Dental Traumatology

Dental Traumatology 2011; **27**: 230–234; doi: 10.1111/j.1600-9657.2011.00997.x

Dental Injuries in 12-year Old Nigerian students

Olaniyi O. Taiwo, Hassan P. Jalo

Regional Centre for Oral Health Research and Training Initiatives for Africa, Jos, Plateau State, Nigeria

Correspondence to: Olaniyi O. Taiwo, RCORTI for Africa Jos, P. M. B. 2067, Jos, Plateau State, Nigeria
Tel.: +234 8033450079
Fax: +234 73 462901
e-mail: taiwo25@yahoo.co.uk

Accepted 17 February, 2011

Abstract – *Objectives*: To determine the prevalence and causes of Traumatic Dental Injuries (TDIs) in 12-year-old Nigerian students. The study also sought to ascertain the relationship(s) among gender, location (urban and rural areas) and overjet in the presentation of TDIs. *Methods*: The sample size included 719 school children aged 12 years from 36 public schools. They were proportionately selected through a multistage sampling technique. TDIs to the teeth were evaluated clinically by one examiner (intra-examiner reliability test was 0.771 by Cronbach's Alpha test). The TDIs were classified according to the WHO classification. Overjet was considered a risk when its values were >6 mm. The children answered a structured questionnaire on sociodemographics and oral health behaviours. Analysis was performed using SPSS V16.0 (SPSS Inc, Chicago, IL, USA). Pearson's Chi-squared test was used to test for association between variables and Odds ratio (OR). P values <0.05 were considered statistically significant. *Results*: There were 411 (57.2%) boys. More than half (54.2%) were from the urban areas. Prevalence of TDI was 15.2% (prevalence in the urban and rural locations were 15.1% and 15.2% respectively). The maxillary central incisors (66.7%) were the most affected teeth followed by the laterals (17.4%). Enamel fracture (73.5%) was the most common type of TDI noticed followed by enamel and dentine fracture (15.9%). Falls (64.2%) were the most frequent cause of trauma. Collisions account for 9.2%. Eighteen (2.5%) students had overjet >6 mm. TDIs were more prevalent among males (P = 0.025, OR = 1.520, 95% CI = 1.049, 2.202) and those with overjet >6 mm (P = 0.029, OR = 0.344, 95% CI = 0.141, 1.088). The occurrence of TDIs was not related to location (P > 0.05). *Conclusions*: The prevalence of traumatized teeth among 12-year-olds in Nigeria was comparable to other studies. Being male and having an overjet >6 mm were associated with a higher probability of having a traumatized tooth.

There is a fourfold reason for why traumatic dental injuries (TDIs) are a public dental health problem today. First is that trauma to the oral region occurs frequently and makes up 5% of all injuries for which people seek treatment in all dental clinics and hospitals in a country. Second, TDIs tend to occur at a young age during which growth and development take place. Third, treating a TDI can often be complicated and expensive frequently involving the participation of specialists in several disciplines. Fourth, a TDI is mostly irreversible and thus treatment would likely continue for the rest of the patients' life (1). Globally, dental injuries to permanent anterior teeth are more common among boys than among girls. This high occurrence among boys is attributed to unintentional accidents, violence and outdoor activities like sports and games (2). There is paucity of data on the prevalence of TDIs from Africa (1–3).

The main TDI related events reported in publications were violence (range: 1.2–70.6%), collisions (range: 1.7–65.3%), falls (range: 8.3–54%), sports (range: 2.3–49.4%), leisure activities (range: 8.9–36.6%) and traffic accidents (range 0.6–24.1%) (4, 5). The difference in the proportion of causes of TDIs probably depends on a number of factors, including population type, age group, culture, region in the world and environment (6). Important risk factors identified in the occurrence of TDIs include the male gender, incisal overjet >6 mm, absence of lip coverage and adverse socioeconomic characteristics (5, 7–9).

Having untreated fractured teeth had directly been related to the emotional state of children and their appearance. On average, children with an untreated TDI were 20 times more likely to report an impact on Quality of Life (QoL) because of the injury when compared with children without any TDI (1, 2). Likewise, using the Child Oral Health Quality-of-life questionnaire, Berger et al. (10) were able to demonstrate a profound and continuing effect on the QoL of children and their parents following severe dental injury. Children with fractured teeth experience difficulties with eating and enjoying food (3, 7). Untreated children avoided smiling and experienced affected social interactions compared with their non-injured peers (11). The last decades have observed a dramatic increase in the number of research articles related to dental trauma among adolescents. This

may indicate that TDIs has evolved into a major public health problem (2).

The objectives of the present study were to determine the prevalence and causes of TDIs in 12-year-old Nigerian school children and to ascertain the relationship(s) among gender, location (urban and rural) and overjet in the presentation of TDIs in this population.

Materials and methods

The study was carried out in three states in the northern part of Nigeria. This represents a state each from the three geo-political zones in northern Nigeria. The sample size included 719 school children aged 12 years from 36 public schools. They were proportionately selected through a multistage sampling technique. An interviewer-administered questionnaire was used to collect data on demographic status, oral health practices, causes of trauma and treatment history. An adapted form was used to record findings from oral examinations.

Oral examination was performed by an examiner. TDIs were scored using the WHO classification (12). The criteria and scoring for TDI are shown in Table 1. Children were seated and examined using plain mirrors and community periodontal index periodontal probes under natural light within the school premises during class hours. Dental examinations included the whole dentition. The examiner recorded the type of damage sustained, the tooth/teeth affected, treatment offered or not, and size of incisal overjet. Ten percent of the students were re-examined at random to check for intra-examiner reliability. Intra-examiner reliability was 0.771 by Cronbach's Alpha test.

Data entry and statistical analysis were carried out with SPSS for Windows version 16.0 (SPSS Inc, Chicago, IL, USA). Data analysis included descriptive statistics (frequency distribution and cross tabulation). Statistical significance for difference was assessed using the chi-squared test and multivariate logistic regression for contribution of variables studied. The level of significance was set at 5%.

Results

There were 411 (57.2%) boys. More than half (54.2%) of the students were from the urban areas. Prevalence of TDI was 15.2% (prevalence in the urban and rural locations were 15.1% and 15.2% respectively). Twenty-one students (2.9%) had more than one tooth traumatized. Eighteen (2.5%) students had overjet >6 mm. Table 2 shows the distribution of TDIs by gender, location and the incisal overjet. Falls (64.2%) was the most frequent cause of trauma. Collisions accounts for 9.2% (Table 3). Table 4 shows that enamel fracture (73.5%) was the most common type of TDI noticed followed by enamel and dentine fracture (15.9%). The maxillary central incisors (66.7%) were the most affected teeth followed by the laterals (17.4%). None of the students seen had any restorative treatment on the traumatized teeth. Of all the fractured teeth, 11.4% were from the mandible (Table 5). TDIs were more prevalent among males ($P = 0.025$, OR = 1.520, 95%

Table 1. The WHO classification and scoring for TDI (12)

Code	Description
0	No trauma
1	Fracture of enamel of tooth
2	Fracture of crown without pulpal involvement
3	Fracture of crown with pulpal involvement
4	Fracture of root of tooth
5	Fracture of crown and root of tooth
6	Fracture of tooth, unspecified
7	Luxation of tooth.
8	Intrusion or extrusion of tooth
9	Avulsion of tooth
10	Other injuries including laceration of oral soft tissue

TDI, traumatic dental injuries.

Table 3. Frequency distribution of causes of TDI in 109 Nigerian school children aged 12 years

Causes of TDI	Frequency (%)
Collisions	10 (9.2)
Falls	70 (64.2)
Sports	1 (0.9)
Being hit by an object e.g. stone	7 (6.4)
Do not remember	12 (11)
Others (inappropriate use of teeth, violence etc)	9 (8.3)

TDI, traumatic dental injuries.

Table 2. Frequency distribution of traumatic injuries in 719 Nigerian students by gender, location and incisal overjet

	TDI [*n* (%)]	No TDI [*n* (%)]	All [*n* (%)]	OR (95% CI)	*P*-values	Adjusted OR (95% CI)	*P*-values
Gender							
Boys	73 (17.8)	338 (82.2)	411 (57.2)	1.0	0.025	1.0	0.041
Girls	36 (11.7)	272 (88.3)	308 (42.8)	1.5 (1.0–2.2)		1.6 (1.0–2.4)	
Location							
Urban	59 (15.1)	331 (84.9)	390 (54.2)	1.0	0.979	1.0	0.686
Rural	50 (15.2)	279 (84.8)	329 (45.8)	0.9 (0.7–1.4)		1.1 (0.7–1.7)	
Overjet							
≤6 mm	103 (14.7)	598 (85.3)	701 (97.5)	1.0	0.029	1.0	0.072
>6 mm	6 (33.3)	12 (66.7)	18 (2.5)	0.3 (0.1–1.0)		0.4 (0.1–1.1)	
All	109 (15.2)	610 (84.8)	719 (100)				

TDI, traumatic dental injuries.

Table 4. Frequency distribution of types of TDI in 109 Nigerian school children aged 12 years

Types of TDI	Frequency (%)[1]
Enamel fracture	97 (73.5)
Fracture of crown without pulpal involvement	21 (15.9)
Fracture of crown with pulpal involvement	5 (3.8)
Fracture of tooth, unspecified[2]	4 (3.0)
Avulsion of tooth	5 (3.8)

TDI, traumatic dental injuries.
[1]A total of 132 teeth were affected.
[2]Non-vital tooth with discoloration.

Table 5. Frequency distribution of types of tooth with TDI in 109 Nigerian school children aged 12 years

Types of Tooth	Frequency (%)
Maxilla	
Right central	45 (34.1)
Right lateral	13 (9.8)
Right canine	3 (2.3)
Left central	43 (32.6)
Left lateral	10 (7.6)
Left canine	3 (2.3)
Mandible	
Left central	1 (0.8)
Left canine	1 (0.8)
Left molar	1 (0.8)
Right central	3 (2.3)
Right lateral	6 (4.5)
Right premolar	2 (1.5)
Right molar	1 (0.8)

TDI, traumatic dental injuries.

CI = 1.049, 2.202) and those with overjet >6 mm (P = 0.029, OR = 0.344, 95% CI = 0.141, 1.088). The occurrence of TDIs was not related to location (P > 0.05).

Discussion

The prevalence of TDIs in this population of 12-year-old Nigerian school children was 15.2%. This figure is higher than those previously reported in the western parts of Nigeria; 10.9% in Ife town (13) and 9.8% in Lagos (14). These differences could be as a result of varying sampling techniques, diagnostic criteria, teeth involved (both studies were limited to anterior teeth, whereas this study examined the whole dentition) and patterns of behaviour among the students. The 15.2% prevalence in our study is lower than that reported from findings in other parts of the world: 19.9% (4), 20.3% (15), 35% (16) and 58.6% (17). These may also be due to the above-mentioned reasons. Another important finding from this study is that none of the students with TDIs has received any dental treatments for the traumas. This is similar to the findings of Agbelusi who reported on the traumatic fracture of anterior teeth in 12-year-old Nigerians (14). Epidemiological studies had demonstrated that the treatment needs of TDIs are poorly met. This applies to both developing and developed countries. In Britain, only 10–15% and in Finland, only 25% of children who had sustained a TDI had received treatment (18) and 14.6% in a South African study (3). An Australian study reported that only one-third of the surveyed patients presented for dental treatment within 24 h of the injury, while the remainder delayed seeking treatment for varying times up to a year (19). The lack of treatment (in our study) maybe a result of ignorance of the availability of such treatment options. This is further compounded by the low capacity of oral health care workers especially in the northern part of Nigeria. It may also be due to nature of the injuries as most of them (73.5%) were slight injuries (enamel fractures). It may be that the children and the parents were not concerned about them as it is not a disease and as such did not seek dental care. Approximately 64% of dental injuries in a Canadian study were untreated enamel fractures (11). Garcia-Godoy et al. (20) highlighted some reasons for seeking treatment after TDIs to include aesthetics, pain, colour change and consequences following injury such as abscess formation.

We did not find any difference in the prevalence of TDIs in the students from the urban and rural location. They were virtually the same (15.1% vs 15.2%). A similar study in Jordan comparing the TDIs among urban and rural 10–12-year-old children did not show any statistical difference between the prevalence figures (21). This is in contrast to a report by David et al. showing a significantly higher prevalence of TDIs in the urban area (4) and a Norwegian study that reported a lower prevalence in the rural area (22). The reason for these differences is not known. Cavalcanti et al. proposed that variations in the urban–rural TDI prevalence may be as a result of urban overcrowding, violence and traffic accidents. In relation to school environments, large cities probably have more children in classroom and more students in schools. This could predispose to a higher tendency for trauma in the urban areas (23).

Boys were nearly twice as likely as girls to have a TDI in our study. There is general consensus that boys have a higher risk of TDIs than girls during adolescence (17, 24, 25). This is because boys engage more in outdoor activities and sports than girls. Violence has also been suggested as a cause of more TDIs in boys (2). Otuyemi (13), in a previous study of traumatic anterior dental injuries in 12-year-old Nigerian children, also reported a similar finding.

Falls as the most common cause of trauma in our study is as reported in previous studies (16, 21, 25, 26). This is more common in the rural areas in Nigeria, which are characterized with epileptic or no electric power supplies. This could lead to poor visibility, especially at night and increase the tendencies to stumble over objects, stones etc. Most TDIs are unintentional injuries with falls, collisions and being struck by an object being the most as the most dominating causes. Unknown causes had been postulated as a strategy to conceal the real causes (e.g. physical abuse and assaults) (6).

In this study, the maxillary central incisors were most commonly affected. This agrees well with other studies (2, 14, 27). It has been reported that the majority of TDIs

would involve the anterior teeth, especially the maxillary central and lateral incisors (1, 28). Nearly all (88.6%) the TDIs reported in this study occurred on the maxillary dentition. This, we believe, is as a result of the anatomy of the maxillary arch, which is slightly more protruded than the mandible thus serving as a shock absorber. There were two cases of trauma on the molar on the mandible. This may be as a result of inappropriate use of the teeth especially as a tool in opening bottle covers. This is a fairly common practice among Nigerians.

Many studies had reported enamel fractures as the most common type of TDI affecting the teeth (5, 16, 21, 27, 29). Our study also confirms this with 73.5% of all the traumatized teeth having enamel fractures. Another study reported enamel–dentine fractures as most common (30).

A previous Nigerian study had reported incisal overjet and lip incompetence as predisposing factors to anterior dental injuries in 12-year-old Nigerians, although the classification for anterior incisal overjet was ≤3 and >3 mm (13). Our study showed significant influence of incisal overjet >6 mm on the prevalence of TDIs. Other studies had reported similar findings that children with incisal overjet >5 mm sustained significantly more injuries to the anterior teeth than those with normal overjet. (8, 16, 17, 21, 24, 30–33). One study had a contrary report (26). Environmental factors, methods of analysis and types of student activities may explain these differences.

Conclusions

The prevalence of TDIs in this population was comparable to other studies. Being male and having an overjet >6 mm were significantly associated with a higher probability of having a traumatized tooth. The occurrence of TDIs was not related to location. TDIs should not be neglected as they have become an important issue in public health and dentistry and have been shown to have an effect on the Qol of affected children.

References

1. Glendor U. Epidemiology of traumatic dental injuries – a 12 year review of the literature. Dent Traumatol 2008;24:603–11.
2. David J, Astrøm AN, Wang NJ. Factors associated with traumatic dental injuries among 12-year-old schoolchildren in South India. Dent Traumatol 2009;25:500–5.
3. Naidoo S, Sheiham A, Tsakos G. Traumatic dental injuries of permanent incisors in 11- to 13-year-old South African school children. Dent Traumatol 2009;25:224–8.
4. Huang B, Marcenes W, Croucher R, Hector M. Activities related to the occurrence of traumatic dental injuries in 15- to 18-year-olds. Dent Traumatol 2009;25:64–8.
5. Traebert J, Bittencourt DD, Peres KG, Peres MA, de Lacerda JT, Marcenes W. Aetiology and rates of treatment of traumatic dental injuries among 12-year-old school children in a town in southern Brazil. Dent Traumatol 2006;22:173–8.
6. Glendor U. Aetiology and risk factors related to traumatic dental injuries – a review of the literature. Dent Traumatol 2009;25:19–31.
7. Ramos-Jorge ML, Peres MA, Traebert J, Ghisi CZ, Martins de Paiva S, Pordeus IA et al. Incidence of dental trauma among adolescents: a prospective cohort study. Dent Traumatol 2008;24:159–63.
8. Jarvinen S. Traumatic injuries to upper permanent incisors related to age and incisal overjet : a retrospective study. Acta Odontol Scand 1979;37:335–8.
9. Garcia-Godoy F, Sanchez JR, Sanchez RR. Proclination of teeth and its relationship with traumatic injuries in pre-school and school children. J Pedod 1982;5:114–9.
10. Berger TD, Kenny DJ, Casas MJ, Barrett EJ, Lawrence HP. Effects of severe dentoalveolar trauma on the quality-of-life of children and parents. Dent Traumatol 2009;25:462–9.
11. Fakruddin KS, Lawrence HP, Kenny DJ, Locker D. Impact of treated and untreated dental injuries on the quality of life of Ontario school children. Dent Traumatol 2008;24:309–13.
12. Bastone EB, Freer TJ, McNamara JR. Epidemiology of dental trauma: a review of literature. Aust Dent J 2000;45:2–9.
13. Otuyemi OD. Traumatic anterior dental injuries related to incisor overjet and lip competence in 12-year-old Nigerian children. Int J Paediatr Dent 1994;4:81–5.
14. Agbelusi GA, Jeboda SO. Traumatic fracture of anterior teeth in 12-years old Nigerian children. Odontostomatol Trop 2005;28:23–7.
15. Petti S, Tarsitani G. Traumatic injuries to anterior teeth in Italian schoolchildren: prevalence and risk factors. Endod Dent Traumatol 1996;12:294–7.
16. Malikaew P, Watt RG, Sheiham A. Prevalence and factors associated with traumatic dental injuries (TDI) to anterior teeth of 11–13 year old Thai children. Community Dent Health 2006;23:222–7.
17. Marcenes W, Zabot NE, Traebert J. Socio-economic correlates of traumatic injuries to the permanent incisors in schoolchildren aged 12 years in Blumenau, Brazil. Dent Traumatol 2001;17:222–6.
18. Oliveira LB, Marcenes W, Ardenghi TM, Sheiham A, Bonecker M. Traumatic dental injuries and associated factors among Brazilian preschool children. Dent Traumatol 2007;23:76–81.
19. Lam R, Abbott P, Lloyd C, Lloyd C, Kruger E, Tennant M. Dental trauma in an Australian rural center. Dent Traumatol 2008;24:663–70.
20. Garcia-Godoy F, Garcia-Godoy F, Garcia-Godoy FM. Reasons for seeking treatment after traumatic dental injuries. Dent Traumatol 1989;5:180–1.
21. Hamdan MA, Rock WP. A study comparing the prevalence and distribution of traumatic dental injuries among 10-12-year-old children in an urban and in a rural area of Jordan. Int J Paediatr Dent 1995;5:237–41.
22. Skaare AB, Jacobsen I. Dental Injuries in Norwegians aged 7–18 years. Dent Traumatol 2003;19:67–71.
23. Cavalcanti AL, Bezerra PKM, Barros de Alencar CR, Moura C. Traumatic anterior dental injuries in 7- to 12-year-old Brazilian children. Dent Traumatol 2009;25:198–202.
24. Traebert J, Almeida IC, Marcenes W. Etiology of traumatic dental injuries in 11 to 13-year-old schoolchildren. Oral Health Prev Dent 2003;1:317–23.
25. Adekoya-Sofowora CA. Traumatized anterior teeth in children: a review of the literature. Niger J Med 2001;10:151–7.
26. Marcenes W, Alessi ON, Traebert J. Causes and prevalence of traumatic injuries to the permanent incisors of school children aged 12 years in Jaragua do Sul, Brazil. Int Dent J 2000;50:87–92.
27. Garcia-Godoy F, Sanchez R, Sanchez JR. Traumatic dental injuries in a sample of Dominican school children. Community Dent Oral Epidemiol 1981;9:193–7.
28. Llarena del Rosario ME, Acosta Alfaro VM, Garcia-Godoy F. Traumatic injuries to primary teeth in Mexico city children. Dent Traumatol 1992;8:213–4.
29. Sanchez AV, Garcia-Godoy F. Traumatic dental injuries in 3 to 13 year old boys in Monterrey, Mexico. Endod Dent Traumatol 1990;6:63–5.

30. Hamdan MA, Rajab LD. Traumatic injuries to permanent anterior teeth among 12-year-old schoolchildren in Jordan. Community Dent Health 2003;20:89–93.
31. Nguyen QV, Bezemer PD, Habets L, Prahl-Andersen B. A systematic review of the relationship between overjet size and traumatic dental injuries. Eur J Orthod 1999;21:503–15.
32. Cortes MI, Marcenes W, Sheiham A. Prevalence and correlates of traumatic injuries to the permanent teeth of schoolchildren aged 9–14 years in Belo Horizonte, Brazil. Dent Traumatol 2001;17:22–6.
33. Bauss O, Freitag S, Röhling J, Rahman A. Influence of overjet and lip coverage on the prevalence and severity of incisor trauma. J Orofac Orthop 2008;69:402–10.