

# A Ten Year Audit of Traumatic Dental Injuries in Children in a Tertiary Hospital in Southern Nigeria

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## ABSTRACT

**Objective:** To determine the prevalence, management and outcome of traumatic dental injuries among children treated at the Paediatric Dental Clinic of the University of Benin Teaching Hospital.

**Methods:** Data of children with traumatic dental injuries were collected from the clinical register for all children who were treated at the Paediatric Dental Clinic from November 2004 to October 2014. Data collected included the year of trauma, age, sex, teeth injured, type of traumatic dental injury and treatment done. These were analyzed with the chi square test and probability values of  $p < 0.05$  applied.

**Results:** Three hundred and nine children (5.0%) suffered dental trauma out of a total number of 6,169 children (age range 1-16 years) seen within the study period. The mean age of the patients with dental trauma was  $7.61 \pm 4.0$  years. Dental injuries relating to the primary teeth was recorded in 104 (33.7%). Those relating to the permanent teeth was 188 (60.8%) and soft tissue injuries accounted for 17 (5.5%). Many males 177 (57.3%) were affected more than females 132 (42.7%) but this was not statistically significant ( $P = 0.086$ ). There were two peak age incidences of trauma namely the 2-3 years and 9-10 years of age. The most common type of injury was enamel-dentin fractures 69 (22.3%) in permanent teeth and lateral luxation 32 (10.4%) in primary teeth. In the primary teeth related injury, the most commonly performed treatments were extractions and drug prescriptions each in 43 (39.8%) while for permanent teeth were restorations 86 (42.8%) and root canal treatment 57 (28.4%).

**Conclusion:** The clinic prevalence of traumatic dental injury in this study was relatively low, still this low percentage represents a large number of patients. Institution of standard treatment modalities and a long-term follow-up will minimize complications and improve outcome.

**Keywords:** Children, Dental injury, Prevalence, Trauma, Treatment.

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## INTRODUCTION

Dental trauma is the second most prevalent problem in dentistry after dental caries and its associated sequelae.<sup>1,2</sup> It is a common dental problem and, in some countries, where the incidence of dental caries

has decreased, it is considered a more major threat to the anterior teeth.<sup>3</sup> Traumatic dental injury (TDI) is described as a lesion of variable extension, intensity and severity caused by forces acting on the tooth either as a result of accidents and/or assault.<sup>3,4</sup> It has

a great impact on the quality of life, affecting children physically, aesthetically and psychologically.<sup>4, 5</sup> Oral injuries are most frequent during the first 10 years of life, decreasing gradually with age, and are uncommon after the age of 30 years. Non-oral injuries are however seen more frequently in adolescents and young adults and are common throughout life.<sup>5,6</sup> Although the oral region comprises a small area approximating 1% of the total body surface area, it accounts for about 5% of all injuries for which patients seek treatment.<sup>7</sup>

Reports on the prevalence of traumatic dental injuries varies between countries and it has been reported to be as low as 2.4% in studies in Brazilian children<sup>8</sup>, 5.7% in Nigeria children<sup>9</sup> and as high as 69.2% in Chinese children.<sup>10</sup> The variation in prevalence has been seen to differ as a result of several factors including the type of study, trauma classification, methodology, study size and population, geographical location and differences in cultural behaviour.<sup>11</sup> Other identified factors included the local environment and the behavioral and cultural diversities of individual countries.<sup>12-14</sup>

Previous studies showed that traumatic dental injuries are common<sup>15,16</sup> but with few identifying annual variations in the prevalence of traumatic dental injuries in children involving both primary and permanent teeth over a period of time.<sup>17,18</sup> This retrospective study aimed to determine the prevalence, management and outcome of dental trauma in both the primary and permanent teeth over a 10 -year period

**MATERIAL AND METHODS**

This retrospective study was carried out in dental patients aged 1-16 years who attended the Paediatric

Dentistry Clinic of the University of Benin Teaching Hospital, Benin City, Edo State in Southern Nigeria from Nov 2004 to Oct 2014. This center is the only tertiary health institution in the State that has specialist paediatric dentists. Data were collected from the clinical register and the information obtained comprised the year of trauma, age, sex, teeth injured, type of traumatic dental injury and treatment done. Anterior teeth with documented evidence of radiographic exposure, pulp analysis with an electric pulp tester and those with tooth crown discoloration were included in the selection criteria. The exclusion criteria included children above 16-years-of age, those with trauma to the posterior teeth and those with incomplete data. Traumatic dental injury was classified according to the criteria published by Andreasen and Andreasen.<sup>2</sup>

Ethical approval was obtained from the Hospitals ethics and research committee with protocol no ADM/E/22/A/VOL.VII/14648. The IBM SPSS Version 21 (IBM Corp, USA) was used to compute and analyze the data. The chi-square test was used for descriptive and analytical analysis. Significance levels were set at 95% confidence interval and probability values (p-values) less than 0.05 were regarded as significant.

**RESULTS**

Three hundred and nine children (5%) presented with traumatic dental injuries out of 6,169 children (age range 1-16years) seen in the period under review. Table 1 shows the annual incidence of children with dental trauma.

There were 177(57.3%) boys and 132(42.7%) girls. [A ratio of 1.34:1]

Table 1: The annual incidence of children with dental trauma

Year	Total No of Patients Recorded	No of Traumatic Dental Injury	Percent (%)
Nov 2004- Oct 2005	419	8	1.90
Nov 2005- Oct 2006	515	10	1.94
Nov 2006- Oct 2007	651	21	3.23
Nov 2007- Oct 2008	561	24	4.28
Nov 2008- Oct 2009	821	35	4.26
Nov 2009- Oct 2010	568	23	4.05
Nov 2010- Oct 2011	585	35	5.98
Nov 2011- Oct 2012	617	35	5.67
Nov 2012- Oct 2013	733	58	7.91
Nov 2013- Oct 2014	699	60	8.58
Total	6169	309	5.01

Table 2 demonstrates the gender distribution of patients with traumatic dental injuries relating to the primary and permanent teeth. The ratio of TDI by gender (M/F) relating to primary teeth was [1.1:1] and the ratio relating to permanent teeth was [1.5:1]. This was not statistically significant. (P = 0.162)

Figure 1 shows the age and gender distribution of dental trauma with the highest incidences in males aged 7-11-years. There was an equal distribution in both gender in those aged 2-years. This was not statistically significant. (P=0.211)

Figure 2 depicts the frequency distribution of traumatised dentition. Although 412 teeth of the primary and permanent dentition were affected. The primary dentition accounted for about 25% of the injured teeth. Maxillary central incisors were the most commonly injured dentition and the least injured were the maxillary canines.

Trauma type observed were enamel/dentine fractures in 74(23.9%), lateral luxation injury in

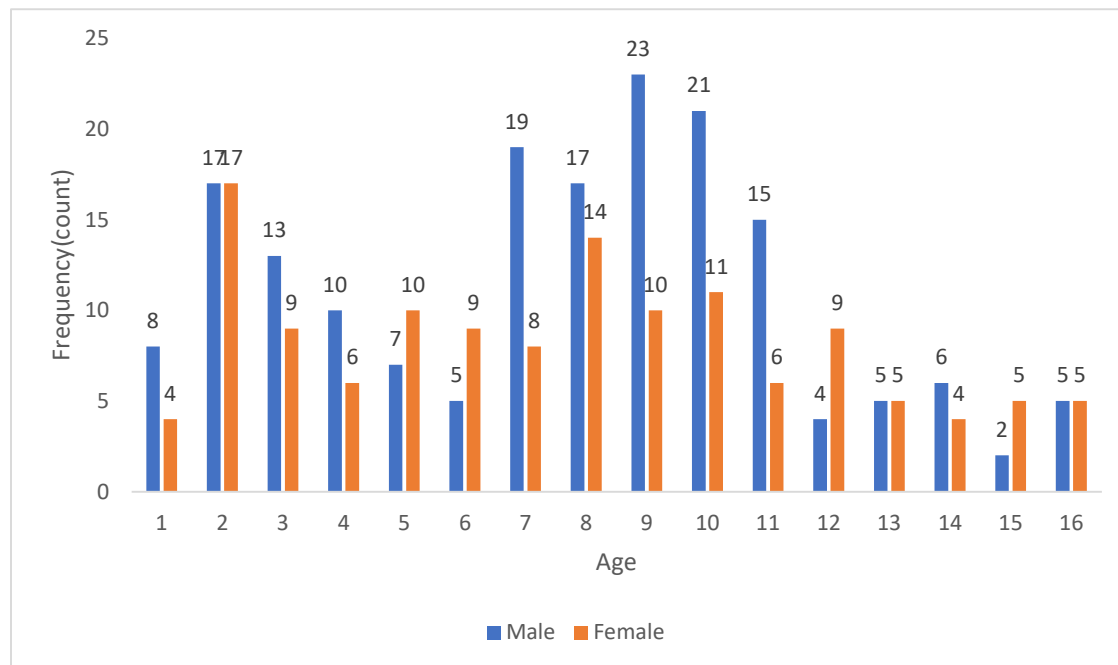
43(13.9%). The least type of trauma seen was the crown root fracture in 2(0.6%). Table 3 shows the frequency distribution of types of traumatic dental injuries.

Table 4 demonstrates the frequency of the traumatic dental injuries relating to the primary 104(33.7%) and permanent 188(60.8%) teeth. This was not statistically significant. (P=0.204). There was no root fracture or crown root fracture in the primary dentition during the duration of this study. Also highlighted was the number of a few complications noticed during the short follow up period.

Table 5 shows the treatment instituted for the reported injuries. The treatment carried out mostly in primary teeth related injuries were extractions and drug prescriptions (39.8% each), while in permanent teeth related injuries were restoration (42.8%) and root canal treatment (28.6%)

Table 2: Gender distribution of patients with injuries relating to the primary and permanent teeth

Gender	Primary teeth n (%)	Permanent teeth n (%)	Total n (%)	P-value
Male	60(52.2)	117(60.3)	177(57.3%)	0.162
Female	55(47.8)	77(39.7)	132(42.7%)	
Total	115(37.2)	194(62.8)	309(100%)	



X<sup>2</sup>=19.07; p=0.211

Figure 1: Age and Gender based distribution of Dental trauma

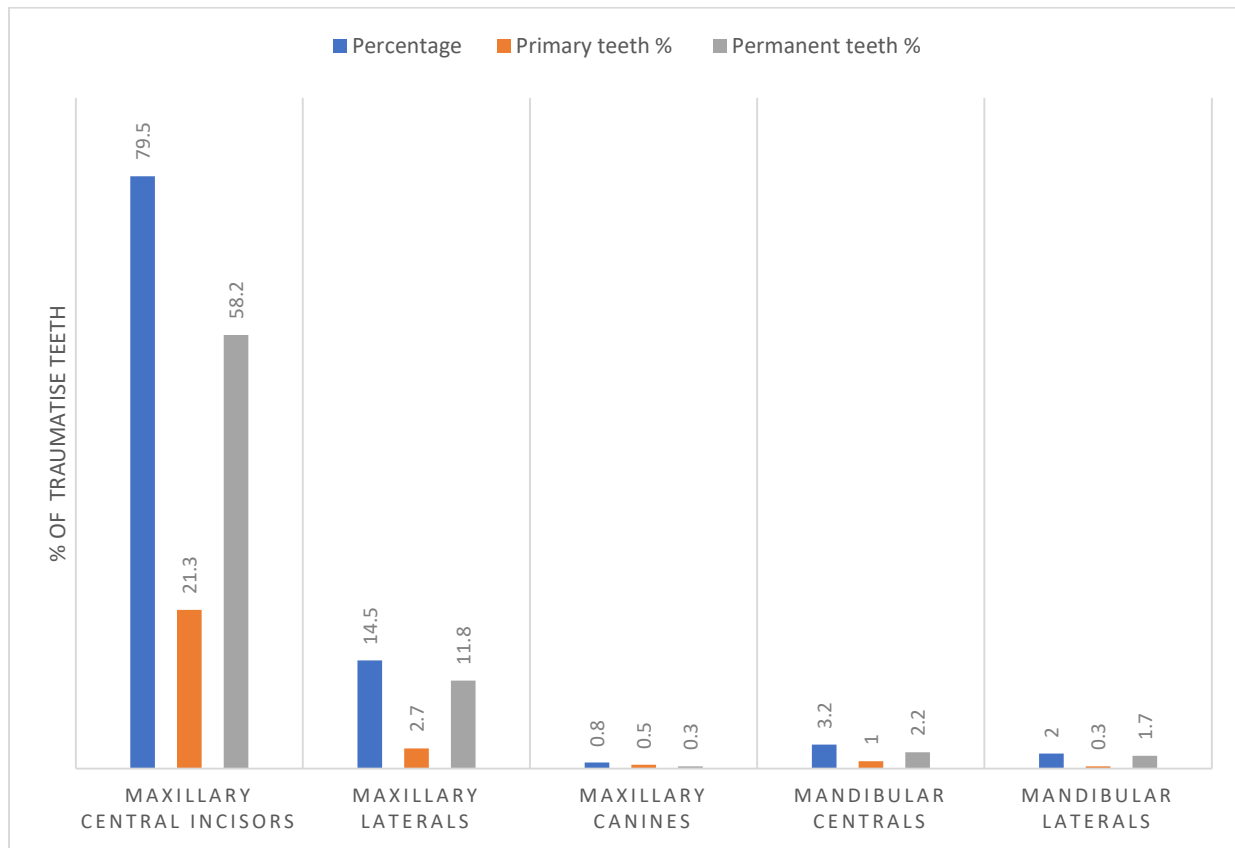


Figure 2: Frequency distribution of traumatised dentition

Table 3: Dental trauma distribution of type of dental injury

Trauma Type	Frequency	Percent (%)
Enamel fracture	18	5.8
Enamel/dentine fracture	74	23.9
Enamel/dentine with pulpal involvement	44	14.2
Crown discoloration	24	7.8
Root fracture	3	1.0
Avulsion	23	7.4
Concussion	10	3.2
Crown root fracture	2	0.6
Alveolar fracture	4	1.3
Extrusive luxation	10	3.2
Intrusive luxation	28	9.1
Lateral luxation	43	13.9
Subluxation	9	2.9
Soft tissue laceration	17	5.5
<b>Total</b>	<b>309</b>	<b>100.0</b>

Table 4: Frequency of traumatic dental trauma relating to the primary and permanent teeth.

Type of Dental trauma	Primary n(%)	Permanent n(%)	Total n(%)
Enamel Fracture	1(0.32)	17(5.48)	18(5.8)
Enamel/Dentine Fracture	5(1.6)[1*]	69(22.3) [3*]	74(23.9)
Enamel/Dentine (With pulpal involvement)	0(0)	44(14.2) [2*]	44(14.2)
Crown discoloration	4(1.3)	20(6.5)	24(7.8)
Root fracture	0(0)	3(1.0) [1*]	3(1.0)
Avulsion	9(2.9)	14(4.5)	23(7.4)
Concussion	2(0.6)	8(2.6)	10(3.2)
Crown root fracture	0(0)	2(0.6)	2(0.6)
Alveolar fracture	2(0.65)	2(0.65)	4(1.3)
Extrusive luxation	7(2.2)	3(1.0)	10(3.2)
Intrusive luxation	24(7.8) [2*]	4(1.3) [1*]	28(9.1)
Lateral Luxation	32(10.3)	11(3.6)	43(13.9)
Subluxation	7(2.3)	2(0.6)	9(2.9)
Soft Tissue injuries			17(5.5)
<b>Total</b>	<b>104(33.7)</b>	<b>188(60.8)</b>	<b>309</b>

P= 0.204

\*Number of teeth that had complications during the short follow-up period.

Table 5: Distribution of treatment methods

Method of treatment	Primary teeth (%)	Permanent teeth (%)	Total (%)
Drug prescription	43(39.8)	8(3.9)	51(16.5)
Restoration	5(4.6)	86(42.8)	91(29.5)
Repositioning	2(1.9)	2(1.0)	4(1.3)
Pulpectomy	11(10.2)	0(0.0)	11(3.6)
Root canal treatment	0(0.0)	57(28.4)	57(18.4)
Re-implantation	0(0.0)	14(6.9)	14(4.5)
Splinting	0(0.0)	16(8.0)	16(5.2)
Extractions	43(39.8)	5(2.5)	48(15.5)
Suturing	4(3.7)	13(6.5)	17(5.5)
<b>Total</b>	<b>108</b>	<b>201</b>	<b>309</b>

## DISCUSSION

This study has shown that the clinic prevalence of paediatric traumatic dental injury in Benin City, Nigeria stood at 5.0%. This study prevalence corroborates with that obtained from a previous southern Nigeria clinic based study<sup>9</sup> while some other studies presented a higher prevalence rate<sup>14,15,17</sup>. Studies on traumatic injuries in other countries were at variance with the results from this study; with Brazilian children<sup>8</sup> showing a prevalence of 2.4%, Turkish children<sup>12</sup> a 9.5% rate and Chinese children<sup>10</sup> 69.2%. Coincidentally, another similar Nigerian study<sup>19</sup> identified a trauma prevalence rate of 10.5% which is higher than the report of this study.

The variation in their results<sup>19</sup> and from this present study may be as a result of the duration of and location of study. Other possible reasons behind the variation may include study size and population. This study showed an increase in the annual incidence of traumatic dental injuries during the period under review. The relative incidence ranged from 1.1% in the first year to 8.6% on the tenth year. The improved level of oral health awareness over time may have contributed to the increase number of clinic presentations. Other possible contributory factors are those that poses an increased risk of traumatic dental injury which include but not limited

to changes in lifestyle<sup>20</sup> and the continuous modernization of gadgets.<sup>20-21.</sup>

This study did not demonstrate any significant difference amongst gender in the prevalence of traumatic dental injury. More males were affected than females in both the primary and permanent dentition in this study which is in agreement with the results of other studies.<sup>8,10,21,22</sup> However some other studies<sup>23,24</sup> have demonstrated that females showed a higher rate of traumatic dental injury than males due to their increasing inclination towards sporting activities.

In this study, the peak incidence for dental trauma in children with primary dentition was between 2 and 3 years which were similar to findings by Arenas et al<sup>25</sup>. This is attributable to the period at which children begin to walk and to run thereby increasing the risk of falling and injuring the anterior teeth. This finding is in agreement with the study by Osuji<sup>26</sup> where the peak incidence is within the age range. The peak incidence to injury to the permanent dentition in this study was the 9-10 year age range which was in agreement with other studies<sup>16,19.</sup>

Most of the injuries in this study affected the permanent dentition. This finding is in agreement to some previous other studies<sup>27,28</sup> but contrary to another study<sup>9</sup>. This finding may have been as a result of the age groups mostly affected in this study [7-11years]. This study also showed that the maxillary central incisors is the most commonly involved teeth. These findings are in accordance with other previous studies<sup>8-10,18,27-30</sup> and the reason adduced was simply that the position of these teeth makes them more susceptible to trauma.<sup>10,18,27-30</sup>

Luxation injuries was generally more common in primary teeth, with lateral luxation been the most common injury affecting primary teeth in this study. This finding is similar to other studies<sup>14,31-33</sup> but at variance with the findings by Unal et al.<sup>3</sup> The rationale behind the increased number of luxation injuries in the primary dentition is most likely due to the resilient bone surrounding the primary teeth.

This study found out that the most common fracture in permanent teeth was that of enamel and dentine, similar to the findings of other worker.<sup>3,5,14,31</sup> This is however at variance with the results from other studies<sup>16,17</sup>, wherein enamel fracture was more prevalent. Another study also identified a high rate of avulsion<sup>17</sup> which differs from the results of this study. This could be due to improved education on management of severe traumatic dental injury among school children<sup>15, 19</sup>. Similarly, we recorded a

low incidence of soft tissue injuries as had been reported by other researchers.<sup>5,7,31</sup>

Drug prescription and dental extraction were the main treatment of choice for the primary dentition. Other studies indicated the same type of treatment in the primary dentition as being adequate with a favourable outcome.<sup>34-36</sup> This treatment method is preferred in order to prevent damage to the underlying permanent teeth. Restoration and root canal treatment were mostly applied for permanent teeth in order to preserve the dentition, restore aesthetics as well as function. This was indicated also in a previous study.<sup>34</sup>

The outcome of dental trauma depends on the type of injury, time prior emergency treatment, and quality of treatment.<sup>28</sup> Consideration has to be given to the fact that complications of dental trauma can occur several months or even years after the injury.<sup>37</sup> The most favorable outcome of traumatic dental injuries is healing of the pulp and surrounding tissues<sup>28</sup> and by extension preserving the functionality of the affected teeth. As such all treatment procedures were directed to minimize undesired consequences which might lead not only to the loss of the tooth, but also to the loss of the alveolar bone and in such way impede realization of possible treatment plan.

This present study had a favourable outcome with intervention carried out for most of the patients that presented with traumatic dental injuries relating to the primary teeth. Same could applied to those patients who presented with traumatic dental injuries relating to the permanent teeth despite the minimal permanent loss of hard dental tissue through tooth extraction in this study. Although there were a few complications during the short follow up period, such cases were reported as re-treated and those with poor prognosis extracted. This study demonstrated a loss of hard dental tissues in 2.5% for anterior permanent teeth as a result of traumatic dental injuries; this could suffice as an acceptable outcome when compared with the study by Lam<sup>38</sup> who estimated that 26-76% permanent loss of dental hard tissue in the various types of dental injuries. The reported average period of follow up in this study was less than six months. This short period of follow up could be due to parents' reluctance to accompany asymptomatic children to follow-up appointments coupled with the fact that the paediatric clinic in this center refers and losses their patients to the adult clinic after the age of sixteen. Moreso, parents could change their dentist

occasioned by clinic proximity maybe due to family relocations or child admission into a boarding school. The outcome from this current study for soft tissue and periradicular tissues were favourable. Numerous studies<sup>5,8,13,38</sup> have shown that, traumatic dental injuries may affect the periradicular tissues which may undergo apical periodontitis, external resorption, disturbances in root development, ankylosis, soft tissue recession and fibrous healing.<sup>34,38</sup> Other complications include malalignment and discolouration of teeth, difficulty with eating, compromised aesthetics and discomfort.<sup>38</sup>

The limitation of the study included the retrospective nature and the reported short period of follow up.

### CONCLUSION

The clinic prevalence of traumatic dental injury in this study was relatively low, still this low percentage represents a large number of patients. Institution of standard treatment modalities and a long-term follow-up could minimize complications and improve outcome.

### Source of Support

Nil.

### Conflict of Interest

None declared.

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