Dental Traumatology

Dental Traumatology 2009; **25**: 506–509; doi: 10.1111/j.1600-9657.2009.00787.x

Relationship between traumatic dental injuries and obesity in Brazilian schoolchildren

Evelyne Pessoa Soriano[1], Arnaldo De França Caldas Jr[1], Marcus Vitor Diniz De Carvalho[2], Kátia Urbano Caldas[3]

[1]Department of Preventive and Social Dentistry, [2]Department of Oral Medicine, [3]Dental Care for Disabled People, University of Pernambuco, Recife-PE, Brazil

Correspondence to: Evelyne Pessoa Soriano, Rua Jornalista Guerra de Holanda, 158 apto. 1601, Casa Forte CEP 52061 010, Recife - PE, Brazil
Tel.: +55 81 32665926
Fax: +55 81 32665926
e-mail: evelynesoriano@yahoo.com.br

Accepted 9 January, 2009

Abstract – The aim of this study was to investigate if obesity is associated to the occurrence of dental trauma in the permanent anterior teeth of adolescents from Recife, Brazil. It included a random sample of 1046 boys and girls aged 12 years attending both public and private schools. The sample size was calculated using a 95% confidence interval level; a statistical significance of 5%; and an odds ratio of 1.55. The sample selection was carried out in two stages: first, schools were selected by simple sampling, and then children were chosen using a proportionality coefficient. Data were collected through clinical examinations and interviews, after examiner calibration. Dental trauma was classified according to ANDREASEN; ANDREASEN criteria. Obesity was considered according to National Center of Health Statistics – NCHS (USA) procedures for the assessment of nutritional status. Subjects were considered as non-obese when the observed percentile was ≤97, while obese adolescent presented percentiles >97. Data were summarized and analyzed using the statistical software SPSS. The prevalence of traumatic injuries was higher among obese boys than obese girls (17.2% and 16.2%, respectively), but there were no statistically significant differences between *traumatic dental injuries* and *obesity* ($P > 0.05$). It was concluded that the presence of obesity was not associated to traumatic dental injuries in adolescents from Recife, Brazil.

Traumatic dental injuries in schoolchildren have been reported by many authors (1–8) and the prevalence of injured teeth varies in different populations (Table 1).

Children and adolescents are more prone to these problems than adults (9, 10). In 1990, it was stated that at least half of all schoolchildren had a chance of suffering traumatic dental injuries before leaving school (11, 12).

Some risk factors need to be taken into account in dental injuries assessment, such as inadequate lip coverage and increased incisal overjet. Obesity among schoolchildren also has been pointed as another risk factor to the traumatic dental injury, suggesting that a subject that presents obesity or overweight would be more prone to injuries (13–16).

Obesity affect children and adolescents in many countries (14, 16), including Brazil, where children's and adolescents' weights have increased between 1971 and 1997, ranging from 4.1 to 13.9% (17, 18).

Physical and psychological complications of obesity can also lead to relevant economic consequences to health system. So, obesity is today considered as an important public health problem (19, 20).

Therefore, considering the importance of dental trauma in a population and the risk factors closely associated with it, the aim of this study was to investigate if obesity must be considered as a risk factor related to traumatic injuries to permanent anterior teeth in 12-year-old children attending private and public schools in Recife, Brazil.

Material and methods

A cross-sectional survey was carried out with schoolchildren aged 12 years, of both sexes, attending public and private elementary schools in Recife, Brazil. To obtain the list of all schools in Recife, a contact was made with the local education authorities, who provided the following information: name, addresses, phone number and total number of students aged 12 years at each school. A letter was sent to the parents of the selected children explaining the aim, importance and methods of the study, and requesting their consent to the children's participation.

The 95% confidence interval level, a standard error of 5% and an estimated prevalence of dental injury of 20% (21, 22) were used for the calculation of sample size. Furthermore, an odds ratio of 1.55 was applied to detect difference between obese and non-obese adolescents. A minimum of 958 children was estimated to satisfy the sample size requirements. A correction factor equal to 1.2 was applied to increase accuracy. Thus, the final sample size comprised 1150 children, randomly selected to represent the population of schoolchildren living in Recife.

One dentist (EPS) participated in standardization and calibration training sessions before the baseline field phase began (Interexaminer $\kappa = 0.90$) in order to guarantee the reliability of data, which were collected at the clinical examination and were recorded on a specific form, according to the ANDREASEN; ANDREASEN criteria (23, 24). The instruments were

Table 1. Results of previous studies of traumatic dental injuries in different countries from 1981 to 2007

Author	Country	Age	Sample	Prevalence (%)
García-Godoy et al. (9)	Dominican Rep.	7–14	596	18.1
García-Godoy (11)	Dominican Rep.	5–14	1633	10.0
García-Godoy et al. (13)	Dominican Rep.	6–17	1200	12.2
García-Godoy et al. (14)	Dominican Rep.	7–16	1200	18.9
Uji and Teramoto (17)	Japan	6–18	15822	21.8
Holland et al. (19)	Ireland	8–12–15	7171	16.4
Hunter et al. (21)	Wales	11–12	968	15.3
Sanchez and García-Godoy (23)	Mexico	3–13	1010	28.4
Forsberg and Tedestam (25)	Sweden	7–15	1635	18.0
Zerman and Cavalleri (27)	Italy	6–21	2798	7.3
Delattre et al. (28)	France	6–15	2020	13.6
Josefsson and Karlander (31)	Sweden	7–17	88	11.7
Otuyemi (33)	Nigeria	12	1016	10.9
Hamdan and Rock (1)	Jordan	10–12	459	19.2
Petti and Tarsitani (34)	Italy	6–11	824	20.3
Borssén and Holm (35)	Sweden	1–16	3007	35.0
Hamilton and Holloway (36)	England	11–14	2022	34.0
Marcenes et al. (37)	Syria	9–12	1087	33.2
Caldas and Burgos (7)	Brazil	6–15	127	50.8
Nicolau et al. (29)	Brazil	13	652	20.4
Cortes et al. (6)	Brazil	9–14	3702	13.6
Marcenes et al. (38)	Brazil	12	652	58.6
Traebert et al. (32)	Brazil	12	307	18.9
Soriano et al. (24)	Brazil	12	116	23.3
Malikaew (39)	Thailand	11–13	2725	35.0
Levin et al. (40)	Israel	18–21	427	31.1

sterilized before use. A plain front-surface mouth mirror and a blunt probe (WHO 621) were used to identify the presence and extent of restorations or to remove debris. To increase the accuracy of diagnosis teeth were dried before examination using gauze squares. Artificial lighting was used, and the subjects were examined at school during class hours in a predetermined order. The examiner used gloves and mask during all the clinical examinations, which included only permanent maxillary and jaw incisors. Intraexaminer variability was checked by examining every 10th subject for a second time ($\kappa = 0.99$).

Children were weighted to the nearest 0.1 kg on a digital scale and height was measured to the nearest 5 mm using a stadiometer. Three readings were made and the mean height was considered. Nutritional status was evaluated on the basis of NCHS procedures (25, 26). Subjects were considered as non-obese when the observed percentile was ≤ 97, while obese adolescent presented percentiles >97. Traumatic dental injuries were divided in two categories among the obese adolescents: absent or present.

All results were analyzed using the Statistical Package for Social Science (SPSS 10.0, SPSS Inc., Chicago, IL USA). The frequency distributions and mean were calculated. The chi-squared test was used for a number of comparisons. The significance level was set at 5%.

Results

Of the 1046 children examined in the survey, 486 (46.5%) were from private and 560 (53.5%) were from public schools. The group comprised 520 (49.7%) females and 526 (50.3%) males. The response rate was 90.9%.

The prevalence of traumatic injuries to permanent anterior teeth was 10.5% ($n = 110$). With 95% of reliability it is estimated the incidence of traumatic dental injuries in this population is between 8.7% and 12.4%.

Obese subjects sustained more traumatic dental injuries than non-obese subjects (16.8% vs 9.9%).The association between obesity and dental trauma is statistically significant ($P < 0.05$; OR = 1.84; CI = 1.02–3.33). This result indicates that obese schoolchildren are 1.84 times more prone to experience traumatic dental injuries than non-obese schoolchildren.

The prevalence of traumatic injuries was higher among obese boys than obese girls (17.2% and 16.2%, respectively). The statistical tests showed no association between sex or the presence of obesity and the occurrence of traumatic dental injuries in the studied sample (Table 2).

Table 2. Distribution of traumatic dental injuries by sex according to obesity

		Traumatic dental injuries							
		Yes		No		Total			
Sex	Obesity	*n*	%	*n*	%	*n*	%	*P*-value	OR and CI with 95%
Male	Obese	9	17.3	43	82.7	52	100.0	$P^{\dagger} = 0.232$	1.59 (0.74–3.45)
	Non-obese	55	11.6	419	88.4	474	100.0		1.00
Total		64	12.2	462	87.8	526	100.0		
Female	Obese	6	16.2	31	83.8	37	100.0	$P^{\ddagger} = 0.125$	2.14 (0.84–5.44)
	Non-obese	40	8.3	443	91.7	483	100.0		1.00
Total group	Obese	15	16.8	74	83.2	89	100.0	$P^{\dagger} = 0.042$*	1.84 (1.02–3.33)
	Non-obese	95	9.9	862	90.1	957	100.0		1.00
Total		110	10.5	936	89.5	1046	100.0		

CI is a confidence interval to odds ratio (OR).
*P-value < 0.05.
†Chi-square test.
‡Fisher's exact test.

Discussion

This study identified a prevalence of 10.5% of traumatic dental injuries to the permanent anterior teeth among 12-year-old schoolchildren in Recife. This result corroborates the affirmation that dental injuries among children frequently present a prevalence between 10% and 20% (8). The prevalence of traumatic injuries was higher among obese boys than obese girls (17.2% and 16.2%, respectively).

Traumatic dental injury is not a result of disease but a consequence of several factors that accumulate throughout life if not properly treated. Thus, data presented in this study represent the sum of dental trauma experience of 12-year-old schoolchildren in Recife, because it was observed that the time of dental injuries occurrence varied, that is, some had occurred in the same year as the examination and others occurred up to 6 years before. The prevalence of dental trauma presented in this study is therefore considered as a cumulative prevalence.

Obesity was a not a risk factor in the sample studied. Two previous studies (27–30) had produced a similar result, namely that the overweight or obese schoolchildren presented a higher risk of dental trauma than non-obese, highlighting the fact that, in this case, obese individuals present less agility, which could make them more prone to accidents and, consequently, to dental trauma (27, 30).

However, the results of this study cannot be compared with those of the two abovementioned ones as the method of evaluating obesity used by those authors (the body mass index) was different from the analysis carried out in this study, which used the National Center for Health Statistics (NCHS) reference tables. Another study (31, 32) that investigated obesity as a risk factor for traumatic dental injuries did not detect any statistically significant relationship between obesity and dental trauma. Nevertheless, the methods used in the evaluation of this factor were not mentioned.

References

1. Hamdan MA, Rock WP. A study comparing the prevalence and distribution of traumatic dental injuries among 10–12-year-old children in an urban and in a rural area of Jordan. Int J Paediat Dent 1995;5:237–41.
2. Stokes AN, Loh T, Teo CS, Bagramian RA. Relation between incisal overjet and traumatic injury: a case control study. Endod Dent Traumatol 1995;11:2–5.
3. Zaragoza AA, Catalá M, Colmena ML, Valdemoro C. Dental trauma in schoolchildren six to twelve years of age. ASDC J Dent Child 1998;65:492–4.
4. Marcenes W, Al Beiruti N, Tayfour D, Issa S. Epidemiology of traumatic injuries to the permanent incisors of 9–12-year-old schoolchildren in Damascus, Syria. Endod Dent Traumatol 1999;15:117–23.
5. Sánchez MH, Roche RG, Lorenzo IS, Rojas NBA, Chibás AP. Accidentes en el hogar de los menores de 10 años. Municipio Regla, 1996–1997. Rev Cubana Hig Epidemiol 1999;37:109–13.
6. Cortes MIS, Marcenes W, Sheiham A. Prevalence and correlates of traumatic injuries to the permanent teeth of schoolchildren aged 9–14 years in Belo Horizonte, Brazil. Dent Traumatol 2001;17:22–6.
7. Caldas AF Jr, Burgos MEA. A retrospective study of traumatic dental injuries in a Brazilian dental trauma clinic. Dent Traumatol 2001;17:1–4.
8. Dearing SG. Overbite, overjet, lip drape and incisor tooth fracture in children. N Z Dent J 1984;80:50–2.
9. García-Godoy F, Sanchez R, Sanchez JR. Traumatic dental injuries in a sample of Dominican schoolchildren. Community Dent Oral Epidemiol 1981;9:193–7.
10. Cavalleri G, Zerman N. Traumatic crown fractures in permanent incisors with immature roots: a follow-up study. Endod Dent Traumatol 1995;11:294–6.
11. García-Godoy FM. Prevalence and distribution of traumatic injuries to the permanent teeth of Dominican children from private schools. Community Dent Oral Epidemiol 1984;12:136–9.
12. Andreasen JO, Andreasen FM. Dental traumatology: quo vadis? Endod Dent Traumatol 1990;6:78–80.
13. García-Godoy F, Morbán-Laucer F, Corominas LR, Franjul RA, Noyola M. Traumatic dental injuries in schoolchildren from Santo Domingo. Community Dent Oral Epidemiol 1985;13:177–9.
14. García-Godoy F, Dipres FM, Lora IM, Vidal ED. Traumatic dental injuries in children from private and public schools. Community Dent Oral Epidemiol 1986;14:287–90.
15. Marcenes W, Alessi ON, Traebert J. Causes and prevalence of traumatic injuries to the permanent incisors of school children aged 12 years in Jaraguá do Sul, Brazil. Int Dent J 2000;50:87–92.
16. Dietz WH, Robinson TN. Use of body mass index (BMI) as a mesure of overweight in children and adolescents. J Pediatr 1998;132:191–3.
17. Uji T, Teramoto T. Occurrence of traumatic injuries in the oromaxillary region of children in a Japanese prefecture. Endod Dent Traumatol 1988;4:63–9.
18. Wang Y, Monteiro C, Popkin BM. Trends of obesity and underweight in older children and adolescents in the United States, Brazil, China, and Russia. Am J Clin Nutr 2002;75:971–7.
19. Holland TJ, O'Mullane DM, Clarkson J, O'Hickey S, Whelton H. Trauma to permanent teeth of children, aged 8, 12 and 15 years, in Ireland. J Paediatr Dent 1988;4:13–6.
20. Bandini LG, Dietz WH. Myths about childhood obesity. Pediatr Ann 1992;21:647.
21. Hunter ML, Hunter B, Kingdon A, Addy M, Dummer PM, Shaw WC. Traumatic injury to maxillary teeth in a group of South Wales schoolchildren. Endod Dent Traumatol 1990;6:260–4.
22. Kish L. Survey sampling. New York: John Wiley & Sons; 1965.
23. Sanchez AV, García-Godoy F. Traumatic dental injuries in 3- to 13-years-old boys in Monterrey, Mexico. Endod Dent Traumatol 1990;6:63–5.
24. Soriano EP, Caldas AF, Góes PSA. Risk factors related to traumatic dental injuries in Brazilian schoolchildren. Dent Traumatol 2004;20:246–50.
25. Forsberg C, Tedestam G. Traumatic injuries to teeth in Swedish children living in an urban area. Swed Dent J 1990;14:115–22.
26. NCHS- National Center for Health Statistics. Growth curves for children: birth-18 years, United States. Hyattsville, MD: US Department of Health Education and Welfare; 1977, 78–1650.
27. Zerman N, Cavalleri G. Traumatic injuries to permanent incisors. Endod Dent Traumatol 1993;9:61–4.
28. Delattre J-P, Resmond-Richard F, Allanche C, Perrin M, Michel J-F, Le Berre A. Dental injuries among schoolchildren aged from 6 to 15, in Rennes (France). Endod Dent Traumatol 1994;11:186–8.
29. Nicolau B, Marcenes W, Sheiham A. Prevalence, causes and correlates of traumatic dental injuries among 13-years-old in Brazil. Dent Traumatol 2001;17:213–7.
30. Petti S, Cairella G, Tarsitani G. Childhood obesity: a risk factor for traumatic injuries to anterior teeth. Endod Dent Traumatol 1997;13:285–8.

31. Josefsson E, Karlander EL. Traumatic injuries to permanent teeth among Swedish school children living in a rural area. Swed Dent J 1994;18:95–104.
32. Traebert J, Peres MA, Blank V, Böell RS, Pietruza JA. Prevalence of traumatic dental injury and associated factors among 12-year-old school children in Florianópolis, Brazil. Dent Traumatol 2003;19:15–8.
33. Otuyemi OD. Traumatic anterior dental injuries related to incisor overjet and lip competence in 12-year-old Nigerian children. Int J Paediatr Dent 1994;4:81–5.
34. Petti S, Tarsitani G. Traumatic injuries to anterior teeth in Italian schoolchildren: prevalence and risk factors. Endod Dent Traumatol 1996;12:294–7.
35. Borssén E, Holm A–K. Traumatic dental injuries in a cohort of 16-years-olds in Northern Sweden. Endod Dent Traumatol 1997;13:276–80.
36. Hamilton FA, Holloway PJ. An investigation of dento-alveolar trauma and its treatment in an adolescent population. Part 1: the prevalence and incidence of injuries and the extent and adequacy of treatment received. Brit Dent J 1997;182:91–5.
37. Marcenes W, Beiruti NA, Issa S. Epidemiology of traumatic injuries to the permanent incisors of schoolchildren aged 9 to 12 years in Damascus, Syria. Endod Dent Traumatol 1999;15:117–23.
38. Marcenes W, Zabot NE, Traebert J. Socio-economic correlates of traumatic injuries to the permanent incisors in schoolchildren aged 12 years in Blumenau, Brazil. Dent Traumatol 2001;17:222–6.
39. Malikaew P, Watt RG, Sheiham A. Prevalence and factors associated with traumatic dental injuries (TDI) to anterior teeth of 11–13 years old Thai children. Community Dent Health 2006;23:222–7.
40. Levin L, Samorodnitzky GR, Schwartz-Arad D, Geiger SB. Dental and oral trauma during childhood and adolescence in Israel: occurrence, causes, and outcomes. Dental Traumatol 2007;23:356–9.