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Risk factors related to traumatic dental injuries in Brazilian schoolchildren

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Abstract – The aim of this pilot study was to analyse whether overjet, lip coverage and obesity represented risk factors associated with the occurrence of dental trauma in the permanent anterior teeth of schoolchildren in Recife, Brazil. It included a random sample of 116 boys and girls aged 12 years, attending both public and private schools. Data was collected through clinical examinations and interviews. Dental trauma was classified according to Andreasen's criteria (1994). Overjet was considered as risk factor when it presented values higher than 5 mm. Lip coverage was classified as adequate or inadequate, while obesity was considered according to National Center for Health Statistics (NCHS) procedures for the assessment of nutritional status. The prevalence of dental injuries was 23.3%. Boys experienced more injuries than girls, 30 and 16.1%, respectively ($P > 0.05$). There was a statistically significant difference between traumatic dental injuries and overjet ($P < 0.05$) and between traumatic dental injuries and lip coverage ($P = 0.000$). No statistical significant differences were found when obesity and dental trauma were analysed ($P < 0.05$). It was concluded that boys from lower social strata attending public schools, presenting an overjet size greater than 5 mm and an inadequate lip coverage, were more likely to have traumatic dental injuries in Recife, Brazil. Obesity was not a risk factor for dental trauma in this sample.

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Key words: traumatic dental injuries; risk factors; prevalence; epidemiology

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Epidemiological reports indicate that dental trauma is a serious health problem (1), which will exceed dental caries and periodontal disease in a foreseeable future, and may cause aesthetic, psychological, social and therapeutic problems (2).

Traumatic dental injuries in schoolchildren have been reported by many authors (3–9), and the prevalence of injured teeth varies in different populations and at various ages (10). During the last decades, several data have been found by authors that used different methods of study. Nevertheless, there is no doubt that traumatic dental injuries nowadays still presents a high prevalence specially in young people (Table 1).

A number of risk factors need to be taken into account when assessing dental injuries. Thus, studies have affirmed that the prevalence of traumatic dental injuries increases with increasing incisal overjet and inadequate lip coverage (3, 8, 11–16). Also, obesity among schoolchildren has been pointed as another risk factor to the traumatic dental injury, suggesting that an obese or overweight subject would be more prone to injuries (17, 18).

Although there are numerous studies of traumatic dental injuries, there is no information on prevalence and risk factors for dental trauma in Recife, Brazil. The aim of this study was to describe the prevalence and associated risk factors to traumatic injuries to permanent anterior teeth in 12-year-old children from private and public schools in Recife.

Table 1. Results of previous studies of traumatic dental injuries from 1981 to 2003

Author	Country	Year	Age	Sample	Prevalence (%)
García-Godoy, Sanchez, Sanchez	Dominican Republic	1981	7–14	596	18.1
García-Godoy	Dominican Republic	1984	5–14	1633	10
García-Godoy et al.	Dominican Republic	1985	6–17	1200	12.2
García-Godoy et al.	Dominican Republic	1986	7–16	1200	18.9
Uji & Teramoto	Japan	1988	6–18	15822	21.8
Hunter et al.	Wales	1990	11–12	968	15.3
Sanchez & García-Godoy	Mexico	1990	3–13	1010	28.4
Forsberg & Tedestam	Sweden	1990	7–15	1635	30
Zerman & Cavalleri	Italy	1993	6–21	2798	7.3
Delattre et al.	France	1994	6–15	2020	13.6
Josefsson & Karlander	Sweden	1994	7–17	88	11.7
Otuyemi	Nigeria	1994	12	1016	10.9
Hargreaves et al.	África	1995	11	1035	15.4
Petti & Tarsitani	Italy	1996	6–11	824	20.2
Borssén & Holm	Sweden	1997	1–16	3007	35
Hamilton & Holloway	UK	1997	11–14	2022	34
Marcenes et al.	Syria	1999	9–12	1087	33.2
Caldas & Burgos	Brazil	2001	6–15	250	50.8
Nicolau, Marcenes, Sheiham	Brazil	2001	13	652	20.4
Cortes, Marcenes, Sheiham	Brazil	2001	9–14	3702	13.6
Marcenes, Zabot, Traebert	Brazil	2001	12	652	58.6
Traebert, Peres, Blank et al.	Brazil	2003	12	307	18.9

Materials and methods

A pilot study of a cross-sectional survey was carried out on 116 schoolchildren aged 12 years old, both genders attending public and private schools in Recife, Brazil. This random sample represented 10% of the final sample that comprised 1150 children.

In order to obtain the list of all schools in Recife, a contact was made with local authorities of the Education Council that provided the following information: name, addresses, phone number and total number of students at the age of 12 years for each school. One public and one private school was selected for this preliminary study by a convenience criterion.

A letter was sent to the parents of the selected children explaining the aim, importance and methods of the study, and asking for their consent for the children's participation.

One dentist (E.P.S.) participated in standardization and calibration training sessions before the baseline field phase began (Kappa = 0.92).

Data was collected through a clinical examination and recorded in a specific form, according to Andreasens' criteria (20). The instruments used were previously sterilized. A plane front-surface mouth mirror and a blunt probe (WHO 621) were used to identify the presence and extent of restorations or to remove debris. In order to increase the accuracy of diagnosis, teeth were dried before examination by using gauze squares. Artificial illumination was used, and the subjects were examined at school during class hours in a predetermined order. The examiner used gloves and a mask during all the clinical examinations that included only permanent maxillary and mandibular incisors. Intra-examiner variability was checked through duplicate examinations of every 10th subject.

The children were weighed to the nearest 0.1 kg on a digital scale. Obesity was evaluated based on National Center for Health Statistics (NCHS) procedures, and the child was considered as an obese subject when weight for age (WA) variable showed values equal or higher than the value of the 97th percentile.

Family income was calculated based on monthly wages of economically active members of the family and divided according to the current Brazilian minimum salaries (MS).

All results were analysed using the computerized statistical software Statistical Package for Social Science (SPSS 10.0, Chicago, IL, USA). The frequency distributions and means were obtained. The chi-squared test was used for some comparisons. The significance level was set at 5%.

Results

Of the 116 children examined in the survey, 58 (50%) were from private and 58 (50%) were from public schools. The group consisted of 56 (48.3%) females and 60 (51.7%) males. Intra-examiner agreement was calculated, and the score was 1.0, indicating a perfect agreement.

The prevalence of traumatic injuries to the teeth was 23.3%. Children attending public schools have sustained more traumatic injuries than those from

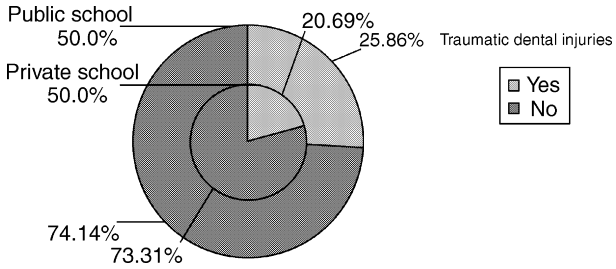

Fig. 1. Frequency distribution of traumatic dental injuries by public and private schools.

private schools (Fig. 1), but there was no statistically significant differences ($\chi^2 = 0.43$; $P > 0.05$).

Boys experienced more injuries compared to girls, 30 and 16.1%, respectively ($\chi^2 = 3.14$; $P > 0.05$). The boys–girls ratio was 1.41 : 1. Children with inadequate lip coverage were more likely to have traumatic injuries than those with adequate lip coverage ($\chi^2 = 16.18$; $P = 0.000$). Also, children with an overjet size greater than 5 mm have experienced more dental injuries than those with an overjet size equal to or lower than 5 mm, presenting a statistical significant difference ($\chi^2 = 4.69$; $P < 0.05$; Table 2).

The most common type of teeth affected were maxillary central incisors (48.14%). Fracture in enamel only accounted for most injuries (59.25%), followed by fracture in enamel/dentine without pulp exposure (37.03%). Only 10 (37%) of the children who had experienced traumatic dental injuries to the teeth reported that they were not taken to the dentist for evaluation or treatment of the injured teeth.

The main reported causes of traumatic injuries to the permanent incisors were falls (33.3%) and collisions with people or inanimate objects (29.6%). Ten children (37%) did not remember the cause of dental injury.

Of the 27 children who presented traumatic injuries to permanent anterior teeth, 3 (11.1%) were considered as obese subjects (values equal to or higher than the 97th percentile) when dental trauma and WA variable were compared (Table 3), but this result was not statistically significant ($P = 0.205$).

Table 2. Frequency distribution of traumatic injuries to the permanent incisors in 116 schoolchildren, Recife, Brazil

	Dental injury (*N* (%))	No dental injury (*N* (%))	Total	*P*-value for χ^2-test
Gender				
Boys	18 (30)	42 (70)	60 (51.7)	
Girls	9 (16.1)	47 (83.9)	56 (48.3)	$P > 0.05$
Overjet				
≤5 mm	13 (17.1)	63 (82.9)	76 (65.5)	
>5 mm	14 (35)	26 (65)	40 (34.5)	$P > 0.05$
Lip coverage	12 (44.4)	74 (83.1)	86 (74.1)	$P < 0.05$
Adequate	15 (55.6)	15 (16.9)	30 (25.9)	
Inadequate				
Total	27 (23.3)	89 (76.7)	116 (100)	

Table 3. Distribution of children according to WA and HA variables

	WA					
	<P3	<P10	<P90	<P97	P97+	Total
Yes	1	2	20	1	3	27
No	0	4	67	12	6	89
Total	1	6	87	13	9	116

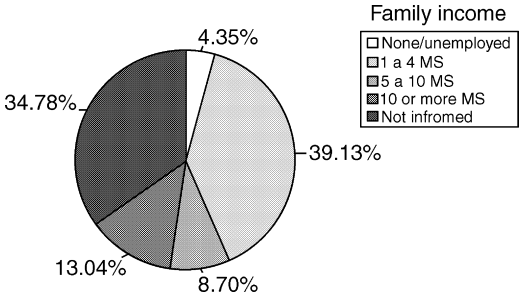

Fig. 2. Frequency distribution of traumatic dental injuries by family income.

Among the children who sustained dental injuries, 39.1% presented a low family income, ranging 1–4 MS (Fig. 2).

Discussion

This pilot study identified a prevalence of 23.3% of traumatic dental injuries to the permanent anterior teeth among schoolchildren at the age of 12 years in Recife. This result was similar to that of other studies that used the same diagnostic criteria. In Valparaíso, Chile, a prevalence of 33% was observed among schoolchildren aged 10 to 12 years (21). In 2001, the prevalence found in Ankara, Turkey, was 33.7% (22).

Previous studies carried out in Brazil used a different diagnostic criteria and showed a large range in prevalence of traumatic injuries at the age of 12 years. In Blumenau, the prevalence reported was 58.6% (23). In Jaraguá do Sul (24) the reported prevalence was 15.3%. In another study carried out in Belo Horizonte (8), the prevalence at the age of 12 years was 13.6%.

Boys sustained more traumatic dental injuries than girls did. This is in agreement with other studies (1, 5, 8, 25). Children attending public schools presented more traumatic dental injuries than those from private schools, similar to the results found in 1986 (26). On the other hand, this finding does not agree with a study conducted in the city of Santo Domingo, Dominican Republic (27), that

reported a prevalence of 10% of traumatic dental injuries in children from private schools. Also, it was reported (28) that Jordanian children from private schools presented more traumatic injuries than those from public schools because they usually had more sophisticated indoor games compared with the classical outdoor sports and games practised by children from public schools.

The results of this pilot study also suggests that an overjet size greater than 5 mm and an inadequate lip coverage were predisposing factors related to the occurrence of traumatic dental injuries. This relationship between traumatic injuries to anterior permanent teeth and the overjet size and lip coverage have been discussed by various authors. Frequency of traumatic dental injuries increases in relation to the increased overjet (29). Traumatic injuries to teeth are also significantly associated with deviations from normal function and posture of perioral soft tissues (13). As observed in a study carried out in Brazil (8), being a boy, presenting an overjet size greater than 5 mm and inadequate lip coverage were predisposing factors associated with having dental injuries.

The most common type of injury was enamel fractures. This is in agreement with previous studies (9, 11, 30, 31) that reported enamel fractures as the main type of traumatic injuries to teeth.

The aetiology of injuries in the present sample was in agreement with earlier reports that found that falls were the most reported cause of injuries to permanent teeth (1, 3, 13, 21, 24, 31).

Obesity was not a risk factor for dental trauma in this sample. Two previous studies have found that obese children were more prone to traumatic dental injuries than non-obese subjects (17, 18). Although the present study has found that there was no correlation between traumatic dental injuries and obesity, this result cannot be compared to that of the other two reports because different methods were used. These authors used the body mass index (BMI) for the calculation of obesity data, while the present analysis used the NCHS procedures to evaluate nutritional status of children.

General accidents are more common among lower socio-economic groups (25, 32). In this study, there was a tendency among children from low social strata to present more traumatic dental injuries, mainly because of falls and collisions. In a study conducted in the UK (33), children from a low socio-economic group also sustained more traumatic injuries. These results indicating that behaviour and environment may be important factors related to the occurrence of traumatic dental injuries suggest that an interaction between socio-economic status and physical environment may be important in the occurrence of dental trauma (18). However, studies conducted in Brazil (8, 23) indicated that children from higher socio-economic status had a higher risk of experiencing dental trauma because of greater ownership of bicycles, access to skateboards and other types of sports. It is important to highlight that these studies used different methods to investigate socio-economic status. Besides, few studies in the literature have included socio-economic status in their analysis (24), which makes a better comparison of results difficult.

Thus, boys from lower social strata, attending public schools and presenting an overjet size greater than 5 mm and inadequate lip coverage, were more likely to have traumatic dental injuries in Recife, Brazil.

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