Prevalence of traumatic dental injuries among new orthodontic patients seen at the University of Benin Teaching Hospital, Nigeria

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Abstract

Objective: The aim of this study was to determine the prevalence of traumatic dental injuries among new orthodontic patients.
Method: The dental records of 150 patients consisting of 57 males (38%) and 93 females (62%) with a mean age of 18.4 ± 7.6 years who presented for orthodontic treatment at the University of Benin Teaching Hospital Dental Centre were assessed for data relating to traumatic injuries to the permanent anterior teeth. The causes and types of dental trauma, type of tooth involved and number of affected teeth were evaluated with patients' histories, study casts and pre-treatment radiographs. Descriptive statistics were performed for the study variables, age and gender differences in the frequency of traumatized teeth were evaluated with the chi-square test.
Result: The results revealed dental trauma prevalence of 21.3% among the new patients before the onset of their orthodontic treatment. The prevalence of dental trauma was significantly higher in males ($p<0.05$) and most frequently observed in patients aged 6 to 10 years. Falls was the commonest cause of dental traumatic injuries among the patients (37.5%). The most common type of trauma to the teeth was enamel fracture (46.9%) followed by avulsion (28.1%). Most traumatic injuries affected the right and left maxillary central incisors. Frequency of trauma to only one tooth was observed in 68.8% of the patients and multiple teeth involvement seen in 31.2%.
Conclusion: This study revealed a high prevalence of traumatic dental injuries among new patients seeking orthodontic treatment at Benin City, Nigeria. An early orthodontic evaluation and interceptive therapy where appropriate is recommended to reduce risk of dental trauma in Nigerian young population.

Key words: Traumatic dental injury, Dental trauma, Orthodontic patients

Introduction

Traumatic injuries to the dentition are common conditions in children and adults that may result in fractures of tooth, discoloration, mobility, tooth loss and pain. Trauma to the anterior teeth could therefore constitute aesthetic, functional and psychological problems to individuals[1,2]. Epidemiological studies among general populations in many countries have reported high prevalence of traumatic dental injuries in children and adolescents, ranging from 9.4% to 34% indicating that dental trauma is a significant dental public health problem[3-8].

Most dental trauma have been reported to frequently affect the maxillary incisors[2] and increased overjet, protrusion of upper incisors and inadequate lip coverage have been considered to possibly constitute the most significant predisposing factors to traumatic injuries of the maxillary incisors[9-11]. These malocclusion traits are often present in association with other occlusal discrepancies in the patients seeking orthodontic treatment. Epidemiological studies have revealed also that a significant percentage of patients for orthodontic treatment suffered from dental trauma prior to their presentation for orthodontic therapy[12-14]. Traumatized incisors may therefore constitute challenges to orthodontists during orthodontic treatment as the implications of tooth movement for traumatized teeth and their long-term prognosis must be taken into consideration. Patients with previous dental trauma experience have been suggested to be more susceptible to complications such as root resorption and loss of tooth vitality[9]. Collaboration has been suggested as crucial between orthodontists, paedodontists or general dental practitioners of the individuals with traumatized teeth for effective management[15]. The knowledge of the prevalence of dental trauma in prospective orthodontic patients is therefore imperative as it has implications for orthodontic diagnosis, treatment planning and timing of treatment. Adequate history which includes detailed

questions about previous episodes of dental trauma and treatment if any, of the dental trauma, in conjunction with clinical and radiographic assessments are of utmost importance in assessment of patients who are seeking orthodontic treatment.

Presently, there is no Nigerian epidemiological study that has previously evaluated prevalence of dental trauma among new orthodontic patients. Therefore, the objectives of this retrospective study were to determine the prevalence of traumatic injuries to the permanent anterior teeth, the causes and types of traumatic injuries, the type and number of teeth involved in the injury and the age and sex distribution of traumatized teeth among the new orthodontic patients who presented at the University of Benin Teaching Hospital, Benin City, Nigeria.

Materials and method

The material for this study included the dental records of patients who had presented for treatment of malocclusion at the Orthodontic unit of the University of Benin Teaching Hospital Dental Centre, Benin City, Nigeria between January 2008 and January 2014. The dental histories, clinical dental status, dental casts and pre-treatment radiographs including periapical and dental panoramic tomographs were retrospectively analyzed to determine frequency of previous trauma to the permanent anterior teeth in all the patients before commencement of orthodontic treatment. The causes and types of dental trauma, type of tooth involved in trauma and number of affected teeth and their distribution within the arches were determined. Age and gender differences in the frequency of traumatized teeth were also determined. Twenty nine patients with incomplete records, no pretreatment study models and radiographs were excluded from the data utilized for this study leaving a remaining sample of 150 subjects with complete records.

The re-examination of 20 randomly selected patients' records 4 weeks after initial examination revealed no significant differences between the initial and repeated recorded data. Kappa values were statistically insignificant indicating a good intra examiner reliability[16].

Descriptive statistics were performed for the study variables and statistical age, and gender differences in the frequency of traumatized teeth were evaluated with the chi-square test and $p<0.05$ was regarded as significant. The data analysis was carried out with Statistical Package for Social Sciences software version 17 (SPSS, Chicago, Illinois).

Result

A total of 150 dental records of orthodontic patients comprising 57 males (38%) and 93 females (62%) aged 10 - 40 years (mean age of 18.4 years ± 7.6) were analyzed. The results revealed that 32 of the 150 patients had traumatic injuries to their permanent anterior teeth before their presentation for orthodontic treatment which represents dental trauma prevalence of 21.3% as shown in **Table 1** and was significantly higher in males ($P<0.05$). Age distribution of patients with and without dental trauma was shown in

Table 1. Gender distribution of the patients with and without dental trauma

	Sex					
Dental trauma	**Males**		**Females**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
Patients with dental trauma	17	29.8	15	16.1	32	21.3
Patients without Dental trauma	40	70.2	78	83.9	118	78.7
Total	**57**	**100.0**	**93**	**100.0**	**150**	**100.0**

$X^2 = 3.950$ $P<0.05$

Table 2. Age distribution of the patients with and without dental trauma

	Dental trauma					
Age (years)	**With dental trauma**		**Without dental trauma**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
6-10	7	21.9	17	14.4	24	16.0
11 - 15	6	18.8	28	23.7	34	22.7
16 - 20	6	18.8	21	17.8	27	18.0
21 - 25	6	18.8	34	28.8	40	26.7
26 - 30	3	9.4	13	11.1	16	10.7
31 - 35	4	12.5	2	1.7	6	4.0
36 - 40	0	0.0	3	2.5	3	2.0
Total	**32**	**100.0**	**118**	**100.0**	**150**	**100.0**

$X^2 = 10.346$ $P>0.05$

Table 3. Age and sex distribution of the subjects with dental trauma

	Sex					
Age (years)	**Males**		**Females**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
6 - 10	5	29.4	2	13.3	7	21.9
11 - 15	4	23.5	2	13.3	6	18.8
16 - 20	3	17.6	3	20.0	6	18.8
21 - 25	2	11.8	4	26.7	6	18.8
26 - 30	0	0.0	3	20.0	3	9.4
31 - 35	3	17.6	1	6.7	4	12.5
36 - 40	0	0.0	0	0.0	0	0.0
Total	**17**	**100.0**	**15**	**100.0**	**32**	**100.0**

$X^2 = 6.520$ $P>0.05$

Table 2. **Table 3** shows the age and sex distribution of the subjects with dental trauma and highest frequency of traumatized teeth was observed among the patients aged 6 - 10 years.

Table 4 shows that the major causes of dental traumatic injuries in these patients were falls (37.5%) and domestic accidents (18.8%). The most frequent type of traumatic injury to the teeth among the patients was enamel fracture (46.9%) followed by avulsion in 28.1% as shown in **Table 5**. **Table 6** shows that the most frequently traumatised teeth were the maxillary right central incisors (34.2%) followed by the left maxillary central incisors (28.9%). Also, the

Table 4. Gender distribution of the causes of trauma to the teeth among the patients

Causes of traumatised Teeth	Sex: Males N	Males %	Females N	Females %	Total N	Total %
Fall	7	41.2	5	33.3	12	37.5
Fights	2	11.8	1	6.7	3	9.4
Domestic accident	3	17.6	3	20.0	6	18.8
Road traffic accident	2	11.8	3	20.0	5	5.6
Unknown	3	17.6	3	20.0	6	18.8
Total	**17**	**100.0**	**15**	**100.0**	**32**	**100.0**

X^2 = 0.745 P>0.05

Table 5. Distribution of the types of injury to the teeth among the patients

Types of Injury	Sex: Males N	Males %	Females N	Females %	Total N	Total %
Enamel fracture	7	41.2	8	53.3	15	46.9
Crown fracture	2	11.8	3	20.0	5	15.6
Root fracture	0	0.0	0	0.0	0	0.0
Avulsion	6	35.3	3	20.0	9	28.1
Intrusion	1	5.9	0	0.0	1	3.1
Luxation	1	5.9	1	6.7	2	6.3
Total	**17**	**100.0**	**15**	**100.0**	**32**	**100.0**

X^2 = 2.150 P >0.05

Table 6. Distribution of traumatic injuries to the permanent teeth according to the FDI*

Tooth type	Sex: Males N	Males %	Females N	Females %	Total N	Total %
11	5	35.7	8	33.3	13	34.2
12	0	0.0	2	8.3	2	5.3
13	0	0.0	2	8.3	2	5.3
21	7	50.0	4	16.7	11	28.9
22	1	7.1	4	16.7	5	13.2
31	1	7.1	0	0.0	1	2.6
32	0	0.0	1	4.2	1	2.6
33	0	0.0	1	4.2	1	2.6
41	0	0.0	1	4.2	1	2.6
42	0	0.0	1	4.2	1	2.6
Total	**14**	**100.0**	**24**	**100.0**	**38**	**100.0**

*Federation Dentaire International notation X^2 = 10.399 P>0.05

Table 7. Gender distribution of the number of traumatised teeth among the patients

Number of traumatised Teeth	Sex: Males N	Males %	Females N	Females %	Total N	Total %
One tooth	11	64.7	11	73.3	22	68.8
Two teeth	5	29.4	1	6.6	6	18.8
Three teeth	1	5.9	1	6.6	2	6.3
Four teeth	0	0.0	1	6.6	1	3.1
Five teeth	0	0.0	1	6.6	1	3.1
Total	**17**	**100.0**	**15**	**100.0**	**32**	**100.0**

X^2 = 4.559 P>0.05

distribution within the arches showed that the maxillary teeth were more frequently affected by trauma than the mandibular teeth. The frequency of trauma to only one tooth was observed in 68.8% of the patients and two teeth were involved in 18.8% as shown in **Table 7**.

Discussion

This study revealed a prevalence of dental traumatic injury in 21.3% of the patients who newly presented for orthodontic treatment at the University of Benin Teaching Hospital Orthodontic clinic, Benin City, south-southern region of Nigeria. This prevalence of patients who had suffered trauma to their permanent anterior teeth before seeking orthodontic treatment is higher than prevalence of 9.1% dental trauma reported among new orthodontic patients seen at Bristol Dental Hospital[14] and 10.3% reported among patients before onset of their orthodontic treatment in a private practice by Bauss et al[13]. This discrepancy could be attributed to higher frequency of dental trauma among this sample of Nigerian patients before their presentation for orthodontic treatment and possibly extended period of this retrospective review compared to other studies[13,14]. However, a comparable prevalence of 19.9% and 20.26% of traumatic dental injuries to the present study was reported among Taiwan adolescents[17] and Italian children[7] respectively in a school based population study. A relatively high prevalence of 9.8% traumatic fracture of anterior teeth was also reported in Lagos school children, south-western Nigerian in an epidemiological study limited to children aged 12 years old[18]. Therefore, an early mixed dentition orthodontic intervention may be necessary in a younger Nigerian population to reduce the risk of dental trauma. Provision of mouthguards and early interceptive orthodontic treatment have been suggested for patients with overjet of 9mm, prominent incisor position and inadequate lip coverage[9,15].

The prevalence of dental trauma was statistically significantly higher in males than females for the total intending orthodontic patients in this study. This findings is consistent with other studies which reported that males were more susceptible to traumatic injuries to the dentition and suffered more dental trauma than females[2,13,14,19]. Age is a common predisposing factor to traumatic dental injuries and the highest prevalence of traumatized anterior teeth was observed among patients aged 6 - 10 years at the time of presentation for orthodontic treatment in this study. This observation is consistent with previous studies who reported more traumatic dental injuries in children with mixed dentition[2,14]. Similarly high frequency of dental trauma was also observed among the adolescents and young adults in this study.

The main cause of dental trauma among the patients was falls which constituted over a third as a cause of injuries among these patients and have been reported as the commonest cause of dental trauma in similar epidemiological studies among the new intending orthodontic patients in other populations[13,14] and also

among adult patients evaluated in a similar retrospective study in Ibadan, south-western Nigeria[19]. Domestic accidents (18.8%) also constituted significant causes of traumatic dental injuries in this present study and included falls during playing and sporting activities at home. Road traffic accidents also constituted 15.6% causes of dental trauma and less than one-fifth of the patient did not specify the causes of their dental trauma. The commonest type of trauma to the anterior permanent teeth among these patients was enamel fracture (46.9%) followed by avulsion (28.1%) and crown fracture involving enamel and dentine without pulpal involvement (15.6%), with rarity of root fractures among the patients in this study. A similar findings also have been reported in other studies[6,14].

Most traumatic injuries in this study affected the permanent maxillary central incisors and the most frequently traumatized tooth was the right maxillary central incisors followed by left maxillary central incisors. Similar epidemiological studies have also reported the permanent maxillary central incisors as the most commonly traumatized teeth[2,7,13,14,19]. Maxillary incisors are described to be more prone to traumatic injury in individuals with increased overjet, proclined upper incisors, protruded upper maxillary anterior segment, incompetent lips and class II malocclusion[9,11,20] which further buttressed the need for an early orthodontic evaluation of individuals and application of interceptive orthodontic therapy as appropriate. Most of the traumatic injuries involved only one tooth (68.8%) and multiple teeth involvement was observed in 31.2% of the patients. This prevalence is similar to 69.2% reported for one tooth and 30.8% for multiple teeth among new orthodontic patients seen at the Bristol dental hospital[14].

This evaluation of prevalence of dental traumatic injuries carried out among the new orthodontic patients provided insight into demographics of the patients, causes and types of traumatic dental injuries suffered and also the type and number of teeth affected by trauma. The orthodontists will therefore need to take into consideration the challenges involved in treating patients with a history of dental trauma vis a vis consequences of trauma on dentition development, possible risk of future episodes of trauma during treatment, increased risk of root resorption as a result of orthodontic forces and long-term prognosis of the traumatised teeth and treatment duration[15].

Conclusion

This study revealed high prevalence of traumatic dental injuries as slightly more than one fifth of this sample of Nigerian patients (21.3%) who presented for orthodontic treatment at Benin City had suffered trauma to their permanent anterior teeth. Falls was the commonest cause of dental traumatic injuries among these patients, and enamel fracture was the most frequent type of traumatic injuries observed with the central maxillary incisors being mostly affected.

An early orthodontic evaluation and interceptive therapy where appropriate is recommended in Nigerian younger population to reduce risks of dental trauma. It is also desirable for orthodontists to be conscious of the implications of tooth movement for traumatized teeth and develop a protocol for management of orthodontic patients presenting with dental traumatic injuries in order to achieve successful treatment outcomes.

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