ORIGINAL ARTICLE

Impact of untreated dental caries on oral health of adolescents from cities in the countryside of Rio Grande do Sul

Open acess

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Abstract

Introduction: Dental caries is a major public health problem around the world, because it can cause pain and suffering to individuals. Even with a decline in childhood disease in recent years, it is observed in many countries.

Objective: The objective of this research is to analyze the mean of dental caries and the prevalence of untreated caries and associated factors in students from the southern region of Brazil.

Methods: The approach of this study is quantitative, with a cross-sectional design. The research sample was composed of 77 adolescents from the state schools of the urban area of the municipalities of Ciríaco and David Canabarro, Rio Grande do Sul, Brazil. For the data collection, clinical exams were performed, using the DMFT index, and the application of two semistructured questionnaires to adolescents and their parents. The data were analyzed by descriptive statistics and inferential statistics to the Pearson chi-square test and ANOVA at a significance level of 5%.

Results: The prevalence of untreated dental caries in the final sample was 40.3% and the DMFT index (decayed, missing and filled teeth) 2.32, there was no statistical difference between cities. There was a statistically significant relationship between the variable toothache in the last six months and the outcome of untreated caries (p = 0.012) with 76% of those who had pain. There was also an association between the variable perception of the treatment at the last visit and untreated caries (p = 0.021), with 84.6% of adolescents considering poor / regular treatment.

Conclusion: Although the average dental caries has been low, many adolescents have decayed and untreated teeth, with toothache and lack of quality in dental treatment being the factors that most impacted.

Keywords: dental caries, toothache, dmf index, dental care.

■ INTRODUCTION

Caries and periodontal disease are the most prevalent oral diseases from the point of view of public health, thus causing a great impact on the quality of life of the individuals affected by them. For this reason, such diseases are addressed in several epidemiological studies, and their results are important for the development of preventive and oral health promotion measures[1].

In particular, dental caries is a major public health problem worldwide, as it can cause pain and suffering to individuals. Even with a decline of the disease in children in recent years, it is observed in many countries, prevalence still remains high, with records from several countries having a prevalence greater than 50% in children 12 years of age[2].

Dental pain, which can be caused by untreated dental caries, is also a public health problem in many countries, including Brazil[3]. Due to its high prevalence, this pain is one of the main causes of suffering and with social, psychological and economic consequences in the affected individuals, resulting in a compromise of quality of life and bringing impacts to society. In addition, dental pain has been pointed out by individuals, including children, as the main reason for seeking dental care[4]. It is relatively common for school-age children to present high prevalence of dental pain, which is mainly caused by untreated dental caries and related to poor oral health conditions[5].

Dental caries can be influenced by environmental factors, lifestyle and socioeconomic conditions. However, there are limitations and difficulties to its control, and in most of the world it remains untreated, particularly in the socioeconomically disadvantaged populations, affecting children and adolescents to a large extent[6].

In recent years, the social condition has been highlighted in the evaluation of dental caries, being considered as a factor of relevance for the risk of caries[2]. Low income, represented by the difficulty of accessing dental services and hygiene products, together with the lack of information and knowledge about oral hygiene habits, is associated with the prevalence and severity of dental caries[7-9]. Many epidemiological studies describe the association between social status and poor oral health status[7-10]. There is evidence that the distribution of caries in populations is unequal and commonly associated with socioeconomic status. Thus, studies on the factors that determine oral diseases have gained more importance and usually include socioeconomic factors, such as schooling, individual or family income, and occupation of individuals[2].

In this context, it is extremely important to carry out an epidemiological survey in municipalities that have not yet been carried out, such as the one developed in the present study, which intends to serve as a basis for assessing the current situation and for monitoring these indicators. In addition, it will be possible to assess the impact of possible changes, which must be achieved through the development of preventive, educational and oral health promotion measures in the population.

The objective of this research is to analyze the mean of dental caries and the prevalence of untreated caries and associated factors in school children in the southern region of Brazil.

■ METHODS

For ethical questions, the project was submitted to the approval of the Research Ethics Committee of the Southern Faculdade Meridional/IMED and approved under number 2,014,434. School principals were also asked to consent to access to schoolchildren, from the Authorization Term of the site. Parents of adolescents were asked to sign a Free and Informed Consent Form in order to confirm their understanding and the release of their children's participation in the present study. Also, the adolescents were asked to sign the Term of Assent, confirming their participation in the accomplishment of this work.

Study Design and Sampling

The research has a quantitative approach, whose design is cross-sectional. The study population consisted of all 100 students enrolled in the month of July 2016 in the two state schools of the urban area of the municipalities of the interior of Rio Grande do Sul aged between 11 and 12 years. Of these, 60 adolescents were students of the school that belongs to the municipality of David Canabarro and 40 students of the school of the municipality of Ciríaco. Of the total, 54 and 23 students, respectively from the two municipalities, accepted to participate in the study, totaling a sample of 77 adolescents, which characterized a loss of 23%.

Location of the Study

The municipality of David Canabarro is located in the Northwest region of Rio Grande do Sul, Brazil. With a population of 4,683 inhabitants[11] and a total area of 174,939 km². The municipality of Ciríaco is located in the Northwest region of Rio Grande do Sul, Brazil. With a population of 4,922 inhabitants[11] and total area of 273,873 km².

Instruments and Procedures for Data Collection

To collect data, a self-administered questionnaire was used for the students and another one for the parents, with questions related to dental care, risk factors and knowledge about dental caries.

Afterwards, a clinical examination was performed to collect data on dental caries in all adolescents, using the DMFT index (index of decayed, missing and filled teeth). The DMFT index measures the dental caries attack on the permanent dentition. Their initials represent, respectively: decayed (D), missing (M), filled (F) teeth and the unit measure being the tooth (T). The lost are subdivided into extracted and indicated extraction, proposed by Palmer and Klein[12].

For inclusion criteria, students should be enrolled in the state schools of the urban area of David Canabarro and Ciríaco, accept to participate in the research, by signing the Terms of Consent, and be present at the date of data collection.

Firstly, it was requested the authorization of the place in the state schools of the municipalities, and later, to request the signature of the parents or guardians consenting to participate in the research besides signing the Term of Assentment by the adolescents.

A questionnaire was sent to parents of adolescents, containing questions related to socioeconomic conditions, access to dental services of their children, using as reference the "Form of socioeconomic evaluation, access to dental services, and self-perception of oral health adopted in SB Brazil 2010.[13] Both questionnaires were adapted, adding some specific questions to the present study on knowledge about dental caries, methods of prevention and oral hygiene, ingestion of candies and candies and access to the dentist.

Subsequently, a semi-structured questionnaire was applied to students with information on diet, knowledge about dental caries, oral hygiene habits and self-perception of oral health. The questionnaires were delivered to the students in their respective classrooms to be answered. After 1 hour, the rooms were collected to collect the questionnaires, so that the influence of the researcher did not occur. Data collection was carried out in the schools in July 2016, in the morning and afternoon shifts, according to the availability of the schedules by the School Directors and the Teachers present in class, seeking not to interfere with the activities proposed by the schools and the teachers. Afterwards, the data were collected through intraoral clinical examinations, according to the DMFT index for dental caries. The students were called one at a time so that they could be examined properly. Groups composed of flat mouth mirror and sterilized exploratory catheter and tongue depressors were used, following biosafety norms of the Ministry of Health for epidemiological survey. All students were examined next to natural light (window) and with lighting and flashlight help in a room provided by the school heads.

Data were analyzed individually by descriptive statistics and by inferential statistics using the Pearson chi-square test and ANOVA at a significance level of 5%. Statistical Package for the Social Sciences (SPSS) 20.0 was used for this purpose.

◼ RESULTS

The analysis identified that of the 77 participants who answered the questionnaire, 54 (70.1%) lived in the municipality of David Canabarro and the others in Ciríaco and were 11 or 12 years old, 50.6% female and the other male. Of these, 59 (76.6%) reported not knowing how tooth decay occurs, but only 3.9% of them brush their teeth only once a day, unlike the others, who brush twice or more a day and only 33.8% use dental floss daily. The majority of them have ever been to the dentist, being 98.7% in the last year, the reasons for which were varied: 54.5% for review / checkup or prevention, 10.4% for toothache, and the others for some treatment. The majority had a good perception of the dental treatment performed in the last consultation (83.1%), but 28.6% believe that they currently require dental treatment.

When the students were questioned about the presence of toothache, 25 (32.5%) reported having suffered toothache in the last 6 months. Thus, 64 (83.1%) of the students had a good perception of the treatment in the last consultation being satisfied.

When questioned about the frequency of intake of candy or sweets, 23.4% stated that they ingest every day.

Regarding parents' schooling, 57.2% attended elementary school, 27% up to high school and 15.6% attended higher education. Regarding income, questioned about the amount received monthly, 55.9% receive from R$500 to R$1,500.00, and the other part (44.1%) receives from R$1,501.00 to R$4,500.00 monthly. According to the parents, 85.5% said that access to the dental surgeon is easy and fast, 67.5% attending public service and 32.5% attending private service.

The mean DMFT index found in all adolescents was 2.32 (sd 1.81). According to the municipalities, the average of the adolescents of David Canabarro was 2.43 (sd1.93) and that of Ciríaco 2.09 (sd 1.50). According to statistical analysis to verify difference between the groups, it was possible to observe that there was no statistically significant difference between the means of dental caries among the adolescents of the two municipalities, from the Analysis of Variance (ANOVA) test, with p = 0.45.

When the components of the DMFT index were analyzed separately, it was verified that the prevalence of untreated dental caries was 40.3%, observed by the sum of the components decayed and filled, but with caries present. In Figure 1, the frequencies of the DMFT components (decayed, missing and filled teeth) are represented (Figure 1).
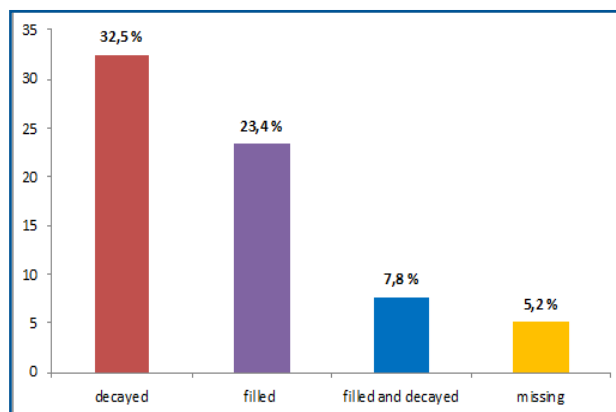

Figure 1: Distribution of the dental caries experience, according to the DMFT components of adolescents from the cities of David Canabarro and Ciríaco, RS, 2016.

For the construction of the dental caries untreated dependent variable, the components of the DMFT were categorized into two groups: 1. Yes - decayed and filled, but with caries; 2. No caries - all other components.

Bivariate relationships are presented in Tables 1 and 2, between dependent variable and independent variables (socio-demographic variables and variables of habits and oral perceptions). After statistical analysis, a statistically significant relationship was observed between the variable toothache in the last 6 months and untreated caries with a frequency of 76% of those who had toothache in the last 6 months and caries present (p=0.012). Also, there was an association between the variable perception of dental treatment at the last visit and untreated caries (p=0.021), with 84.6% of those who considered the treatment as poor and / or regular (Table 1 and Table 2).

The data found in the scientific publications with high evidences and that served for the discussion of the work are in Table 3.

Table 1: Bivariate analysis between sociodemographic variables and untreated caries in adolescents from the cities of David Canabarro and Ciríaco, RS, 2016.

Variables	Untreated caries				
	Yes		No		p
	n	%	n	%	
City					0.570
David Canabarro	24	44.4	30	55.6	
Ciríaco	10	43.5	13	56.5	
Age (years)					0.555
11	21	43.8	27	56.2	
12	13	44.8	16	55.2	
Gender					0.215
Male	19	50.0	19	50.0	
Female	15	38.5	24	61.5	
Education Level					0.968
Up to completion of elementary school	20	58.8	24	55.8	
High schoo	9	26.5	12	27.9	
Higher education	5	14.7	7	16.3	
Monthly family income (in Brazilian reais)					0.506
500.00-1.500.00	15	44.1	28	65.1	
1.501.00-4.500.00	19	55.9	15	34.9	
Last dental consultation					0.114
Public Service	20	38.5	32	61.5	
Private Service	14	56.0	11	44.0	
Access to the dental surgeon					0.505
Easy and fast	29	85.3	33	76.7	
Regular and difficult	5	14.7	10	23.3	

* p <0.05 - Statistically significant difference.

Table 2: Bivariate analysis between variables of habits and oral perceptions and untreated caries in adolescents from the cities of David Canabarro and Ciríaco, RS, 2016.

Variables	Untreated caries				
	Yes		No		
	n	%	n	%	p
Knowledge of how dental caries occur					0.594
Yes	8	44.4	10	55.6	
No	26	44.1	33	55.9	
Eat sweets or candy					0.594
Once or twice a week	26	76.5	33	76.7	
Every day	8	23.5	10	23.3	
Number of use of dental floss					0.318
Once a day	10	29.4	16	37.2	
Once a week	24	70.6	27	62.8	
Number of toothbrushing per day					0.579
Once or twice a day	12	35.3	15	34.9	
More than twice a day	22	64.7	28	65.1	
Reason for your last visit					0.160
Check up or prevention	21	61.8	21	48.8	
Toothache, Exodontia, Filled	13	38.2	22	51.2	

Continuation- Table 2: Bivariate analysis between variables of habits and oral perceptions and untreated caries in adolescents from the cities of David Canabarro and Ciríaco, RS, 2016.

Variables	Untreated caries				
	Yes		No		
	n	%	n	%	p
Perception about the last dental appointment					*0.021
Good	32	50.0	32	50.0	
Bad/regular	2	15.4	11	84.6	
Need for dental treatment currently					0.145
Yes	9	26.59	13	30.2	
No	25	73.5	30	69.8	
Toothache in the last 6 months					*0.012
Yes	6	24.0	19	76.0	
No	28	53.8	24	46.2	
Satisfaction with teeth/mouth					0.504
Satisfied	23	67.6	25	67.4	
Not satisfied	11	32.4	14	32.6	

* $p < 0.05$ - Statistically significant difference.

Table 3: Evidences in Scientifics articles.

Authos/ Year	Objectives of the study	Search Location	Sample (tsize and age)	Results
Hoffmann et al. (2004)[17]	To verify the prevalence of caries among preschoolers and schoolchildren in a municipality with fluoridated water located in the Southeast Region of Brazil and its relation with the socioeconomic level, measured by the type of school.	Rio Claro-SP	888 children 5 to 12 years old from public and private schools.	At 5 years, the dmtf index was 2.48, increasing until the age of 8 years; and 42.20% had no caries experience. After this age, the dmtf index decreased to reach 0.42 at 12 years. At the same time, the DMFT index increased according to age, reaching a mean of 2.71 at 12 years, and 28.90% did not present a caries experience. Dmtf and DMFT, excluding caries-free children, did not present a statistical difference regarding the socioeconomic level, nor did they differ in the percentage of children with dmtf higher than 3. A higher percentage of children with DMFT greater than 3 were observed in the group of children in public schools than in private schools ($p = 0.005$).
Galindo et al. (2005)[8]	To verify the prevalence of dental caries and associated factors in children enrolled in the Family Health Unit.	Vietnã, Recife- PE	128 children 6 to 12 years old.	Of the total, 14.1% of the children were free of caries. At 11 and 12 years, 29.7% had DMFT = 0, 29.7% had values between 4-8. DMFT decreased significantly with the increase in family income ($p = 0.02$). The number of decayed, lost and restored primary teeth (dmtf) reached a maximum value at 7 years (4.50), almost significantly higher ($p = 0.05$) in the families with the highest number of children up to 12 years old (4.50). The educational level of those responsible, the number of daily cleanings and access to dental care did not affect these indices

Continuation- Table 3: Evidences in Scientifics articles.

Authos/ Year	Objectives of the study	Search Location	Sample (tsize and age)	Results
Moreira, Rosenblatt e Passos (2007)[18]	To verify the prevalence of caries in two types of schools and to compare the mean DMFT with respect to the gender, age and level of schooling of the mother among adolescents from public and private schools.	João Pessoa-PB	3,330 teenagers to 15 years old, of whom 1,665 were from the public network and 1,665 from the private network.	The prevalence of caries in public schools was 51.6% and 9.3% in private schools. The mean DMFT in females was 4.79 and 3.46 males, in public schools (p<0.0001) and 2.11 and 1.65 (p=0.0007), in schools private partnerships. At age 12, it was 3.37 in public schools and 1.35 in private schools, while at 15 it was 5.65 and 2.88 in both schools, respectively. For those whose mothers completed higher education, the mean DMFT was 4.21 in the public network and 1.81 in the private network. The prevalence of caries was higher in children of the public network, in the female gender, increased with age and decreased with the increase in the level of schooling of the mother.
Meneghim et al. (2007)[7]	To evaluate the relationship between a socioeconomic classificationn model and the prevalence of dental caries and dental fluorosis in schoolchildren.	Piracicaba- SP	812 schoolchdren 12 years old.	The mean DMFT index at age 12 was 1.7; and the percentage of children in this same group with dental fluorosis was 31.4%. The association between dental caries and socioeconomic variables was statistically significant for the variables "family income", "mother and father's degree of education", "housing" and "socioeconomic class" , as well as fluorosis. Regarding dental fluorosis, only the variable "mother's degree of education" presented a statistically significant result.
Pau et al. (2008)[32]	To document the prevalence of 1 month dental pain in 11-14 year olds who attended the sixth grade of schools in Peshawar, Pakistan, and to explore the effect of dental pain and the impact on daily life in dental care.	Peshawar- Paquistão	500 students 11 to 14 years old.	The prevalence of dental pain was estimated at 30.4%, and the search for care in those who reported pain was estimated at 64%. The search for care was associated with pain in one tooth, difficulty sleeping and difficulties to play, which represented 35% of the variance
Rihs et al. (2008)[33]	To verify the prevalence of tooth pain reported by schoolchildren and their relationship with the dental caries experience, as well as the need for treatment in schoolchildren.	Paulínia- SP	540 children 2 and 5 years old.	The prevalence of oral pain in the city was 22.8% and the DMFT in the city was 0.9 (Confidence Interval = 0.8-1.1). Students who reported pain had a higher DMFT index and a higher percentage of decayed teeth than those without pain (p <0.05). In addition, students with pain reported had a higher percentage of teeth requiring curative treatment (p=0.033), with more indication of restorations with two or more surfaces (p=0.017). Socio-demographic, socioeconomic, and self-perception conditions influenced the pain experience, students who did not report pain were more satisfied with the appearance of their teeth.

Continuation- Table 3: Evidences in Scientifics articles.

Authos/ Year	Objectives of the study	Search Location	Sample (tsize and age)	Results
Rihs et al. (2010)[16]	To evaluate the prevalence of dental caries and the need for dental treatment, to identify the epidemiological aspects in the distribution of dental caries in the population that presents higher caries rates in adolescents.	Indaiatuba- SP	309 schoolchildren. 12 years old.	The percentage of caries-free schoolchildren was 38,8%. Among the schoolchildren examined, 36.6% presented caries activity. The mean DMFT was 2.50. The carious component was the most prevalent 61.0%. The Gini coefficient was 0.602 and the value of the SiC index was 5.97; In this group in particular, 74.7% presented caries activity at the moment of the examination.
Rigo, Caldas Junior e Souza (2011)[6]	To investigate the influence of demographic, socioeconomic factors, access to dental services and oral hygiene habits in dental caries among schoolchildren in the municipality.	Passo Fundo- RS	535 schoolchildren of 12 and 15-19 years old of municipal schools in the urban zone	The prevalence of dental caries was 83.6% at 12 years and 93.8 at 15-19 years of age. The DMFT index at 12 years was 3.38 and 5.62 in the other age group. Schoolchildren aged 15 to 19 were almost three times more likely to have dental caries than 12 year old schoolchildren. Living in homes with six or more rooms in the house was considered a protective factor for dental caries in schoolchildren.
Knackfuss, Costenaro e Zanatta (2011)[30]	To verify the prevalence of toothache and associated factors in students from three public schools, two municipal schools and one state school	Santa Maria- RS	847 schoolchildren 14 to 17 years old.	The prevalence of toothache was in 63.2% of the students and the chance of having very frequent pain was higher in girls (OR 0.22 CI 95% 0.07-0.64). In the last 6 months, students aged over 14 years were more likely to have a longer dental pain time (OR 3.31 CI95% 1.39-7.87). 30% of dental pains are associated with caries lesions
Boeira et al. (2012)[34]	To evaluate the prevalence of dental pain and its association with demographic and socioeconomic variables, the behavior of mothers and clinical aspects related to mothers and children in a birth cohort.	Pelotas- RS	1,129 children 5 years old	The prevalence of pain in the last 6 months was 16.5% (14.4, 18.8), and in the last 4 weeks, 7.3% (95% CI: 5.8, 8.9). Through the multivariate analysis, the prevalence of dental pain was higher in children with dark skin (RP = 1.60, 95% CI: 1.08, 2.37), who had a lower socioeconomic level (RP = 1.9, 1,2-3,0), and with a high prevalence of caries at 5. In addition, even in children whose mothers had: lower education (PR = 1.9, 1.0 -3.6), less than 10 (PR = 1.7, 1.2-2.5) and less than 10 in two arches (PR = 1.6, 1.0-2.6).
Ferreira et al. (2012)[22]	To investigate odontalgia as a reason for last consultation, and to evaluate its association with socioeconomic, psychosocial and oral health variables.	Piracicaba- SP	592 teenagers 15 years old	The DMFT index was 1.67 (SD = 2.21) and 23.3% presented with untreated caries. Still, 28.6% of the carious component was found, lost 4.2% and 67.2% obturated. Of these, 33.44% reported dental pain as the reason for the last consultation. Odontalgia was associated with low income, the highest number of people living in the same household, the low frequency of daily brushing, the high interval between dental consultations, the longest period of time in which the last dental appointment occurred, the dental anxiety, to the consumption of cariogenic foods, high experience of caries, and to the presence of untreated carious lesion.

Continuation- Table 3: Evidences in Scientifics articles.

Authos/ Year	Objectives of the study	Search Location	Sample (tsize and age)	Results
Freire et al. (2012)[12]	To estimate the prevalence of toothache in Brazilian adolescents and to analyze their associated factors, using PeNSE data	26 capitals of Brazilian states and the Federal District	54,985 children and teenagers 11 to 19 years old	There was a prevalence of tooth pain in 17.8% in the sample as a whole, however, the North and Center-west regions with the exception of one in the South region obtained the highest values. Prevalence was highest among female students (19.7%) between 14 and 16 years old (17.9%) and older than 17 years (22.9%), in adolescents indigenous or black, of public schools, that did not live with the mother or the same has low education. In adolescents who reported low frequency of brushing and high consumption of goodies and soft drinks, and who had tried cigarette and alcohol.
Ferreira et al. (2013)[25]	To investigate the different gradients of perceived family cohesion and its association with socioeconomic, behavioral and oral clinical variables in adolescents.	Piracicaba- SP	524 teenagers 15 years old	The mean value of the DMFT and Sic index index was 1.64 and 4.18, respectively. Of the total sample, 47.5% had no caries experience and 22.32% had untreated carious lesion. The presence of gingival bleeding was observed in 17.55% of adolescents. The mean of the family cohesion score was 32.23, ranging from 12 to 50. Univariate analysis and multinomial logistic regression showed that adolescents with low family cohesion were more likely to have low income, presence of caries and low frequency of daily brushing, unlike adolescents with medium and high family cohesion. Adolescents with high family cohesion were more likely than adolescents with average cohesion to have a high income and a protection against smoking. The family cohesion perceived by the adolescent was associated with behavioral, socioeconomic and oral health variables.
Geus et al. (2013)[19]	To verify the prevalence and severity of dental caries in schoolchildren of urban and rural areas of the city, as well as to analyze the self perception of oral health of children.	Ponta Grossa-PR	705 children from 5 to 12 years old, 293 of public schools in the rural area and 412 in the urban area.	The prevalence of caries in rural schools was 86.7%, compared to 63.1% in urban schools. Children in rural schools also have a higher prevalence of toothache 68.9%, compared to 59.9% in urban school children. The mean DMFT of this region was 1.0 and the dmft was 3.87. In the urban area, DMFT and dmtf indexes were 0.39 and 2.19, respectively. The dmtf and DMFT indexes, in schoolchildren living in urban and rural environments, were different, being significantly higher for the rural area. The prevalence of severe caries was also higher in rural areas. Most of the children revealed that they had already consulted a dentist and that they felt satisfied with their oral health, with no significant difference between schools.

Continuation- Table 3: Evidences in Scientifics articles.

Authos/ Year	Objectives of the study	Search Location	Sample (tsize and age)	Results
Krisdapong et al. (2013)[5]	To evaluate the prevalence and extent of school absence due to dental pain, dental caries and oral health related quality of life (OHRQoL) in a sub sample of the national oral health survey in Thailand. In addition, we investigated the associations of school absence as a variable of outcome with behavioral and sociodemographic explanatory variables, dental caries and OHRQoL.	Tailândia	1063 children 12 years old and teenagers 811 15 years old	The prevalence of dental caries was 58% and the DMFT 1.6 at 12 years and 68.6% and DMFT 2.4 at 15 years. Of these, 5.1% and 4.4% of adolescents aged 12 and 15 years respectively were absent from school due to dental pain, and those who were absent were 15 years old. Quality of life related to oral health and dental pain was associated with school absenteeism in adolescents aged 12 years.
Lopes et al. (2013)[10]	To determine which of the socioeconomic and demographic variables were associated with untreated caries in adolescents.	São Paulo	4,246 children 12 year old from public and private schools in all administrative districts of the city	The authors found that 54.8% of the children were free of caries. Through the multivariate analysis they observed that there was an influential association between dental caries not treated with socioeconomic and demographic variables and that the higher prevalence of untreated dental caries was in children who had pain in the last 6 months, black and / or brown, from public schools, with income equal to or less than a minimum wage and living in housing with more than one person per room.
Ferraz et al. (2014)[3]	To evaluate the clinical consequences of untreated tooth decay in the occurrence of toothache in Brazilian preschool children.	Serro- MG	540 children 2 and 5 years old	The mean number of decayed teeth was 2.73, the prevalence of dental caries was 50% and that of dental pain was 25%. More advanced age, pulp involvement, ulceration, fistula and abscess were significantly associated with dental pain
Noro et al. (2014)[26]	Correlate toothache with socioeconomic conditions, access to oral health services and adolescents' lifestyle.	Sobral- Ceará	688 children and a teenagers 11 and 15 years old	The authors had a prevalence of toothache in 31.8% of adolescents. The DMFT, reason for dental care, frequency of visits to the dentist and those who received a brush at school were the factors that presented the most relation to toothache. However, the authors concluded that access to health care is one of the determinants of the prevalence of toothache in adolescents, and in order to reduce it, strategies should be developed to prevent oral diseases
Skinner et al. (2014)[20]	To investigate potential social and behavioral risk factors influencing adolescent oral health (NSW survey).	New South Wales – Austrália	1199 teenagers 14 and 15 years old	Clinical exams revealed that 44.4% of the adolescents presented experience in caries in at least one tooth, while 10.6% of the sample had severe caries. Severe dental caries was found to be significantly related to a variety of factors, including family income, fluoridation status, tooth brushing behavior and sugary drink consumption.

Continuation- Table 3: Evidences in Scientifics articles.

Authos/ Year	Objectives of the study	Search Location	Sample (tsize and age)	Results
Rosa, Abegg e Ely (2015)[29]	To investigate the association between SOC (Sense of Consistency) and toothache in adolescents	36 municipalities with up to 50,000 inhabitants in Rio Grande do Sul	1,150 teenagers 15 to 19 years.old	Of the adolescents in the sample, 29.8% reported having toothache in the last 6 months. The prevalence of dental caries was 31.0% and the DMFT index was 3.22. SOC was a significant protective factor for toothache; The prevalence ratio was 0.65 (95% CI = 0.55-0.75). The girls presented 39% more toothaches than the boys (95% CI = 1.15-1.68). Individuals who saw the dentist for reasons other than revisions or check-ups had a tooth prevalence that was 85% higher than their counterparts (95% CI = 1.47-2.34). Adolescents with caries reported up to twice as much toothache as those without dental caries.
Schuch et al. (2015)[4]	To evaluate the reports of dental pain in a school sample of children from southern Brazil and to test their association with socioeconomic, demographic, psychosocial and clinical variables. The consequences of dental pain on the perception of oral health and its impact on daily life were also investigated.	Pelotas- RS	1199 children 8 and 12 years old	The prevalence of dental pain was 35.7% in the last 6 months. It was observed a higher prevalence of dental pain in children from low income families, for girls, for those who live in conditions of overcrowding for those who reported dental fear, and for those with experience in caries, after Adjustments. The presence of pain pains influenced the perception of oral health and impacted children's daily lives.
Santin et al. (2016)[24]	To analyze the association of untreated dental caries (UDC) and household food insecurity (HFI) in different income strata of schoolchildren, considering other risk variables for dental caries	Araucária – PR	538 children 12 years old	The prevalence of UDC and HFI was 45% and 39%, respectively. The multivariate models showed that UDC was significantly more prevalent among children with food-related HFI and per capita income up to $ 70.71 than among those in the same income stratum who were HFI-free [RP = 1.52 (CI 95% = 1.01-2.29)]. HFI was associated with a higher frequency of UDC in low-income students, but did not have a significant impact on this variable among children of different income strata. The mean DMFT index was 2.4.
Shekhawat, Chauhan e Nordstroem (2016)[31]	To determine the prevalence of dental pain among schoolchildren after the time of commutation of the year. It also explores how dental pain has its social impacts on your daily life.	Leh, Ladakh- Índia	200 indigenous teenagers from the Himalayas (Ladakh) 12 to 15 years old	The prevalence of dental pain in the last 6 months was 77%, approximately 89% of the students reported at least one impact due to dental pain, being more reported by women. The most reported impact was difficulty in eating presented by 50.5% of participants, followed by difficulty in sleeping 22.07%. About 6% reported that pain prevented them from going to school and another 6.7% could not smile and attend school with pain.

■ DISCUSSION

According to the World Health Organization, index values correspond to the following degrees of severity: very low (0.0 to 1.1), low (1.2 to 2.6), moderate (2.7 to 4, 4), high (4.5 to 6.5) and very high (6.6 and more)[14]. It's observed that the values obtained in the present study classify the mean of dental caries as low in both municipalities investigated.

The total DMFT index found was 2.32, of which 2.43 in schoolchildren in the municipality of David Canabarro and 2.09 in the schoolchildren of Ciríaco. Similar results were found in the National Oral Health Survey, in which the DMFT was 2.06 in the Southern Region of the country at age[12,15] as well as in the study by Rihs et al.[16] in the city of Indaiatuba, SP, in which the DMFT was 2.50. These indi corroborate the data presented in this research. The importance of these oral findings in schoolchildren is of extreme relevance for the Public Health of the municipalities, since the planning of strategies can be formulated from the results demonstrated here.

Differently from these results, some studies found moderate DMFT: in Rio Claro, SP, the authors obtained DMFT 2,71[17]; in João Pessoa, PB, 3.37 in public schools and 1.35 in private schools[18]; in Serro, MG, the mean was 2,73[3], and in the municipality of Passo Fundo-RS the DMFT index at 12 years of age was 3,386. However, better results were still found by Geus et al.[19], with a very low DMFT average of only 1.0 in Ponta Grossa, PR, as well as in the National Oral Health Survey, which obtained a mean of 1.49 in Porto Alegre[15].

The study also aimed to relate the socioeconomic conditions, such as the family income of the students, to the prevalence of dental caries, since findings in the literature showed associations between this variable and the high DMFT. One can cite in this regard the research of Galindo et al.[8], which reinforce this statement, since the authors observed that the DMFT decreased significantly with the increase in family income. Other studies corroborating these findings are Freire et al.[2], who observed that the caries experience was significantly higher in families with lower income, and that of Skinner et al.[20], who showed that the experience of dental caries severity was related to several factors, including family income. However, in the present study, there was no statistical significance. This can be attributed to the higher socioeconomic level of the municipalities in which the research was carried out. These municipalities have Human Development Index (HDI) equal to 0.762 in David Canabarro and 0.719 in Ciríaco. This means that both are in the range of high Human Development Index between 0.700 and 0.799) and may suggest that there is effective access to health services and goods for their population. With regard to the dimensions that contribute most to the HDI of both municipalities are longevity, income and education[21]. The Gini index (which measures the degree of concentration of income and varies from 0 to 1, where 0 represents the situation of total equality, and the value 1 means complete inequality of income) of the municipalities is 0.44 in the municipality of David Canabarro and 0.45 in the municipality of Ciríaco[21]. Thus, the presented indicators are considered good to demonstrate social development in both municipalities. It should also be noted that socioeconomic conditions and the higher level of education and information may be related to lower rates of dental caries among schoolchildren in the municipalities, resulting in a greater demand for dental services.

The variables "last dental consultation", "access to dental services", "frequency of brushing and flossing" had no relation to dental caries not treated in the present study. Although no relation was observed with these variables, the percentage of adolescents who attended the dentist in the last year was 98.7%, and the main reasons for the professional's search were the review, prevention or checkup reported by the students. In addition, the vast majority found access to dental services easy, so much so that 94.8% of parents reported taking their child to the dentist. With regard to oral hygiene habits, most students reported brushing at least twice a day. According to authors, hygiene habits and access to dental services are important factors for the prevention of dental caries[6]. However, the study by Ferreira et al.[22] showed different results to those found in the present study, since 33.44% reported that the reason for the last visit was pain of dental origin, related to the low frequency of daily brushing, to the longest period of time of the last dental visit and high experience of caries. In view of this, it can be inferred that the search for dental services for reviews and oral hygiene habits were frequent in schoolchildren in both municipalities. Results found in the study by Junqueira et al.[23] showed a positive relationship between higher rates of health need and the difficulty of access to services, and also lower health needs related to the higher prevalence of children free of dental caries.

The prevalence of untreated dental caries ascertained in this study was 40.3%, similar to the studies by Santin et al.[24] conducted in Araucária, PR, with 12-year-old adolescents, where the prevalence of caries with untreated clinical diagnosis was 45%. Similarly, a study by Skinner et al.[20] conducted in New South Wales, Australia, showed that 44.4% of adolescents had experience in caries in at least one tooth. However, it was slightly higher when compared to other studies, such as those by Ferreira et al.[22] and Ferreira et al.[25], both conducted in Piracicaba, São Paulo, Brazil, which showed that 23.3% and 22.32% of the adolescents presented with untreated carious lesion, respectively. However, the prevalence was lower than the findings of the capital, Porto Alegre, where the experience of untreated dental caries was high, with 63.1%, and in the southern region of Brazil, which was 60.7%[15]. Thus, it can be observed that the students of the municipalities surveyed had better results than the studies carried out in the South of the Country.

In addition, in the present study, 32.5% reported having suffered toothache in the last 6 months, similar time to results found by other authors, such as Schuch et al.[4] in Pelotas, RS, where the prevalence of dental

pain was of 35.7%, and Noro et al.[26], made in Sobral, CE, where the prevalence of toothache was 31.8% in the last 6 months. This prevalence should be considered high when compared to the following studies: Freire et al.[27] performed in 26 capitals of Brazilian states and in the Federal District, where the prevalence of toothache was 17.8%; Jaiswal et al.[28], in Kollipara Mandal, Guntur district, Andhra Pradesh, India, whose prevalence of toothache was 28.3%; Rosa et al.[29], performed in 36 municipalities with up to 50,000 inhabitants in Rio Grande do Sul, where 29.8% reported having toothache in the last 6 months. In turn, it is inferior to the results of the study carried out in Santa Maria, RS, where they found a prevalence of toothache in the last 6 months in 63.2% of students[30] and in Leh, Ladakh, India, which showed that the prevalence of pain in the last 6 months was 77%[31]. In the literature, different periods of time can be observed to investigate the experience of dental pain, some shorter, such as 4 weeks, which reduce bias risks. However, in longer periods, such as 6 months and 1 year, pain resulting from a chronic disease can be evaluated, as described by Schuch et al.[4] in which, as in the present study, a period of 6 months. The prevalence of dental pain is a measure of quality of life and one of the indicators of oral health. Its reduction is one of the objectives of the 2020 global oral health goals[32].

The untreated tooth decay experience had a statistically significant association with the toothache variables in the last 6 months, with 76% of those who had toothache in the last 6 months and caries present (p = 0.012). In the study by Rihs et al.[33] conducted in Paulínia, SP, students who reported dental pain had a higher DMFT index and, as a consequence, a greater need for treatment, saying that pain in recent months was related to schoolchildren with worse oral health conditions. Our results still corroborate with the findings of Lopes et al.[10] carried out in São Paulo, SP, which observed an association between untreated dental caries in children who had pain in the last 6 months. caries not treated as being of African descent, from public schools, with income equal to or less than a minimum wage and living in housing with a high family density. The study by Rosa et al.[29] conducted in 36 municipalities with up to 50,000 inhabitants in Rio Grande do Sul, showed that adolescents with dental caries reported having up to twice as much toothache as those without dental caries. Authors describe that quality of life related to oral health and dental pain was associated with school absenteeism in 12-year-old adolescents. The authors describe that, in every 20 children, at least one report school absence due to toothache[5]. Therefore, the present study observed that school adolescents with untreated tooth decay presented dental pain in the last 6 months, which was similar to other regions of the State and the Country, which may cause oral health impacts of adolescents in society.

Noro et al.[26] described that the fear of dental surgeons and dental procedures are still experienced by a large part of the population. Because of this, adolescents are likely to seek fewer dental services because of their distrust of dentists and the high anxiety associated with fear of procedures. According to the authors, these elements explain the irregular pattern of dental care in adolescents. In the present study, another variable that was associated with untreated caries was the perception of the treatment in the last consultation, 84.6% of whom found the treatment to be poor or regular, and caries present (p = 0.021). It can be assumed that fear and anxiety cause adolescents to describe dental treatment as bad or regular, frequent less the dentist and, as a consequence, have more untreated tooth decay. Corroborating this statement, Schuch et al.[4] described that patients with fear are more likely to postpone treatment, thus leading to more extensive dental problems.

The study has the design as a limitation, especially since it does not allow cause-effect inferences among dental caries factors, and because it does not allow follow-up of the examined ones, as in most cross-sectional studies[2,3,24,34,35]. It suggests thus, the next studies are carried out with a different methodological approach, such as a cohort study that allows cause-effect inferences with the factors related to dental caries.

The research has a great social relevance, since it approached a sample of school adolescents of two interior municipalities of the northwest region of Rio Grande do Sul. The determination of the oral health status, through this survey, contributes and allows the public sector to take cognizance and develop strategies to prevent wider problems, and may reduce the pathologies investigated.

The contribution of this research to the field of public health of the municipalities is inediticidade in carrying out an epidemiological research with oral exams in the students, thus describing a prevalent oral complaint and its need for treatment.

■ CONCLUSION

From the obtained results, it was possible to conclude that:

• average dental caries is low in schoolchildren of both municipalities, however, with a high prevalence of untreated dental caries;

• there was an association between the presence of toothache in the last six months and the perception of dental treatment in the last consultation with the presence of untreated dental caries, being the toothache and the absence of quality in dental treatment the factors that most impacted.

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Resumo

Introdução: A cárie dentária é um grande problema de saúde pública em todo o mundo, pois pode causar dor e sofrimento aos indivíduos. Mesmo com um declínio da doença em crianças nos últimos anos, é observado em muitos países.

Objetivo: O objetivo desta pesquisa é analisar a média de cárie dentária e a prevalência de cárie não tratada e fatores associados em escolares da região Sul do Brasil.

Método: A abordagem do estudo é quantitativa, cujo delineamento é de corte transversal. A amostra foi composta por 77 adolescentes das escolas estaduais da zona urbana dos municípios de Ciríaco e David Canabarro, RS. Para a coleta de dados, foram realizados exames clínicos, utilizando o índice CPOD, e a aplicação de dois questionários semiestruturados dirigidos aos adolescentes e a seus pais. Os dados foram analisados individualmente, primeiramente por estatística descritiva e, posteriormente, por estatística inferencial ao teste do qui-quadrado de Pearson e de ANOVA, ao nível de significância de 5%.

Resultados: A prevalência de cárie dentária não tratada na amostra final foi de 40,3% e a média de dentes com experiência de cárie, medida pelo índice CPOD (média de dentes cariado, perdidos e obturados) foi 2,32, não havendo diferença estatística entre os municípios. Houve relação estatisticamente significativa entre a variável dor de dente nos últimos seis meses e o desfecho cárie não tratada (p=0,012) com 76% dos que tiveram dor. Também houve associação entre a variável percepção do tratamento na última consulta e cárie não tratada (p=0,021) com 84,6% adolescentes que consideraram o tratamento ruim/regular.

Conclusão: A média de cárie dentária foi baixa, porém, muitos adolescentes possuem dentes cariados sem tratamento, sendo a dor de dente e a ausência de qualidade no tratamento odontológico os fatores que mais impactaram.

Palavras-chave: cárie dentária, índice CPO, odontalgia, tratamento odontológico.