

# Prevalence and Characteristics of crown fractures in permanent upper incisors from schoolchildren in a southern Brazilian city

## *Prevalência e características da fratura coronária em incisivos permanentes superiores de escolares em uma cidade do sul do Brasil*

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### ABSTRACT

The main goal of this study is to assess the prevalence of crown fractures in permanent upper incisors of schoolchildren using a photographic method. 227 children were photographed. Of the 889 teeth examined, 8.4% of them presented some coronal fracture. Coronal fractures due to dental trauma were most prevalent in permanent upper incisors and more frequent in boys than in girls. Most of the fractures affected only the enamel and did not need restorative procedure.

**Key words:** Dental trauma, tooth injuries, permanent teeth

### INTRODUCTION

Dental fractures in childhood and adolescence must receive special attention, since they may have an effect both on the patient's speaking and chewing capacity, as well as on the physical appearance<sup>1</sup>. Depending on the intensity of the trauma, its sequelae may have a negative impact throughout the patient's adult life<sup>2</sup>. Several studies carried out on Brazilian schoolchildren<sup>1-5</sup> have proved that dental trauma is frequent among Brazilian children.

Many studies showed a high prevalence of traumatic injuries to permanent anterior teeth, especially central upper incisors<sup>6-13</sup>. Even though many of these injuries do not need restorative treatment; among those who do, however, the percentage of dental rehabilitation is still low<sup>1,14</sup>.

Most dental fractures are related to accidents. The absence of lip coverage and the presence of a marked overjet seem to be the most important local factors that determine an increase in the susceptibility to and the severity of trauma to anterior teeth<sup>15</sup>. Nevertheless, geographical and

socio-cultural aspects are also closely related to accidents, and therefore to dento-alveolar trauma, thus determining specific features for each community<sup>2</sup>.

Due to this fact, epidemiological studies about the prevalence, etiological aspects and treatment of dentoalveolar trauma in young permanent teeth are extremely important. Such studies can be considered as a tool for the implementation of effective preventive and educative strategies against fractures.

In order to produce such a contribution, the main goal of this paper is to study the prevalence of crown fractures in permanent upper incisors of schoolchildren from public schools in the city of Camboriu, Brazil.

### MATERIAL AND METHODS

Two hundred and twenty-seven children aged between 115 and 191 months and enrolled in three public schools in the city of Camboriu, Brazil, were photographed. All of them fulfilled the following criteria:

- All upper incisors erupted, with at least  $\frac{3}{4}$  of the crown exposed.
- Their parents or whoever responsible for them under the law signed a consent form authorizing the research.

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- All of them were 5<sup>th</sup> to 8<sup>th</sup> grade students.

The children were lectured on oral health and hygiene, as well as on proper oral hygiene techniques.

A written permission to carry out the research was obtained from local health and educational authorities, and an informed consent was obtained from the students parents before the examination of the children.

Photographs were taken after the removal of dental plaque through supervised tooth brushing carried out by the researchers. A “Dental EYE III” Yashica© camera loaded with photographic film (asa 100, 36 pictures) was used. All photographs were taken with the students seated, while the photographer was placed in front of them at the school courtyard, under natural lighting. Acrylic palatal expanders covered with PVC film were used for each shot.

The slides were projected onto a white screen two meters away from the slide projector, in a dark room. A previously calibrated examiner observed the images and noted down in a specific form the presence and the characteristics of each fracture. The teeth considered as “fractured” were those that presented a loss of dental structure without caries lesions or hypoplasia. In order to define the need of restoration the following criteria were employed:

- NINR (Not In Need of Restoration) fracture: Teeth fractured only at the incisal surface, without exposure of the dentin nor aesthetically compromised.
- INR (In Need of Restoration) fracture: Teeth fractured with exposure of the dentin or aesthetically compromised.

The statistical analysis of the data obtained was carried out using the Epi Info 6 statistical package<sup>16</sup> with a significance level of 5%. In order to analyze statistical differences between genders, Chi-square test was applied.

## RESULTS AND DISCUSSION

Dentoalveolar trauma is a constant source of concern in the daily practice of pediatric dentistry. In order to implement proper preventive and educational measures it is necessary to understand its etiological factors, as well as its characteristics and frequency.

Out of 227 children who were examined, the researchers collected data from 889 teeth, being 220 upper right laterals, 226 upper right central incisors, 226 upper left central incisors and 217 upper left laterals. Seven, one, one and ten teeth were left out for the teeth number 12, 11, 21 and 22 respectively. Such exclusions were due either to the absence of the tooth, unfocused photographs or inadequate dental position.

Among schoolchildren, high prevalence of traumatic injuries seems to be a frequent finding, even in very different populations<sup>6-12,18,19</sup>. In Brazil, the most recent researches have confirmed this worldwide trend<sup>1-4</sup>. The results of the present work also show a high prevalence of traumatic injuries. Table 1 shows that at least one of the permanent upper incisors of 61 of the children (26.9%) presented clinical signs of coronal fracture. As regards to the gender of the children, the results show that dental fractures in permanent upper incisors were more frequent in boys than in girls (Table 1); the difference is statistically significant (p= 0.042).

**Table 1.** Frequency and distribution of the children who presented dental fracture regarding gender.

GENDER	WITH FRACTURE		WITHOUT FRACTURE	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Female	28	21.4	103	78.6
Male	33	34.4	63	65.6
TOTAL	61	26.9	166	73.1

p= 0.042, non-parametric test “Chi-square”, with Yates correction.

Regarding the number of teeth affected, the present research observed that 21.6% of the children presented injuries in only one tooth, 4.4 % presented

two injured tooth and 0.9% presented three injured tooth (Table 2). Most of the authors agree that the majority of accidents involve one tooth only<sup>3,6,8,12,13</sup>.

Furthermore, 21.2 % of the boys who presented fractures presented it in more than one tooth, whereas the figure for girls was 17.9% (Table 3), even though the difference here is not statistically significant ( $p=0.996$ ).

For this age group, most studies show that there is higher prevalence of dento alveolar trauma among boys<sup>1,3,7,9,10-12,17</sup>.

**Table 2.** Frequency and percentage distribution of the children regarding the number of fractured teeth

NUMBER OF FRACTURED TEETH	FREQUENCY	PERCENTAGE (%)
None	166	73.1
One	49	21.6
Two	10	4.4
Three	2	0.9
TOTAL	227	100

**Table 3.** Frequency and percentage distribution of the children who presented dental fractures (permanent incisors) regarding gender and the number of fractured teeth

NUMBER OF FRACTURED TEETH	FEMALES		MALES	
	n	%	n	%
One	23	82.1	26	78.8
Two or more	5	17.9	7	21.2

$p=0.996$  (Chi-square, with Yates correction). Not significant.

Considering all the 889 teeth that were examined, 8.4% of them (75 teeth) presented some coronal fracture (Table 4). Table 4 shows the distribution of the teeth according to the presence or absence of fractures, making clear that the most affected teeth are central incisors. Such results are

similar to those found in literature<sup>3,6-10,12,13</sup>.

The comparison between the left side and the right side did not produce statistically significant results ( $p=0.600$ ) (Table 4). Differences between the two sides of the mouth have not been a significant finding in epidemiological works<sup>3,4</sup>.

**Table 4.** Frequency and percentage distribution of fractured teeth.

Teeth and Region	n	Fractures	
		n	%
<b>Right Side</b>	<b>446</b>	<b>35</b>	<b>7.8</b>
1.2	220	07	3.2
1.1	226	28	12.4
<b>Left Side</b>	<b>443</b>	<b>40</b>	<b>9.0</b>
2.1	226	33	14.6
2.2	217	07	3.2
<b>TOTAL</b>	<b>889</b>	<b>75</b>	<b>8.4</b>

$p=0.600$  (Qui-square, with Yates correction) (Comparison between the right and the left side). Not significant.

In the present study, most dental fractures (56%) affected only the enamel and were thus considered not in need of restoration, as shown on Table 5, and described in other studies<sup>12,17,19,20</sup>.

Although 33 teeth were diagnosed as in need

of restoration, only two of them were found to be properly treated (Table 5). The comparison between the left side and the right side regarding the extension of the lesions did not produce statistically significant results ( $p=0.328$ ; Table 5).

**Table 5.** Frequency and percentage distribution of fractured teeth regarding the need of restoration

Teeth and Region	FRACTURE NINR <sup>(1)</sup> n (%)	FRACTURE INR <sup>(2)</sup> n (%)	TOTAL n (%)
Right Side	17 (48.6)	18 (51.4)	35 (100)
1.2	5 (71.4)	2 (28.6)	7 (100)
1.1	12 (42.9)	16 (57.1)	28 (100)
Left Side	25 (62.5)	15 (37.5)	40 (100)
2.1	20 (60.6)	13 (39.4)	33 (100)
2.2	5 (71.4)	2 (28.6)	7 (100)
TOTAL	42 (56)	33 (44)	75 (100)

(1) Teeth presenting fractures only at incisal surface without exposure of the dentin and not aesthetically compromised.(2) Aesthetically compromised fractured teeth or with exposure of the dentin (including two teeth already restored).

$p= 0. 328$  (Chi-square, with Yates correction) (Comparison between the right and the left side).

When evaluating the results, the comparison with other studies must be judicious, since both traumatic events and access to dental treatment are directly influenced by social-economical and cultural factors.

Based on the results of the present study, we concluded that, out of all children, 61 (26.9%) presented at least one of the permanent upper incisors with clinical signs of coronal fracture. Considering all the examined teeth (889 teeth), 8.4% (75 teeth) presented some coronal fracture. These fractures were most prevalent in permanent upper incisors and were more frequent in boys than in girls. Out of all children, 166 (73.1%) did not present evidence of coronal fractures in the upper incisors, 49 (21.6%) presented evidence of fracture in only one tooth, 10 (4.4%) presented evidence of fracture in 2 teeth and 2 (0.9%) presented evidence of fracture in 3 teeth. Most of the fractures affected

only the enamel and did not need restoration. The statistical approach showed that the difference between the two sides of the mouth was not significant.

## RESUMO

*O presente trabalho teve como objetivo principal a definição da prevalência e das características das fraturas coronárias em incisivos superiores permanentes, utilizando método fotográfico para a análise. Foram examinadas 227 crianças de ambos os gêneros, na faixa etária de 115 a 191 meses, matriculadas em três escolas públicas da cidade de Camboriú, no estado de Santa Catarina, Brasil. Foram feitos slides fotográficos dos incisivos superiores, sob luz natural, após escovação supervisionada em todas as crianças. Um observador previamente calibrado observou as imagens e anotou a presença e características das*

*fraturas encontradas. Os resultados mostraram que, dos 889 dentes examinados, 75 (8,4%) apresentaram algum tipo de fratura coronária. Houve maior prevalência de dentes fraturados em meninos, com diferença estatisticamente significativa. A maioria das fraturas (56%) afetou apenas esmalte dentário.*

**Descritores:** Trauma dental, Injúria dental, Dentição permanente

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