Dental pain, socioeconomic status, and dental caries in young male adults from southern Brazil

Dor de dente e sua relação com condições sócio-econômicas e cárie dentária em adultos jovens do sexo masculino no Sul do Brasil

João Luiz Dornelles Bastos [1]
Lincon Hideo Nomura [1]
Marco Aurélio Peres [1]

[1] Centro de Ciências da Saúde, Universidade Federal de Santa Catarina, Florianópolis, Brasil.

Correspondence
M. A. Peres
Departamento de Saúde Pública, Centro de Ciências da Saúde, Universidade Federal de Santa Catarina. Campus Universitário – Trindade, Florianópolis, SC 88049-970, Brasil.
mperes@ccs.ufsc.br

Abstract

The aim of this study was to assess dental pain prevalence and its association with dental caries and socioeconomic status in 18-year-old males from Florianópolis, Santa Catarina, Brazil. A cross-sectional study was conducted in a random sample (n = 414) selected from the Brazilian Army conscription list in 2003. Dental pain during the 12 months prior to the interview was recorded as the outcome. Socioeconomic data were obtained through a questionnaire. Dental caries experience was registered according to the DMFT Index. Analyses included simple and multiple non-conditional logistic regression following a hierarchical approach. Response rate was 95.6%. High rates of inter-examiner agreement were achieved (kappa > 0.83). Dental pain prevalence was 21.2% (95%CI: 17.3-25.1). After adjustment, individuals with one or more untreated caries were 3.2 times more likely (95%CI: 1.7-5.8) to have dental pain compared to caries-free subjects. Conscripts with low family income were 1.8 times more likely (95%CI: 1.0-3.3) to have dental pain than those with higher income.

Toothache; Social Class; Risk Factors

Introduction

Few epidemiological studies of young adults have inquired about toothache in Brazil or elsewhere in the world. A MEDLINE bibliographic database search for the subject headings "tooth pain", "toothache", "dental pain", and "prevalence" in articles published from 1993 to March 2004 was performed. Four articles were retrieved by this search: two focused on children aged 8 to 10 years [1,2], one gathered information from adolescents aged 12, 14, 16, and 18 years [3], and the last included adults 20 years and over [4].

Most oro-facial pain has dental causes, namely toothache [5], and such acute pain usually derives from oral conditions, specifically dental caries and periodontitis [1,6,7]. However, it is known that pathological processes are not a necessary or sufficient cause of the phenomenon [8]. Thus, perception of pain can be modulated by cognitive factors such as knowledge, beliefs, and expectations, all being influenced by the social and cultural environments of affected individuals [8,9,10].

Dental pain is less commonly reported by older as compared to younger persons [11]. Difference in reported tooth pain may be related to lower expectations for oral health later in life, so that a certain amount of pain is expected [12]. Fewer teeth at risk of pain could also explain this difference [11].

The association between socioeconomic status and dental pain prevalence remains un-

clear. Some studies point to a higher prevalence of dental pain among low socioeconomic groups [13,14,15], while others indicate a lack of such association [16,17].

It is argued that dental pain can affect quality of life [11], leading to sleep disorders, decreased work effectiveness, school absence, and avoidance of certain types of food [1,18,19]. Dental pain has also been identified as a good predictor of restricted access to dental health services [20] as well as one important element for appropriate planning of oral health services [21].

This study aimed to assess dental pain prevalence among 18-year-old males selected from the Brazilian Army conscription list in a southern Brazilian city in 2003. Associations between outcome and socioeconomic conditions were tested through a hierarchical approach.

Methods

A cross-sectional study was conducted among a total population of 3,735 male conscripts (18 years) at the 63rd Infantry Battalion in Florianópolis, Santa Catarina, southern Brazil, in 2003. Non-residents of Florianópolis and/or older conscripts were excluded.

The sample would require 350 individuals if the following parameters were adopted: unknown prevalence (P = 50%), sample error of 5% (e = 0.05), and 95% confidence level (α = 0.05) in a finite population (3,735). As part of a larger project [22], this study investigated dental pain prevalence in the same population group and took a sample of 414 subjects, which was deemed appropriate for the present study's purposes.

All subjects were called in for medical examination in August-September 2003. Nonclinical and clinical data were collected simultaneously. There was no recommended date or criterion for appearing for the examination, only a limit for each day according to a predefined number. Seventeen conscripts were randomly selected on each of the first 14 days and 16 each on the remaining 11 days.

The fieldwork team consisted of three previously calibrated examiners [23]. Kappa test was adopted in order to check for intra- and interexaminer reliability in dental caries diagnosis. One in every ten subjects was examined twice to test for intra- and inter-examiner agreement. Dental caries were measured through DMFT index [24] with natural light and sterilized plane mirrors, in respect to all measures of cross-in-

fection control. Non-clinical data were collected through a socioeconomic questionnaire. Conscripts were not re-interviewed to test for reliability during the fieldwork.

Subjects were asked about dental pain experience through a single question, as follows: "*Have you experienced toothache in the last twelve months?*". Parents' and conscripts' schooling (measured in full years of study) as well as family income in the previous month, recorded in Brazilian currency (*reals*) and later converted to minimum wages (1 minimum wage = approximately U$80.00) were collected. Conscripts were also asked about their family size, existence and/or frequency of oral health-related behaviors (tooth brushing, flossing, and use of fluoridated dentifrice), and access to dental services, as well as lifetime dental consultations and dental consultation during the previous 12 months.
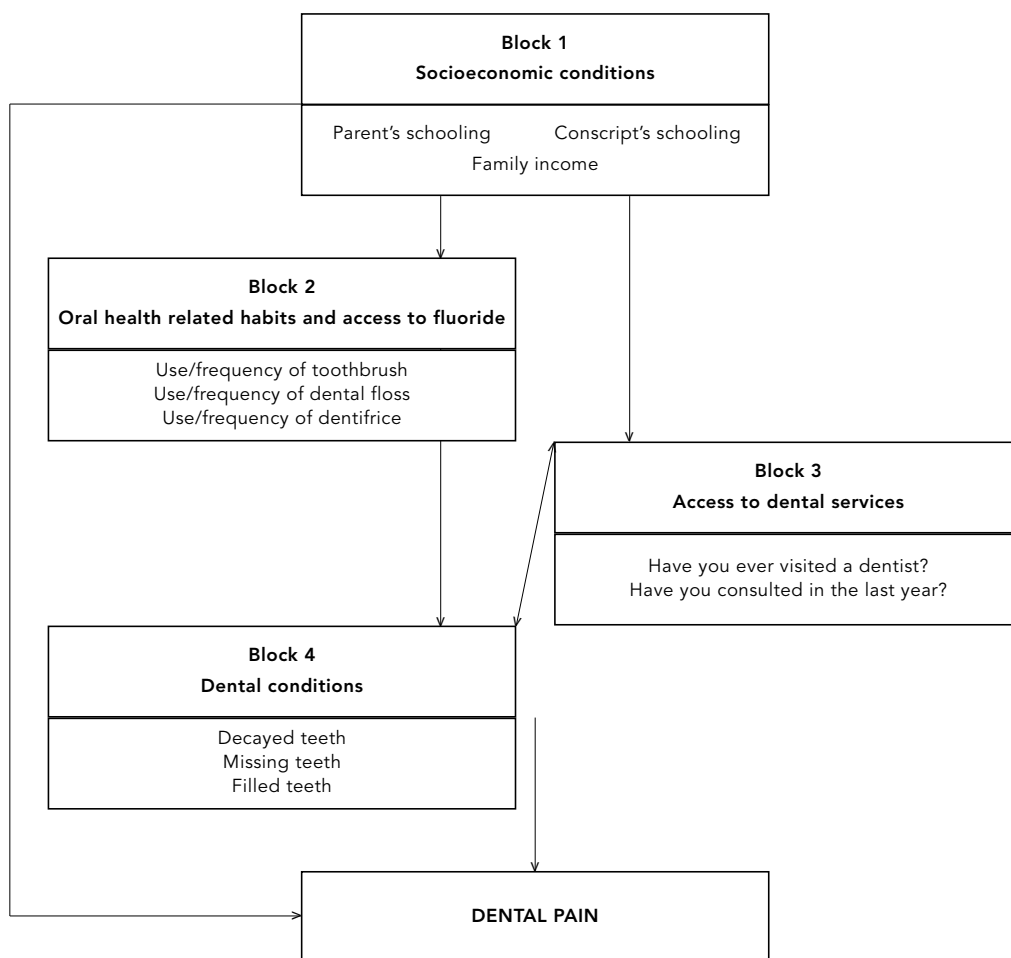
Data were processed and analyzed with SPSS 10.0 for Windows. Confidence intervals (95%) were calculated for prevalence of dental pain and caries experience. Dental caries prevalence was assumed as the proportion of individuals with DMFT > 0. DMFT descriptive statistics were also performed.

Relationships between outcome and independent variables were tested through bivariate analyses, estimation of odds ratio, and respective confidence intervals. Analyses were concluded by using non-conditional multiple logistic regression under a hierarchical approach (Figure 1).

Socioeconomic conditions were conceived as distal determinants (Figure 1, block 1). Parents' and conscripts' schooling were collected in attention to the following hypothesis: (i) individuals with more schooling are more likely to develop positive health-related behaviors and health status; (ii) higher educational level is commonly associated with higher income and better workplace and housing conditions; and (iii) health and schooling share some of the same determinants. Parents' schooling represented a more stable condition, which possibly influenced subjects' early childhood and life course. Conscripts' schooling may have played a role in later health status, modulating habits and oral health-related self-care. Analysis of family income data considered the hypothesis that income is strongly associated with material conditions: conscripts from more affluent families are more likely to live in good quality housing, enjoy more opportunities to develop

Figure 1

Hierarchical model for data analyses and interpretation.

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                    ┌─────────────────────────────────────┐
                    │              Block 1                 │
                    │      Socioeconomic conditions        │
                    ├─────────────────────────────────────┤
                    │  Parent's schooling   Conscript's schooling │
                    │             Family income            │
                    └─────────────────────────────────────┘

        ┌───────────────────────────────────────┐
        │              Block 2                   │
        │ Oral health related habits and access to fluoride │
        ├───────────────────────────────────────┤
        │        Use/frequency of toothbrush     │
        │        Use/frequency of dental floss   │
        │        Use/frequency of dentifrice     │
        └───────────────────────────────────────┘
                                        ┌─────────────────────────────────┐
                                        │            Block 3              │
                                        │     Access to dental services   │
                                        ├─────────────────────────────────┤
                                        │  Have you ever visited a dentist? │
                                        │  Have you consulted in the last year? │
                                        └─────────────────────────────────┘
        ┌───────────────────────────────────────┐
        │              Block 4                   │
        │          Dental conditions            │
        ├───────────────────────────────────────┤
        │          Decayed teeth                 │
        │          Missing teeth                 │
        │          Filled teeth                  │
        └───────────────────────────────────────┘

                    ┌─────────────────────────────────────┐
                    │            DENTAL PAIN               │
                    └─────────────────────────────────────┘
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good oral health behavior, have access to a variety of oral hygiene items, and make healthy dietary choices.

Distal determinants are represented in Figure 1 (block 1). This block would directly or indirectly influence the remaining blocks, so-called mediating factors. Inside each block, stepwise backward procedure was performed to select the best predictors. Variables with $p < 0.25$ in bivariate analysis were included in the model. The level of statistical significance set in multivariate analysis (stepwise forward procedure) was 0.10 to remove variables from the model. Approval was obtained from the Institutional Review Board/ Research Ethics Committee of the Federal University in Santa Catarina.

Results

From a total of 414 conscripts, 18 refused to take part in the study (95.6% response rate). The lowest kappa value on a tooth-by-tooth basis was 0.84, but the vast majority of values were equal to 1.00.

Dental caries status in this population was assessed in 1999 [25] and later in 2003. Mean DMFT index was 3.3 (95%CI: 2.9-3.6) and the decayed component (D) reached 1.8 (95%CI: 1.5-2.0). Mean filled (F) teeth was 1.2 (95%CI: 1.0-1.4), followed by missing component (M) with 0.3 (95%CI: 0.2-0.4). Caries prevalence was 65.9% (95%CI: 62.9-68.9), while dental pain prevalence was 21.2% (95%CI: 17.3-25.1).

Mean family income was R$618.10 (approximately U$206.00) per month. Mean conscripts'

schooling was 10.4 years, while parents' mean schooling was 10.0 years for fathers and 9.4 for mothers. Eighteen (4.5%) young males reported no lifetime contact with any kind of dental services.

The first two steps of data analyses were to test the relationship between the outcome and independent variables through bivariate analyses and to select the best predictors of dental pain at each block through stepwise backward procedure (Table 1).

Stepwise backward procedure in Figure 1 (block 1) selected mothers' mean years of schooling (p = 0.004), conscripts' mean years of study (p = 0.035), and family income (p = 0.037). In Figure 1 (block 2), flossing and frequency of flossing were selected as adjusting variables due to their distribution and statistical significance (p = 0.112 and p = 0.127, respectively). Brushing, frequency of brushing, and use of fluoridated dentifrice were excluded from the analysis, since they were not adequately dis-

Table 1

Association between dental pain experience and socioeconomic conditions, behavioral aspects, access to dental services, and caries in 18-year-old males (n = 396) from Florianópolis, Santa Catarina, southern Brazil, 2003.

Variables	Dental pain				crude OR	95%CI	adjusted OR*	95%CI
	Yes		No					
	n	%	n	%				
Socioeconomic conditions (Figure 1, block 1)								
Father's schooling (years) **								
> 8	23	12.1	167	87.9	1.0			
≤ 8	54	31.8	116	68.2	3.4	2.0-5.8		
p					**< 0.001**			
Mother's schooling (years)								
> 8	26	12.4	184	87.6	1.0		1.0	
≤ 8	58	31.2	128	68.8	3.2	1.9-5.4	2.4	1.3-4.2
p					**< 0.001**		**0.004**	
Conscript's schooling (years)								
> 8	60	18.2	269	81.8	1.0		1.0	
≤ 8	24	35.8	43	64.2	2.5	1.4-4.4	2.0	1.1-4.0
p					**0.002**		**0.035**	
Family income (MW)								
≥ 6	25	12.6	173	87.4	1.0		1.0	
< 6	59	29.8	139	70.2	3.0	1.7-5.0	1.8	1.0-3.3
p					**< 0.001**		**0.037**	
Oral hygiene (Figure 1, block 2)								
Do you brush your teeth?								
Yes	84	21.3	310	78.6	1.0			
No	–	–	2	100.0	0.2	0.0-2.7		
p					**0.684**			
Frequency of brushing								
≥ 2/day	83	22.4	287	77.6	1.0			
< 2/day	1	3.8	25	96.2	0.1	0.2-1.0		
P					**0.054**			
Flossing								
Yes	26	17.8	126	82.9	1.0		1.0	
No	58	23.9	186	76.1	1.5	0.9-2.5	1.5	0.9-2.5
p					**0.112**		**0.112**	

(continues)

Table 1 (continued)

Variables	Dental pain				crude OR	95%CI	adjusted OR*	95%CI
	Yes		No					
	n	%	n	%				
Frequency of flossing								
≥ 1/day	27	17.3	129	82.7	1.0		1.0	
< 1/day	57	23.7	183	76.3	1.5	0.9-2.5	1.5	0.9-2.5
p					0.127		0.127	
Fluoridated dentifrice?								
Yes	84	21.3	310	78.7	1.0			
No	–	–	2	100.0	0.2	0.0-2.7		
p					0.684			
Access to dental service (Figure 1, block 3)								
Have you ever visited a dentist?								
Yes	76	20.1	302	79.9	1.0		1.0	
No	8	44.4	10	55.6	3.2	1.2-8.3	3.2	1.2-8.3
p					0.019		0.019	
Did you visit your dentist in the last 12 months?								
Yes	54	53.2	179	76.8	1.0			
No	30	18.4	133	81.6	0.7	0.4-1.2		
p					0.254			
Caries attack (Figure 1, block 4)								
DMFT Index								
0	13	9.6	122	90.4	1.0			
≥ 1	71	27.2	190	72.8	3.5	1.9-6.6		
p					< 0.001			
D (decayed) component								
0	29	11.5	224	88.5	1.0		1.0	
≥ 1	55	38.5	88	61.5	4.8	2.9-8.0	4.2	2.5-7.2
p					< 0.001		< 0.001	
M (missing) component								
0	62	18.2	279	81.8	1.0		1.0	
≥ 1	22	40.0	33	60.0	3.0	1.6-5.5	2.0	1.0-3.8
p					< 0.001		0.045	
F (filled) component								
0	37	17.9	167	82.1	1.0			
≥ 1	47	24.5	145	75.5	1.4	0.9-2.4		
p					0.124			

* adjusted OR: adjusted by stepwise backward procedure in order to select the best predictors at each block;
** not available for 36 individuals.
MW = minimum wages.

tributed among participants. In Figure 1 (block 3), no contact with dental services was identified (p = 0.019). Finally, in Figure 1 (block 4), only D and M components maintained statistical significance (p < 0.001 and p = 0.045, respectively). DMFT index and F component showed p > 0.25.

The last step was to enter the best predictors from Figure 1 (blocks 1, 2, 3, and 4) in stepwise forward procedure, following the hierarchical approach. After adjusting for socioeconomic variables, flossing, and frequency of flossing lost statistical significance (p = 0.747 and p = 0.921) and were removed. No contact with dental services also lost statistical significance (p = 0.224). D component remained associated with dental pain even after adjusting, but lost magnitude (OR = 4.3 to OR = 3.2). M component lost statistical significance but remained in the model (p = 0.094) (Table 2).

Table 2

Stepwise logistic regression under hierarchical approach for the association between dental pain
and risk factors in 18-year-old males (n = 396) from Florianópolis, Santa Catarina, southern Brazil, 2003.

Variables	crude OR	95%CI	adjusted OR*	95%CI
Socioeconomic conditions (Figure 1, block 1)				
Mother's schooling (years)				
> 8	1.0			
≤ 8	2.4	1.3-4.2		
p	**0.004**			
Conscript's schooling (years)				
> 8	1.0			
≤ 8	2.0	1.1-4.0		
p	**0.035**			
Family income (MW)				
≥ 6	1.0			
< 6	1.8	1.0-3.3		
p	**0.037**			
Caries attack (Figure 1, block 4)				
D (decayed) component				
0	1.0		1.0	
≥ 1	4.2	2.5-7.2	3.2	1.7-5.8
p	**< 0.001**		**< 0.001**	
M (missing) component				
0	1.0		1.0	
≥ 1	2.0	1.0-3.8	1.7	0.9-3.4
p	**0.045**		**0.094**	

* adjusted by socioeconomic conditions.
MW = minimum wages (referent to September 2003).

Discussion

Dental pain prevalence during the previous 12 months was 21.2% (95%CI: 17.3-25.1). Similar results were found in Toronto, Canada, where dental pain prevalence reported in the previous four weeks was 18.0% among 14-20-year-olds of both sexes [26]. Another survey in Ontario showed 13.0% for 12-19-year-old males and females [27]. Research in a representative sample in the United States found a dental pain prevalence of 12.2% in adults (≥ 18 years) [16].

The authors from Toronto [26] showed similar results to those of the current study, even though different time periods were adopted (1- and 12-month intervals, respectively). Sociocultural disparities may have impacted the reporting of dental pain, leading to concordant prevalence rates in studies with diverse study periods. Methodological discrepancies in data collection and analysis may also have accounted for lower comparability. After all, these studies did not focus on populations equally distributed according to age and gender.

The instrument's inaccuracy stands out as a limitation in the current study. Clinical conditions such as tooth eruption (third molar), sensitivity of exposed dentine (temperature sensitivity), and different types of oro-facial pain may have been included in the reporting of dental pain, thus overestimating it. The utilization of more specific data collection instruments and examination and control of other clinical conditions (as mentioned above) could improve study validity. Absence of data on women's self-reported dental pain could also introduce bias, since they hypothetically attend health services more regularly and tend to report some types of oro-facial pain more frequently. On the other hand, high response rates (nearly 96.0%) and high inter- and intra-examiner agreements (minimum kappa value of 0.84) reinforce the internal validity of this study. Likewise, data on self-reported symptoms are easily gathered in

community studies and should be used more extensively.

Low family income and low mother's and conscript's schooling were associated with dental pain prevalence, in agreement with other studies [13,14,15]. D component was also associated with dental pain after adjustment, indicating that untreated dental caries and their severe and cumulative consequences still require more adequate approaches and interventions to reduce and/or control them. According to previous observations, unless pain is unbearable, patients tend to postpone dental treatment for two weeks in most cases [7]. Those experiencing high levels of dental anxiety are among those with the poorest oral health-related quality of life [28], which partially explains this finding. As reported in another study, lower-income individuals had worse oral conditions and were more likely to endure pain than their counterparts [4]. This suggests differences in access to services and possibly variable pain thresholds according to socioeconomic status.

Comparison of schooling and income characteristics in the study population and the overall Florianópolis population reinforces this study's external validity. Mean per capita family income was R$618.12 in this study, as compared to R$701.42 for the city as a whole [29]. Among conscripts' parents, 47.1% had less than eight years of schooling. Among individuals 25 years and over, 34.3% of Florianópolis residents had less than eight years of schooling [29].

Some important findings emerge from our analyses. First, dental pain prevalence affected one-fifth of the study population. Second, dental caries is one of the main causes of dental pain. Third, low family income and low mothers' and conscripts' schooling are associated factors with dental pain. Finally, services and strategies focusing on this population may not have been adequately applied, especially for those with worse socioeconomic and oral-health conditions.

Resumo

Nesse estudo, objetivou-se estimar a prevalência de dor de dente e testar sua associação com cárie dentária e condições sócio-econômicas em jovens de 18 anos do sexo masculino de Florianópolis, Santa Catarina, Brasil. Realizou-se estudo transversal em uma amostra aleatória (n = 414) de alistandos do Exército Brasileiro no ano de 2003. Dor de dente, relatada até 12 meses prévios à pesquisa, foi o desfecho investigado. Coletaram-se dados sócio-econômicos por meio de questionário. Cárie dentária foi aferida utilizando-se o índice CPOD. Utilizou-se análise de regressão logística múltipla não condicional, segundo um modelo hierárquico de determinação. A taxa de resposta foi de 95,6%. Alta reprodutibilidade diagnóstica foi atingida (kappa > 0,83). A prevalência de dor de dente foi de 21,2% (IC95%: 17,3-25,1). Após o ajuste entre as variáveis, identificou-se que jovens com um ou mais dentes cariados não tratados apresentaram uma chance 3,2 vezes maior (IC95%: 1,7-5,8) de relatar dor de dente em relação aos livres de cárie não tratada. Jovens de famílias com baixa renda apresentaram chance 1,8 vez maior (IC95%: 1,0-3,3) de acusarem dor em relação aos de maior renda.

Odontalgia; Classe Social; Fatores de Risco

Contributors

J. L. D. Bastos participated as principal author and was responsible for the study planning, clinical and non-clinical data collection, and assembling of the database, as well as collaborating in the data analysis and drafting the article. L. H. Nomura participated in the study planning, clinical and non-clinical data collection, assembling of the database, and critical review of the paper. M. A. Peres conceived and planned the study, analyzed the data, contributed to drafting of the paper, and conducted a critical review.

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