

# Oral and Maxillofacial Trauma in Brazilian Children and Adolescents

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Children and adolescents are frequently victims of oral and maxillofacial trauma. The purpose of this study was to determine the characteristics of oral and maxillofacial trauma that resulted in police records, in children and adolescents aged between 0 and 16 years during a period of 5 years. Among the 28,200 reports analyzed, 463 were included in the study. The men:women ratio observed was 1.6:1 and the most prevalent age range was between 15-16 years (44.40%). Most trauma cases resulted from physical assault (64.50%) and culminated in soft-tissue lesion (80.36%). Excoriations (28.64%) led as the most frequent type of lesion, and the maxillary region (22.63%) was the most common location of injury. The most common type of dental lesion was dental trauma (54.76%), and bone fractures prevailed in the nasal region (36.7%). The findings of this survey may contribute to plan and execute preventive measures as well as to guide curative measures aimed at this population group.

Key Words: dentoalveolar trauma, soft-tissue, violence, maxillofacial trauma.

## Introduction

The face is a very important region of the body, since it centers physiological and sensory functions. Facial injury may be a life threat, causing the obstruction of airways or severe hemorrhage. Furthermore, it may also cause pain, impaired facial expression and permanent disorder of functions such as sight, smell, mastication and deglutition, as well as psychological disorders. Harm to an individual's aesthetics and function has a significant effect on his/her personal and professional relationships.

The oral and maxillofacial regions are frequent targets of trauma. Together, oral and maxillofacial injuries correspond to 35% of the injuries in the whole body in the group between 0 and 6 years of age and 14% in the group between 7 and 15 years. In the former group, this result may be attributed, among other factors, to the fact that the head of children at early age consists of an area proportionally larger and heavier than in adults, as well as to their decreased ability to protect their face when compared to adults (1).

External causes, such as violence and accidents, are constantly indicated among the causes for oral and maxillofacial trauma in children and adolescents. Among violence victims, there has been an increase in the incidence of trauma in these regions and in the proportion of young adults presenting these injuries (1,2).

The occurrence of dental trauma resulting from domestic violence was studied in a group of Brazilian children and adolescents, and a predominance of avulsions (33.3%) and fractures (66.6%) was observed (3).

Literature has demonstrated a lack of studies

approaching, simultaneously, different etiologies, types and locations of oral and maxillofacial trauma in children and adolescents. The perspective of developing a study of this nature may contribute to approach this population group more comprehensively, in both health and social aspects.

The purpose of this study was to describe the characteristics of oral and maxillofacial trauma in Brazilian children and adolescents in a study period of 5 years.

## Material and Methods

A cross-sectional epidemiological study was developed to obtain the frequency of oral and maxillofacial traumas, based on forensic reports of a police institution in a medium-size municipality (600,000 inhabitants) in Brazil, for a period of 5 years.

The study comprised reports with the following characteristics: (a) crimes that occurred and were registered in the municipality during a time span of 5 years; (b) individuals aged 16 years or younger, regardless of gender; (c) trauma located in the oral and maxillofacial regions.

The study was developed by analyzing approximately 28,200 forensic reports, and recording the information on a specific form containing fields regarding the characteristics of the trauma (type and location), the individual (gender, ethnicity and age) and the occurrence (etiology).

Incomplete fields in the analyzed forms were grouped with the code "unknown". In tables where there was more than one field with less than 1% of the cases, these fields were grouped with the code "others".

The statistical analysis was developed with the use of descriptive analysis. The characteristics and the relationship

between the different types of soft-tissue lesions were analyzed by the Chi-square test, considering an alpha of 0.05, using the CDC public domain Epi-Info software. The study was approved by the institutional Ethics Committee (Process #2003.1.863.58.5).

## Results

A total of 463 cases of oral and maxillofacial trauma were registered in the age range between 0 and 16 years, in the period of 5 years. In general, it was observed that the number of cases increased year after year. Most of the victims (61.30%) were men and the men:women ratio was 1.6:1.

There was an increase in the number of cases as the age advanced. The age range with the lowest proportion was that of children under 5 years of age, accountable for 10.20% of the cases, and the most frequent range was that of young adults between 15-16 years of age, presenting 44.40% of the cases. The most common ethnicity was white, with 70.40% of the cases, followed by *pardo* (12.10%) and black individuals (5.40%). Physical assault was the most common etiology in all years, taking place in 64.50% of the cases, followed by traffic accidents (13.20%), infractions (7.60%), firearm (3.50%) and abuse (2.20%) (Table 1).

A characteristic was quite similar among the etiologies of oral and maxillofacial trauma in all the age ranges studied, with physical assault and traffic accidents being always the two most frequent ones, and the others varying at each range (Fig. 1).

There were 555 injuries registered, with a mean of 1.2 *per* child. The most frequently observed type of trauma was soft-tissue lesion (80.36%), followed by dental trauma (7.75%) and bone fracture (4.33%) (Table 2). Excoriation (28.64%), edema (23.94%), contused wound (15.88%) and ecchymosis (14.32%) were the most common types of soft-tissue lesions (Table 2). According to Figure 2, the location of this type of trauma was more frequent in the maxillary (22.63%), oral (21.21%) and nasal (18.46%) areas. The dental injuries occurred in 7.75% of traumas and their most common type was dental trauma (54.76%), followed by dental avulsion (45.24%). Bone fracture occurred in 4.33% of the cases, with nasal (36.67%), maxillary (26.67%) and mandible (20.0%) fractures being more frequent, as presented in Figure 3.

The relationships between soft-tissue lesion and dental injury ( $p < 0.001$ ) and between soft-tissue lesion and facial bone fracture ( $p < 0.001$ ) were considered statistically significant, contrary to the relationships between dental injury and facial bone fracture.

The relationships between the two main etiologies and the types of lesion were also evaluated. The relationships between traffic accidents and soft-tissue lesion ( $p < 0.001$ ),

and dental injury ( $p < 0.001$ ) were considered statistically significant, contrary to the relationships between physical assault and these types of lesion (Table 3).

Table 1. Characteristics of the cases

	Number of cases	%
<b>Year</b>		
1°	68	14.70
2°	96	20.70
3°	101	21.80
4°	84	18.20
5°	114	24.60
Total	463	100.00
<b>Gender</b>		
Male	284	61.30
Female	179	38.70
Total	463	100.00
male:female ratio	1.6:1	
<b>Age group (years)</b>		
<5	47	10.20
5-9	66	14.30
10-14	144	31.10
15-16	206	44.40
Total	463	100.00
<b>Ethnic group</b>		
White	326	70.40
Black	25	5.40
Brown	56	12.10
Unknown	56	12.10
Total	463	100.00
<b>Etiology</b>		
Physical aggression	299	64.50
Traffic accident	61	13.20
Infractional act	35	7.60
Gunshot wound	16	3.50
Maltreatment	10	2.20
Other causes	21	4.50
Unknown	21	4.50
Total	463	100.00

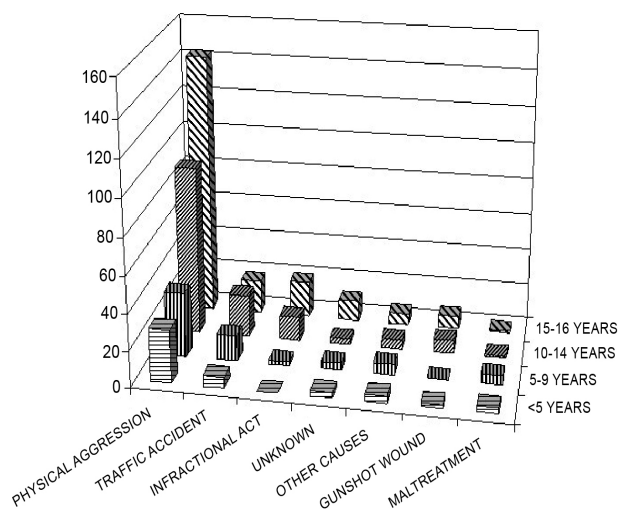


Figure 1. Etiology of the injury regarding the age group.

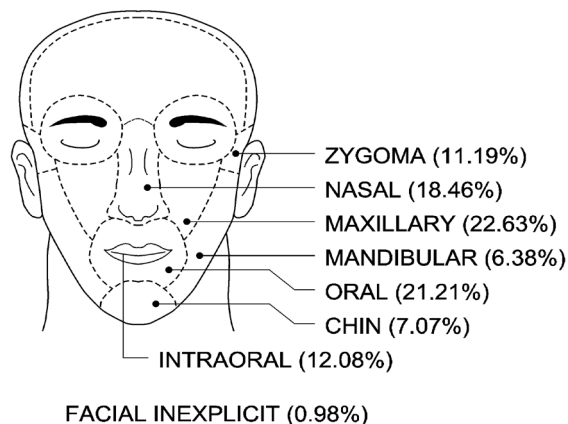


Figure 2. Types of trauma.

## Discussion

In this study, the characteristics of oral and maxillofacial trauma in children between 0 and 16 years of age were analyzed. Data were collected from police records of body lesion examinations, and must be interpreted as the number of cases reported.

Regarding gender, studies in the world literature demonstrate that men are more affected than women, and this predominance keeps constant throughout time (4). The identified men:women ratio of 1.6:1 agrees with that observed in several studies, in which it varied between 1.6:1 and 3.3:1 (1,4-8). Souza (9) found a significantly higher ratio than most of the studies mentioned (4.2:1), still with the predominance of men, and this difference may have been found due to the sample size of only 42 patients. In another study addressing exclusively child abuse, the ratio was 1:1.6. According to several authors, boys obtain freedom earlier to perform activities without the direct

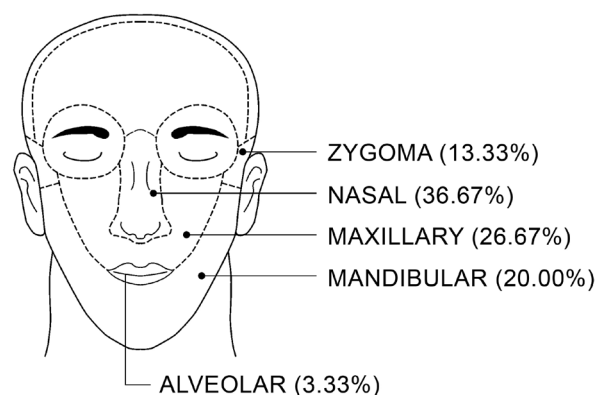


Figure 3. Localization of bone fractures.

Table 2. Type of soft tissue injury

Type of soft tissue injury	N	%
Excoriation	128	28.64
Edema	107	23.94
Bruised cut	71	15.88
Ecchymosis	64	14.32
Hematoma	21	4.70
Cicatrice	18	4.03
Bruise	12	2.68
Intraoral soft tissue injury	12	2.68
Facial lesion	8	1.79
Cut	6	1.34
Total	441	100.00

Table 3. Correlation between different types of trauma and the two main etiologies and the types of trauma (Chi-square test)

Correlation between	Significance	NS
Soft tissue injury and dental injury	p<0.001	
Soft tissue injury and bone fracture	p<0.001	
Dental injury and bone fracture		x
Physical aggression and soft tissue injury		x
Physical aggression and dental injury		x
Physical aggression and bone fracture		x
Traffic accident and soft tissue injury	p<0.001	
Traffic accident and dental injury	p<0.001	
Traffic accident and bone fracture	p=0.0219	

NS: No significance.

supervision of an adult, are more active, engage in more dangerous activities, practice more impact sports, have a more adventurous nature and are more aggressive than girls, participating in fights and, consequently, suffering more aggressions (9).

Several authors have observed that the occurrence of maxillofacial trauma increases gradually as people age (6). This statement may be due to the fact that younger children spend more time under the protection of their family and, therefore, are less exposed to accidents or traumas compared with the older population. As the children grow, the social environment changes and their contact with the exterior world increases (6). The age range between 15-16 years (44.4%) was the most frequent in the present study, the same reported by Bamjee et al. (5) and similar to those of other authors, who referred to a higher frequency in the age range between 13 and 17 years (8) and between 13 and 18 years (4). Other authors found different prevalent age ranges. Gulinelli et al. (11) reported a prevalence (20.3%) of 16-20-year-old age group. Guedes et al. (12) reported the age group of 6 to 10 year (31.52%), which might have occurred because the study comprised a wide age range from children to older adults (1) or because the study was conducted in hospitals and dental or medical emergency services, which means that etiologies not observed in this study, such as sports-related falls or accidents (1,2,13), were included. In the literature, there is a divergence in the standardization of limit ages for age ranges, which complicates the comparison between the several epidemiological studies (9).

The white ethnicity was the most frequent in the present study followed by *pardo*, as reported elsewhere (4). These results indicate similar proportions to the data observed, considering that the distribution of the population by ethnicity revealed a proportion of 69.75% of white, followed by 22.83% of *pardo* and 6.36% of black people (14). The racial factor is susceptible to changes in its epidemiological characteristics according to the culture and region evaluated (4). The evaluation of this population indicator is significantly important, since racial segregation may lead to social and economical discriminations in society.

In this study, the most common etiologies were physical assault and traffic accidents. Studies developed in Sweden (1), South Africa (5) and United Kingdom (2) obtained similar results: i.e., physical assault was also the most common etiology for oral and maxillofacial trauma, also followed by traffic accidents (5,15) in some cases. In Brazil, Ferreira et al. (16), in a 10-year retrospective study, observed traffic accidents as the main etiology (53%). Souza (9) found the most common etiology to be falls and traffic accidents, in equal percentage, and also observed that etiologic factors may be related with age, considering

that younger individuals are exposed to traumas of lesser intensity, increasing their exposure as years go by. Gassner et al. (17) also observed a constant relationship between the etiologies in all studied years and age ranges. According to Shaikh and Worral (2), factors such as geographical location, socioeconomic status, family or cultural environment influence etiology and the incidence of facial trauma.

The most frequent type of lesion in the present study was soft-tissue injury, similar to the findings of several studies (7,8,13,17), but different from another one (1) that reported dental injuries as the most common type of trauma. Silva et al. (15) separated children (up to 11 years of age) and adolescents (12 to 18 years of age) by age range and verified that, the former presented a prevalence of dental lesions, whereas among the latter, soft-tissue lesions prevailed.

The most common type of soft-tissue lesion was excoriation, with predominance in the maxillary region, different from other studies, which found lacerations (7,17) and contusion in the lips and oral mucosa (8) to be the most common type.

Regarding dental injury, dental trauma was the most common type, different from the result obtained by Gassner et al. (7). Munante Cardenas et al. (4) found a prevalence of tooth avulsion as dental injury. Spring and Cote (18) reported that dentoalveolar fractures were more frequent, which are often excluded from statistical studies on facial trauma. In this study, nasal fractures were also more common, in agreement with the findings of Anderson (19). In the opposite direction, several studies observed mandible fractures as the most frequent (4-6,9). Keniry (20) states that the mandible is the bone most commonly affected by fractures, whereas those of the zygoma are rare.

Traumatic dental injuries occur with great frequency in preschool, school-age children, and young adults comprising 5% of all injuries for which people seek treatment (1,21). A 12-year review of the literature reports that 25% of all school children experience dental trauma and 33% of adults have experienced trauma to the permanent dentition, with the majority of injuries occurring before age nineteen (22).

A study with children and adolescents found that despite the high incidence of facial trauma, the occurrence of fractures was rare (9). This may be explained by the relative elasticity of the child skeleton and the fact that the children's bone morphology is different from the bone tissue in the adult, their cortical bone portion is thin and their medullary bone portion is thick, which generates a model of great elasticity to the bone and resistance to fracture (9,18). Another hypothesis would be the presence of the buccal fat pad that protects the zygomatic region, reducing the frequency of facial fractures in children (23). In the present study, the bone fractures were not related

with the injury of teeth.

From the point of view of the main causes or situations that led to buccal-maxillofacial trauma, it was observed that traffic accidents presented a more frequent relationship with soft-tissue lesions and dental injury.

According to these findings, it is possible to conclude that most trauma cases in children and adolescents derived from physical assault and resulted in soft-tissue lesion, in the form of excoriation in the maxillary region. The information obtained in this study may assist the planning and execution of preventive measures and guide curative measures aimed at this population group.

## Resumo

Crianças e adolescentes frequentemente são vítimas de trauma nas regiões oral e maxilofacial. O objetivo deste estudo foi determinar as características do trauma na região oral e maxilofacial que resultaram em registros policiais, em crianças e adolescentes na faixa etária de 0 a 16 anos, por um período de 5 anos. Dos 28.200 laudos avaliados, 463 foram incluídos na pesquisa. A taxa homem:mulher observada foi de 1,6:1 e a faixa etária de maior ocorrência foi a de 15-16 anos (44,40%). A maioria dos casos de trauma foi decorrente de agressão física (64,50%) e resultou em lesão de tecido mole (80,36%). Entre os tipos mais frequentes, destacam-se as escoriações (28,64%) e quanto à localização, a região maxilar (22,63%). O tipo de lesão dental mais comum foi trauma dental (54,76%), e as fraturas ósseas predominaram nas regiões nasal (36,7%). Os resultados encontrados podem auxiliar no planejamento e execução de medidas preventivas e direcionar medidas curativas dirigidas a este grupo populacional.

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