



A retrospective study of traumatic dental injuries in children treated at a pediatric dental emergency

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Abstract

Objective: To determine the prevalence of traumatic dental injury (TDI) and relate it to the age and gender of patients attended at the pediatric dental emergency unit of the *Universidade Federal de Espírito Santo*, Vitória, Espírito Santo.

Methodology: A cross-sectional observational analytic study was undertaken by collecting data from the medical records of 0-12 year-old patients, treated between 03/2003 and 11/2010. The variables analysed consisted of age, gender, number and teeth most affected, and sequelae. Data were tabulated using Excel 2007 and statistical analysis was performed using the Chi-square test.

Results: A total of 596 medical records was analyzed, of which 124 contained reports of TDI. The greatest prevalence of TDI occurred in male children (63.7%) and in the 5 year-old age group (21%). The teeth most affected were the upper central incisors (65.8%) with 1-2 teeth involved (75.8%). In terms of sequelae, subluxation (30%) was the most prevalent. The results of the bivariate analysis were significant when age and type of sequela were compared.

Conclusion: A relationship was found between the type of sequela caused by TDI and the child's age at the time of the accident but not with their gender.

Key words: Epidemiology; Dental trauma; Primary dentition

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Estudo retrospectivo de lesões dentárias traumáticas em crianças atendidas no pronto-socorro odontopediátrico

Resumo

Objetivo: Determinar a prevalência das lesões dentárias traumáticas (LDT) e relacionar com faixa etária e sexo dos pacientes assistidos no Pronto-Socorro Odontopediátrico da Universidade Federal do Espírito Santo, Vitória-ES.

Métodos: Foi realizado um estudo analítico observacional seccional mediante a coleta de dados dos prontuários de pacientes na faixa etária de 0 a 12 anos, atendidos no período de 03/2003 a 11/2010. As variáveis analisadas compreenderam a idade, sexo, número e dentes mais afetados, e sequelas promovidas. Os dados foram tabulados no Excel 2007 e para a análise estatística foi utilizado o teste Qui-quadrado.

Resultados: Um total de 596 prontuários foi analisado, onde 124 continham relatos sobre LDT. A maior prevalência de LDT ocorreu em crianças do sexo masculino (63,7%) e na faixa etária de 5 anos (21%). Os dentes mais acometidos foram os incisivos centrais superiores (65,8%) sendo envolvidos no trauma 1 a 2 dentes (75,8%). Quanto às sequelas, a subluxação (30%) foi a mais prevalente. A análise bivariada apresentou resultados significantes quando comparado idade/tipo de sequela.

Conclusão: Foi observada uma relação do tipo de sequela provocada pela LDT em relação à idade da criança no momento do acidente, mas não com o sexo.

Palavras-chave: Epidemiologia; traumatismos dentários; dentição decídua.

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Introduction

Traumatic dental injuries (TDI) rank among the most serious public health problems in children and adolescents in Brazil and worldwide because of their prevalence, impact on quality of life, prolonged costly treatment and the possibility of establishing programs to prevent and control such injuries [1]. The causes of TDI are widely known with falls, collisions with objects or people, car accidents, sports and violence being the most common [2,3]. Some studies have shown that certain individual clinical factors are related to the greater prevalence of trauma in anterior teeth, such as labial protection [4,5] and accentuated overjet [4,6].

Epidemiological studies report a high prevalence of TDI in many countries [6-11]. The literature contains many studies with TDI data for permanent teeth [12,13], but there are few reports on prevalence in primary teeth [14,15].

Studies on the prevalence of TDI can help with the holding of educational campaigns and appropriate therapeutic approaches to provide guidelines on prevention and the management of patients with trauma in the emergency room. The literature also reports that the prevalence of TDI in primary teeth can vary from place to place. In Brazil, prevalence ranges from 9.4% [16] to 36.8% [15].

Despite the increase in publications on TDI in permanent dentition in Brazil, there is still a lack of data on the management of the injury in the country. The substantial variations in incidence which have been found highlight the need for more studies on its prevalence and the factors associated with it [3].

Trauma in primary dentition requires a different approach from that used in permanent dentition, because of the very close relationship between the apex of the primary tooth affected by the trauma and the germ of the permanent successor. Possible effects on the permanent tooth must be considered when immediate treatment is being administered. The likelihood of delayed trauma sequelae should also be considered, both for primary and permanent dentition [5].

This study set out to evaluate the prevalence of TDI types in primary dentition in 0-12 year-olds who presented themselves at the pediatric emergency clinic of the *Universidade Federal de Espírito Santo* (UFES), between 2003 and 2010. As well as surveying both the prevalence and type of TDI in primary dentition, the number and type of tooth most affected will be analysed. In addition, TDI in primary dentition will be related to demographic factors such as age and gender.

Methods

This research consists of a cross-sectional observational analytic study, based on data collection from 596 medical records of 0-12 year-olds, of both sexes, attended at the Outreach Project "Pediatric dental emergency" carried out by the Department of Pediatric Dentistry at the UFES (Vitória, Espírito Santo, Brazil).

The study was approved by the Research Ethics Committee at the UFES (No. 091/06) and the data on the 2003 to 2010 period were collected by a single researcher. The inclusion criteria stipulated that the records of children who had been attended at the emergency clinic for TDI care in primary teeth be selected. Information on gender, age at the time of trauma, teeth involved and the type of traumatic injuries (fractures and luxations) were collected from the medical records. All the medical records used had been fully filled out with the necessary information and a free informed consent form had been signed by their parents/guardians.

To check the occurrence of TDI, the classification used was that described by Andreasen, Andreasen and Andersson [12] in the Fractures section (Crown without pulp exposure, Crown with pulp exposure, Crown-Root, Root and Alveolar bone) and luxations (Concussion, Subluxation, Side dislocation, Intrusive dislocation, Extrusive luxation and Avulsion).

Data were tabulated using Microsoft Office Excel (2007) and the statistical analysis used tables to summarize the data studied. The Chi-square test was used to compare categorical data and the results of the test were statistically significant at $p \leq 0.05$. The SPSS statistical software was used to calculate frequency and for the Chi-square test.

Results

An analysis of the medical records of 596 children attended at the pediatric dental emergency clinic at UFES found that 124 (20.8%) contained information relating to TDI. The incidence of TDI was higher for males (64.06%) than for females (35.94%). The age group with highest incidence was 5 years, with 21% (Table 1). The frequency of the number of teeth involved in TDI in primary dentition in the same child ranged from 1 to 7, while the highest frequency was of 1 to 2 teeth affected, or 75.8% (Table 2). The teeth most involved in TDI in primary dentition were the upper central incisors, 65.8% (Table 3).

Table 1. Frequency of traumatic dental injuries in primary teeth according to age of children at the time of trauma (Vitória, Brazil, 2010).

Age (years)	Traumatic Dental Injuries	
	Absolute frequency (n)	Relative frequency (%)
0	02	1.6
1	19	15.3
2	19	15.3
3	21	16.9
4	18	14.5
5	26	21.0
6	13	10.5
7	05	4.0
8	01	0.8
Total	124	100



Table 2. Frequency distribution of the number of primary teeth involved in traumatic dental injuries (Vitória, Brazil, 2010)

Number of teeth	Traumatic Dental Injuries	
	Absolute frequency (n)	Relative frequency (%)
1	51	41.1
2	43	34.7
3	11	8.9
4	15	12.1
5	01	0.8
6	02	1.6
7	01	0.8
Total	124	100

Analysis of the frequency of the type of sequelae caused by LDT in children showed that in terms of lesions there was no statistically significant difference in relation to gender ($p=0.220$) (Table 4), but that there was a statistically significant difference in terms of age group (Table 5). The most frequently found sequela was subluxation occurring in the 2-5 age group. This was followed by intrusion at the age of one year, crown fracture in the 1-5 age group and avulsion in the 5-8 age group ($p=0.05$).

Table 3. Frequency distribution of primary teeth involved in traumatic dental injuries (Vitória, Brazil, 2010)

Teeth affected	Traumatic Dental Injuries	
	Absolute frequency (n)	Relative frequency (%)
51	85	33.3
61	83	32.5
62	27	10.6
52	25	9.8
71	08	3.1
81	08	3.1
53	05	2.0
63	05	2.0
72	03	1.2
82	03	1.2
54	01	0.4
83	01	0.4
84	01	0.4
Total	254*	100

* A child could have more than one tooth affected by the same trauma, according to Table 2.

Table 4. Frequency distribution of types of sequelae caused by traumatic dental injuries in children according to gender. Bivariate analysis using Chi-square test for sequelae related to the types of variables and gender (Vitória, Brazil, 2010)

Type of Sequelae	Total		Gender				p-value
			Female		Male		
	n	%	n	%	n	%	
Extrusion	19	7.4	2	2.2	17	10.4	0.220
Intrusion	38	14.8	16	17.6	22	13.5	
Dislocations	23	9.0	11	12.1	12	7.4	
Subluxation	77	30.0	31	34.1	46	28.2	
Concussion	18	7.0	07	7.7	11	6.7	
Crown Fracture	31	12.1	07	7.7	24	14.7	
Root Fracture	03	1.2	01	1.1	02	1.2	
Crown-Root Fracture	03	1.2	01	1.1	02	1.2	
Necrosis	13	5.1	3	3.3	10	6.1	
Avulsion	29	11.4	12	13.2	17	10.4	
Soft tissue	02	0.8	01	1.1	01	0.6	
Total	256	100	92	100	164	100	

Table 5. Frequency distribution of types of sequelae caused by traumatic dental injuries in children according to age. Bivariate analysis using Chi-square test for the variables related to types of trauma according to age (Vitória, Brazil, 2010)

Type of Sequelae	Total		Age (Years)									p-value
	n	%	0	1	2	3	4	5	6	7	8	
Extrusion	19	7.4	-	2	6	7	3	1	-	-	-	0.05
Intrusion	38	14.8	-	13	6	6	3	5	5	-	-	
Dislocations	23	9.0	-	3	3	2	3	6	3	3	-	
Subluxation	77	30.0	1	7	13	16	11	23	6	-	-	
Concussion	18	7.0	-	2	4	2	-	5	5	-	-	
Crown Fracture	31	12.1	1	8	8	5	4	4	1	-	-	
Root Fracture	03	1.2	-	-	-	2	1	-	-	-	-	
Crown-Root Fracture	03	1.2	-	3	-	-	-	-	-	-	-	
Pulp Necrosis	13	5.1	-	-	1	4	2	5	1	-	-	
Avulsion	29	11.4	1	2	4	6	2	8	2	3	1	
Soft Tissue	02	0.8	-	-	-	1	-	-	1	-	-	
Total	100	256	3	40	45	51	29	57	24	6	1	

Discussion

TDI treatment is common in pediatric clinical practice and is crucial for prognosis and emergency care at this moment [11]. Consequently, the professional's knowledge is vital when considering the clinical, radiographic and emotional aspects involved.

In this study an analysis of 596 medical records found that 124 contained information relating to TDI, yielding a prevalence of 20.8% (Table 1). The incidence reported in other studies ranges from 14 to 36%. In Brazil a study by Bonini et al. [4] showed a prevalence of 13.9%, Padua et al. [17] showed 14.8%, Feldens et al. [18] 15%, Della Vale et al. [14] 22.5%, Kramer et al. [19] 23.6%, while Granville-Garcia et al. [15] showed 36.8%. In other countries the prevalence of TDI in primary teeth also varies. Carvalho et al. [8] found a prevalence of 18% while Andreassen and Ravn [7] found 30%.

In terms of age, Bijella et al. [20] reported that dental trauma can be found from the age of five months onwards, with the predominant phase of oral trauma occurring when the child begins to stand up, walk and run [5]. In this study, a high incidence was found in the 1-5 age group, with 38 (30.6%) children aged between 1 and 2, 21 (16.9%) aged 3 and 26 (21%) aged 5 (Table 1).

In the literature the results of TDI vary in relation to age. Bijella et al. [20] found the highest incidence between 5 months and three years. Cunha et al. [21] found the highest prevalence in children aged 1 to 2, while for Kramer et al. [22] it was in 2-3 year-olds. The higher incidence of TDI in these age groups has been justified by the fact that it is the time when children learn to walk. It is also justified by physiological and behavioral factors, such as the lack of motor coordination, intense curiosity and lack of attention. Granville-Garcia et al. [15] and Oliveira et al. [16] found the highest incidence of TDI in 4 to 5 year-olds while for Pádua et al. [18] it was in 5 year-olds, in public as well as in private schools. Other studies have shown that the incidence of TDI increases with age [4,9,10,15,16,19].

On the question of gender in this study, males (63.7%) presented significantly more traumatic injuries during primary dentition than females, in a ratio of 1.75:1. These results are consistent with those of other authors [9,11,15,17,21]. However, a large part of the TDI studies into primary dentition found no difference between the genders [7,16,19].

In this study it was seen that for 41.1% of children, there was only one tooth involved (Table 3), similar to what is reported in the literature [16,18,19]. Although most TDIs appear to involve just one tooth, multiple traumas damaging two or more teeth are quite prevalent, especially in primary dentition. It is also important to note that the clinical signs are usually more obvious in one tooth only, despite the involvement of the adjacent teeth.

Table 4 shows that there was no evidence of a statistical difference between the TDIs in terms of gender ($p < 0.05$). Male children had a higher prevalence of subluxation

(28.2%), which was also true for females (34.1%). From these data it can be concluded that gender does not influence TDI type.

A total of 255 teeth were involved in TDI and the most frequently affected teeth were the upper central incisors (65.8%), followed by the lateral incisors (20.4%) and then the lower incisors (8.6%). Reports in the literature are unanimous in showing that the teeth most frequently affected are the primary upper central incisors, without any difference between the right and left sides [7,10,16,17,20,22].

As regards the type of sequelae caused by TDI, there was a higher incidence of subluxation in 30% of cases, followed by intrusion of primary teeth (14.8%), crown fracture (12.1%), and avulsion (11.4%) (Table 4). Luxations were more prevalent than fractures due to the fact that the bone in primary teeth is more porous, and therefore more prone to luxation [12,13].

The literature shows that luxations are more prevalent in primary dentition, in contrast to permanent teeth where the highest prevalence is that of fractures [12,13]. Luxation in primary dentition occurs more frequently due to the greater porosity and resilience of the alveolar bone in this age range²³. There is consensus that TDIs as a result of luxation, subluxation and concussion are more common in primary teeth [7,9,10,24].

With regard to age and type of post-trauma sequelae, there was a statistically significant difference. It was seen that subluxation was the most frequent sequela and occurred at 5, 3, 2 and 4 years of age. This was followed by intrusion in the first year of life, probably due to greater bone porosity. The five year age group presented the highest incidence of TDI and it was the period which recorded the greatest number of subluxations, dislocations, concussion, pulp necrosis and avulsion. This particular age group can be associated with the beginning of the child's school life, and also with the practice of sport [15,16].

While the findings of this research are in consonance with a number of studies in both the national and international literature [7,9,10] they disagree with others [19,21]. In these studies, the methodology used could be considered a limitation, where a cross-sectional approach could lead to undiagnosed lesions. For example, luxations are not identified in most cases due to the fact that there was no evidence of sequelae of this type of trauma when the survey was being undertaken [7,13].

From the data presented in this research, it was seen that sustained efforts must be made and health promotion policies drafted to prompt the implementation of preventive strategies to reduce the prevalence of TDI in preschool children, and draw up plans to treat these injuries [17].

Conclusion

- Gender does not influence the type of traumatic sequelae caused by TDI.
- The age range of children influences the type of traumatic sequelae caused by TDI.



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