

Dental pain prevalence and association with dental caries and socioeconomic status in schoolchildren, Southern Brazil, 2002

Prevalência de dor de dente e associação com cárie e condições socioeconômicas em escolares, sul do Brasil, 2002

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ABSTRACT: The objective of this study was to assess the relation between dental pain, dental caries and socioeconomic status among 12- and 13-year-old schoolchildren enrolled in a public school in Florianópolis, SC, Brazil in 2002. This study was a cross-sectional study involving 181 schoolchildren. Dental pain experience was the dependent variable analyzed. Socioeconomic data of the children's families were obtained through a questionnaire. Dental caries experience was registered according to the DMFT index (WHO, 1997). The field workteam consisted of an examiner and a recorder. The statistical analysis was performed using the chi-square test and the non-conditional multiple logistic regression. The response rate was 93.4%. The intraexaminer agreement measured on a tooth by tooth basis was high ($\kappa \geq 0.73$). Dental pain prevalence was 33.7% (CI_{95%} 26.0-42.0). The multiple regression analysis, adjusted by sex and other variables, showed that children with DMFT > 1 presented 2.9 (OR CI_{95%} 1.4-6.1, $p < 0.01$) more chances of having dental pain when compared with those with DMFT ≤ 1 . Children whose mother's schooling level was equal or less than 4 years presented 2.5 (OR CI_{95%} 1.2-5.6, $p = 0.02$) more chances of having dental pain when compared with others whose mothers had more than 5 years of schooling and, finally, children whose family income was up to U\$ 67.00 showed 3.2 (OR CI_{95%} 1.2-8.4, $p = 0.02$) more chances of having dental pain when compared with the ones whose families had higher income. High levels of caries attack, low mother schooling level and low family income were associated to dental pain.

DESCRIPTORS: Toothache; Epidemiology; Prevalence; Socioeconomic factors.

RESUMO: O objetivo deste estudo foi investigar as relações entre dor de dente, cárie dentária e condições socioeconômicas em escolares de 12 e 13 anos de idade de uma escola estadual de Florianópolis, SC, Brasil em 2002. Tratou-se de um estudo transversal que envolveu 181 escolares. Episódio de dor de dente foi a variável dependente investigada. Através de um questionário, foram obtidas informações socioeconômicas das famílias. Cárie dentária foi aferida através do índice CPOD. A equipe consistiu de um examinador e um anotador. A análise estatística compreendeu o teste qui-quadrado e a análise de regressão logística múltipla não condicional. A taxa de resposta foi de 93,4%. A concordância intra-examinador para diagnóstico de cárie dentária, medida dente a dente, foi alta ($\kappa \geq 0,73$). A prevalência de dor de dente foi de 33,7% (IC_{95%} 26,0-42,0). A análise de regressão revelou, após o ajuste pelo sexo e demais variáveis, que crianças com índice CPOD > 1 apresentaram uma chance 2,9 (OR IC_{95%} 1,4-6,1, $p < 0,01$) maior de ter dor de dente em relação àquelas com índice CPOD ≤ 1 . Crianças cujas mães tinham até 4 anos de estudo relataram 2,5 (OR IC_{95%} 1,2-5,6, $p = 0,02$) mais a chance de dor de dente comparadas às demais que tinham mais de 5 anos de estudo e, finalmente, àquelas de famílias com renda menor que R\$ 200,00 mensais apresentaram 3,2 (OR IC_{95%} 1,2-8,4, $p = 0,02$) vezes mais a chance de apresentarem dor em relação às com renda maior. Alto ataque de cárie dentária, baixa escolaridade materna e baixa renda familiar estiveram associados, independentemente, à dor de dente na população estudada.

DESCRIPTORIOS: Odontalgia; Epidemiologia; Prevalência; Fatores socioeconômicos.

INTRODUCTION

Pain experience, normally conceived as a consequence of the disorders of the human body organs/systems, is considered a major public health

problem¹⁷. From an oral health perspective, untreated dental caries usually lead to a specific kind of pain, dental pain²².

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Current neurophysiological concepts of pain recognize that a specific pathological process, such as dental caries, is neither necessary nor sufficient to cause dental pain²².

The additional finding that individuals' pain perception can be affected by cognitive factors, such as knowledge, beliefs and expectations, all these being influenced by social and cultural environments, give pain a multifactorial aetiology^{6,7,22}.

A few epidemiological studies on the dental health of the population inquired about toothache²². However, it is known that such phenomenon can affect people's daily lives, causing an impact on their quality of life²¹.

Disturbance of sleep, decreased work effectiveness, school absences and avoidance of certain types of food are events frequently related to orofacial pain, particularly dental pain^{15,21,22}.

Dental pain has been associated with many factors, such as low socioeconomic status, high levels of dental caries and restricted access to dental services*.

The association between socioeconomic status and dental pain prevalence still remains unclear. Some findings point to a higher prevalence of dental pain among low socioeconomic groups^{1,4,9,11,16,19,25,*}. On the other hand, some studies point to a lack of association between these two factors^{2,14,20,26}.

Caries experience has been consistently associated in some studies with dental pain. However, these studies did not control potential confounding factors, such as the pattern of dental care^{4,5,12,23,24,27}.

Toothache has also been associated with patterns of dental care. Individuals with restricted access to dental services tend to report dental pain and seek emergency service more frequently. Some authors consider dental pain experience as a predictor of dental services utilization⁸.

Dental caries could also be used as a predictor to identify those at greatest risk for dental pain and elucidate possible risk factors involved in the aetiology of dental pain²².

The objective of this study was to assess dental pain prevalence and its association with dental caries and socioeconomic status among 12- and 13-year-old schoolchildren enrolled in a public school in Southern Brazil in 2002.

MATERIAL AND METHODS

A cross-sectional study was carried out involving 12- and 13-year-old schoolchildren (n = 181) enrolled in a public school, named "Padre Anchieta Basic School", in Florianópolis, Santa Catarina, Brazil, in 2002. The dental caries status of this population was assessed in 1971 and 1997¹⁰ and later, in 2002.

All non-clinical and clinical data were collected between August and December, 2002. Prevalence of dental caries was measured through DMFT Index (decayed, missing, filled teeth) according to the WHO (World Health Organization) criteria²⁸.

The field workteam consisted of an examiner and a recorder. The examiner had previous calibration training¹⁸. One in every 10 children was re-examined to test intraexaminer agreement. The kappa test was adopted on a tooth by tooth basis in order to check the intraexaminer agreement in caries diagnosis.

Non-clinical data such as behavioral and socioeconomic information, as well as access to dental service and fluoride sources were collected through a questionnaire applied to the families at the children's houses.

The questionnaire was pre-tested at the Pediatric Dental Clinic, Federal University of Santa Catarina. Eighteen 12- or 13-year-old children who agreed to participate in the pre-test procedure were interviewed, as well as their parents. As a result, language adaptations were made to the questionnaire.

Dental pain experience reported up to twelve months before this study was the dependent variable analyzed.

A letter was sent to the parents of the selected children explaining the aims, characteristics and importance of the study and asking for their participation.

Data were processed for analysis using a statistical software (Statistical Package for Social Sciences - SPSS 10.0 for Windows, Chicago, USA). Confidence intervals (95%) were calculated for prevalence of dental pain and for caries experience.

The chi-square test was used to evaluate the relationship between non-clinical/clinical data and dental pain prevalence. Variables with p val-

* Goes PSA, Watt R, Hardy R, Sheiham A. Factors associated with the prevalence and severity of dental pain in 14-15 years old Brazilian schoolchildren. *Community Dent Oral Epidemiol* (in press).

ues ≤ 0.20 under the chi-square test were included in the non-conditional multiple logistic regression analysis, using the stepwise forward procedure. Such variables entered this model according to their significance under the chi-square test.

Formal ethical approval for this project was granted by the Ethics Committee of the Federal University of Santa Catarina.

RESULTS

Of a total of 181 schoolchildren, 169 participated in the study (93.4% response rate). Half of the lack of responses was due to refusal in taking part of the study and the other half was due to children's transference to other schools.

Examiner agreement was high. Kappa values were calculated on a tooth by tooth basis. The minimum value obtained was 0.73, but the great majority of values were equal to one.

DMFT index values are presented in Table 1, with means, percentages and confidence intervals. Caries prevalence was 57.40% (CI_{95%} 50.00-65.00), the mean value was 1.39 and the median was 1.00. Dental pain prevalence was 33.7% (CI_{95%} 26.00-42.00).

Socioeconomic data collected are displayed in Table 2.

Only 21 (12.4%) parents could not be interviewed due to incomplete address information or relocation to another neighborhood or city.

Father average years of study was 5.3 years, while mother average years of study was 5.4 years. Mean family income was R\$ 692.00 per month, which corresponded to 3.46 Brazilian minimum wages in December 2002.

All children confirmed the habit of toothbrushing with fluoridated dentifrice. A hundred and twenty seven children (75.10%) did not have the habit of flossing (Table 2).

Almost 65% of the children reported having experience with school-based fluoride mouthrinse (Table 2). When asked about professionally applied fluoride compounds at a private service, fewer

children answered affirmatively (32.50%) (Table 2). Only 19 children (11.20%) reported having no contact with any kind of dental services in their whole life (Table 2).

A significant association between dental pain prevalence and higher caries experience ($p = 0.01$), low father schooling level ($p = 0.01$, considering 8-year cut-off point), low mother schooling level ($p \leq 0.01$, considering both 4- and 8-year cut-off point), low family income ($p = 0.02$), positive fluoride mouthrinse experience ($p = 0.03$) and professionally applied fluoride compounds at a private service ($p = 0.03$) was identified using the chi-square test (Table 3).

Low father schooling level (8-year cut-off point), low mother schooling level (8-year cut-off point), experience with fluoride mouthrinse and experience with professionally applied fluoride compounds were no longer significant when the non-conditional multiple logistic regression was performed (Table 4).

The multiple regression analysis showed that children with DMFT > 1 presented 2.9 (OR CI_{95%} 1.4-6.1, $p < 0.01$) more chances to have dental pain when compared with those with DMFT ≤ 1 . Children whose mother schooling level was lower than 4 years of study presented 2.5 (OR CI_{95%} 1.2-5.6, $p = 0.02$) more chances of dental pain when compared with others whose mothers had 4 years or more of schooling and, finally, children whose family income was up to US\$ 67.00 presented 3.2 (OR CI_{95%} 1.2-8.4, $p = 0.02$) more chances of having dental pain when compared with the ones whose families had higher income.

DISCUSSION

Dental pain prevalence observed in the schoolchildren during the last twelve months before this study was 33.7% (CI_{95%} 26.0-42.0). A higher prevalence of dental pain was registered, in the city of Harrow (England), among 8-year-old schoolchildren (47.5%, CI_{95%} 44.0-52.0)²¹. Another study, which involved 14- and 15-year-old schoolchildren

TABLE 1 - Caries experience, according to the DMFT index, in 12- and 13-year-old schoolchildren enrolled in the Padre Anchieta Basic School. Florianópolis, Southern Brazil, 2002.

Age	n		D	M	F	DMFT
12 and 13	169	Mean	0.65	0.01	0.66	1.39
		%	46.76	5.76	47.48	100.00
		CI _{95%}	0.63 - 0.67	0.006 - 0.014	0.46 - 0.86	1.14 - 1.64

TABLE 2 - Socioeconomic and behavioral data of 12- and 13-year-old schoolchildren enrolled in the Padre Anchieta Basic School and their families. Florianópolis, Southern Brazil, 2002.

Variables	n	%	Variables	n	%
Gender			< once a day	4	9.52
Male	77	45.60	Presence of sugar in breakfast		
Female	92	54.40	Yes	133	78.70
Father schooling (years of study)			No	36	21.30
≥ 8	40	27.00	Presence of sugar in lunch		
< 8	108	73.00	Yes	76	45.00
Father schooling (years of study)			No	93	55.00
≥ 4	79	53.40	Presence of sugar in dinner		
< 4	69	46.60	Yes	83	49.10
Mother schooling (years of study)			No	86	50.90
≥ 8	43	29.10	Experience with fluoride mouthrinse at school		
< 8	105	70.90	Yes	109	64.50
Mother schooling (years of study)			No	52	30.80
≥ 4	107	72.30	Ignored	8	4.70
< 4	41	27.70	Previous exposure to fluoride gel at school		
Number of family members			Yes	100	59.20
< 6	86	58.10	No	68	40.20
≥ 6	62	41.90	Ignored	1	0.60
Family income (Brazilian currency)			Exposure to fluoride gel at a private dental office		
≥ R\$ 200.00	32	21.60	Yes	55	32.50
< R\$ 200.00	116	78.40	No	98	58.00
Dwelling conditions			Ignored	16	9.50
Masonry	83	56.10	Have you ever been to the dentist at least once before?		
Another type of material	65	43.90	Yes	150	88.80
Frequency of toothbrushing			No	19	11.20
≥ 2 times a day	160	94.67			
< 2 times a day	9	5.33			
Frequency of flossing					
≥ once a day	38	90.48			

from Recife (Brazil), showed a dental pain prevalence of 33.6% (CI_{95%} 31.1-36.8)* - findings very similar to those presented in this study.

High levels of caries attack were strongly associated with dental pain, which corroborates the findings presented by Goes *et al.**. This ascertainment reveals that dental caries and their severe and cumulative consequences still need more adequate approaches/interventions in order to reduce and/or control them.

Low family income and low mother schooling levels were associated with dental pain prevalence even after adjusting possible confounding fac-

tors. Goes *et al.** also reported strong association between dental pain prevalence and low socioeconomic position. Hypothetically, variable pain thresholds, according to the socioeconomic status and also influenced by other socio-cultural factors, could, to some extent, explain these findings³.

Contrary to some other studies^{8,11}, no association between restricted access to dental services and higher prevalence of dental pain were found in this study, while analyzing these variables under the non-conditional multiple logistic regression. Although the female sex was not associated with a higher prevalence of dental pain in this study,

TABLE 3 - Association between dental pain experience and socioeconomic factors, dental caries, behavioral variables and dental service in 12- and 13-year-old schoolchildren enrolled in the Padre Anchieta Basic School. Florianópolis, Southern Brazil, 2002.

Variables		Dental pain				χ^2	p
		Yes		No			
		n	%	n	%		
Gender	Male	21	27.3	56	72.7	2.60	0.070
	Female	36	39.1	56	60.9		
DMFT	≤ 1	30	27.3	80	72.7	5.87	0.010
	> 1	27	45.8	32	54.2		
DMFT	0	19	26.4	53	73.6	6.71	0.010
	≥ 3	19	51.4	18	48.6		
Father schooling (years study)	≥ 8	9	22.5	31	77.5	5.50	0.014
	< 8	47	43.5	61	56.5		
Father schooling (years study)	≥ 4	54	68.4	25	31.6	2.76	0.068
	< 4	38	55.1	31	44.9		
Mother schooling (years of study)	≥ 8	9	20.9	34	79.1	7.40	0.005
	< 8	47	44.8	58	55.2		
Mother schooling (years of study)	≥ 4	34	31.8	73	68.2	6.00	0.010
	< 4	22	53.7	19	46.3		
Number of family members	< 6	32	37.2	54	62.8	0.03	0.494
	≥ 6	24	38.7	38	61.3		
Family income (Brazilian currency)	≥ R\$ 200.00	7	21.9	25	78.1	4.40	0.027
	< R\$ 200.00	49	42.2	67	57.8		
Type of housing	Masonry	29	34.9	54	65.1	6.70	0.257
	Another type of material	27	41.5	38	58.5		
Frequency of toothbrushing	≥ 2 times a day	54	33.8	106	66.3	0.10	0.566
	< 2 times a day	2	28.6	5	71.4		
Presence of sugar in breakfast	Yes	49	36.8	84	63.2	2.70	0.071
	No	8	22.2	20	77.8		
Presence of sugar in lunch	Yes	31	40.8	45	59.2	3.10	0.056
	No	26	28.0	67	72.0		
Presence of sugar in dinner	Yes	29	34.9	54	65.1	0.10	0.435
	No	28	32.6	58	67.4		
Experience with fluoride mouthrinse at school	Yes	34	31.2	75	68.8	6.90	0.031
	No	23	44.2	29	55.8		
Previous exposure to fluoride gel at school	Yes	36	36.0	6	64.0	1.00	0.611
	No	21	30.9	47	69.1		
Exposure to fluoride gel at a private dental office	Yes	23	41.8	32	58.2	7.00	0.030
	No	33	33.7	65	66.3		
Have you ever been to the dentist before?	Yes	48	32.0	102	68.0	1.80	0.141
	No	9	47.4	10	53.6		

TABLE 4 - Risk factors associated with dental pain in 12- and 13-year-old schoolchildren enrolled in the Padre Anchieta Basic School, Florianópolis, Southern Brazil, 2002. Multiple logistic regression analysis.

Variables	OR (CI _{95%})	p	OR ^a (CI _{95%})	p
Mother schooling (years of study)		0.01		0.02
≥ 4	1.0		1.0	
< 4	2.5 (1.2-5.2)		2.5 (1.2-5.6)	
Family income (Brazilian currency)		0.04		0.02
≥ R\$ 200.00	1.0		1.0	
< R\$ 200.00	2.6 (1.0-6.5)		3.2 (1.2-8.4)	
DMFT		0.02		< 0.01
≤ 1	1.0		1.0	
> 1	2.3 (1.2-4.4)		2.9 (1.4-6.1)	

OR = odds ratio; OR^a = odds ratio adjusted by gender and the other variables.

it was used as a control variable.

This study presents some limitations. Some cross-sectional epidemiologic studies describe their results as odds ratio but use the definition of prevalence ratio (PR). However, when prevalence is high, differences are found between estimators and confidence intervals, although all the measures maintained statistical significance. In addition, analyses based on PR, particularly those examining the effects of more than one exposure variable, as in the present study, can cause computational problems and are difficult to interpret¹³. Moreover, all results showed cannot be inferred to all 12-

and 13-year-old schoolchildren from Florianópolis. Furthermore, subjects may have failed to identify their pain as of dental origin or may have included other conditions in their reporting of dental pain. However, the strong association found between higher levels of caries attack and prevalence of dental pain indicates that these biases may not have occurred.

A high response rate (of almost 94%) and a high intraexaminer agreement (kappa minimum value of 0.73) reinforce the internal validity of this study.

Some important findings emerge from our analyses. First, dental pain prevalence was high in the studied population. Second, dental caries is one of the major pathological causes of dental pain. Third, low family income and low mother schooling are factors involved in the aetiology of dental pain. Moreover, a borderline interaction association with dental pain between income and DMFT was found (0.44). However, interaction between mother schooling and DMFT, and income and DMFT was not associated with dental pain ($p = 0.20$). This last finding is unexpected and may have occurred due to the small size of the sample of this study. Slade²² (2001) showed evidences about the role of social class on dental pain. Deprivation and stress caused by poverty may alter the hypothalamic adrenal axis and modulate pain thresholds.

Finally, services and strategies focusing this population may not have been adequately applied, especially for those at worse socioeconomic and oral health conditions.

These findings help us elucidate the aetiology of dental pain and call our attention to the necessity of more specific studies about the subject. Precise questionnaires, capable of isolating the type of dental pain, need to be developed to be used in epidemiological studies²².

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