (N = 44)

<table>
<thead>
<tr>
<th>Causes of injuries</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical abuse (n = 30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional/home treatment</td>
<td>23</td>
<td>52.3</td>
</tr>
<tr>
<td>Corporal punishment</td>
<td>7</td>
<td>15.9</td>
</tr>
<tr>
<td>Rape/sexual assault</td>
<td>6</td>
<td>13.6</td>
</tr>
<tr>
<td>Drowning/near drowning</td>
<td>3</td>
<td>6.8</td>
</tr>
<tr>
<td>Gunshot injuries</td>
<td>2</td>
<td>4.5</td>
</tr>
<tr>
<td>Poisoning</td>
<td>2</td>
<td>4.5</td>
</tr>
<tr>
<td>Human bite</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Perpetrators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents/caregivers</td>
<td>21</td>
<td>47.7</td>
</tr>
<tr>
<td>School mates/friends</td>
<td>13</td>
<td>29.5</td>
</tr>
<tr>
<td>Other relatives</td>
<td>4</td>
<td>9.1</td>
</tr>
<tr>
<td>Self-inflicted</td>
<td>3</td>
<td>6.8</td>
</tr>
<tr>
<td>Stranger</td>
<td>2</td>
<td>4.5</td>
</tr>
<tr>
<td>Neighbour</td>
<td>1</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Injuries affected the skin most commonly, in 31 of 44 (70.5%) of the patients, and these included bruises, scarification marks, lacerations, burns, indurations and swellings. The extremities were involved in 23 of 44 (52.3%), the face in 20 of 44 (45.5%) and the head in 16 of 44 (36.4%) patients. Notably among the head injured was an 8-year-old boy who developed a left-sided subdural haematoma following assault by his father. He had a burr hole and craniotomy to evacuate the haematoma, and he is currently on neuro-rehabilitation.

The chest, abdomen and back were involved in 11 of 44 (25.0%) cases, and these include a 9-year-old girl who was severely battered by her foster caregiver. The child came to live with the foster caregiver because her own mother could no longer afford to cater for the child following her separation from the child’s father who was beating and maltreating her.
The vulva was involved in all six cases of sexual assaults and the phallus in a 10-year-old physically challenged boy who had auto-amputation of his glans penis after tying it with thread to stop himself from bed-wetting. Prior to this, he had suffered maltreatment from co-boarding house mates and his housemasters because he had enuresis.

Less than half of all the patients, 20 of 44 (45.5%), received treatment before presenting at the hospital. They included eight (18.2%) from private hospitals, six (13.6%) from traditional healers, four (9.1%) from other public hospitals and last two (4.5%) received only first-aid treatment at home. Hospital interventions included routine laboratory and radiological investigations in 40 (90.9%), administration of analgesics in 38 (86.4%), antibiotics in 32 (72.7%), wound dressing and suturing in 30 (68.2%), anti-tetanus in 26 (59.0%), anti-malaria in 15 (34.1%), intravenous fluids in 15 (34.1%), anti-convulsant in 12 (27.3%), HIV prophylaxis in 7 (15.9%), hepatitis prophylaxis in 3 (6.8%) and major surgical operation in 2 (4.5%) cases. Medical social welfare unit was involved in 16 (36.4%) cases. Four cases (9.1%) were charged to court for prosecution but no conviction has been secured yet.

Altogether, 37 (84.1%), 4 (9.1%) and 3 (6.8%) patients were discharged home, discharged against medical advice (DAMA) and died, respectively. Of the mortality, two (66.7%) resulted from drowning at school while the third was the child with GSI sustained on the farm while on hunting expedition. The PTS score at presentation by the final outcome was compared using one-way ANOVA. (Table 2). The mean PTS score of patients who died was significantly lower than the scores of patients who were either discharged home after successful treatment or discharged against advice ($p < 0.001$). However, post hoc analysis showed that there was no significant difference between the PTS of those who were DAMA and those discharged home ($p > 0.05$).

### Table 2. Comparison of PTS score by patients outcome

<table>
<thead>
<tr>
<th>Outcome</th>
<th>PTS score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharged home</td>
<td>9.9 ± 1.7</td>
</tr>
<tr>
<td>DAMA</td>
<td>9.8 ± 1.5</td>
</tr>
<tr>
<td>Died</td>
<td>4.5 ± 0.7</td>
</tr>
</tbody>
</table>

$p < 0.001$.

Follow up

Since March 2014 when the study ended, only eight (18.2%) patients reported for follow-up visit. Interestingly, these included one of the patients who took DAMA. Of these eight patients, three are not yet fully recovered, one is still undergoing neuro-rehabilitation for sequelae of severe head injury, another is having serial reconstructive surgery and the third is at a government fostering facility. The remaining five had recovered fully from their injuries. None was yet to manifest any psychosocial disorder.

**DISCUSSION**

It is not surprising that only 44 cases of non-accidental injuries were recorded over the 17 month period of this study as it was recognized from the outset that based on the subject of research; the sample yield was likely to be small. Non-accidental injuries in children are not commonly reported by parents and caregivers. This is especially so in the developing world [4–6]. Previous reports from Nigeria lay credence to this. Anochie and Graham-Douglas reported only 14 cases over a 3 year period in Port Harcourt in Rivers State [4], while in Imo State, Okoro et al. recorded only four cases representing just 7.5% of all childhood burn injuries seen over an 18 month period. The situation in Nigeria is not different from Uganda, also in Africa, where non-accidental injuries accounted for a paltry 15% of all childhood injuries [13]. These observations may not be unconnected with the feelings of guilt and shame which are sometimes felt by perpetrators of paediatric non-accidental injuries who are usually close family members or associates [4–6]. Hence, they are reluctant to bring the children for care at the hospital.

Nevertheless, the non-accidental injury rate of 21.3% of all injuries observed in this study is lower than the 28% observed in Port Harcourt in Nigeria [4] but higher than the 15% reported from Uganda [13]. The Port Harcourt study focused only on
injuries resulting from traditional/home interventions for convulsions, while the current study includes all causes of non-accidental injuries seen in the hospital. The inclusion of other types of non-accidental injuries in our study might explain the lower rate observed compared to the Port Harcourt study. The Uganda paper was the report of a retrospective study. Retrospective studies are usually bedevilled by the possibility of data losses, and this could explain its lower yield. Nonetheless, the current study collaborates these earlier reports and further gives insight into the reality and magnitude of the burden of non-accidental injuries in the African continent. This calls for action by stakeholders and the need to raise more awareness about the condition among child care providers as obtainable in the developed world [14].

The observation that the skin was the most frequently affected part in the current study may not be unconnected with the focus of this study. While most other studies were on accidental injuries [8–11], this study focused on intentional or non-accidental injuries and as such, the skin is the most readily available body part to assailants. The high rate of injury due to therapeutic interventions by both parents and traditional healers is an indication of the wide acceptance of these therapeutic measures in the African setting [5]. However, this practice could be fraught with lots of dangers in that, bruises, burns and lacerations could occur as observed in this study. Transmission of infections like tetanus, HIV and hepatitis could also occur when the sharp implements are not sterile before using them. Recognizing and integrating traditional medicine into the Nigeria health-care system will help unmask some practices in this largely informal and yet important component part of health-care delivery in the developing world [5, 15]. Those practices found inimical can then be the focus of appropriate education and intervention.

Although most of the injuries occurred at home, it seems that school-related injuries have worse outcome than domestic injuries. Two of the three deaths recorded in this study occurred at school. Furthermore, one-third of the cases of rape occurred at school. This raises concern about the safety in schools in the study area, and this may jeopardize the chances of school children in the study area achieving quality education [16]. There is therefore a need for the implementation of safety education and injury preventing measures in the schools as obtainable in the developed world [17]. Such education and measures should be directed at both staffs and pupils with appropriate mechanisms put in place to monitor and ensure its effective delivery.

A close look at the perpetrators of the injuries shows that most were by close associates of the victims and this corroborates the observations that most perpetrators of abuse against children are close family members or friends [4–6, 14]. The cases involving the 8-year-old boy and the 9-year-old girl with severe head injury and multiple injuries from battering no doubt, further led credence to this assertion and it is an indication that child battering continues to be a global problem since Henry Kempe first described it more than five decades ago [18]. Studies have shown that most cases of domestic violence occur on the spur of the moment secondary to anger; [19–21] therefore, aggressors are most likely to use their strength or use commonly available household items. This has been corroborated in the current study, as all the implements used to inflict the injuries in this study were household items [4–6, 22]. Researchers have identified the tendency for children from family with history of abuse to also suffer abuse especially, with the presence of domestic violence [21, 23]. This observation fits well into the case of the 9-year-old girl who might have suffered emotional abuse from domestic violence and battering of her mother only for her to suffer physical abuse in the hands of her foster parent. This underscores the recommendation by Olushoga that perhaps, parenting skill classes for parents and guardians may be one viable approach to combating the menace of violence against children [23]. Backing this with the use of legal instruments such as the adopted Nigerian version of the Child Right Act [24] to punish culprits and make deterrents as recommended by the Paediatric Association of Nigeria [25] may help dissuade perpetrators from abusing children.

Quite a proportion of the patients with physical abuse resulted from corporal punishments. In Nigeria and other African countries, corporal punishment is still a widely acceptable mean of child upbringing and correcting an errant child [5–6, 21, 22]. This should be discouraged because, when corporal
punishment is used for disciplinary purposes, the caregiver may apply greater than necessary force, thus inflicting injury out of anger, some of which may be very severe as seen in some patients in the current study. Besides, it has been shown that corporal punishments are not effective in bringing up children [26]. Other newer forms of disciplinary measures like expression of parental disappointments, 'time out', grounding and withdrawal of privileges have been advocated as safer and better methods of instilling discipline in a child [26].

The cases of GSI in this report attest to the rising profile of its burden in Nigeria [27, 28] Of interest is the observation that most cases of GSI earlier reported from the same study location showed that most episodes of GSI occurred during hunting expeditions and children were involved as well [27]. This shows the need for enlightenment campaigns directed at the local hunters regarding safety practices while on hunting expeditions. For example, there may be a need for all members of a hunting expedition to wear a particular uniform which should reduce the incidence of members of the expedition being mistaken for animals. The cases of sexual assault in this study reinforce the observation that violence against women is still common in our society [29]. Of the self-inflicted injuries, the two cases of poisoning could be explained by the usual maladjustment that characterize adolescence [30, 31]. The case of the patient with penile amputation could be likened to the interconnectivity of abuse types and their injuries. He might have probably suffered emotional abuse from the embarrassment from his roommates and teachers leading him to take the action that led to the amputation of his glans penis. This lends credence to the observation that one form of abuse can seamlessly lead to the other [14, 32]. It further reinforces the roles played by child factors and their environment in the origin of abuse in children [32]. His physical disability led to his being taken to the particular school, only for the hostile school environment to culminate in circumstances that led to his injury. This act frankly negates the principles of rights to education, dignity and freedom from discrimination enshrined in Sections 15, 11 and 10 of the Nigeria’s Child Right Act [24]. Also, it may reflect the poor knowledge of teachers in the child’s school of the impacts of the disability he has on his life quality and education. Sadly, this lack of understanding has also been described in other developed climes [33]. Recently, UNICEF found that, children with disability who live with their family members tend to attain better education attending main schools than their counterparts attending special schools [34]. This observation may not be totally divulged from the lack of capacity often demonstrated by some teachers to cope with the needs of this group of children under their care [33]. In recognition of the special needs of people with disability, the entire State of the World Children report for year 2013 was dedicated to children with disability by UNICEF [34]. The challenge for stakeholders in Nigeria and other developing world is to follow suit and copy the efforts of international bodies like the UNICEF.

The fact that some patients in this study required critical interventions like major surgeries showed that non-accidental injuries can be very severe [6, 14, 32]. The care given to the patients in this study generally reflects the level of preparations and facilities available to cater for children with such condition in the developing world [5, 6]. For example, multi-team approach was used in some cases and prosecution is ongoing in some cases. However, one of the patients was taken into special child protection centres as obtainable in the developed world [14, 26, 32]. Expectedly, the PTS correlated well with predicting the outcome of patients in this study as only patients with very low scores died [12]. This affirms its reliability in predicting outcomes for children with injuries. Its ease of use can make it a ready tool in triaging children with injuries for appropriate interventions in busy emergency units in the developing countries. In all, the 6.8% mortality recorded is comparable to the 7.1% recorded for some Nigerian children with non-accidental injuries [4]. This highlights the realities of deaths associated with non-accidental injuries among children in the country and raises the need for care providers to improve on the quality of services rendered to children with the condition. The follow-up rate recorded in this study was quite low. This falls in line with the generally poor compliance with follow up by Nigerian patients [35]. However, this may be compounded in this study, by the guilt and
shame which are sometimes felt by perpetrators of paediatric non-accidental injuries who are usually close family members or associates [4–6, 35].

CONCLUSION
This study highlights the reality of intentional or non-accidental injuries among children in the study area and further raises the need for all stakeholders especially paediatric care providers to deliberately look out for this condition in children presenting with any form of injury at their facilities. Furthermore, it raises the need for multicentre study on the subject. Doing so will further raise awareness about the condition, allow adequate data collection and reduce its burden in our society. There is need to activate all valid instruments available to combat the menace of intentionally inflicting injuries on children in the country.

LIMITATIONS
The limitations of this study stemmed from the fact that it is a hospital-based study. Hospital-based data acquisition commonly excludes patients with mild to moderate injuries. In addition, some children may have been taken for treatment to other health-care facilities apart from the hospital where the study took place. Thus, it is possible that the incidence of the injuries recorded in this study may be lower than the true population estimate, and the data might have been skewed towards more severe injuries. This effect could have been mitigated by the fact that most patients with injuries in Nigeria are taken directly to the nearest tertiary health centres. Finally, in the data-poor setting of the study, hospital-based studies are commonly the most reliable, and sometimes, source of realistic data on injuries and its causes.

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