Original Article

Caries experience in adolescents from a metropolitan region of the Brazilian Amazon

Experiência de cárie em adolescentes de uma região metropolitana da Amazônia brasileira

Abstract

Purpose: To estimate the prevalence of dental caries among adolescents from a poor metropolitan region of the Brazilian Amazon, and to identify the independent socioeconomic variables of access to dental services, oral hygiene habits, and self-perception of oral health.

Method: The sample comprised 178 adolescents aged from 15 to 19 year-old, enrolled in schools in the Eastern zone of the city of Manaus, AM, Brazil. Primary data were collected using a standardized questionnaire and clinical examination.

Result: The prevalence of dental caries was 92.7%, and the mean DMF-T index was 5.16 (SD: 0.28). The average number of decayed, missing, and filled teeth was 4.4, 0.87, and 0.75, respectively. No statistically significant differences were found between DMF-T index and *per capita* household income. Most adolescents declared that they had had an appointment with a dentist at least once in their lifetime, had sought the public service, and that pain was the predominant reason for consultation. The perception of oral health of the majority was good/excellent.

Conclusion: The data suggest lack of restorative dental treatment and high prevalence of dental caries in this socially disadvantaged sample, which evidences the need to implement strategies to improve delivery of oral health care.

Key words: Oral health; epidemiology; dental caries

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Resumo

Objetivo: Estimar a prevalência de cárie em adolescentes, escolares de uma região metropolitana de Manaus, Brasil, identificando variáveis independentes socioeconômicas, de acesso a serviço odontológico, hábitos de higiene oral e autopercepção da saúde bucal.

Metodologia: Foram investigados 178 escolares de 15 a 19 anos, matriculados nas escolas da zona leste da cidade de Manaus, AM, Brasil. Foram coletados dados primários por meio de questionário e exame clínico.

Resultado: A prevalência de cárie foi 92,7% e a média do índice CPO-D foi de 5,16 (desvio-padrão: 0,28). A média de dentes cariados, perdidos e obturados foi de 4,4; 0,87 e 0,75, respectivamente. Não foram encontradas diferenças estatisticamente significantes entre CPO-D e renda domiciliar *per capita*. A maioria dos adolescentes declarou já ter ido ao dentista pelo menos uma vez na vida e ter procurado o serviço público, sendo a dor o motivo predominante para a consulta. A percepção da saúde bucal da maioria foi boa/ótima.

Conclusão: Os dados obtidos sugerem carência de tratamento odontológico restaurador e prevalência preocupante sobre dentes perdidos por cárie dentária, evidenciando necessidade de implantação de estratégias de atenção à saúde bucal, considerando a realidade desta população em desvantagem socioeconômica.

Palavras-chave: Saúde bucal; epidemiologia; cárie dentária

Introduction

Dental caries is a disease highly prevalent worldwide, and previous studies have explored its multifactorial etiology and complex interaction with social and economic variables in different regions (1-3). Epidemiological surveys have shown a significant reduction of the DMF-T index for 12 year-old children in the Northern region of Brazil, where the DMF-T dropped from 7.5 to 3.1 between 1986 and 2000 (4,5). Fluoride exposure is considered the single main factor responsible for the local control of the dental caries disease in children (6).

Few studies have been designed specifically to investigate the oral health status of adolescents. The last Brazilian national survey (5) showed a DMF-T of 6.14 for subjects from 15 to 19 year-old in the Northern region of Brazil, which was higher than the index values for their counterparts in the Southern (5.77) and Southeast (5.94) regions. Although it is important to characterize the magnitude and distribution of the disease in the general population, the representativeness by the disease distribution in geographic macro-regions could underestimate or mask some regional or local problems. Epidemiological data also are used to plan actions in oral health policy considering that social inequalities are expressed in terms of health-disease and that most diseases are concentrated in small portions of the population, particularly in the socially disadvantaged strata (7,8).

The aim of this study was to assess the prevalence of dental caries in adolescents from the Eastern zone of Manaus, capital of the Amazonas state, in Brazil, which is the city area having the most deficient urban infra-structure and public services. The Eastern zone of the city of Manaus consists of 10 neighborhoods with 324,986 inhabitants, and 12.3% of this population belongs to the 15-19 year-old age range. This region is characterized by settlements in squat and shanty areas, where demographic growth occurred in a disorderly manner, combining poor living conditions with serious social and environmental problems (10). The Superintendence of the Free Trade Zone also is concentrated in this zone, known as the industrial district, which occupies 45% of the total area. Both the Gini index (0.57) and the HDI (0.71) of this zone are the lowest indicators in the city of Manaus (11). The local population has a high incidence of diseases resulting from or aggravated by poor nutrition and immune-preventable conditions. Only 61.1% of homes are covered by the public water supply (9), and it should be highlighted that the public water supply of the city of Manaus is not fluoridated.

Methodology

This research was authorized by the Amazonas State Secretary of Education and Teaching Quality and approved by the Research Ethics Committee of the Federal University of Amazonas (Protocol CEP/UFAM 031/2006).

The sample was composed of 178 students from 15 to 19 years of age, enrolled in public and private schools of the Eastern zone of the city of Manaus, according to data provided by the Amazonas State Secretary of Education. Sample size was computed by means of the probabilistic sampling technique by conglomerates, similar to that used for the national survey in 2000. The schools were selected using weighted statistics, and for each school, a new draw was taken among the classrooms where the students from 15 to 19 year-old were registered. A random draw without replacement resulted in a total of 4 schools and 21 classrooms, where all students in the target age group were eligible to participate in the study.

A letter of recommendation from the Amazonas State Secretary of Education was sent to the principal of each school, and an informed consent form were filled out and signed by the persons responsible for the schoolchildren under 18 year-old. The students older than 18 year-old signed the informed consent form by themselves or could refuse to participate.

A standardized questionnaire form was used to collect data on socio-economic conditions, access to dental service, and self-perception about oral health. Clinical examination was performed individually in a school room using a flashlight, a flat intraoral mirror, a WHO-modified probe, and sterile gauze. Before the clinical examination, the students performed supervised brushing using toothbrush, dentifrice, and dental floss. The students were seated on a school chair, and the dentist was positioned in front of the examinee. To guarantee data reliability and reproducibility, previous intra-examiner calibration was performed; an agreement of 94% and Kappa statistics of 0.91 were achieved, representing a satisfactory level of agreement. The DMF-T index was used in accordance with the WHO standards (12).

Statistical analysis was performed in the program SAS – *Statistical Analysis System* version 6.12. Data were analyzed by descriptive statistics, Kruskal Wallis test, and Chi-square test, at a 5% level of significance.

Results

The sample demographics showed 50.6% of males and 57.1% of mulatto ethnic group. *Per capita* home income ranged from R$ 3.33 to R$ 1,166.67 (median = R$ 133.33; mean = R$ 179.21 ± 18.60). The lower quintile of per capita home income distribution was R$ 66.67, corresponding to 19% of the minimum wage in the research period.

Caries prevalence was 92.7% for all students in the sample. The DMF-T index for the study age group was 5.16 (± 0.28) (Table 1). The Kruskal-Wallis test showed no significant difference between males and females ($P = 0.35$). Considering the per capita home income in relation to the lowest quintile of per capita home income, no significant differences in DMF-T were found. No significant association was observed between the student mother's educational level (no education, elementary education, complete and incomplete high school education) and DMF-T ($<$ or ≥ 3) (Chi square test, $P = 0.71$).

Table 2 displays the results on access to dental care and oral health habits. Seventy-six percent of the students

declared that they had had a dental appointment at least once, and 56% of those reported that they sought the dental public services; the predominant reason for the dental appointment was pain (41%). The majority of students (92%) reported having any present treatment needs. Oral hygiene was performed by all students; 78% used fluoridated toothpaste and toothbrush, and 22% also used dental floss.

Self-perception of oral health was significantly associated with DMF-T index (Table 3). Subjects DMF-T < 3 considered their oral health as good/excellent; for subjects with DMF-T equal to or higher than 3, 40.9% considered their oral health as regular.

Most subjects also reported toothache in the previous 6 months, and 68.5% had DMF-T equal to or higher than 3. About 50% of the students with no reported pain in the previous 6 months had DMF-T lower than 3 (Table 4).

At least one tooth had been lost due to caries in 47.8% of the adolescents; the carious component was present in 88.2%, and filled teeth in 28.7%. Decayed tooth was the component that most contributed to the DMF-T index computation (Table 5).

Table 1. Descriptive statistics of DMF-T by age (from 15 to 19 years old).

| Index | Variables | Age (years) | | | | | |
		15 n = 110	16 n = 25	17 n = 15	18 n = 22	19 n = 6	15 a 19 n = 178
DMF-T	Mean	4.51	5.12	7.07	6.64	6.33	5.16
	Standard Error	0.47	0.84	1.04	0.89	2.01	0.2851

Table 2. Access to dental services and oral hygiene habits.

Question	Answer	Frequency
Have you ever been to a dentist?	Yes	76%
	No	24%
Where?	Never been to a dentist	24%
	Public service	56%
	Private service	10%
	Health insurance and medical insurance	8%
	Philanthropic service	2%
Why?	Never been to a dentist	24%
	Routine appointment	16%
	Pain	41%
	Cavities in teeth	15%
	Wounds, lumps or stains	1%
	Others	3%
Do you think you need treatment today?	Yes	92%
	No	8%
How do you do your oral hygiene?	Toothbrush and toothpaste	78%
	Toothbrush, toothpaste and dental floss	22%

Table 3. Association between self-perception of oral health and categorized DMF-T.

Classification	DMF-T < 3	DMF-T ≥ 3	Total
Poor/bad	4	30	34
	9%	24%	20%
Regular	16	52	68
	36%	41%	40%
Good/excellent	24	45	69
	54%	35%	40%
Total	44	127	171
	26%	74%	100%

* Chi-square Test ($P = 0.037$)

Table 4. Association between pain reported in the previous six months and categorized DMF-T.

Classification	DMF-T < 3	DMF-T ≥ 3	Total
No pain	26	41	67
	54%	32%	38%
Pain	22	89	111
	46%	68%	62%
Total	48	130	178
	27%	73%	100%

* Chi-square Test (*P*=0.006)

Table 5. Mean of DMF-T components and percentage of caries-free individuals in the age bracket between 15 and 19 years.

Age	# of school children	DMF-T	Carious	Lost	Filled	% of individuals DMF-T=0
5 to 19 years	178	5.16	4.41	0.87	0.75	7.3%

Discussion

Few epidemiological studies on oral health of adolescents are available up to date, and Brazilian studies focusing this age group have shown significant results only when comparing geographic macro-regions (North, Northeast, Central-West, Southeast, and South). For the Eastern zone of the city of Manaus, the DMF-T was lower than that found for the entire Northern region (DMF-T=6.14) in the last national oral health survey (5). One possible explanation for this finding is the fact that the sample drawn from the Eastern zone of Manaus comprised adolescents attending a regular school with better access to health information and care than subjects that are not students.

When analyzing the components of the DMF-T index (decayed, missing, and filled teeth), the mean of adolescents with teeth with dental caries (mean=4,4) was higher than the findings of a similar study in Florianópolis, SC, in the Southern region of Brazil (13). These results suggest deficient access to dental restorative services for most adolescents from the Eastern zone of Manaus, in combination with absence of some disease controlling factors, such as no fluoridated water supply (14,15) in the city of Manaus. The incidence of dental caries is different in municipalities that have or do not have fluoridated water supply. In the last Brazilian national survey, cities over 100,000 inhabitants with fluoride in the water supply had a DMF-T of 4.83 for 15-19 year-old subjects in comparison with a DMF-T of 5.71 in the municipalities without fluoridated water supply (5).

In the present study the prevalence of missing teeth was high considering that the goal proposed by the WHO for the year 2000 (16) suggested that 80% of the 18 year-old population should not have a missing tooth. The present sample comprised subjects under 18 year-old, but only 52% of the subjects examined had not lost a single tooth.

In relation to socioeconomic variables, no association was found between DMF-T index and *per capita* home income or mother's education, which was found to be significant in previous studies in the Brazilian states of Bahia, Paraná, and Paraíba (17-19).

In the present study 24% of the schoolchildren reported that they had never had a dental appointment, which is a higher percentage than the findings of the last Brazilian and Northern region survey (13.4% and 16.5%, respectively) (5). Studies on self-perception of oral health are not common, but 20% of schoolchildren reported a poor or bad oral health condition, and 40% reported good/excellent oral health. This result is similar to that found in the last oral health survey (5), in which 11% of the Brazilian population between 15 and 19 years old classified their oral health as poor or bad and 50% considered it as good/excellent.

Toothache in the previous six months was reported by the majority of schoolchildren (62%), which is far above the percentage found in the national survey (5), in which 36% reported pain. This was the first reason for the subjects seek dental treatment according to approximately half of the schoolchildren. This figure is similar to the findings in São Paulo (19) where adolescents also sought dental services for emergency.

The present data were analyzed using Chi-square tests, and the authors recognize that this is a limitation of the study because only bivariate relationships were tested the several variables. The use of multivariate models may be used in further studies to find a model to investigate if a DMF-T ≥ 3 is related to the variables chosen.

Conclusions

Although the DMF-T index for the 15-19 year-old students from the Eastern zone of the city of Manaus was lower than the value of the Northern region of Brazil, the results suggest high prevalence of missing teeth due to dental caries and a lack of restorative dental treatment. This constitutes a public health problem of major concern and requires the implementation of selected preventive and restorative strategies to provide effective oral health care.

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