

Prevalence of dental caries and treatment needs in preschool children in a recently fluoridated Brazilian town

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Abstract

Aim: The aim of this study was to evaluate the prevalence of dental caries and to estimate the treatment needs, in 4-6-year-old preschool children in a Brazilian town that has recently started a water fluoridation program. **Methods:** Children (n=127) were randomly selected and examined according to the WHO criteria. The children were examined in schools by calibrated dentists. The intra- and inter-examiner reliability of caries scores showed kappa values ranging from 0.81-0.95 and 0.8, respectively. Mann-Whitney and chi-square tests were used to analyze the results with 5% significance. **Results:** The mean \pm SD dmft was 4.45 ± 3.9 (95%CI 3.76-5.41). The dmft index was mainly composed by the decayed component (4.18 ± 3.4 - 95%CI 3.57-4.79). Only 21.3% of the children were "caries-free" (dmft=0) and 62.2% showed dmft \geq 3. Fillings and pulp therapy were the most required treatments. **Conclusions:** The data collected in this study indicate that young children have high caries prevalence and many teeth needing treatment. In addition to the fluoridation program in the public water supply, appropriate health promoting strategies must be implemented to the most vulnerable age groups for controlling dental caries.

Keywords: dental caries, epidemiology, preschool, oral health.

Introduction

Dental caries is one of the most prevalent chronic diseases affecting humans. It is caused by a complex interaction of factors over time: production of acid by microorganisms and fermentation of carbohydrates in the diet, and factors such as saliva and dental susceptibility. In addition, physical, biological, environmental and socioeconomic factors are also considered risk factors for the development and progression of disease¹⁻².

The oral health of children has improved in recent years in developed countries, therefore, increasing the number caries-free individuals³. The goal of the World Health Organization (WHO) for the year 2000 was to achieve 50% caries-free 5-year-olds. More than 40% of the global decline of dental caries may be associated with the use of fluoridated toothpastes and other forms of fluoride, such as fluoridation of public water supply⁴. However, the prevalence and severity of dental caries in some developing countries are still high particularly in primary teeth. It is estimated that more than half of the children have caries in primary teeth. Until recently only 43.2% of young children in a Chilean community were classified as "caries-free". In subsequent years the number of children with carious lesions in primary teeth increased considerably reaching almost 70% at the age of five years old⁵.

There is no doubt that information about dental caries development in this age group is relevant. Nevertheless, data about dental caries for the 5-6-year-old children are still scarce⁶. Caries in primary teeth can be a good predictor of caries development in permanent dentition⁷.

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In order to cover up this topic, the National Brazilian Survey (SB Brasil) has included this age group in the Brazilian oral health epidemiologic investigation since 2003⁸. Analysis of the data of the last Brazilian National Oral Health Survey shows that 65% of the 5-year-old children in the Northeast region showed at least one decayed primary tooth. The mean dmft observed was 3.21 and 90% of this value was due to the decayed component⁸.

In a study conducted in João Pessoa, State of Paraíba, Brazil, 43.7% of the children at 48 months of age had dental caries. Among these, 10.7% presented early childhood caries and 33.0% had severe caries⁹.

In 1996, an epidemiological survey was conducted in the State of Paraíba, Brazil, comprising 11 cities and totaling 41 public schools in the region. Alagoinha was one of the cities involved, and presented an average DMF-T of 3.09 for 6-12 year-old children at the time. Regarding the treatment needs, the cities with the highest indexes were Araruna (21%), Cuitegi (19%) and Alagoinha (18%)¹⁰.

The aim of the present study was to determine the prevalence of dental caries and the related treatment needs in 4-6 year-old children of both genders from public schools in the city of Alagoinha, State of Paraíba, Brazil.

Material and methods

The city of Alagoinha is located at 84 km from Paraíba capital (João Pessoa) and has approximately 13,000 inhabitants, mostly located in the urban area. The Human Development Index (HDI) was 0.573 in 2000, which is considered medium development.

The city displays fluoridated public water supply since 2006. The Autonomous Service of Water and Sewage (ASWS) is responsible for the supervision, maintenance and distribution of water. According to information obtained from ASWS and external monitoring held in the city, the water from public supply has average fluoride concentrations between 0.2 and 0.7 mg / L.

As Alagoinha is considered a small city, all children in the target age group (4-6 year olds) who were permanent residents and were in enrolled in public schools and kindergartens in the city were examined, resulting in a study population of 127 children [73 male (57.5%) and 54 female (42.5%)] Initially, the parents or guardians were contacted to authorize the study by signing informed consent forms. There were only 2 losses (only 1.6%): one child that refused undergoing examination and one children whose parents did not return the signed informed consent form.

The codes and criteria of the WHO¹¹ and Health Ministry were adopted¹². The examinations were performed by two examiners assisted by a noter under natural light, in public units of children education. The intraexaminer kappa accordance values were 0.81 and 0.95 and the interexaminer value was 0.80, indicating satisfactory

reproducibility of diagnoses. Examinations were performed only after supervised toothbrushing. For the clinical examination, the child was sat in a chair facing the examiner. Disposable gloves, hoods, masks and wooden spatulas, and properly sterilized dental mirrors and ballpoint millimeter probes (WHO standard)¹¹ were used.

Data were processed in the database using the program SPSS (Statistical Package for Social Science) version 13.0. The descriptive statistics was performed to determine the prevalence of dental caries in the population studied. The data were also subjected to statistical tests of association such as Fischer's exact test and chi-square, in addition to the Mann Whitney U test at 0.05 significance level.

This research started after obtaining approval from the Ethics Committee in Human Research of the Center for Health Sciences, Federal University of Paraíba, Brazil (0491/2008).

Results

The prevalence of dental caries among 4-6-year-old children was 78.7% (Table 1). The mean dmft and standard deviation found were 4.45 ± 3.9 (95% CI 3.76-5.14) (Table 2). The carious component constituted 78.7% of the index while missing and filled components constituted 16.5% and 2.4%, respectively. There was no statistically significant difference when comparing mean dmft data of boys and girls ($p > 0.05$). The same was observed when taking into account each dmft component versus gender ($p > 0.05$). Only 21.3% of children examined were caries-free and approximately 62.2% had high caries experience with dmft ≥ 3 . The caries experience was slightly higher in females than in males, but this difference was not statistically significant ($p > 0.05$).

Examining the type of treatment need during the epidemiological investigation, the highest percentage was the indication of restorations (69%), and restoration of two or more surface was the most predominant (46%), followed by restoration of only one surface, pulp treatment plus restoration and remineralization of white spots. Other treatments such as extractions and sealants were also recommended (Table 3). More complex treatments, such as metal crowns or esthetics were not indicated.

The most commonly decayed teeth were the molars (35%) and central incisors (22%) (Figure 1). The primary mandibular second molars and the maxillary central incisor were more affected than the other teeth.

Table 1 - Prevalence of dental caries among children according to the gender. Alagoinha, Paraíba, Brazil, 2009.

	Male n= 73	Female n= 54	Total n= 127
Caries-free (%)	21.9	20.4	21.3
With Caries (%)	78.1	79.6	78.7

Table 2 - Dmft index and components in children aged to 4 to 6 years old, according to the gender. Alagoinha, Paraíba, Brazil, 2009.

	Male n = 73		Female n= 54		Total n= 127	
	(m ± sd)	IC (95%)	(m ± sd)	IC (95%)	(m ± sd)	IC (95%)
Decay*	4.0 ± 3.4	3.19-4.81	4.43 ± 3.5	3.47-5.38	4.18 ± 3.4	3.57-4.79
Missing*	0.34 ± 0.8	0.14-0.55	0.33 ± 0.9	0.06-0.60	0.34 ± 0.92	0.18-0.50
Filled*	0.05 ± 0.3	0.02-0.13	0.19 ± 1.3	0.19-0.56	0.11 ± 0.91	0.05-0.27
dmft*	4.3 ± 3.8	3.4-5.20	4.65 ± 4.0	3.54-5.76	4.45 ± 3.9	3.76-5.14

*Mann-Whitney U $p > 0.05$

Table 3 - Percentage of teeth according to type of treatment need. Alagoinha, Paraíba, Brazil, 2009.

Type of treatment need	n	%
Restoration of one surface	154	23
Restoration of two or more surface	299	46
Pulp treatment+dental restoration	82	12
Exodonty	42	06
Remineralization	77	12
Pit-and-fissure Sealant	07	01

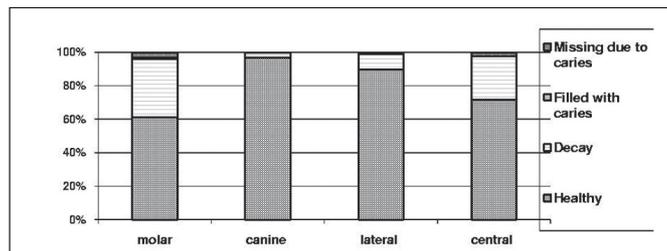


Fig. 1. Percentage of teeth affected by dental caries. Alagoinha, State of Paraíba, Brazil, 2009.

Discussion

In the same way as observed in the city of Alagoinha, other studies have also obtained high mean dmft and prevalence of dental caries above 60%^{7,13-14}. The prevalence of dental caries observed in the present study was higher than in other regions of Brazil, as in the city of Indaiatuba, São Paulo State, where 5-year-old preschoolers presented mean dmft of 1.73 and prevalence of dental caries of 42.6%¹⁵. Similar data have been found in municipal public schools in the city of Recife, Pernambuco State with 47% prevalence of dental caries and mean dmft of 2.06¹⁶.

The results of the present study (21.3% of caries-free children) are far from the goal recommended by the WHO for 2000 (50% of caries-free children at 5 years of age), although this research covered 4-6-year-old children. This is similar to the findings of Cypriano et al.⁷, who reported that only 38.5% of 6-year old children were caries-free, but differed from those of studies performed in Chile⁵ and in other regions of Brasil¹⁵⁻¹⁸. Reaching the goals of WHO for this age group is an important issue for the municipalities, even though it can be observed that for those cities with higher living standards better life conditions and better health conditions are reached in shorter periods¹⁹.

Concerning the sample stratification by gender, it was found that females had a slightly higher caries experience than males, but this difference was not statistically significant. According to Declerck et al.²⁰, the caries experience is significantly associated with gender, where female children are less susceptible to develop the disease at the age of 5, which was not observed in this study.

Taking into consideration the components of dmft index, it was observed that the highest part was composed by the carious component, as in several studies conducted in Brasil^{15,21} or even in other countries¹³. This is partly due to a lack of organization in the system of oral health and limited access to health services indicating the need for early identification of risk groups¹⁷. These data refer to the need for more coverage of dental services in the city and extensive need for care.

A cause of concern was the low percentage of children with filled teeth (only 2.4%) in the studied population. One explanation for the lack of treatment in preschool children may be due to the fact that

parents and/or professionals do not give the due value to the primary teeth¹⁶. Moreover, this result can be interpreted as reflecting the difficulty of access of this population to measures of health promotion.

Some preventive measures that have broad range if adopted in population strategies, such as the development of oral health care models, according to the principles of universality, equity and integrality could provide more appropriate oral health promotion²². Attention to oral health should be established in the first year of life, before a more severe or even more difficult and expensive condition to completion of preventive treatment is installed¹⁷.

The results obtained for the city of Alagoinha not only provided relevant information regarding the prevalence of dental caries, but also identified the main needs for treatment in the studied population. There are several requirements to be met, mainly of low complexity, represented by restorations mostly involving two or more surfaces.

The benefit of fluoride can be measured in a study conducted in rural areas of Paraíba, in which groups living in areas with moderate levels of fluoride showed lower prevalence of dental caries than those living in areas with lower fluoride levels²³. The city of Alagoinha presents artificial fluoridation of public water supply since 2006. The maximum benefit of fluoridation requires time and the continuity of the method can result in a greater control of disease progression. Thus, it is emphasized the importance of maintaining of this measure of health promotion as well as the control performed by ASWS and the partnership with the UFPB in monitoring water fluoridation.

Preventive strategies targeting children affected by dental caries, such as gels for topical applications, use of fluoridated dentifrices, supervised toothbrushing 3 to 4 times a year, as well as health education can contribute to significant changes in dental caries process. There is a need to focus on strategies that can mitigate the damage caused by the progression of the disease, in addition to the access of children to restorative treatment for those with caries experience.

The results of this study indicate that children in the city of Alagoinha have a high prevalence of dental caries with great need of treatment. In addition to the recently implemented fluoridation of public water supply, actions and strategies appropriate to the most vulnerable group should be introduced, with greater investment towards programs for prevention and control of dental caries involving children and parents and/or guardians.

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