Original Article

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Prevalence of dental trauma among 6-7-year-old children in the city of Recife, PE, Brazil

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Abstract

Dental trauma has a great impact on quality of life, affecting children physically, esthetically and psychologically. **Aim:** To assess the prevalence of dental trauma in 6-7-year-old northeastern Brazilian children and its correlation with gender. **Methods:** This cross-sectional study was carried out with 1,791 children attending 20 public schools in the city of Recife, Brazil. Data collection included oral examination to identify indicators of traumatic dental injury, such as crown discoloration in incisors, and was conducted by 4 previously trained Graduate students (Kappa > 0.8). Traumatic dental injuries were classified according to Andreasen's criteria. Root fracture was not recorded as no radiographs were taken. Statistical analysis was performed using Pearson's chi-square at a 5.0% level of significance. **Results:** The prevalence of dental trauma was 9.1% and males were significantly more affected. Crown discolorations followed by enamel fracture were, respectively, the injuries indicators more frequently observed in primary and permanent dentition. The most affected teeth were the upper central incisors in both dentitions. **Conclusions:** The prevalence of dental trauma in primary teeth was low among 6-7-year-old children in the city of Recife and showed association with gender.

Keywords: tooth injuries, child, prevalence, preschool, oral health.

Introduction

The decline in the prevalence and severity of dental caries among children in many countries, including Brazil, can make dental trauma into one of the most serious public health problems. Moreover, dental trauma causes a great impact on quality of life, affecting children physically, esthetically and psychologically[1-3].

Some studies reported a prevalence of traumatic dental injuries ranging from 5.02% to 62.1% (Table 1) in primary teeth and from 6.4% to 27.56% in the permanent dentition (Table 2). This variation may be caused by a number of factors such as: differences in data collection method, sample selection and place where the study was conduced[20,21].

Regarding age of highest prevalence of trauma in primary teeth, a great discrepancy among findings is observed, as it ranges between 0 and 5 years[2,3,6,21-24]. At this age range, children's poor motor skills do not allow precise and safe movements[23]. As to permanent dentition, a higher incidence is observed in the 9-10-year-old age group[24,25].

Luxations are more common than fractures in the primary dentition because of the resilient bone and surrounding periodontal tissues. Meanwhile, crown fracture is the most frequent dental injury in the permanent dentition[22,24,26]. The maxillary central incisors have been reported as the most frequently injured teeth in both primary and permanent dentitions. Crown discoloration is a complication of dental trauma and it is very common in children[1-3,10,12,13,22,24,26].

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Table 1. Prevalence of traumatic dental injuries in primary teeth in different studies.

Author	Year	Country	Sample (N of children)	Age	Dental Trauma (%)
Oliveira et al. [4]	2007	Brazil	892	5-59 months	9.4
Feldens et al. [5]	2008	Brazil	376	First year	14.3
Ferreira et al. [6]	2009	Brazil	3489	< 5 years	14.9
Tumen et al.[1]	2009	Turkey	657	5-72 months	5.0
Jorge et al. [7]	2009	Brazil	519	1-3 years	41.6
Feldens et al [8]	2010	Brazil	888	3-5 years	36.4
Viegas et al [9]	2010	Brazil	388	60-71 months	62.1
Wendt et al [10]	2010	Brazil	571	12-71 months	36.6
Granville-Garcia et al [11]	2010	Brazil	820	1-5 years	20.1

Table 2. Prevalence of traumatic dental injuries in permanent teeth in different studies.

Author	Year	Country	Sample (N of children)	Age	Dental Trauma (%)
Artun et al [12]	2005	Kuwaiti	1583	13-14	14.9
Fakhruddin et al [13]	2008	Ontario	2422	12-14	11.4
Lin & Naidoo [14]	2008	South Africa	290	10-14	9.3
Naidoo et al [15]	2009	South Africa	1665	11-13	6.4
Adekoya-Sofowora et al. [16]	2009	Nigeria	415	12	12.8
Cavalcanti et al [17]	2009	Brazil	448	7-12	21.0
Huang et al [18]	2009	Taiwan	6312	15-18	19.2
Navabazam & Farahani [19]	2010	Iran	1440	9-14	27.5

Some studies claim that boys are more prone to dental trauma than girls[1,24,26], which may be explained by male's higher participation in sports and physical activities.The most frequent etiologic factor for the occurrence of dental trauma is fall from the child's own height, followed by collision against a hard object [1,2,5,7,22,26].

In the literature, there is a shortage of population-based studies investigating the prevalence of dental trauma and its etiological factors in the age range of 6-7 years. Therefore, this study was carried out to assess the prevalence of traumatic dental injuries in 6-7-year-old northeastern Brazilian children and its correlation with gender.

Material and methods

This study was carried out in the city Recife, the capital of Pernambuco state, located in the northeastern region of Brazil. According to the Brazilian Institute of Geography and Statistics, this city has a total area of 220,000 km^2. In accordance with data supplied by the Department of Education of Recife, children start elementary education at the age of six. About 144,000 schoolchildren are enrolled in municipal schools, of which almost 100,000 are in elementary education. The city of Recife has a total of 214 public schools run by the municipality.

The sample size was calculated using the Epi-Info 6.0 software program. The estimated prevalence for dental trauma was 10.0%, based on a similar population[27]. The precision index adopted was 3.0% with a margin of error of 5.0%. Because the subjects were not selected at random, but per conglomerate, the correction factor of 2.1 was used. Minimum sample size for fulfilling the requirements was estimated at 800 children. To compensate for possible losses during the survey of data, the sample size was increased by 20.0%, resulting in a final sample of 960 children.

This cross-sectional study was carried out with 1,791 children attending 20 public schools in Recife. The data were collected in larger amounts than the minimum required because other factors in this sample were investigated for other study; however we maintain the proportion of children in the schools that have participation in this study. The schools were selected by lottery and following the proportion of children.

Data collection included an oral examination conducted in classrooms under natural illumination to identify the type of the traumatic injury to the incisors teeth was conducted by 4 dentists (postgraduate students) trained in the calibration and standardization of the criteria used. Inter-examiner agreement was satisfactory (Kappa > 0.8). The calibration was placed with photographs and compared with a gold standard.

Traumatic dental injuries were recorded according to the method described by Andreasen, Andreasen[20] for dental trauma. Root fracture was not recorded and no radiographs were taken. Crown discoloration indicating pulp damage was included in the criteria.

The data were subjected to simple descriptive analysis and the statistical analysis was done with SPSS (statistical Package for the Social Sciences) version 11 and SAS (Statistical Analysis System) version 8. Pearson's chi-square test was used and a 5.0% margin of error was allowed in evaluating the reliability of the statistical tests.

Table 3. Distribution of children considering the gender and presence or not of dental trauma

Trauma	Gender						p-value
	Male		Female		Total		
	n	%	n	%	n	%	
Yes	102	11.2	61	6.9	163	9.1	p (1) = 0.002*
No	811	88.8	817	93.1	1628	90.9	
Total	913	100.0	878	100.0	1791	100.0	

(*): Significant association at 5.0%.
(1): Using the Pearson's chi-square test.

The parents or guardians were previously informed of the purpose and methods of this study and their written informed consent was obtained. The study design was in accordance with the principles of the Helsinki Declaration and was approved by the Ethics Committee of the University of Pernambuco, Brazil (Protocol # 211/09).

Results

The prevalence of dental trauma in both dentitions was 9.1% (n = 163) and male children were significantly more affected by trauma (p > 0.05) (Table 3).

Among 1,791 children examined, 163 were affected by trauma. The most common indication of dental trauma was crown discoloration (5.0%), followed by enamel fracture (2.9%), enamel-dentin fracture (0.5%), extrusive luxation (0.3%), lateral luxation (0.2%), intrusive luxation (0.2%) and avulsion (0.0%).

The primary dentition (n = 156) was more affected than the permanent dentition (n = 7) in the age range considered (Table 4). In all children, 14,000 teeth were examined, being 8,078 (57.7%) permanent incisors and 5,922 (42.3%) primary incisors.

With regard to permanent teeth, only 0.15% (n = 7) had dental trauma. The maxillary central incisors were the only affected teeth and the types of trauma were: enamel fracture (n = 6), enamel-dentin fracture (n = 4) and luxation (n = 2).

With regard to primary teeth, 3.6% (n = 163) were affected by dental trauma. The maxillary teeth were again the only affected, firstly the maxillary central incisors (89.2%) followed by the maxillary lateral incisors.

The most common indicator of dental trauma in the teeth of primary dentition were color change (57%) followed by enamel fracture (31.4%). The other 11.6% (n = 18) were due to luxation (n = 12), enamel-dentin fracture (n = 5), and avulsion (n = 1).

Discussion

The prevalence of dental trauma among 6-7-year-old children reported in this study was 9.1%. However, the prevalence of children with dental trauma in the primary dentition was 8.7%. This result is similar to the one reported by Oliveira et al.[4], higher than that found by Tumen at al.[1] and lower than that reported by other authors[5-11].

The low prevalence of children with dental injury in permanent teeth (0.4%) can be explained by the fact that the sample consisted of children in the mixed dentition phase, most of them showing permanent incisors in the process of eruption. It is important to bear in mind that the root fracture was not recorded, as no radiographs were taken, which certainly accounted for the low number of traumas.

Regarding gender, boys had more injuries than girls. Many other authors also reported a similar pattern[1,15,19,22,27,28]. This difference can be attributed to the greater participation of boys in contact sports, fights and more aggressive types of playing activities[28]. However, others studies indicated an increasing trend of dental trauma among girls, probable because of their increasing participation in sports or activities formerly practiced by boys only[29].

Table 4. Prevalence of dental trauma in children considering the dentition and different types or sequelae of trauma

Type of Trauma	Dentition				Total	
	Primary		Permanent			
	n	%	n	%	n	%
Enamel fracture	49	31.4	3	42.8	52	34.9
Enamel-dentin fracture	5	3.2	3	42.8	8	4.1
Extrusive luxation	6	3.8	-	-	6	3.5
Lateral luxation	3	2.0	1	14.4	4	2.3
Intrusive luxation	3	2.0	-	-	3	2.3
Avulsion	1	0.6	-	-	1	0.6
Crown discoloration	89	57.0	-	-	89	52.3
Total	156	100.0	7	100.0	163	100.0

For both primary and permanent teeth, dental trauma occurred more frequently in the maxilla involving central incisors. This finding is in accordance with previous studies[1-3,6,7,10,11,22,24,26,27].

The most common type of injury in the primary dentition was crown discoloration (60.6%) followed by enamel fracture (29.1%). However, in the study by Tumen et al.[1] these results were inverted: enamel fracture was followed by crown discoloration. Other authors[2,22,24,28] who also assessed primary dentition found a higher prevalence of the concussion and luxation.

In fact, crown discoloration is a complication of the trauma. In the present study, this complication was high in the primary dentition and it can have consequences to the permanent incisors. This result might be due to the fact that this part of the population has some difficulties to access the public dental service and do not seek treatment at the time of the trauma. The other injuries that followed crown discoloration were of small magnitude, although a large number of need of treatments was observed, in the same way as reported by Traebert[30].

Regarding the permanent dentition, only 7 of a total of 8,078 teeth presented dental trauma, fracture being the most prevalent type of injury. These results agree with the findings of Naidoo et al.[15] and Navabazam & Farahani[19], who claim that the permanent dentition is mostly affected by crown fracture than luxation injury. It is possible that primary teeth were more associated with luxation, while permanent teeth were more associated with fracture because skeleton plasticity decreases as the patient gets older.

Our results indicate that the prevalence of dental trauma in primary teeth was low among 6-7-year-old children in the city of Recife and showed association with gender.

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