Dental Traumatology 2006; doi: 10.1111/j.1600-9657.2005.00390.x

DENTAL TRAUMATOLOGY

Dental trauma and associated factors in Brazilian preschoolers

Granville-Garcia AF, de Menezes VA, de Lira PIC. Dental trauma and associated factors in Brazilian preschoolers. © Blackwell Munksgaard, 2006.

Abstract – This study aims to determine the prevalence of dental trauma and its relation to associated factors among preschool children in both private and state schools in the city of Recife, Brazil. A cross-sectional study was conducted in which a total of 2651 preschool children were examined; out of this total, 1313 were enrolled in private schools and 1338 in state schools. The associated factors analyzed were: type of school, gender, age group and nutritional status. After a dental exam, the anthropometric measurements of weight and height were registered. Children that presented weight values above two Z scores were considered overweight/obese. The total prevalence of trauma was 36.8%. The most frequent type of trauma was enamel fractures (58.1%); the most affected subjects were the overweight/obese children; the males and the children in private schools. With regard to age group, the risk of trauma increases as children get older ($P < 0.001$). The high prevalence of dental trauma in preschoolers and its possible harm for permanent dentition, suggest that public health policies need to be implemented with a view to its prevention.

Ana Flávia Granville-Garcia[1], Valdenice Aparecida de Menezes[2], Pedro Israel Cabral de Lira[3]

[1]Department of Pedodontics, Caruaru Society of Higher Education, Caruraru, Brazil; [2]Department of Social Dentistry, Dentistry College at the Pernambuco University, Recife, Brazil; [3]Department of Nutrition, Federal University of Pernambuco, Recife, Brazil

Key words: trauma; deciduous teeth; obesity; associated factors

Ana Flávia Granville-Garcia, Rua Visconde de Itaparica 214 apto 602B Torre, 50710090 Recife, Pernambuco, Brazil
Tel.: +55813229746
Fax: +558133267107
e-mail: anaflaviagg@hotmail.com

Accepted 24 May, 2005

Oral trauma among preschool children is a relatively under-researched issue when compared to the vast amount of publications concerning trauma of school-age children. Nonetheless, studies have demonstrated that about one-third of these preschoolers suffer traumatic lesions (1–4).

The upper teeth, specially the central incisors, are the most affected ones and dental luxation is typical in primary dentition while coronal fractures are more common in permanent dentition (5, 6).

Cardoso et al. (2) found the 1–3-year age group had the highest risk of trauma in the deciduous dentition. Nonetheless, Sànchez et al. (7) and Osuji (8) state that children aged from 4 to 5 years are the most likely to suffer trauma. However, the current literature is unanimous in that trauma occurs as a result of psychomotor underdevelopment and poor motor skills, which do not allow the child to perform precise and safe movements (5, 6, 9–11).

The literature regarding gender is rather controversial. Some studies report that there is a preponderance of males in the prevalence of oral trauma among children (12, 13). Other studies state that there is no preponderance of either sex (4, 14–16).

Protrusion of the upper incisors, absence of lip coverage, epilepsy, intellectual disability, and socioeconomic conditions are among the predisposing factors to trauma (2, 10, 15, 17, 18). In addition, the literature also suggests the inclusion of overweight/obesity as a further factor predisposing to trauma (19).

Keeping in mind that epidemiological research studies help to reduce health problems among the population, the present research seeks to contribute to the study of trauma by investigating the prevalence of dental trauma in deciduous teeth and its relation to associated factors, including age, gender, nutritional status, and type of school (15, 16, 19, 20).

Methodology

A total of 2651 children from 1 to 5 years of age of both sexes were examined for this cross-sectional study. The children were randomly selected from 84 state and private preschools in Recife, a city in the northeast region of Brazil. In order to obtain a representative sample, the schools were chosen from every one of the six political-administrative regions of the city. The criteria for the diagnosis of dental condition were followed in accordance with the English classification (21): discoloration; fracture involving the enamel; fracture involving the enamel and dentine; fracture involving enamel, dentine and pulp; loss due to trauma (avulsion); dislocation due to trauma (lateral intrusion and extrusion); restoration due to trauma.

Clinical chart

The clinical chart contained the child's identification, type of school, age, gender and dental chart for recording the absence, presence and type of trauma, as well as the anthropometric measurements.

Dental exam

The children were seated in school chairs and the exam proceeded in the schoolyard in daylight. For the dental exam a No. 3 mouth mirror, tweezers and a periodontal probe were used. Before the exams, gauze was used for the removal of dental plaque. A duly trained assistant recorded the data.

Anthropometric data

While the dental exam proceeded a previously trained team carried out the anthropometric evaluation. The measures followed World Health Organization (WHO) guidelines (22). The National Center for Health Statistics (NCHS) standard, adopted by WHO was used in this study. The $\tilde{Z}$ score was taken as baseline. Children over two $\tilde{Z}$ scores for their height/weight ratio were considered overweight/obese (22).

Data quality control

In order to comply with the accuracy of the results, a gold standard was established for the diagnosis criteria. An intra-examiner agreement was established randomly with 10% of the sample, and a re-exam was carried out within 24 h. The intra-examiner result was above 0.90.

This research project was approved by the Ethics Committee of the State of University de Pernambuco. The exams were carried out after parents or guardians informed consent.

Results

A total of 2651 preschool children were examined (Table 1). Out of this total, 1313 (49.6%) attended private schools and 1338 (50.4%) attended state schools. Results showed that with the exception of the 3–4-year age group the percentage of children examined who presented trauma increased with age (Table 1). The percentage of male children presenting trauma was 6.2% higher then that of females. The prevalence of overweight/obese children was 9.0% of the total sample.

The results by means of a simple logistic regression analysis revealed that the variables studied exhibited associations with dental trauma ($P < 0.001$). Multiple logistic regression analysis confirmed these results (Table 2). Children in private schools are 1.27 times more likely to suffer trauma (OR 1.27; $P < 0.005$). Also, male children exhibited a greater likelihood of suffering trauma (OR 1.27; $P < 0.001$) and this increased with age. Overweight/obese children exhibited 2.5 times (OR 2.5; $P < 0.001$) greater chance of suffering trauma when compared to those without overweight/obesity.

Among the 2651 students participating in the study, fractures involving the enamel and discoloration were the most frequently diagnosed types of lesions (Table 3).

Discussion

A number of authors advocate the need for criteria when analyzing prevalence studies, since the frequency of the most observed type of trauma may

Table 1. Evaluation of trauma according to type of school, age, gender, and height/weight ratio

	Dental injuries				Total	
	Yes		No			
Variables	*n*	%	*n*	%	*n*	%
School						
Private	541	41.2	772	58.8	1313	49.6
Public	436	32.6	902	67.4	1338	50.4
Age						
1	51	22.3	178	77.7	229	8.6
2	139	33.4	277	66.6	416	15.7
3	221	37.5	368	62.5	589	22.2
4	269	40.9	389	59.1	658	24.8
5	297	39.1	462	60.9	759	28.6
Sex						
Male	544	39.1	846	60.9	1390	52.4
Female	433	34.3	828	65.7	1261	47.6
Weight/height ratio						
Overweight/obesity	139	57.9	101	42.1	240	9.0
Non-overweight/obesity	838	34.8	1573	65.2	2411	91.0
Total	997	36.8	1674	63.2	2651	100

Table 2. Final results of the multivariate analysis through logistic regression of the association between the variables studied and dental trauma in children from 1 to 5 years

Variables	Dental injuries		Unadjusted OR (95% CI)	*P*	Adjusted OR (95% CI)	*P*
	Yes	No				
School						
Private	541	772	1.45 (1.24–1.70)	<0.001*	1.27 (1.08–1.5)	0.005*
Public	436	902	1.00		1.00	
Sex						
Male	544	846	1.23 (1.05–1.44)	0.001*	1.27 (1.08–1.15)	0.003*
Female	433	828	1.00			
Age						
1	51	178	1.00	<0.001*	1.00	<0.001*
2	139	277	1.75 (1.21–2.54)	0.003*	0.90 (0.73–1.12)	0.367
3	221	368	2.10 (1.47–2.98)	<0.001*	0.98 (0.78–1.23)	0.866
4	269	389	2.41 (1.70–3.42)	<0.001*	1.11 (0.86–1.44)	0.422
5	297	462	2.24 (1.59–3.16)	<0.001*	2.12 (1.49–3.02)	<0.001*
Weight/height ratio						
Overweight/obesity	139	101	2.58 (1.97–3.38)	<0.001*	2.50 (1.89–3.30)	<0.001*
Non-overweight/obesity	838	1573	1.00		1.00	

*Adjusted for all variables in the model.

Table 3. Evaluation of the type of trauma

Trauma	Total	
	n	%
Discoloration	294	24.0
Fracture into the enamel	711	58.1
Fracture into the enamel and dentine	60	4.9
Fracture into the pulp	1	0.0
Tooth missing by trauma	71	5.8
Tooth displaced: lateral	24	2.0
Tooth displaced: intrusion	32	2.6
Tooth displaced: extrusion	2	0.0
Tooth restored after trauma	–	–
Combined trauma	28	2.3

vary according to the environment studied. If the study is carried out in a hospital setting, the most commonly recorded type of trauma is dislocation (luxation). In schools, homes or dental offices, trauma of a lesser magnitude is observed, such as fractures of the enamel and dentine (1, 2).

The overall prevalence of trauma observed in this study was 36.8%. This result was similar to that found by Garcia-Godoy et al. (35%) and Al-Majed et al. (32.8%) (1, 23). However, it was higher than the findings of Sànchez et al. (16.6%), Bijella et al. (30.2%), Yagot et al. (24.4%) and Mestrinho et al. (10–20%) (7, 10, 14, 15). This demonstrates the need for greater attention to dental trauma. Due to its high prevalence, trauma is now considered a public health problem (15).

When analyzed separately, the children from private schools exhibited a percentage of trauma (41.2%) higher than that found among children in state schools (32.6%) which was statistically significant. This can be explained by the fact that Brazilian children with higher socioeconomic status have greater access to some higher risk toys as skateboards and bicycles. Similar results were also obtained by Garcia-Godoy and Garcia-Godoy (20), which were in contrast to those of Zadik (17). However, the latter considered the level of the guardian's education as an important socioeconomic indicator, which does not sound appropriate in present-day Brazil.

In this study, the classification cited in the final report of the National Diet and Survey was employed since it considers the findings in accordance with the clinical aspects resulting from accidents affecting the teeth. No radiography is thus required and that suits epidemiological purposes (21).

In this investigation, the most frequent dental lesion resulting from trauma was fracture of the enamel (58.1%), followed by discoloration (24%). Other authors have confirmed the same findings (1, 14, 15, 21, 24–26). The higher number of traumas of lesser magnitude recorded may be related to the environment in which the examinations were carried out. As mentioned earlier, studies in hospital settings generally record a greater frequency of dislocations.

Reviewing the literature, it can be seen that the 12–36-month age group is often cited as the group with the greatest risk for trauma. This is the time when children begin their first independent movements in learning how to walk and are still developing their motor skills (6, 9, 10, 12, 26). On the other hand, in the present study the children most frequently affected by dental trauma were the 4–5-year age group. According to Garcia-Godoy et al., Sànchez et al. and Osuji (1, 7, 8), at this age children are more active and independent and therefore more susceptible to dental trauma. However, trauma does seem to increase with age. Probably because small children rarely see the

dentist and are not subject to an early diagnosis. On the other hand, school age children have access to the school clinic when trauma is eventually noticed by the dentist.

With regard to gender, the results of this study corroborate work carried out by other researchers (6, 9, 12, 26), which state that male children are more prone to dental trauma.

Petti et al. (19) identified overweight/obesity as a possible factor associated with dental trauma and the results of the present research confirmed this hypothesis. Overweight/obese children had 2.5 times more traumas than non-overweight/obese ones ($P < 0.001$). This seems to suggest that excessive weight may cause children to become less skillful and less dexterous. Being aware that obesity is a common risk factor for various illnesses, health professionals should reinforce the need for healthy eating habits, a diet low in sugar and fats, as well as the practice of physical activities so as to improve life quality. By adopting an interdisciplinary approach, the dental surgeon can make it clear how psychological, sociological and anthropological factors have an adverse affect on oral health and thereby foster the progress of dentistry by a preventative philosophy.

Studies along this line are indeed important for establishing public health policies. Dental surgeons should make an effort to ensure correct diagnosis and monitoring; to alert parents and guardians to the risks of neglecting treatment with its possible harm for the permanent dentition; and at the appropriate age, alert parents to the need for using teeth guards during sports activities.

Conclusion

The high prevalence of dental trauma in childhood found in the present study reveals the urgent need for establishing health policies, which confer no less importance to deciduous than to permanent dentition. Knowledge of the stages of tooth development is fundamental so as to prevent possible damage to the permanent tooth germs. In addition, knowledge of the influence of associated factors is also crucial to practitioners. Among these factors, excess weight should be treated with caution since it is an issue that has caused considerable controversy, being a common risk factor for other illnesses. Thus, the dental surgeon should recommend healthy eating habits and physical exercise, thus playing a preventative role in the patients' well being.

References

1. Garcia-Godoy F, Dipre FM, Lora IM, Vidal ED. Traumatic dental injuries in pre-school children from Santo Domingo. Community Dent Oral Epidemiol 1983;11:127–30.
2. Cardoso M, Rocha MJC. Federal University of Santa Catarina follow-up management routine for traumatized primary teeth-part-1. Dent Traumatol 2004;230:307–13.
3. Caldas A Jr, Burgos MFA. A retrospective study of traumatic dental injuries in Brazilian dental trauma clinic. Dent Traumatol 2001;17:250–3.
4. Kramer PF, Zembruski C, Ferreira SH, Feldens CA. Traumatic dental injuries in Brazilian preschool children. Dent Traumatol 2003;19:299–303.
5. Andreasen JO. Etiology and pathogenesis of traumatic dental injuries. A clinical study of 1298 cases. Scand J Dent Res 1970;78:329–42.
6. Harrington MS, Eberhart AB, Knapp JF. Dentofacial trauma in children. J Dent Child 1988;55:334–8.
7. Sànchez JR, Sànchez RS, Garcia-Godoy F. Traumatismos delos dientes anteriores em niños pré-escolares. Acta Odontol Pediat 1981;2:17–23.
8. Osuji OO. Traumatized primary teeth in Nigerian children attending university hospital: the consequences of delays in seeking treatment. Int Dent J 1996;46:166–70.
9. O'Neil DW, Clark MV, Lowe JM, Harrington MS. Oral trauma in children: a hospital survey. Oral Surg Oral Med Oral Pathol 1989;68:691–6.
10. Bijella MFTB, Yared FN, Bijella VT, Lopes EY. Occurrence of primary incisor traumatism in Brazilian in Brazilian children: a house-by-house survey. J Dent Child 1990;4:126–9.
11. Pugliesi DM, Cunha RF, Delbem AC, Sundefeld ML. Influence of the type of dental trauma on the pulp vitality and the time elapsed until treatment: a study in patients aged 0–3 years. Dent Traumatol 2004;20:139–42.
12. Llarena Del Rosario ME, Alfaro VMA, Garcia-Godoy F. Traumatic injuries to primary teeth in Mexico City children. Endond Dent Traumatol 1992;8:213–4.
13. Cardoso M, de Carvalho Rocha MJ. Traumatized primary teeth in children assisted at the Federal University of Santa Catarina, Brazil. Dent Traumatol 2002;18:129–33.
14. Yagot KY, Nazhat NY, Kuder A. Traumatic dental injuries in nursery schoolchildren from Baghdad, Iraq. Community Dent Oral Epidemiol 1988;16:292–3.
15. Mestrinho HD, Bezerra ACB, Carvalho JC. Traumatic dental injuries in Brazilian pre-school children. Braz Dent J 1998;9:101–4.
16. Flores MT. Traumatic injuries in the primary dentition. Dent Traumatol 2002;18:287–98.
17. Zadik D. A survey of traumatized primary anterior teeth in Jerusalem preschool children. Community Dent Oral Epidemiol 1976;4:149–51.
18. Garcia-Godoy F, Dipre FM, Lora IM, Vidal ED. Traumatic dental injuries in children from private and public schools. Community Dent Oral Epidemiol 1986;14:287–90.
19. Petti S, Cairella G, Tarsitani G. Childhood obesity: a risk factor for traumatic injuries to anterior teeth. Endod Dent Traumatol 1997;13:285–8.
20. Garcia-Godoy F, Garcia-Godoy FM. Primary teeth traumatic injuries at a private pediatric dental center. Endod Dent Traumatol 1987;3:126–9.
21. Hinds K, Gregory JR. National diet and nutrition survey: children aged 1 1/2 to 4 1/2 years. HMSO: London, 1995; pp. 52–4.
22. Organizacion Mundial de la Salúde. Medicion del cambio del estado nutricional: diretrices para evaluar el efecto nutricional de programas de alimentación suplementaria destinados a grupos vulnerables. WHO: Genebra, 1983; pp. 12–4.
23. Al-Majed I, Murray JJ, Maguire A. Prevalence of dental trauma in 5–6 and 12–14-year old boys in Riyadh, Saudi Arabia. Dental Traumatol 2001;17:153–8.

24. Schatz JP, Joho JP. A retrospective study of dento-alveolar injuries. Endod Dent Traumatol 1994;56:35–8.
25. Hargreaves JÁ, Cleanton-Jones PE, Roberts GJ, Williams D, Martejka JM. Trauma to primary teeth of South African pre-school children. Endod Dent Traumatol 1999;15:73–6.
26. Cunha RF, Puglies DMC, Vieira AEM. Oral trauma in Brazilian patients aged, 0–3 years. Dental Traumatol 2001;17:210–2.