Dental Caries and Orofacial Pain Trends in 12-Year-Old School Children between 1997 and 2003

Jefferson Traebert[a]/Josimari Telino de Lacerda[a,b]/
Tatiana Konrad Fischer[c]/Yasaka Jinbo[c]

Purpose: To estimate the prevalence of dental caries and orofacial pain in 12-year-old schoolchildren in the Southern Brazilian town of Palhoça in 2003 and to compare it with results from 1997.

Materials and Methods: A cross-sectional study was carried out involving 444 randomly selected 12-year-old schoolchildren in 2003. WHO (1997) criteria for dental caries and Locker and Grushka (1987) criteria for orofacial pain were used. Chi-square and Fisher exact tests were used to examine association between variables. To test the independence of variables, logistic regression analysis was performed.

Results: The prevalence of caries was 55.8%. The mean DMF-T was 1.65. Component D was the one that most contributed to the indicator. In 1997, caries prevalence was 73.5% and the mean DMF-T was 2.84. Similarly, the component that most contributed to the indicator was D with 74.0%. In the trend analysis a reduction of 24.1% in the caries prevalence and 41.9% in the severity measured by the DMF-T was observed. The prevalence of orofacial pain was 66.6%. In 1997, the prevalence was 79.5%. In both years the most common type of pain was stimulated toothache. A reduction of 12.9% in the prevalence of orofacial pain and 28.3% in stimulated toothache was observed. Results of the logistic regression analysis showed that orofacial pain was associated with dental caries independently of other studied variables.

Conclusion: A reduction in both caries and orofacial pain in the studied period was observed. Orofacial pain was independently associated with the presence of caries.

Key words: dental caries, orofacial pain, trends, prevalence

Oral Health Prev Dent 2005; 3: 243–248. Submitted for publication: 13.05.05; accepted for publication: 04.10.05.

[a] *Public Dental Health Research Group, University of the South of Santa Catarina, Tubarão, SC, Brazil*

[b] *Preventive Medicine Department, São Paulo University, São Paulo, SP, Brazil*

[c] *Brazilian Association of Dentistry Professional School, Florianópolis, SC, Brazil*

Reprint requests: *Jefferson Traebert, Universidade do Sul de Santa Catarina – Curso de Odontologia, Av. José Acácio Moreira, 787, 88704-900 Tubarão SC, Brazil. Tel/fax: + 55 48 621-3067. E-mail: jtraebert@unisul.br*

The recent nationwide study on the oral health condition of the Brazilian population confirmed a marked decline in the prevalence and the severity of the disease at a worldwide level (Ministério da Saúde, 2004). In fact, studies carried out in towns in different parts of the country had already pointed in this direction (Narvai et al, 2000; Traebert et al, 2002).

There are few trend analysis studies of dental caries in the Brazilian literature despite the World Health Organization's recommendations on the need to follow up the behaviour of disease patterns (Narvai et al, 2000; Traebert et al, 2001; Bastos et al, 2004).

Concomitantly with the decline of dental caries, there has been an increase in scientific interest in other events and problems in oral health, such as malocclusions, fluorosis and traumatic dental injuries. More recently, orofacial pain has been the focus of greater attention in research on public oral health problems (Kosminski and Góes, 2003; Góes et al, 2003; Nomura et al, 2004).

Pain is the main reason for health service attendance, being responsible for two-thirds of medical consultations (Teixeira and Okada, 2003) and for around 70-80% of dental visits. Apart from physical stress and emotional significance, pain represents an economic burden to society, both in terms of dental care and of costs associated with work absenteeism and a loss in productivity (Mcfariane et al, 2002; Teixeira et al, 2003).

Recently, orofacial pain has become a dental speciality in Brazil. The head, face and mouth are the places which are most affected by pain, notably headaches. Dental pain is the most frequent type of orofacial pain and it is also a condition that causes alarm and incapacity impacting on daily life (Sternbach, 1986; Brattberg et al, 1989; Slade, 2001).

Currently, there are few studies on orofacial pain, particularly in Brazil. Data that can portray trend analysis at a populational level are rare. The objective of this study was to determine the dental caries and orofacial pain prevalence in 12-year-old school children in the town of Palhoça, in Brazil in 2003 and compare it to data available for 1997.

MATERIALS AND METHODS

The current cross sectional study was part of an epidemiologic survey of several oral conditions in 12-year-old school children in the town of Palhoça, Brazil, in 2003. For the calculation of the sample a confidence level of 95% and an accuracy level of 5% were adopted. Also, an unknown prevalence (P = 50%) was adopted as this is the value which allows the greater variance. A correction factor of 1.2 was adopted for the purposes of this study. The number found was increased by 10% in order to compensate for possible refusals, giving a total sample size of 444 school children. A two-stage sample selection process was adopted. In the first stage, schools were selected according to their size. In the second stage, a random sampling technique was adopted for the selection of the school children.

Clinical data were gathered through oral examinations of dental caries according to WHO criteria (WHO, 1997). Non-clinical data consisted of orofacial pain questions according to the Locker and Grushka (1987) criteria, adapted to Portuguese and to the Brazilian culture by Góes (2001), as well as information on gender and parental educational level collected by means of interviews which took place just after the examination. The structured interview format and clinic-epidemiological records were previously tested and did not require adjustments. A pilot study was performed with the aim of testing the proposed methodology. Forty 11-year-old school children were examined and interviewed. The methodology was found to be executable, not requiring any adjustments.

Data collection work was done by a team of seven dentists previously trained according to standards set in methodology published in an earlier article (Peres et al, 2001). The clinical examinations took place in large spaces, with good natural lighting. The school children were laid down on benches simulating stretchers. All biosecurity laws prescribed by the Brazilian Ministry of Health's manual (Ministério da Saúde, 2000) were respected. Diagnostic reproducibility was tested by means of repeated examination of 10.0% of the school children, by each of the examiners. Data was processed by using a statistical programme (*SPSS 10.0 for Windows*) and descriptively analysed. Chi-square and Fisher exact tests were used to examine the association between variables. Multiple non-conditional logistic regression analysis was performed to test the independence of variables, by means of a *stepwise forward* procedure. Variables were included in the model according to the increasing value of Chi-squared p. The minimum value for entering into the model was established at 0.20 and the condition for permanence was $p < 0.05$. Gender and parental educational levels were maintained in the model independently of the significance level.

The research project was submitted to and approved by the Ethics Committee for Research at the University of the South of Santa Catarina. A letter was sent to the parents of selected children explaining the importance, aims and characteristics of the study and requesting permission for the participation of their children.

RESULTS

The response rate for this study was 91.6%. The main reasons for missing were parents' non-autho-

Table 1 Caries experience of 12-year-old school children. Palhoça, Brazil, 1997 and 2003

Year of study	n		DMF-T	D	M	F
1997	523	Mean	2.84	2.1	0.04	0.70
		%	100.0	74.0	1.4	24.6
		CI 95%	2.19 – 3.08	1.86 – 2.34	0.00 – 0.09	0.54 – 0.85
2003	407	Mean	1.65	0.89	0.06	0.70
		%	100.0	53.9	3.7	42.4
		CI 95%	1.46 – 1.84	0.76 – 1.02	0.05 – 0.07	0.57 – 0.83

risation of children's participation in the study and absence from school on the days of the examination. Examiners' agreement was high. Kappa values were calculated on a tooth by tooth basis and all values were higher than 0.86.

Of the total examined, 52.1% were boys and 47.9% were girls. With regard to parents' educational level, 62.9% of fathers and 67.6% of mothers had up to eight years' schooling.

The prevalence of caries was found to be 55.8% (CI 95% 51.0 – 60.6). The mean DMF-T was 1.65 (CI 95% 1.46 – 1.84). The component that most contributed to the composition of the indicator was component D (Decayed) (53.9%) followed by component F (Filling) (42.4%). In 1997, the prevalence of caries was 73.5% (CI 95% 69.7 – 77.3) (Fig 1) and the mean DMF-T was 2.84 (CI 95% 2.19 – 3.08). Similarly, component D (Decayed) contributed most to the indicator with 74.0% of the total. Trend analysis showed a reduction of 24.1% in the prevalence of caries and 41.9% in its severity measured by DMF-T (Table 1). In relation to the DMF-T components a reduction of 57.6% in decayed (D) was noted, with the mean for fillings (F) and missing teeth due to caries (M) being maintained. There was a change in the index component contribution percentage with a shift of the decayed component towards the other components. There was a reduction in the contribution of decayed (D) in the DMF-T of 27.0%, and an increase in the components filling (F) and missing teeth due to caries (M), of 71.5% and 164.0% respectively.

With regard to orofacial pain, the prevalence in the present study was found to be 66.6% (CI 95% 62.0 – 71.2). Stimulated toothache was the most prevalent type of pain at 43.3% (CI 95% 37.5 – 47.1). This was in contrast to the data from 1997, where the prevalence of orofacial pain was 79.5%

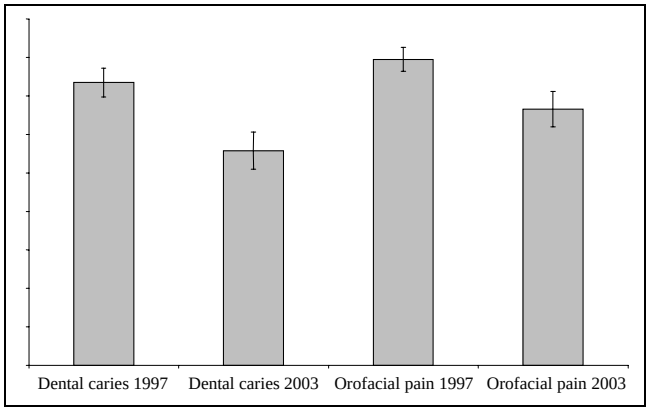

Fig 1 Dental caries, orofacial pain and confidence intervals of 12-year-old school children. Palhoça, Brazil, 1997 and 2003.

(CI 95% 76.4 – 82.6), with stimulated toothache being most prevalent, reported by 71.6% (CI 95% 67.7 – 75.5) of school children. A reduction of 12.9% in the prevalence of pain (Fig 1) and 28.3% in stimulated toothache was observed (Table 2).

Non-conditional multiple logistic regression analysis results showed that orofacial pain was statistically associated with the experience of dental caries, independently of the socio-economic conditions studied. School children with a positive experience of caries had a 2.47 (CI 95% 1.41 – 4.32) times greater chance of reporting orofacial pain compared with their colleagues with no experience of dental caries (Table 3).

DISCUSSION

There was a significant reduction in dental caries within the town during the period studied, the same

Table 2 Prevalence and type of orofacial pain in 12-year-old school children. Palhoça, Brazil, 1997 and 2003

Orofacial pain – type	1997 n (%)	CI 95%	2003 n (%)	CI 95%
Stimulated toothache	363 (71.6)	67.7 – 75.5	172 (43.3)	37.5 – 47.1
During chewing	227 (44.8)	40.5 – 49.1	100 (24.6)	20.4 – 28.8
Spontaneous toothache	224 (44.2)	39.9 – 48.5	92 (22.6)	18.5 – 26.6
In front of the ear	157 (31.0)	27.0 – 35.0	*	–
Around the eyes	125 (24.7)	20.9 – 28.4	50 (12.3)	9.1 – 15.5
Whilst moving maxillaries	110 (21.7)	18.1 – 25.3	*	–
Whilst mouth is open wide	83 (16.3)	13.1 – 19.5	77 (18.9)	15.1 – 22.7
Tongue burns	80 (15.8)	12.6 – 19.0	47 (11.5)	8.4 – 14.6
Acute pain crossing the face or cheeks	56 (11.0)	8.3 – 13.7	23 (5.7%)	3.4 – 7.9
TOTAL	507 (79.5)	76.4 – 82.6	271 (66.6)	62.0 – 71.2

*Information not gathered.

Table 3 Association between orofacial pain, socio-economic status and dental caries in 12- year-old school children. Palhoça, Brazil, 2003. Results of logistic regression analysis

Variables	n (%)	OR_{crude} (CI 95%)	p	$OR_{adjusted}$ (CI 95%)	p
Dental caries			0.042		0.002
DMF-T = 0	110 (61.1)	1		1	
DMF-T > 0	161 (70.9)	1.57 (1.01 – 2.42)		2.47 (1.41 – 4.32)	
Gender			0.557		0.787
Male	139 (65.0)	1		1	
Female	132 (67.7)	1.10 (0.72 – 1.66)		1.07 (0.65 – 1.75)	
Father's level of education			0.464		0.774
Up to 8 years	173 (67.6)	1		1	
More than 8 years	47 (72.3)	1.20 (0.68 – 2.29)		1.10 (0.56 – 2.17)	
Mother's level of education			0.319		0.447
Up to 8 years	184 (66.9)	1		1	
More than 8 years	66 (72.5)	1.30 (0.77 – 2.20)		1.28 (0.67 – 2.44)	

occurred with the DMF-T values. This reduction tendency is probably due to health promotion policies and consolidated collective measures, such as the fluoridation of water supplies (Baldani et al, 2002; Cypriano et al, 2003) and of dentifrices (Cury et al, 2004). It is important to emphasise, however, that such measures were probably acting upon the reduction of morbidity before 1997 since, according to WHO standards caries severity during that year was already considered moderate.

DMF-T analysis of components shows a reduction in the severity of the D component (Decayed), the maintenance of severity of the M (Missing teeth due to caries) and an increase in the contribution of the F (Filling) component which may reflect the decrease in the severity of the disease, as well as an increase in the coverage of services in the town. The reduction found in Palhoça confirms the marked decline in the reported caries indexes in Brazil of 58.2% between 1986 and 2003 (Min-

istério da Saúde, 2004), in São Paulo State of 68.2% between 1986 and 1996 (Narvai et al, 2000) and in Blumenau city of 80.0% between 1986 and 1998 (Traebert et al, 2001).

The prevalence of orofacial pain in 12-year-old school children in Palhoça in 2003 was high, especially when compared with studies carried out in the UK with different groups aged between 18 and 65, where prevalence was found to be 26.0% (Mcfariane et al, 2002). However, in a study of 16- to 17-year-olds in Malaysia, prevalence was found to be 65.0% (Dorey and Jaafar, 1998), close to that found in this study. Comparisons should be made with caution, due to the variations in age range and differences in the research protocols. The majority of studies of orofacial pain are related to jaw joint dysfunctions and to toothache taken in isolation, making it difficult to compare the prevalence of orofacial pain when using a wider conception.

Results regarding the most prevalent type of pain confirm studies performed by Slade (2001), Góes et al (2003), Kosminsky and Góes (2003). Both spontaneous and stimulated toothache prevalences in this study are similar to those found in the UK (49.0%) (Todd, 1973), in Malaysia (47.6%) (Jaafar et al, 1989) and in the north east of Brazil (33.6%) (Góes et al, 2003), but are higher than those found in Kuwait (13.0%) (Vigild et al, 1999) and in the southern region of Brazil (12.3%) (Moyses, 2000).

Variation in the findings of national and international studies can be attributed to cultural and behavioural aspects inherent to the measurement of the pain. Cognitive factors such as knowledge, beliefs and expectations, can also affect the perception of pain (Slade, 2001; Teixeira and Okada, 2003).

The low number of trend studies relating to orofacial pain makes a comparative analysis of the reduction patterns observed in this study impossible. Taking into consideration the association between orofacial pain and caries, the reduction in the orofacial pain patterns could be hypothetically attributed to a reduction in the prevalence and the severity of caries. This is probably also due to an increase in the coverage of services, as can be verified by the increase in the participation of the F (Filling) component in the DMF-T index.

The association between the presence of caries and toothache ($p = 0.002$) corroborates the findings of Slade (2001), Milsom et al (2002) and Nomura et al (2004). The presence of sensitivity to thermal variations and sensitivity to food, in particular to sweets, is due to a destruction of mineralised tissue of the dental element, characteristic of dental caries.

The odds ratio (OR) values found in this study could, however be overestimated since orofacial pain prevalence was high (66.6%). This measure was adopted due to operational difficulties in the prevalence ratio (PR) adjustment for multiple variables in the statistical packages available (Schiaffino et al, 2003).

On the other hand, the high response rate (91.6%) and the high degree of reproducibility (minimum Kappa value 0.86) could re-enforce the internal validity of this study. The calculation and selection of the sample make it possible to infer results with regard to the town's school population.

Despite the significant reduction in the DMF-T index between 1997 and 2003 within the town studied, there is a portion of the population that has suffered the consequences of pain due to dental caries. This leads us to consider the necessity for service providers to be vigilant in relation to dental caries, organising their actions, including actively searching for priority population groups, not only with the aim of reducing morbidity indicators, but mainly to decrease the amount of suffering caused.

The value of gathering subjective data such as orofacial pain in conjunction with the prevalence of other clinical data must be emphasised as an important indicator of populational needs.

ACKNOWLEDGEMENTS

To the dentists Mirelle Pinheiro, Rogerio Salim Jose and Sandra Espindola Lunardelli, who contributed with the 1997 data. Also to Prof. W. Marcenes of Barts and the London Hospital, University of London.

REFERENCES

1. Baldani MH, Narvai PC, Antunes JL. Cárie dentária e condições socioeconômicas no Estado do Paraná, Brasil. 1996 Cad Saude Publica 2002;18:755-763.
2. Bastos JL, Nomura LH, Peres MA. Tendência de cárie dentária em escolares de 12 e 13 anos de idade de uma mesma escola no período de 1971 a 2002, em Florianópolis, SC, Brasil. Cad Saude Publica 2004;20:117-122.
3. Brattberg G, Thorslund M, Wikman A. The prevalence of pain in a general population. The results of a postal survey in a county of Sweden. Pain 1989;37:215-222.
4. Cury JA, Tenuta LM, Ribeiro CC, Paes Leme AF. The importance of fluoride dentifrices to the current dental caries prevalence in Brazil. Braz Dent J 2004;15:167-174.

5. Cypriano S, Pecharki GD, de Souza M da L, Wada RS. A saúde bucal de escolares residentes em locais com ou sem fluoretação nas águas de abastecimento público na região de Sorocaba, São Paulo, Brasil. Cad Saude Publica 2003;19: 1063-1071.
6. Dorey J, Jaafar N. Impact of orofacial pain and discomfort in 16-17 yrs-old in Johor, Malaysia. J Dent Res 1998;77:1350.
7. Góes PSA. The prevalence severity and impact of dental pain in Brazilian schoolchildren and their families. 2001. Thesis (PhD). Department of Epidemiology and Public Health, University College London, University of London, London.
8. Góes PSA, Watt R, Hardy R, Sheiham A. Factors associated with the prevalence and severity of dental pain 14-15 years old Brazilian schoolchildren. In press 2003.
9. Jaafar N, Razak IA, Zain RB. The social impact of oral and facial pain in an industrial population. Ann Acad Med Singapore 1989;18:553-555.
10. Kosminsky M, Góes PSA. Epidemiologia da dor orofacial: tipos de dores mais prevalentes. In: Teixeira MJ, Braun FOJL, Marquez JO, Yeng LT. Dor: contexto interdisciplinar. Curitiba: Ed Maio, 2003.
11. Locker D, Gruska M. The impact of dental and facial pain. J Dent Res 1987;66:1414-1417.
12. Mcfariane TV, Blinkhorn AS, Davies RM, Kincey J, Worthungton HV. Orofacial pain in the community: prevalence and associated impact. Community Dent Oral Epidemiol 2002; 30:52-60.
13. Milsom KM, Tickle M, Blinkhorn AS. Dental pain and dental treatment of young children attending the general dental service. Br Dent J 2002;192:280-284.
14. Ministério da Saúde. Condições de saúde bucal da população brasileira 2002-2003. Área Técnica de Saúde Bucal-Ministério da Saúde. Brasília, 2004.
15. Ministério da Saúde. SIDA. Controle de Infecções e a prática odontológica em tempos de AIDS. Manual de Condutas. Centro de Documentação do Ministério da Saúde. Brasília, 2000.
16. Moyses SJ. Oral health and healthy cities: an analysis of intra-urban differentials in oral health outcomes in relation to “healthy cities” policies in Curitiba, Brazil 2000. Thesis (PhD) – Department of Epidemiology and Public Health, University College London, London.
17. Narvai PC, Castellanos RA, Frazão P. Prevalência de cárie em dentes permanentes de escolares do município de São Paulo. Rev Saude Publica 2000;34:196-200.
18. Nomura LH, Bastos JL, Peres MA. Dental pain prevalence and association with dental caries and socio-economic status in schoolchildren, Southern Brazil, 2002. Pesq Odontol Braz 2004;18:134-140.
19. Peres MA, Traebert, JL, Marcenes W. Calibração de examinadores para estudos epidemiológicos de cárie dentária. Cad Saude Publica 2001;17:153-159.
20. Slade GD. Epidemiology of dental pain and dental caries among children and adolescents. Community Dent Health 2001;13:219-227.
21. Schiaffino A, Rodríguez M, Pasarín MI. ¿*Odds ratio* o razón de proporciones?: Su utilización en estudios transversales. Gac Sanit 2003;17:51-51.
22. Sternbach RA. Pain and ‘hassles’ in the United States: findings of the Nuprin pain report. Pain 1986;27:69-80.
23. Teixeira MJ, Okada M. Dor evolução histórica do conhecimento.In: Teixeira MJ, Braun FOJL, Marquez JO, Yeng LT. Dor: contexto interdisciplinar. Curitiba: Ed Maio; 2003.
24. Teixeira MJ, Teixeira WGJ, Kraychete DC. Epidemiologia geral da dor. In: Teixeira MJ, Braun FOJL, Marquez JO, Yeng LT Dor: contexto interdisciplinar. Curitiba: Ed Maio, 2003.
25. Todd JE. Children’s Dental Health in England and Wales – 1973. London: HMSO, 1975.
26. Traebert JL, Peres MA, Galesso ER, Zabot NE, Marcenes W. Prevalência e severidade da cárie dentária em escolares de seis e doze anos de idade.Rev Saude Publica 2001;35: 283-288.
27. Traebert J, Suárez CS, Onofri DA, Marcenes W. Prevalência e severidade de cárie dentária e necessidade de tratamento odontológico em pequenos municípios brasileiros.Cad. Saude Publica 2002;18:817-821.
28. Vigild M, Petersen PE, Hadi R. Oral health behaviour of 12-year-old children in Kuwait. Int J Paediatr Dent 1999;9: 23-29.
29. WHO. Oral Health Surveys: Basic Methods. 4th edn. Geneva: World Health Organisation. 1997.