

CAUSES AND PATTERN OF TRAUMATIC DENTAL INJURIES IN CHILDREN PRESENTING FOR CARE AT A TERTIARY HEALTH CENTRE

Oredugba Folakemi A^{1*}, Nzomiwu Chioma L²

1. Department of Child Dental Health, College of Medicine, University of Lagos.
2. Department of Child Dental Health, Lagos University Teaching Hospital, Lagos.

Abstract

To assess the causes and pattern of traumatic dental injuries in children presenting for care at a tertiary health care facility.

This was a prospective study with sample consisting of patients who attended the Paediatric Dental Clinic in a period of nine months. Data, including clinical and radiographic examinations were collected using the American Academy of Pediatric Dentistry (AAPD) recommended format for recording of dental injuries.

A total of 55 children, 37(67.3%) males and 18 (32.7%) females aged 1 to 16 years (mean 9.6±3.9 years) sought treatment for 83 traumatised teeth. Twenty (36.4%) patients sought treatment within one week after the injury. The most frequent cause of dental trauma was fall (65.5%), followed by collision (16.4%) and the most common place of occurrence was at home (50.9%). Though compromised aesthetics was the most common reason for seeking dental care, trauma to the dentition was by chance finding in 12(14.5%) of the patients. Seventy-two (86.8%) of the teeth were permanent teeth while 11(13.2%) were primary teeth. Both primary and permanent teeth had more fractures than luxation injuries. Treatment carried out include supportive therapy, composite restoration, pulp therapy, re-implantation and/splinting, extraction and provision of prosthesis.

Tooth fracture was the most common injury presented in both the primary and permanent dentition. The majority of injuries occurred in the home and few parents/caregivers sought dental care for their children/ward immediately after trauma. Parents and teachers are advised to seek immediate treatment of traumatic dental injury to avoid complications and complex treatments.

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Introduction

The oro-facial region, being the most exposed part of the body, has the highest tendency to traumatic injuries¹. Traumatic dental injury (TDI) is one of the most common injuries, especially in the child population.

Traumatic injury is a distressing experience physically, but it may also have an effect on the emotional and physiological well being of both child and parent². Moreover, TDI

may result in pain, loss of function, and could adversely affect the developing occlusion and aesthetics and these may have negative impact on the well-being of affected children³.

Epidemiological studies from various countries indicate that there is considerable variation in the prevalence of traumatic injuries to teeth. This has been attributed to factors such as the location of study, causes of injury, classification of dental trauma, and the dentition studied⁴. Epidemiological studies show that 11.6% to 33.0% of boys and 3.6% to 19.3% of girls have dental trauma of varying severity before the age of 12 years, with a male: female ratio ranging from 1.3 – 2.3:1^{5,6,7}.

In Nigeria, the prevalence of traumatized anterior teeth in a rural population has been reported to be 6.5%⁸ while in the metropolitan

*Corresponding author:

Dr. Oredugba Folakemi A
Department of Child Dental Health, College of Medicine,
University of Lagos
E-mail: fola_ored@yahoo.com

population; it is much higher, at 14.5%⁹.

Traumatic injuries to teeth have a significant impact on the quality of life children and their parents,^{3,10} therefore, the high frequency of occurrence should be of considerable concern to parents as well as the dentist. It is therefore needful to ascertain the common causes, presentation pattern and time-interval between injury and the visit for dental care. This will enable the dentist give proper information to parents/caregivers in terms of providing preventive and immediate care to a child with dental injury. The aim of this study therefore was to determine the causes and patter of traumatic dental injuries in children presenting for dental care at the Paediatric Dental Clinic of a tertiary health care facility.

Materials and Method

The present study was conducted at the Paediatric Dental Clinic of a tertiary health care centre. All patients who sought treatment for traumatic dental injuries in a period of nine months were included in the study. Consent to participate in the study was obtained from parents of the patients. The data for the study was collected from parent/caregiver and child using an interviewer-administered questionnaire developed by the American Academy of Pediatric Dentistry (AAPD, 2002)¹¹. The questionnaire was used to obtain information about basic socio-demographic characteristics, medical history of the patients, the history of dental trauma, clinical and radiographic examinations, treatment and post treatment instructions. With regards to the history, the following information was obtained: date and time of the injury, where and how the injury occurred, type of care provided immediately following injury, time that elapsed between onset of injury and dental care and the type of injury categorized according to the classification proposed by Andreason¹². Treatment was planned and carried out based on the findings of the clinical and radiographic examination and in accordance with the guideline of the AAPD¹¹. Data analysis was done using IBM SPSS version 15.0. Frequency tables were generated for all variables and mean scores computed for numerical variables. Other data analysis tools included chi-square test and degree of freedom. Statistical significance was inferred at $p < 0.05$.

Result

A total of 1216 patients attended the Paediatric Dental Clinic during the 9 month period of study. Among these, 55 (4.5%) patients sought care for traumatic dental injuries, out of which 37(67.3%) were males and 18(32.7%) females. The age range of the patients was 1 – 16 years with a mean age of 9.6 ± 3.9 years. Majority of the male participants belonged to the 9 – 12 year old group followed by the 5 – 8 years age group while most the female belonged to 9 – 12 and 13 – 6 years age group (Figure 1).

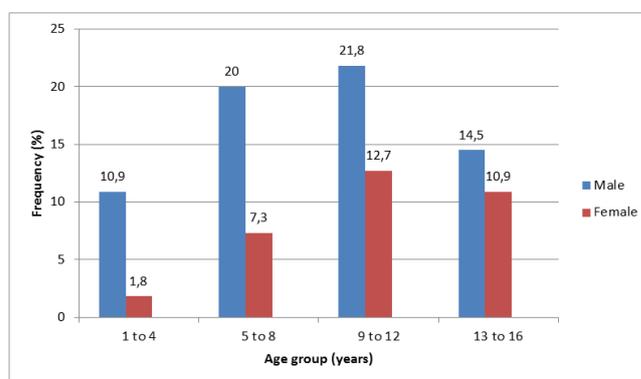


Figure 1. Distribution of patients with TDI according to age and sex

Thirty-six (65.5%) of the subjects sustained injury through falls while 9 (16.4%) sustained injury by collision. The injury occurred in the home in 50.9% and at school during sports in 32.7% (Figures 2 & 3). The younger age group sustained injuries mostly at home while the older age group sustained injury at school (Table 1).

Only 20 (36.4%) sought dental care within one week of injury, 12 (21.8%) between one week and one month of injury while 23 (41.8%) sought dental care after more than one month following injury (Figure 4).

Forty-five (54.2%) of the complaints were of compromised aesthetics, 26 (31.3%) complained of pain and disturbance of function while in 12 (14.5%) of the subjects, trauma to dentition was by chance finding (Figure 5).

Table 2 shows that these 55 children/adolescents presented with a total number of 83 traumatized teeth of which 72(86.8%) were permanent teeth and 11(13.2%) were primary teeth. In both the primary and permanent dentitions, majority of the injuries were crown fractures.

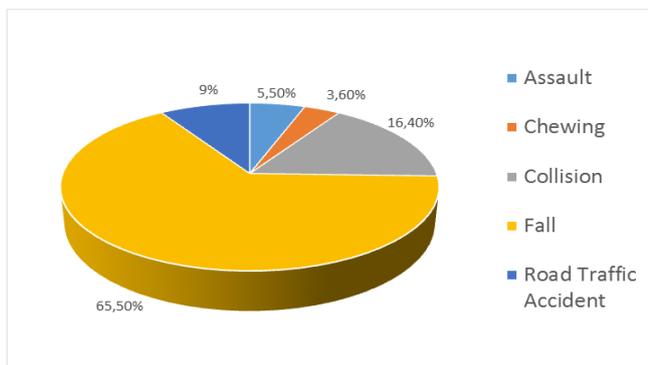


Figure 2. Distribution of patients according to the cause of injury

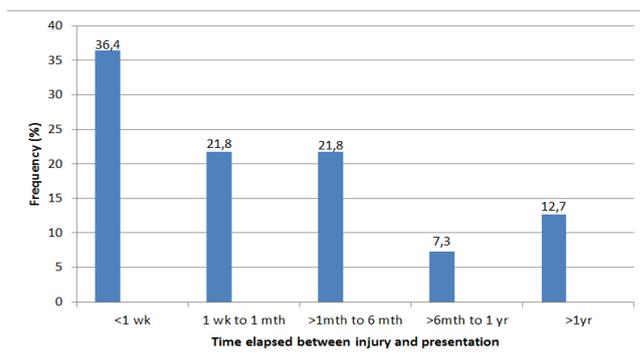


Figure 4. Distribution of patients according to time elapsed between injury and presentation.

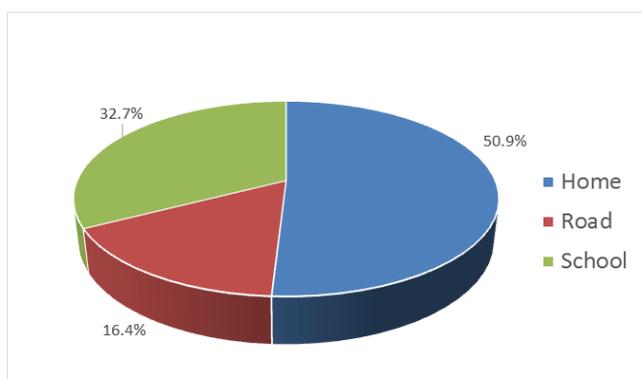
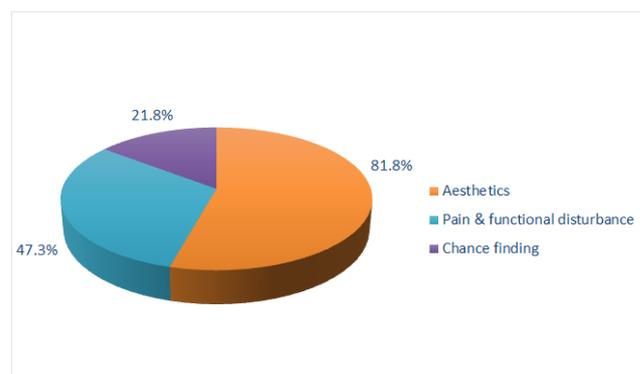


Figure 3. Distribution of patients according to place of injury



*Some patients made more than one complaint
Figure 5. Distribution of patients according to reason for seeking dental care

Age group (years)	Home N (%)	Road N (%)	School N (%)	Total N (%)
1-4	7 (12.7)	-	-	7 (12.7)
5-8	10 (18.1)	2 (3.6)	3 (5.4)	15 (27.3)
9-12	6 (11.0)	4 (7.3)	9 (16.3)	19 (34.5)
13 -16	5 (9.1)	3 (5.5)	6 (11.0)	14 (25.5)
Total	28 (50.9)	9 (16.4)	18 (32.7)	55 (100)

Chi sq 12.496, df 6, p value 0.05

Table 1. Relationship between place of injury and age of the patients

In the primary dentition there was equal number of enamel-only fracture and enamel-dentine-pulp fracture. In the permanent dentition the most common type of fracture was fracture involving the enamel and dentine without the involvement of the pulp. On the other hand there were only nine cases of soft tissue injuries which included tongue laceration, gingival laceration, abrasion injuries and lower lip laceration, occurring either in isolation or together with other hard tissue injuries.

Type of Injury	Types of dentition	
	Primary (11) N(%)	Permanent (72) N (%)
Enamel only	3 (27.3)	7(9.7)
Enamel and dentine only	-	26 (36.1)
Enamel, dentine and pulp	3 (27.3)	20 (27.8)
Subluxation	1 (9.1)	3 (4.2)
Intrusion	2 (18.1)	6 (8.3)
Extrusion	1 (9.1)	3 (4.2)
Avulsion	1 (9.1)	6 (8.3)
Root fracture only	-	1 (1.4)

Table 2. Distribution of types of injury according to the type of dentition

The central incisors were the most commonly involved teeth followed by the lateral incisors (Figure 6). Of the 55 children that sought care for TDIs during the period of this study, 13 (23.6%) had incisal overjet greater than 3mm.

The upper quadrants were the most commonly involved, with slight predilection for the upper left quadrants (41, 49.4%). There was no statistically significant difference between the left and the right side of the jaw. Majority of the injuries in this quadrant were injuries involving the enamel and dentine while root fracture was the least presented (Table 3).

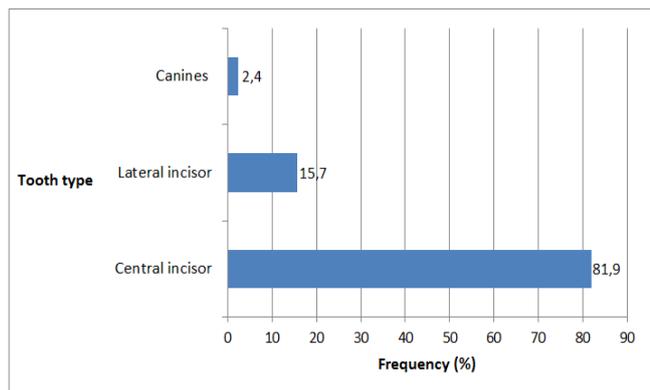


Figure 6. Distribution of the injured teeth according to tooth type

Type of Injury	Quadrants		Total
	Right	Left	
Enamel only	5	5	10
Enamel and dentine only	8	18	26
Enamel, dentine and pulp	12	11	23
Subluxation	2	2	4
Intrusion	4	4	8
Extrusion	2	2	4
Avulsion	6	1	7
Root fracture only	1	-	1
Total	40	43	83

Chi sq 8.36, df 7, p value 0.3

Table 3. Relationship between the type of injury and the side of the jaw affected.

Table 4 shows that, equal number of the permanent teeth 13(18.1%) were treated by restoration with composite resin or root canal therapy, 15.3% of the permanent teeth had apexification procedures and only one permanent tooth was re-implanted. Most of the primary teeth were treated by supportive therapies which involved prophylaxis, pain control and keeping them under observation.

Type of treatment	Dentition	
	Primary (n=11)	Permanent (n=72)
	N (%)	N (%)
Supportive therapy	7 (63.6)	6 (8.2)
Composite restoration	1 (9.1)	13 (18.1)
Extraction	3 (27.3)	3 (4.2)
Prosthesis	-	4 (5.6)
Apexification	-	11 (15.3)
Pulpotomy (apexogenesis)	-	1 (1.4)
Direct pulp capping	-	2 (2.8)
Re-implantation	-	1 (1.4)
Root canal therapy only	-	13 (18.1)
Splinting only	-	12 (16.7)
Splinting and RCT	-	6 (8.2)

Table 4. Distribution of treatment given according to type of dentition

Discussion

In this study, it was found that traumatic injuries to teeth were more common among males than females in the ratio of 2:1. This trend has been reported in most surveys in different populations, that males experienced significantly more trauma to the permanent dentition than females^{5-7, 13-16}. In Nigeria, previous studies have also shown males to experience more traumatic injuries to their teeth than females^{8,9}. This is because boys are more adventurous and are involved in more rigorous physical activities than girls. Vashisth et al¹⁷, found a prevalence of 1.6:1 and ascribed it to the more agitated nature of boys.

Dental injuries were more common in the 9 to 12- year-old age group in both the male and female patients categories in this study. This falls within the age range from other studies which suggest that such injuries are most frequent in children between 6 and 13 years of age^{15,16,18}. There is a relationship between age and gender in this study, though it is not significant. This may be due to the fact that the sample size is small and that it was a clinic-based study.

The major cause of injury was fall (65.5%) followed by collision (16.4%) and is in agreement with other studies on dental trauma in children¹⁵⁻²⁰.

Others sustained injuries from road traffic accident (RTA), assault and chewing. More than half of the injuries from road traffic accident were caused by commercial motorcycles which is a common means of transportation while that of chewing was from chewing ice and chicken bone. The most common place of occurrence of these trauma was the home followed by school and this is in line with another Nigerian study²¹. It is expected that all the trauma that occurred in children between ages 1 to 4 years happened in the home while those of older age group occurred mostly in the school. Most of the trauma that occurred at home was as a result of domestic accidents and careless playing while that of school was as a result of sport related injuries.

Clinical evidences have shown that prognosis of many types of traumatic dental injuries depend on prompt management. However, in this study only 36.4% of the subjects sought care within one week of their dental injury. In fact, only 16.4% presented for care on the day of the injury and mostly because there was excessive bleeding and associated soft tissue injury. It therefore implies that for majority of the children in this study, the time that elapsed between injury and presentation was more than one week and therefore indicates that the parents did not fully understand the importance of seeking immediate care after dental trauma. This is similar to findings from other studies where the percentage of children who sought care immediately or the day following the injury was low^{20,22,23}.

According to the findings of Sandalli et al¹⁶ and Kargul et al¹⁹, the central incisors were the most commonly traumatized teeth. This is similar to the result of this study where the central incisor was the most commonly traumatized teeth in both the primary and permanent dentition followed by the lateral incisors. When compared with other teeth, the central incisors may be more susceptible to traumatic injuries because of their position in the dental arch. Moreover, these teeth may have been proclined in some children, thus making them vulnerable to injury. In this study, 13(23.6%) of the patients that sought dental care had an incisal overjet of more than 3mm. It is well-established that increased incisal over-jet increases the risk of traumatic injuries to teeth²⁴⁻²⁶. However, Glendor²⁷ noted that it is not overjet

and lip coverage alone that increase the risk for TDIs but a complex interaction between the patients oral situation, the design of school playgrounds and human behaviour.

Several studies have reported that the type of injury differs according to the dentition and the cause of injury³. Some studies reported that crown fracture without pulp exposure was the most common injury to the permanent dentition whilst in the primary dentition, luxation was the most commonly reported^{15,28,29}. However, in this study, the most common type of dental injury observed in the primary dentition were enamel-only fracture and enamel-dentine-pulp while in the permanent dentition, majority presented with fracture of both enamel and dentine without involvement of the pulp. Similar findings have been reported in other studies^{18,30}. Overall the primary dentition presented with more fracture than luxation injury in contrast to many other studies which reported that luxation was the most common type of injury in the primary dentition^{15,16,28,29}. In this study, most of the children aged 1 to 4 years old presented with crushed primary central incisors with pulpal exposures. It was found that most of their injuries were as a result of fall on slippery tiled floors in homes and eateries, the flooring design currently in vogue in the country.

The majority of the patients in this study presented with only one traumatized tooth (40, 73%) and this finding is very similar to that reported in previous studies^{15,20,23}. Many of these injuries affected the maxillary region more than the mandibular region and there was no significant difference between the right and left sides of the jaws. The treatment types offered included supportive therapies, composite restoration, extractions, direct pulp capping, vital pulpotomy, apexification, root canal therapy, splinting, re-implantation and provision of prosthesis. Most of the affected primary teeth were managed conservatively while the treatment of choice for the majority of the permanent teeth was composite restoration and root canal therapy. Overall, most of the permanent teeth had endodontic therapies (43%). Among these, 7 (23%) permanent teeth presented with only enamel and dentine fracture and possibly would not have required endodontic therapy if these children had sought treatment earlier.

Conclusion

Fracture was more common than luxation injury in both the primary and permanent dentition. Majority of the injuries happened in the home followed by school. Only 36.4% of parents/caregivers sought dental care for their children/ward within one week after dental trauma. Parents and teachers are advised to be more safety conscious and provide protective appliances such as mouth guard for children during sporting activities. Furthermore proper information should be provided for parents and teachers on emergency care for dental trauma and the need for immediate management of traumatic dental injury to avoid complications and complex treatments.

Declaration of Interest

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References

1. Kihlbert JK: Head injury in automobile accidents. Automobile Injury Research Report 1965. No VJ-1823-R17.
2. Diab M, El-Badrawy HE: Intrusion injuries of primary incisors. Part I: Review and management. *Quintessence Int* 2000; 31:327-334.
3. Aldeiggui JM, Abanto J, Cavalho TS, Mendes FM, Wanderley MT, Bönecker M Raggio DP. Impact of traumatic dental injuries and malocclusions on quality of life of young children. *Health and Qual Life Outcomes* 2011; 9:78.
4. Bastone EB, Freer JT, McNamara JR. Epidemiology of dental trauma: a review of the literature. *Aust Dent J* 2000; 45:2 – 9.
5. Clarkson BH, Longhurst P, Sheiham A: The prevalence of injured anterior teeth in English school children and adults. *J Dent Child* 1973; 4:21 – 24.
6. Jarvinen S: Fractured and avulsed permanent incisors in Finnish children. A retrospective study. *Acta Odontol Scand* 1979; 37:47 – 50.
7. Baghdady VS, Ghose LJ, Enke H: Traumatized anterior teeth in Iraqi and Sudanese children – A comparative study. *J Dent Res* 1981; 60:677-680.
8. Otuyemi OD, Sofowora CA: Traumatic anterior dental injuries in selected rural primary school children in Ile-Ife, Nigeria. *Nig Dent J* 1991; 10:20 – 25.
9. Akpata ES: Traumatized anterior teeth in Lagos school children. *Nig Med J* 1969; 6: 40 – 45.
10. Cortes MI, Marcenes W, Sheiham A: Impact of traumatic injuries to the permanent teeth on oral health-related quality of life in 12–14-year old children. *Community Dent Oral Epidemiol* 2002; 30:193 – 198.
11. American Academy of Pediatric Dentistry. Guideline 2011:112.
12. Andreasen JO, Andreasen FM: Textbook and color atlas of traumatic injuries to the teeth. 3rd ed. Copenhagen: Munksgaard; 1994; 771.
13. Zerman N, Cavalleri G: Traumatic injuries to permanent incisors. *Endod Dent Traumatol* 1993; 9:61-66.
14. Kaba AS, Marechaux SC: A fourteen-year follow-up study of traumatic injuries to the permanent dentition. *J Dent Child* 1989; 56:417-425.
15. Saroglu I, Sonmez H: The prevalence of traumatic injuries treated in the pedodontic clinic of Ankara University, Turkey, during 18 months. *Dent Traumatol* 2002; 18:299–303.
16. Sandalli N, Cildir S, Guler N: Clinical investigation of traumatic injuries in Yeditepe University, Turkey during the last 3 years. *Dent Traumatol* 2005; 21:188–194
17. Vashith S, Bansal M, Gupta N: Prevalence of traumatic injuries and knowledge regarding emergency care among 11 – 14 years government school children in rural area Dehra, Kangra District Himachal. *Oral Hyg Dent Management* 2014; 13:666 – 668.
18. Ekanayake, L. and Perera, M: Pattern of traumatic dental injuries in children attending the University Dental Hospital, Sri Lanka. *Dent Traumatol* 2008; 24: 471–474.
19. Kargul B, Caglar E, Tanboga I: Dental trauma in Turkish children, Istanbul. *Dent Traumatol* 2003; 19:72–75.
20. Rajab LD: Traumatic dental injuries in children presenting for treatment at the Department of Pediatric Dentistry, faculty of Dentistry, University of Jordan, 1997–2000. *Dent Traumatol* 2003; 19:6–11.
21. Adekoya-Sofowora CA, Adesina OA, Nasir WO, Oginni AO, Ugboko VI: Prevalence and causes of fractured permanent incisors in 12-year-old suburban Nigerian schoolchildren. *Dent Traumatol* 2009; 25:314-317.
22. Osuji OO: Traumatized primary teeth in Nigerian children attending University College Hospital, Ibadan: the consequences of delays in seeking treatment. *Int Dent J* 1996; 46:165–170.
23. Zuhail K, Semra OEM, Huseyin K. Traumatic injuries in children in southern Turkey: a retrospective study. *Dent Traumatol* 2005; 21:20–25.
24. Traevert J, Almeida IC, Marcenes W: Etiology of traumatic dental injuries in 11 to 13-year-old school children. *Oral Health Prev Dent* 2003; 1:317–323.
25. Traevert 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; 22:173-178.
26. Otuyemi OD. Traumatic anterior dental injuries related to incisor overjet and lip competence in 12-year-old Nigerian children. *Int J Paed Dent* 1994; 4: 81-85.
27. Glendor U. Aetiology and risk factors related to traumatic dental injuries-a review of the literature. *Dent Traumatol* 2009; 25:19-31.
28. Kirzioglu Z, Karayilmaz H, Erturk MS, Koseler Sentut T. Epidemiology of traumatized primary teeth in the west Mediterranean region of Turkey. *Int Dent J* 2005; 55:329-333.
29. Muriithi HM, Masiqa MA, Chindia ML. Dental injuries in 0–15 year olds at the Kenyatta National Hospital, Nairobi. *East Afr Med J* 2005; 82:592-597.
30. Borsen E, Holm AK. Traumatic injuries in a cohort of 16-year-olds in northern Sweden. *Endod Dent Traumatol* 1997; 13:276-280.