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Toothache and social and economic conditions among adolescents in Northeastern Brazil

Dor de dente e condições socioeconômicas entre adolescentes no Nordeste brasileiro

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Abstract *The scope of this study was to correlate toothache with social and economic conditions, access to oral health facilities and the lifestyle of adolescents in Sobral in the state of Ceará. It was conducted as a cross-sectional analytical study with a sample composed of 688 adolescents. The prevalence of toothache in the study group was 31.8%. A chi-square test of association was performed to measure the relationship between independent variables and toothache, estimating the prevalence ratio by Poisson regression. The factors that demonstrated the closest relationship with toothache were cavity severity, the reason for dental treatment being related to urgency, frequency of dental appointments and the distribution of toothbrushes at school. It was observed that the high prevalence of dental pain in adolescents is directly linked to the access conditions, as well as the characteristics of the actions developed by the health services. Just as there is a need for the deployment of services related to health promotion, based on equity and integration, it is necessary to introduce emergency services to intervene not just to curtail crippling pain, but also as a mechanism to stimulate the development of procedures for the prevention of oral diseases.*

Key words Dental caries, Toothache, Adolescent, Social conditions, Oral health services

Resumo *O objetivo deste estudo foi relacionar dor de dente com condição socioeconômica, acesso aos serviços de saúde bucal e estilo de vida em adolescentes do município de Sobral, Ceará, desenvolvido com delineamento transversal analítico, com amostra composta por 688 indivíduos. A prevalência de dor de dente no grupo pesquisado foi de 31,8%. Para avaliar a relação entre as variáveis independentes e a dor de dente, realizou-se teste de associação pelo qui-quadrado, estimando-se a razão de prevalências por meio da regressão de Poisson. Os fatores que mais demonstraram relação com a dor de dente foram severidade da cárie, motivo do atendimento odontológico relacionado com urgência, frequência ao dentista e recebimento de escova na escola. Observou-se que a alta prevalência de dor de dente em adolescentes está diretamente relacionada às condições de acesso, assim como às características das ações desenvolvidas pelos serviços de saúde. Assim como há necessidade da implantação de serviços vinculados à promoção de saúde, pautados pela equidade e integralidade, é necessária a implantação de serviços de urgência que não simplesmente intervenham na dor de forma mutiladora, mas a encarem como mecanismo de estímulo ao desenvolvimento de procedimentos de prevenção das doenças bucais.*

Palavras-chave Cárie dentária, Odontalgia, Adolescente, Condições sociais, Serviços de saúde Bucal

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Introduction

Toothache is still one of the main problems that lead people to seek dental treatment, representing a substantial impact on public health. This is because its magnitude is sufficiently large to cause undesirable situations, such as difficulty sleeping, decrease in work productivity, school absenteeism and rejection of certain foods, negatively impacting the daily life of the individual and the community¹⁻⁴.

Caries can be considered one of the principal causes of dental pain^{5,6}. Thus, there is a clear association between the “missing” component of the DMFT index and toothache^{7,8}. In response to this demand, some services (public and private) use the most common procedure to solve the problem: traditional mutilation by tooth extraction⁹.

Corroborating this assertion Narvai *et al.*¹⁰, using data available from the Ministry of Health, observed that in the public sector dental extractions correspond to 14% of the basic procedures offered, and that this proportion varies from 22% in the Northeast to 8% in the Southeast, reaching 100% in some municipalities.

Another important factor related to dental services is the fear of oral surgeons and dental clinic procedures still experienced by a large part of the population. In a recent study¹¹ is reported that after dental treatment that began with toothache, adolescents are less likely to seek further dental service owing to their mistrust of oral surgeons and high anxiety. According to the authors, these elements explain the irregular pattern of dental attendance in adolescents.

Toothache has also been associated with oral health care standards. People with restricted access to dental services tend to report toothache and seek urgent care more frequently⁶. In addition to interfering with individual quality of the life, pain is influenced by social conditions and access to dental services. According to Ekanayake and Mendis¹², pain of dental origin is a significant predictor of the usage of such services.

Despite its magnitude and impact on people's daily activities, there are still few epidemiological studies on oral health that include questionnaires regarding toothache¹³. In Chinese adolescents was observed a 41% prevalence of toothache at ages 11, 13, 15¹⁴, while in the United Kingdom was found 26% prevalence at age 12 and 20% at age 15¹⁵.

Irrespective of the age group studied or pain assessment scale, Pau *et al.*¹⁶ concluded that toothache has a significant effect on children, teenagers and adults worldwide.

In Brazil, the first national study to include self-reported toothache in adolescents (SBBrazil 2003¹⁷) showed that 35.7% of those interviewed between ages 15 and 19 described having experienced toothache in the six months prior to research.

The study aimed to correlate toothache with socioeconomic conditions, access to oral health facilities and lifestyle of adolescents in the municipality of Sobral, Brazil.

Methods

This is a cross-sectional analytical study aimed at identifying contributing factors to explain toothache in adolescents in the municipality of Sobral, Brazil.

The present research draws on data obtained from an investigation entitled “Health conditions of children in Sobral, Brazil”, conducted from 1999 to 2000 with children aged five to nine years. On that occasion, 3,425 children were evaluated, resulting in a sub-sample of 1,021 who were assessed with respect to indexes of oral health (dental caries, gingival condition and malocclusions). This number was obtained from the estimate of 30% malocclusion prevalence, associated with a margin of relative error of 10%, a 95% confidence level and 15% rate of non-respondents¹⁸.

Five years after the execution of the study, an active search was undertaken of the 1,021 children (now teenagers), for the purpose of performing a longitudinal study to determine cavity incidence and associated factors¹⁹. The study sample consists of the 688 individuals (67.4%) who were located (Figure 1).

The variable under analysis in this investigation, prevalence of pain from reported dental origin, has an estimated prevalence of 33.6% in northeastern adolescents²⁰. Taking into account this value, the sample of 688 adolescents has sufficient power to estimate prevalence, with a 10.5% margin of error for $\alpha = 0.05$.

Since active search was used in the second study and taking into account that age is an important variable in determining tooth damage, distribution was analyzed at two different times (Figure 2). Distributions were found to be the same ($p < 0.001$ on the chi-square test), making age-related selection bias negligible.

Data collection was performed using two research instruments: a) clinical form for oral exams created from the codes and criteria advocated by the WHO¹³ for epidemiological surveys of

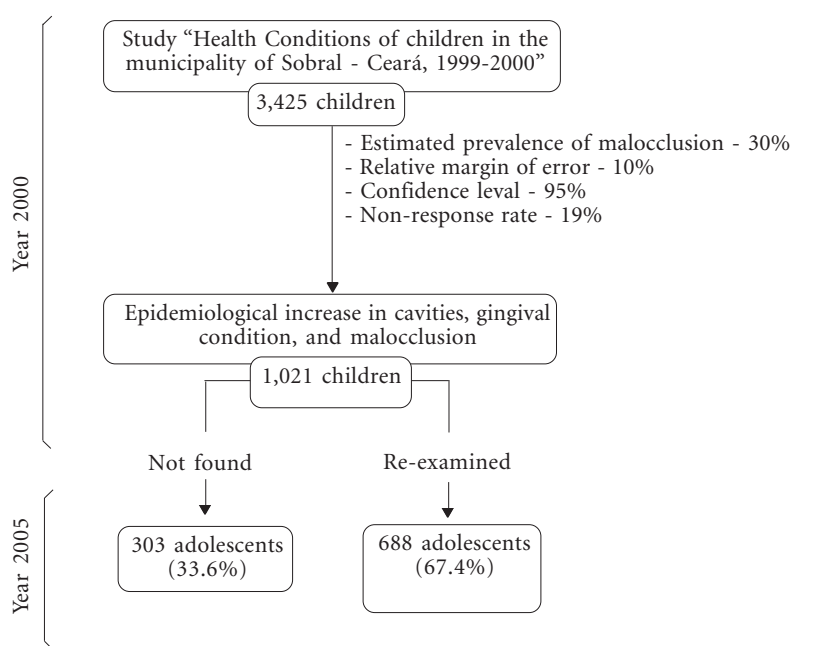


Figure 1. Description of the sampling process.

oral health, identifying dental caries gingival alterations and malocclusion and b) semi-structured questionnaire applied to adolescents, addressing aspects relative to socioeconomic conditions, access to health services and lifestyle, in addition to toothache incidence in the last six months.

Researchers participated in technical training in order to establish patterns for examination and questionnaire application as well as calibration, using inter-rater consensus. General agreement between 0.92 and 0.97% was observed and Kappa coefficient varying from 0.86 to 0.96 was observed, demonstrating a high degree of reproducibility.

Seven teams composed of dentists (examiners) and dental assistants (recorders) from the Municipal Health Secretariat of Sobral collected field data. Preliminary contact was made by community health agents from the Family Health Strategy in light of their bond with and proximity to the community. Agents then scheduled home visits where oral examinations were performed and the questionnaire was applied.

With the aim of standardizing clinical examinations, a toothbrush was given to every study participant. Results of these types of studies show

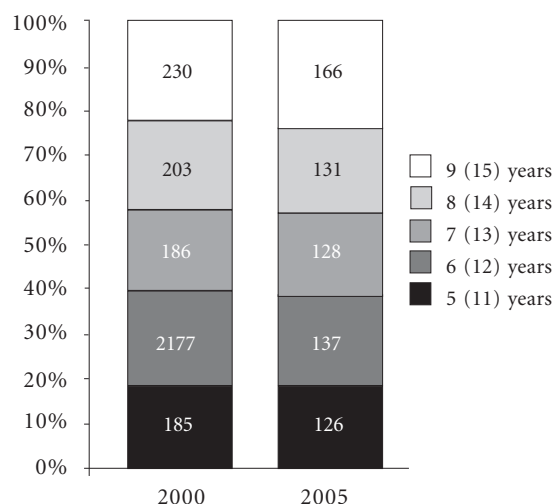


Figure 2. Sample size according to age from 2000 to 2005.

that brushing prior to examination generally results in greater diagnostic efficiency²¹. Independent variables present in the study were grouped

into three categories: socioeconomic conditions, access to health services and lifestyle (Chart 1) The outcome variable was toothache, identified as “present” or “absent”.

The field data collected were entered and processed twice by Epi Info 6.04 software. SPSS 13.0 software was employed for data processing and statistical analysis. Independent variables were dichotomized for bivariate analysis, which was followed by Poisson regression to determine variables with the greatest influence on the toothache observed.

The study was approved by the Research Ethics Committee at Vale do Acaraú State University. Participant safety was ensured, in addition to their anonymity and privacy.

Results

Participants were 352 male and 336 female adolescents between ages 11 and 15, residents of the urban zone of Sobral, Brazil. Age distribution

Chart 1. Independent variables in function of socioeconomic conditions, access to health services and lifestyle.

Socioeconomic conditions	Access to health services	Lifestyle
Individuals/room	Dental attendance	Oral health perception
Schooling	Frequency of dental visits	Perception of appearance
Student	Reason for treatment	Perception of mastication
Type of school	Prevention orientation	Perception of speech
Housing	No treatment received	Perception of personal relationships
Family income	Locality where no treatment was received	Use of toothbrush
Born in Sobral	Reason for no treatment	Use of toothpaste
Residence characteristics	Locality of collective actions	Use of dental floss
Sewage	Locality of collective actions	Daily brushing frequency
Garbage	Receiving a toothbrush	Water supply
Malnutrition	Locality where orientation is received	Perception of treatment need
School lunches	Who provides orientation	Use of pacifier
Failing grades	Vaccinations	Use of baby bottle
Mother's schooling	BHU access	Thumb sucking
Father's schooling	Receives CHA visits	Nursery attendance
Mother's income	Enrolled in FHP	Preschool attendance
Father's income	Health insurance	Elementary school attendance
Race of adolescent father and mother	Malnutrition program	
	Total DMFT	

was as follows: 126 11 year-olds, 137 12 year-olds, 128 13 year-olds, 131 14 year-olds and 166 15 year olds.

In relation to categorized variables such as “socioeconomic condition”, 97.4% of subjects were students and of these, 89.1% studied in public schools. Of this total, 84.9% lived in their own residence. For variables related to “access to health services”, 87.1% classified dental services as good or excellent and 92% provided complete vaccination records. Of those who experienced malnutrition in childhood, 16.1% participated in malnourishment programs, while only 6% had access to private health care. With regard to “lifestyle”, 82.8% evaluated their mastication as good or excellent, as did 95% in relation to speech. Toothpaste and toothbrushes are used by 99.6% and 98.4% of the adolescents, respectively, in contrast to dental floss, which is used by only 8.1% of the study subjects. Another practically universal measure is the public supply of fluoride-treated water, which reaches 98.7% of this population.

The remaining independent study variables were dichotomized in situations of exposure and non-exposure for bivariate analysis.

The prevalence of toothache in the study population was 31.8% (CI95%= 28.3% – 35.3%).

Following this first analysis, the variables relative to *socioeconomic conditions* (born in Sobral, sewage, garbage, malnutrition, school lunches, failing grades, maternal and paternal schooling and income, race of adolescent, father and mother), *access to services* (dental attendance, orientation regarding prevention, no treatment from dental service; location where they were not treated; reason for not receiving treatment; implementation of collective actions; site where public actions were implemented, locality where orientation was received; who provides orientation, basic health unit (BHU) access, receive visits from the community health agent (CHA) enrolment in Family Health Program (FHP) and *lifestyle* (brushing frequency/day, relationships, use of pacifier, use of baby bottle, thumb-sucking, nursery, preschool and elementary school attendance) showed no statistical significance to explain toothache.

Poisson regression was performed with variables exhibiting $p < 0.20$ in univariate analysis. Of variables related to *socio-economic conditions*, only “individuals per room” was included in the model as a control variable. For variables associated with *access to service*, “frequency of dental visits” (length of time between visits), “reason for treatment” (reason for the visit related to

pain), “received a toothbrush” (receiving a toothbrush, especially at school) and total “DMFT” (caries severity) were statistically significant. As to lifestyle, statistically significant variables after Poisson logistical regression were “oral health perception” (related to the adolescent’s self-perception of oral health) and “believes in the need for treatment” (need for treatment). Distribution of these variables is displayed in Table 1.

Factors demonstrating the highest correlation with toothache were total DMFT, indicating the importance of caries severity in determining toothache and those related to treatment being associated with emergency care.

Another factor showing substantial correlation with toothache was frequency of dental visits, indicating those that visit the dentist at least once a year had more toothache than those who had not seen a dentist for over one year.

Receiving a toothbrush where collective oral health is practiced, especially at school, was shown to be a significant factor for the non-occurrence of toothache.

Discussion

Toothache is one of the most traumatic experiences for those requiring treatment, since public sector care is still not universal and access to private services is invariably “open” to a very limited portion of the population, especially when health plans are included. It is therefore necessary to understand its magnitude and seek mechanisms for maximum avoidance of toothache.

In the present study, prevalence of toothache among teenagers studied was 31.8%, similar to observed in Greek adolescents between 11 and 13 years of age (37%)²² and similar to the prevalence of 33.7% in children between 12 and 13 years of age examined in Florianópolis, Brazil²³. Bastos et al.⁶ found a 21.2% prevalence of toothache in young army personnel in Florianópolis, Brazil. Research conducted by Goes et al.²⁰, also in the Brazilian Northeast, involved adolescents between 14 and 15 years of age and showed an incidence of 33.6%, very similar to that recorded in the present study. Finally, our findings corroborate those obtained in a national study (SB-Brasil 2003¹⁷), which indicated a prevalence of 35.7% in 15 to 19 year-old adolescents.

Among the study variables, severity of dental caries was a highly significant independent variable in explaining the occurrence of toothache. Dental caries are the most prevalent illness in oral

Table 1. Association between “toothache” outcome and independent study variables, Sobral-Brazil, 2006.

Variable	Toothache				χ^2	p	RP	p (aj.)	RP (aj)
	Present		Absent						
	n	%	n	%					
Reason for treatment					32.25	<0.001	1.959 (1.576-2.435)	<0.001	1.585 (1.277-1.966)
Emergency care	81	51.3	77	48.7					
Others	117	26.2	330	73.8					
How do you classify your oral health					45.39	< 0.001	2.392 (1.822-3.140)	< 0.001	1.698 (1.272-2.267)
Unfavorable	154	42.5	208	57.5					
Favorable	53	17.8	245	82.2					
DMFT total					48.17	< 0.001	1.955 (1.630-2.344)	< 0.001	1.767 (1.396-2.237)
High	125	57.3	93	42.7					
Low	137	29.3	330	70.7					
Frequency of dental visits					8.513	0.003	1.426 (1.128-1.802)	0.010	1.339 (1.071-1.673)
Less than 1 year	115	38.3	185	61.7					
1 year or more	82	26.9	223	73.1					
Did you receive a toothbrush					6.374	0.012	1.339(1.077-1.664)	0.001	1.421 (1.147-1.760)
Yes	98	38.0	160	62.0					
No	120	28.4	303	71.6					
Do you think you need treatment					29.12	< 0.001	2.181 (1.604-2.965)	0.017	1.484 (1.072-2.055)
Yes	179	38.7	284	61.3					
No	39	17.7	181	82.3					

cavities. Adolescents with total DMF (dmft + DMFT) ≥ 2 presented with greater prevalence of toothache than those with DMFT < 2 . These findings are in accordance with those described in a study on children aged 12 and 13 years²³, which found a 2.9-fold greater risk in children with DMFT ≥ 1 . These data agree with those obtained by Slade⁴, showing dental caries as a predictor for identifying individuals at higher risk of toothache and emphasizing the significant influence of dental caries in determining suffering and dental mutilation. According to Petersen et al.²⁴ the most pressing concern is the pain experienced by children and adults as a result of acute caries toothaches. These teeth are often untreated, but rather extracted to alleviate pain or discomfort.

The motive for dental treatment as it relates to urgent care was another statistically significant variable for explaining toothache, when compared with those seeking dental treatment or preventive care. This situation reflects access to oral health services. Despite substantial alterations after implementation of the National Health System, which mandates universal treatment and

quality for all, services still lack adequate financing to implement all the forecasted measures. It is worth remembering that the historical distortions present in Brazilian public health policies, such as prioritizing remedial dental treatment and a shortage of investment in health promotion and disease prevention (except for schoolchildren), are a great challenge for administrators in terms of providing more adequate oral conditions for the population as a whole. This should be one of the Ministry of Health's primary goals in developing the Family Health Strategy²³. This relationship, however, is one of the limitations of the present research considering that studies^{25,26} report pain itself as the main reason for seeking urgent care services.

Among toothache-related variables, the length of time between dental visits stood out. The need for regular dental appointments aimed at early diagnosis, immediate intervention or limiting the damage, is often pointed out. Our study does not question this need; however, the reality shown indicates that the lack of regular access to oral health services leads adolescents to seek treat-

ment in cases of pain, as demonstrated in other studies⁵. These findings also corroborate those of Alexandre et al.²⁷, who reported that 2 years or more between check-ups did not increase the likelihood of toothache compared to one year or less between visits. This is in accordance to others authors, who stated that services and studies directed over the population are not being properly applied, especially for those with unfavorable socioeconomic conditions and oral health⁶. Teenage use of dental services has often been reported as being influenced by their perceived need, based on the impact of oral health in their daily activities²⁸. Flores and Drehmer²⁹ concluded that to the teenagers the tooth pain represents the illness but decay is not seen as such because it is very common.

Although variables classified as socioeconomic conditions, in particular “per capita” family income, demonstrate significance in bivariate analysis, they lose this significance when included in Poisson regression analysis, and are not included in the model explaining toothache. Thus, this type of study is not able to prove this relationship, as established in previous research³⁰⁻³³. It is therefore important to emphasize that income information is not as easily identifiable, especially in a single interview³⁴. Nevertheless, all variables studied were directly affected by socioeconomic conditions, since high caries severity, lack of regular access to health services, seeking care in emergency situations and not receiving a toothbrush at school are directly linked to an

individuals’ ability to solve their problems through social insertion. This is in agreement with Locker³⁵, who considers the study of social conditions as a cause of oral diseases is still in the initial phase.

So, it is necessary to use some tools in the planning of dental care at a local level³⁶. Baldani et al.³⁷ describe a need for implementing compensatory measures and policies in order to lessen the damaging effects of social inequality. These become more serious if preventative strategies cannot provide equal benefits to low socioeconomic groups. The substantial impact of toothache indicates the urgent need for the public sector to promote caries prevention strategies and acquire appropriate technology to achieve these aims^{30,38,39}. However, it is also essential that the health system supply emergency dental treatment, thereby minimizing the suffering caused by toothache⁴⁰.

Negative impact of toothache should trigger oral health priorities to guarantee universality and equality principle, like proposed by Brazilian National Health System, permitting care access to those with unfavorable socioeconomic conditions and health.

The high prevalence of adolescent toothache is directly correlated to conditions of access to oral health services. Clearly defined strategies are needed at local level, allowing National Health System guidelines to be achieved in the services, particularly those aimed at health promotion and dental caries, which are the main cause of toothache.

Collaborations

The first draft was written by LRA Noro and AG Roncalli and the developing of the instrument too. The data collection was carried out by FIR Mendes Júnior. The interpretation of findings was developed by LRA Noro, AG Roncalli and KC Lima. All authors contributed to article writing and reviewing.

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