

## Tooth pain and associated factors among adolescents of a large population municipality in Northeastern Brazil

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**Abstract** *The aim of this study was to describe and analyze history of toothache and associated factors among adolescent students enrolled in public schools of a city in Northeastern Brazil. An observational, descriptive, quantitative and cross-sectional study was conducted through the application of 4 questionnaires with 458 adolescents. By bivariate analysis, the prevalence of toothache in life was higher among younger adolescents (76.9%;  $p = 0.004$ ), who have visited the dentist at least once (74.8%;  $p = 0.001$ ) and who reported fear (74.9%;  $p = 0.006$ ). The occurrence of dental pain in the last 6 months was low, where male (77.4%;  $p = 0.001$ ) and older adolescents (73.1%;  $p = 0.031$ ) reported no occurrence of pain. Through multivariate analysis, the highest prevalence of dental pain in life remained among younger adolescents (76.9%;  $p = 0.003$ ) and who reported dental fear (74.9%;  $p = 0.006$ ). The prevalence of toothache in the last 6 months remained low through multivariate analysis, among male and older adolescents. It could be concluded that the prevalence of toothache in life was higher than in the last 6 months, showing significant association with gender, age, visit to the dentist and dental fear.*

**Key words** *Adolescents, Oral health, Fear, Anxiety, Toothache*

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## Introduction

Toothache is a relevant theme, as it is still considered one of the main problems that lead people to seek dental care, thus becoming an impacting factor in public health<sup>1,2</sup>. This is because its amplitude is sufficiently capable of generating undesirable and negative situations in the lives of individuals, such as difficulties in eating and sleeping, as well as decreased productivity at work and school<sup>3</sup>. Health care professionals reaffirm the importance of this subject, emphasizing that toothache demands the capacity for adequate diagnosis and handling techniques in Dentistry<sup>4</sup>.

Pain is an experience through which most disease conditions manifest, and may express themselves in different ways and in different populations. According to the Taxonomy Committee of the International Association for the Study of Pain, one of the explanatory models of pain defines it as an unpleasant sensory and emotional experience arising from or described in terms of tissue injury<sup>5</sup>. In the area of dentistry, toothache is one of the main symptoms of its practice, with etiology in neurological, physiological and psychological components, in addition to being characterized as coming from or originating from innervated tissues of the tooth or adjacent structures<sup>6</sup>. It is noteworthy that psychological factors may influence the perception of individuals about dental care, and thus, anxiety, state of attention and emotions may lead to overestimate pain perception<sup>7</sup>.

In this context, Lucas *et al.*<sup>8</sup> made important reflections on what pain is about. Any individual can report their personal experience and say what they know about pain, even though finding words to express this feeling is difficult. The authors pointed out that many definitions can be given, but it will never cover the extent of what this problem is, because pain is a subjective, private experience, and any information about it only the person who feels it can express. Sometimes, it can be deduced by behavior, posture and facial expressions that the individual is experiencing pain and by these indications, it can even be located, but the other aspects about it only the individual can inform.

Despite affecting individuals of different age groups, it has been observed that pain is evident in the group of adolescents, which, according to the World Health Organization, is the age group between 10 and 19 years<sup>9</sup>. Considering the latest epidemiological survey at national level, the SB Brasil<sup>10</sup>, 24.6% of Brazilian adolescents sought dental care due to toothache. This aspect can be justified by the fact that adolescence is a phase where there

is a search for physical, psychic and social balance, making these individuals to often have extreme behaviors and of difficult adaptation / acceptance, sometimes being negligent in oral health care<sup>9</sup>.

Studies have highlighted close relationships between toothache and certain factors, including: access to oral health services, anxiety and dental fear<sup>11-13</sup>.

In this context, it was observed that toothache may be closely linked to conditions of population access to oral health services<sup>14,15</sup>. Thus, the difficulties in access to dental services by a significant portion of the Brazilian population negatively affect the prevention or treatment of oral health problems<sup>15,17</sup>, leading to the exacerbation of painful symptoms of dental origin and consequently affecting the quality of life of adolescents<sup>18</sup>.

Another important aspect in the relationship between toothache and dental care concerns the feelings of fear and anxiety, which make adolescents less likely of seeking dental treatment<sup>2,19</sup>.

These diseases can be considered health indicators, considering the psychosocial impacts associated to them such as the fact that it is a motivating symptom for the patient to seek or further delay dental treatment<sup>20,21</sup>.

It has been observed that most studies evaluating toothache have been conducted in isolation, that is, they mainly verify the perception of individuals about the symptoms. Thus, this study seeks to verify the self-perception of toothache associated with factors such as access to oral health services, fear and anxiety. The relevance of the theme and the need to quantify it are highlighted, so that strategies in the field of public health are developed in order to improve educational actions and approach of these individuals.

In this perspective, the aim of this study was to describe and analyze the history of toothache and its associated factors among adolescents from public schools of a large-population city in northeastern Brazil.

## Methods

This was an observational, descriptive, quantitative, cross-sectional research conducted in public schools of Campina Grande, a large-population city with Human Development Index (HDI) equal to 0.720, located in the "Agreste Paraibano" mesoregion, 112 km away from State Capital, Joao Pessoa, Northeastern Brazil<sup>22</sup>.

The universe of this study consisted of 29,838 adolescents aged 10-19 years enrolled in public

schools. To determine the sample size, a formula was used to calculate finite populations considering: finite population of 29,838 adolescents, 5.0% acceptable error, 95% confidence level and 50.0% prevalence (to unknown value of the phenomenon). Thus, a sample of 380 students was obtained, which was added of 20% to cover possible losses (76 adolescents)<sup>23</sup>. Thus, the final sample may consist of a number of participants between 380 and 456 volunteers, stratified in the 8 city Health Districts.

As for data collection, four questionnaires were applied to adolescents, which were related to toothache<sup>24</sup>, access to health services<sup>25</sup>, dental fear evaluation<sup>26</sup> and dental anxiety evaluation<sup>27</sup>. In addition, variables associated to gender and age of participants were also added.

The questionnaire related to toothache<sup>24</sup> was used to verify the presence or absence of this disease among adolescents at two times: once in the lifetime and in the last six months. An increasing scale was used to assess toothache duration. Toothache intensity was assessed by a verbal scale<sup>28</sup>.

The questionnaire on access to health services aimed to evaluate the access of adolescents to oral health services and the search for dental care. This questionnaire was based on survey adopted in the National Household Sampling Survey<sup>25</sup>.

Dental fear was assessed using the Dental Fear Survey<sup>26</sup> validated for Portuguese language by Cesar et al.<sup>29</sup> and Costa et al.<sup>30</sup>. This instrument is a 5-point likert scale (with five response options) with 20 items that, in the original version, measures 3 factors: avoidance of dental treatment, physiological manifestations of fear and triggered fear. After first data observation, participants were classified as with or without dental fear.

The Modified Dental Anxiety Scale was used to identify dental anxiety<sup>27,31</sup>. The scale is composed of five questions with five response options, with value 1 corresponding to the lowest degree of anxiety and value 5 to the highest. The minimum possible score is 5 (no anxiety) and the maximum 25 (extreme anxiety). For this study, subjects were categorized according to presence or absence of anxiety.

It is noteworthy that questionnaires regarding anxiety and fear sensations were answered only by adolescents who had already visited the dentist at some time in their lives, avoiding adolescents who had never used oral health services to answer them.

For statistical analysis, data obtained were categorized into two groups according to age (10

to 14 years, 15 to 19 years) and gender (males and females). Data were processed using SPSS (Statistical Package for Social Science) software version 20.0. Bivariate and multivariate analyses were performed using Poisson Regression to verify the relationship between history of toothache in life and in the last 6 months and its associated factors (gender, age group, dentist visit in the last 6 months, anxiety and fear) among adolescents. Variables with  $p < 0.20$  value in the bivariate model were entered into the multivariate regression model by a backward stepwise procedure. In the final model, variables with  $p$  value  $< 0.05$  were considered as associated. In all tests, 5% significance level was adopted.

This research was submitted to the Ethics Research Committee of the Paraíba State University and obtained approval. It followed the ethical principles proposed in Resolution 466/2012 of the National Health Council, ensuring confidentiality of data regarding participants.

## Results

At the end of data collection, 458 adolescents participated in the present study, obtaining response rate over 100.0%. Overall, the prevalence of toothache in life among adolescents was 65.7%; while in the last 6 months, 28.6%. Adolescents reported that the pain sensation lasted a very short period (32.2%), being mainly uncomfortable (40.2%) (Table 1).

When analyzing data about history of toothache in life and its associated factors, as shown in Table 2, the responses of 437 adolescents were considered, obtaining response rate of 95.4%. A total of 21 adolescents did not participate in this part of the analysis because they did not remember / know about history of toothache in life.

The occurrence of toothache in life has high prevalence among female adolescents (73.2%), as well as among younger adolescents (76.9%). Between these two variables analyzed, only variable age group obtained values with statistically significant difference in both analyses: bivariate ( $p = 0.004$ ) and multivariate ( $p = 0.003$ ) (Table 2).

It is also possible to observe data related to adolescents' access to oral health services, where toothache in life occurred with higher prevalence among adolescents who visited the dentist once in the lifetime (72.1%), with statistically significant difference in the bivariate analysis ( $p = 0.001$ ); however, values did not remain the same in the multivariate analysis. Variable visit to the dentist in the last 6 months showed association in

the bivariate analysis with toothache ( $p = 0.011$ ); however, this association was lost in the multivariate analysis ( $p > 0.05$ ) (Table 2).

Among adolescents with history of toothache in their lives, 74.3% reported feeling anxious about dental care; however, without statistically significant difference. However, they reported fear (74.9%) regarding dental care, with statistically significant difference for bivariate ( $p = 0.006$ ) and multivariate ( $p = 0.006$ ) analyses (Table 2).

Table 3 shows data on the history of toothache only in the last 6 months and its associated factors. Overall, 430 adolescents responded questionnaires on toothache in the last six months (93.8% response rate). A total of 28 adolescents did not participate in this research because they do not remember / know about their history of toothache in the last six months or because they refused to participate in the study.

It was observed that the occurrence of toothache in the last 6 months presented less frequency for variables gender and age group when compared to the history of toothache in life. Still, the

pattern of younger female adolescents with higher toothache report was maintained (Table 3).

Table 3 also shows data related to adolescents' access to oral health services, a situation in which the occurrence of toothache in the last 6 months presented low frequency. About 31.5% of adolescents who visited the dentist at least once in life experienced toothache and 33.8% of adolescents who visited the dentist in the last 6 months reported toothache. Both showed statistically significant relationship in the bivariate model, but these relationships were not maintained in the multivariate model.

Among adolescents with history of toothache in the last 6 months, 33.0% reported anxiety about dental care, with no statistically significant difference ( $p = 0.103$ ). In this same analysis, in relation to fear, 21.6% reported fear regarding dental care, with no statistically significant difference.

## Discussion

Toothache is a serious Public Health problem, and depending on its intensity, it can negatively reflect the daily activities of affected individuals, as well as society. Among these repercussions, economic costs stand out, whether direct related to health services, or indirect, related to absence in work and academic activities, in the case of students.

The prevalence of toothache among adolescents was high, although most subjects reported very short duration of pain sensation, which was considered predominantly as uncomfortable. This is in agreement with other studies<sup>13,19</sup>.

Corroborating the findings of this work, Hack-Comunello et al.<sup>32</sup> conducted a study with 603 12-year-old students in the city of Joaçaba-SC and found that 71.9% of subjects reported having had one symptom at least once in a lifetime. Similar results were found in the states of Sergipe<sup>9</sup>, in 2011, with prevalence of 71% and São Paulo<sup>19</sup>, in 2012, with prevalence of 71.29%. However, in other studies<sup>12,33</sup>, the prevalence of toothache in the last 6 months was lower than those previously reported, with 14.8% and 22.1% respectively, but also similar to results found in this study. The lower prevalence may have been due to aspects in the methodologies of each study, such as location, type of dental service: public / private and especially time of the last visit to the dentist. Another aspect capable of justifying this disparity is quite logical: if the prevalence of

**Table 1.** Frequency of prevalence, intensity and characteristics of toothache among adolescents from public schools.

Variables	Frequency (%)
Toothache in life	
No	136(29.7)
Yes	301(65.7)
Do not remember	21(4.6)
Toothache in the last 6 months	
No	299(65.3)
Yes	131(28.6)
Do not remember	28(6.1)
Pain duration	
Very short time	97(32.2)
All day long	39(13.1)
The whole night	51(16.9)
More than a day	38(12.6)
Do not remember	76(25.2)
Pain intensity	
Light	55(18.3)
Uncomfortable	121(40.2)
Stressful	42(14.0)
Horrible	68(22.6)
Unbearable	15(5.0)

Source: the authors.

**Table 2.** Bivariate and multivariate analysis using Poisson Regression regarding toothache history and its associated factors among adolescents from public schools.

Variable	History of toothache in life		Bivariate		Multivariate	
	Yes n(%)	No n(%)	Unadjusted OR** p-value (95% CI)		Adjusted OR † p-value (95% CI)	
Gender						
Female	161(73.2)	59(26.8)	0.052	1.13(0.99-1.28)	0.524	1.04(0.92-1.17)
Male	140(64.5)	77(35.5)		1.00		1.00
Age group						
10-14 years	120(76.9)	36(23.1)	0.004	1.19(1.05-1.34)	0.003	1.19(1.06-1.34)
15-19 years	181(64.4)	100(35.6)		1.00		1.00
Visit to the dentist at last once in life						
Yes	287(72.1)	111(27.9)	0.001	2.00(1.31-3.06)	0.306	1.22(0.96-1.78)
No	14(35.9)	25(64.1)		1.00		1.00
Visit to the dentist in the last 6 months						
Yes	157(74.8)	53(25.2)	0.011	1.17(1.03-1.33)	0.401	1.05(0.93-1.19)
No	144(63.4)	83(36.6)		1.00		1.00
Anxiety						
Yes	263(74.3)	91(25.7)	0.029	1.36(1.03-1.79)	0.408	1.12(0.85-1.48)
No	24(54.5)	20(45.5)		1.00		1.00
Fear						
Yes	271(74.9)	91(25.1)	0.006	1.68(1.16-2.43)	0.006	1.65(1.15-2.37)
No	16(44.4)	20(55.6)		1.00		1.00

\*\* Poisson regression not adjusted for independent variables and history of toothache. † Variables incorporated in the multivariate model ( $p < 0.20$ ): gender, age group, visit to the dentist at some time in life, visit to the dentist in the last 6 months, anxiety and fear.

Source: the authors.

toothache in life has been higher than in the last 6 months, this is due to the fact that the likelihood of an adolescent of having had toothache at least once over 19 years is much higher compared to the period of 6 months.

The prevalence of the association between toothache and gender was low, with statistically significant difference among male adolescents who had no toothache in the last 6 months. It is noticeable that there is no consensus in scientific literature about the association between toothache and gender, sometimes with higher prevalence of this condition in males<sup>34</sup>, sometimes in females<sup>5,19</sup>. Regarding age group, statistically significant difference was observed among younger adolescents who had toothache at some point in their lives, corroborating findings of other authors<sup>11,12,33</sup>; as well as among older adolescents, who did not experience toothache in the last 6 months, corroborating other studies<sup>12,35</sup>.

It is relevant to reflect that the relationship between age and toothache may not be directly proportional, since younger adolescents mostly reported pain. This fact leads to the analysis that

pre-adolescents experience a series of changes that directly influence their daily behavior and attitudes, which can be perceived by the accumulated load of stress and rebelliousness, being more prone to care about body and hair, when compared to mouth, thus generating refusal in daily oral hygiene care and, consequently, higher incidence of cases of toothache in the younger age group. In addition, Cabral et al.<sup>12</sup> found no cases of toothache among older individuals. The authors considered the possibility that they may begin to present decreased sensitivity due to the sclerosis of dentin tissues, as well as the fact that they are more independent and seek dental services more frequently.

Access to oral health services is considered an important predictor of quality of life, and should therefore be considered with the presence of toothache<sup>5</sup>. Thus, a periodic visit to the dentist at least once a year is recommended to identify early oral health problems.

In this context, it was observed in the present and other studies<sup>19,36</sup> that the occurrence of toothache in life is directly proportional to the

**Table 3.** Bivariate and multivariate analysis using Poisson Regression regarding history of toothache in the last 6 months and its associated factors among adolescents from public schools.

Variable	History of toothache in the last 6 months		Bivariate		Multivariate	
	Yes n(%)	No n(%)	Unadjusted OR** p-value (95% CI)		Adjusted OR † p-value (95% CI)	
Gender						
Female	82(38.5)	131(61.5)	<0.001	1.70(1.26-2.29)	0.002	1.63(1.20-2.22)
Male	49(22.6)	168(77.4)		1.00		1.00
Age group						
10-14 years	57(36.8)	98(63.2)	0.031	1.36(1.02-1.81)	0.037	1.35(1.01-1.80)
15-19 years	74(26.9)	201(73.1)		1.00		1.00
Visit to the dentist at last once in life						
Yes	123(31.5)	267(68.5)	0.161	1.57(0.83-2.98)	0.898	1.05(0.49-2.20)
No	8(20.0)	32(80.0)		1.00		1.00
Visit to the dentist in the last 6 months						
Yes	70(33.8)	137(66.2)	0.147	1.23(0.92-1.64)	0.755	1.04(0.77-1.41)
No	61(27.4)	162(72.6)		1.00		1.00
Anxiety						
Yes	114(33.0)	231(67.0)	0.103	1.65(0.90-3.02)	0.142	1.54(0.86-2.76)
No	9(20.0)	36(80.0)		1.00		1.00
Fear						
Yes	115(32.6)	238(67.4)	0.203	1.50(0.80-2.83)	-	-
No	8(21.6)	29(78.4)		1.00	-	-

\*\* Poisson regression not adjusted for independent variables and history of toothache in the last 6 months. † Variables incorporated in the multivariate model ( $p < 0.20$ ): gender, age group, visit to the dentist at some time in life, visit to the dentist in the last 6 months and anxiety. \* Missing value because variable was not included in multivariate model.

Source: the authors.

time of visit to the dentist, with statistically significant difference. That is, adolescents who most complained of toothache were those who sought care for the longest time. Therefore, the following question is made: these adolescents only sought care when they really could not stand the pain anymore? Such reflection may be valid as long as other aspects are also considered, such as the existence of barriers that could hinder dental service and consequently delay treatment, such as: lack of professional in the nearest Family Health Basic Unit (UBSF), lack of material for execution of procedures, exacerbated demand, among other factors. The negative impacts caused by toothache on individuals' lives reinforce the need for priority actions in the current oral health policy, expanding access for those with worse oral health conditions.

Despite technological and scientific advances in dental equipment and procedures, feelings of anxiety and fear regarding dental treatment still permeate people's lives.

In this study, there was no statistically significant difference between history of toothache in life and in the last 6 months and anxiety. However, it is well known that the simply fact that the adolescent has toothache and needs some more invasive procedure leads the individual may have some degree of anxiety. Such considerations have been evidenced in other studies<sup>11,37</sup>.

A statistically significant difference between fear and history of toothache sometime in life was observed; however, there was no difference for the toothache variable in the last 6 months. Other studies have also reported the high prevalence of fear<sup>13,38</sup>, which sensation causes several periodic problems, because when preventive treatment is not performed, oral diseases progress and take proportions that need more invasive and, consequently, more painful curative treatments, in addition to treatment refusal.

Toothache is not the only factor recognized as a predictor regarding access to dental services among adolescents, but also technical and man-

agement problems, feelings of fear and anxiety, which are conditions that directly or indirectly influence the psychological state of the patient, leading to refusal and / or postponement of dental care. There is a need for greater use of preventive measures and oral health promotion through collective actions that clarify the population about its importance, as well as the expansion of access to health services, preferably public services, in order to bring a positive view of individuals regarding dental care. Such strategies become essential for improving oral conditions, reducing suffering and improving quality of life.

### Conclusions

The results allow us concluding that the prevalence of toothache reported by adolescents was high.

From the bivariate analysis, it was found that the occurrence of toothache in life was more

prevalent among adolescents aged 10-14 years who visited the dentist some time in their lives and who reported dental fear. It was also observed that the occurrence of toothache in the last 6 months presented low frequency, where male adolescents aged 14-19 years reported not having had toothache in the last 6 months.

Multivariate analysis showed that there was higher prevalence of toothache in life among younger adolescents and those who reported dental fear. However, the prevalence of toothache in the last 6 months was low, where male and older adolescents reported no toothache in the last 6 months.

The results of this study allow us understanding that toothache causes consequences in people's lives, influencing well-being and quality of life. They also warn health systems that improvements need to be made in the field of public health, including health education strategies to reduce feelings of fear and anxiety about dental care, as well as broadening access to health services.

## Collaborations

ACLT Massoni participated in the conception of the research project, statistical analysis and writing of the article. E Porto and LRBO Ferreira participated in the conception of the research project, data collection and writing of the article. MNC Gomes participated in the statistical analysis and writing of the article. AF Granville-Garcia and S D'Avila participated in the statistical analysis and writing of the article.



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