Original Article

Behavioral and social factors related to dental caries in 3 to 13 year-old children from João Pessoa, Paraíba, Brazil

Fatores comportamentais e sociais relacionados à cárie dentária em crianças de 3 a 13 anos em João Pessoa, Paraíba, Brasil

Abstract

Purpose: To record the prevalence of dental caries in 3-13 year-old children and test the association of presence of caries with some social and behavioral factors.

Methods: Cross-sectional design. Data were collected from the Cariology Clinics' database of the Federal University of Paraíba, in João Pessoa, Brazil, for the period between 2005 and 2008. A total of 410 dental charts were selected, and the children were divided into 3 age groups (G1: 3-5 year-old, n=111; G2: 6-9 year-old, n=165; and G3: 10-13 year-old, n=134). Data were collected from the dental records on clinical examination to compute dmf-t and DMF-T indexes, oral hygiene habits, diet, and socio-economic factors. Chi-square tests and Fisher's exact tests at the 5% level of significance were used for statistical analysis.

Results: Dental caries prevalence was: G1(dmf-t: 2.38±3.27; DMF-T: 0.02±1.49); G2(dmf-t: 2.97±3.12; DMF-T: 0.72±1.26); G3(dmf-t: 0.89±1.73; DMF-T: 2.65±3.00). About 32.7% of the children were caries-free. For the oral health habits most subjects reported toothbrushing three or more times daily (44.8%), without assistance (61.9%), and no use of dental floss (73.1%). The majority of children (97%) reported consumption of sugar between meals. Family income and education were associated with dental caries.

Conclusion: The results suggest a high prevalence of caries disease in the sample and specific association with some socioeconomic and behavioral risk factors.

Key words: Dental caries; oral hygiene; cariogenic diet; social conditions

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Resumo

Objetivo: O objetivo deste estudo foi registrar a prevalência de cárie em crianças de 3 a 13 anos e testar sua associação com alguns fatores sociais e comportamentais.

Metodologia: Estudo transversal. Os dados foram coletados do banco de dados da Clínica de Cariologia da Universidade Federal da Paraíba, no período entre 2005 e 2008. Um total de 410 prontuários foram selecionados e as crianças foram distribuídas em 3 grupos conforme faixa etária (G1: 3-5 anos, n=111; G2: 6-9 anos, n=165; e G3: 10-13 anos, n=134). Os dados foram obtidos de exame clínico para cálculo dos índices CEO-d e CPO-D, e entrevista de hábitos de higiene bucal, dieta e fatores socioeconômicos. A análise estatística utilizou testes de Qui-quadrado e de Fisher ao nível de significância de 5%.

Resultados: A prevalência de cárie dentária foi de: G1(ceo-d: 2,38±3,27 e CPO-D: 0,02±1,49); G2(ceo-d: 2,97±3,12 e CPO-D: 0,72±1,26); G3(ceo-d: 0,89±1,73 e CPO-D: 2,65±3,00). Aproximadamente 32,7% das crianças apresentavam-se livres de cárie. Em relação aos hábitos de higiene bucal, a maioria relatou escovar seus dentes três ou mais vezes (44,8%), sem ajuda dos pais (61,9%), e 73,1% não usavam fio dental. O consumo de alimentos com açúcar entre as refeições foi relatado por 97% das crianças. Renda familiar e escolaridade paterna constituíram fatores de risco para a presença da doença cárie.

Conclusão: Os resultados sugerem alta prevalência da doença cárie na amostra estudada e associação específica com alguns fatores sociais e comportamentais de higiene bucal.

Palavras-chave: Cárie dentária; higiene bucal; dieta cariogênica; condições sociais

Introduction

Dental caries is considered a multifactorial disease, which needs the complex interaction of several factors in critical conditions in order to develop clinical manifestation. The onset and progress of the disease is strongly influenced by the intake of carbohydrates from diet. The most cariogenic sugar is sucrose, which is fermented into acids and metabolized in intra- and extra-cellular polysaccharides by biofilm microorganisms. Moreover, the action of salivary components, poor oral hygiene habits, and social and economic factors influence the disease process during a period of time (1-3).

The worldwide decline of dental caries is mainly associated with one or more preventive measures of fluoride use, such as the implementation of fluoridation in public water supply and use of fluoridated dentifrices (4). However, despite the improvement in the oral health conditions, dental caries remains one of the major public health problems in Brazil, affecting individuals of all ages and socio-economic strata (5).

The high prevalence of dental caries in Brazilian children has an overall average of 2.78 DMF-T (mean of decayed, missing, and filled teeth) at 12 year-old, with the highest values for the North (3.13 DMF-T) and Northeast (3.19 DMF-T) regions of the country (6). Recently, the preliminary data on the survey of oral health conditions in 286 children at 12 year-old and 201 adolescents between 15-19 year-old, in João Pessoa/PB (2008), showed that 32.5% were caries-free, and DMF-T was 3.62. Percentage of caries-free decreased with age and reached 13% in 15-19 year-old subjects (6.74 DMF-T). It is relevant to mention that the municipality of João Pessoa has no public fluoridated water supply.

Children from all Paraíba state seek dental treatment at the Dental Clinics of Cariology of the Federal University of Paraíba, which has the largest demand in the city of João Pessoa. For more than six years this clinics has run a program to promote oral health for children based on the program developed in Nexø, Denmark, more than twenty years ago. This dental program is based on three basic principles: education, mechanical control of dental biofilm, and minimum intervention. In addition to this system, the clinics uses the Cariogram® (School of Dentistry, Malmö, Sweden), a computer software to assess the opportunities to prevent dental injuries from caries. In combination, these systems of risk validation, Nexø and Cariogram®, are important tools to classify the risks for dental caries in individual patients and establish a specific treatment plan (7). It is mandatory to answer some questions related to health problems in different groups of subjects as the definition of programs for diseases prevention and treatment and the planning of public services are based on the outcomes of epidemiological studies (8).

Thus, the purpose of this study was to analyze the experience of dental caries and some related factors, such as oral hygiene habits, diet, and socio-economic factors in children aged between 3 and 13 year-old, who attended the Dental Clinic of the Federal University of Paraíba (UFPB), in João Pessoa, Paraíba, Brazil.

Methodology

The research project was approved by the local Research Ethics Committee of the Federal University of Paraíba (UFPB), Brazil. The parents of the children had signed an informed consent form before dental treatment, and the research procedures followed the national and international standards and ethical resolutions for conducting research in human beings.

This cross-sectional and quantitative study analyzed the dental records from the database of the Clinic of Cariology of the UFPB. A total of 410 children in the target age range of 3 to 13 year-old were selected from the population of patients attending the clinics from 2005 to the first semester of 2008. The children were divided into three age groups: G1 – 3-5 years (n=111), G2 – 6-9 years (n=165), and G3 – 10-13 years (n=134).

Data were collected from the dental charts of the selected children, who were examined by dental students attending the Clinical Cariology classes. Clinical intraoral examination followed the World Health Organization (WHO) guidelines using plane mirror and probe, artificial light, and compressed air, after the completion of supervised toothbrushing and professional prophylaxis according to the clinics protocol. The indexes dmf-t and DMF-T adapted from the diagnostic criteria for dental caries recommended by WHO were used (6,9). The subject was considered with caries when the dmf-t and DMF-T were different from zero. The clinical protocol also adopted a structured interview with categorized questions and variables of interest, comprising the following groups:

– oral hygiene habits: frequency of toothbrushing, person responsible for toothbrushing, amount of toothpaste dispensed onto the toothbrush, and use of dental floss;
– diet: frequency of food and sugar intake; and
– socio-economic aspects: family income, and mother's and father's education.

Data were analyzed by using the statistical package SPSS v. 13.0 (SPSS, Chicago, Illinois, USA). Associations of variables were tested by means of Chi-square tests and Fisher's exact tests at the 5% level of significance.

Results

The sample was composed of 410 children, 204 male and 206 female subjects, ranging from 3 to 13 year-old. The presence of caries was diagnosed in 276 individuals (67.3%) (Table 1). The highest average dmf-t was found in the age group of 6-9 year-old children. The highest mean DMF-T was recorded in 10-13 year-old children, which had the lowest average dmf-t (Table 2).

Table 3 presents the association between the presence of caries and oral hygiene habits. The variables with statistically significant relationship with presence of caries were the person responsible for toothbrushing and the amount of toothpaste used. Concerning toothbrushing habits, 44.8% of the children reported brushing their teeth three times per day or more; 61.9% without parents help. The use of dental

floss was reported by only 26.9% of the children. In relation to dietary habits, no variable was significantly correlated with dental caries. The number of children who consumed foods with sugar between meals (n=308) was a significant factor, comprising 96.5% of the sample.

In relation to the socio-economic variables studied, family income was associated with presence of dental caries (Table 4). Children with family income less than or equal to the Brazilian minimum wage had significantly higher prevalence of caries. The level of paternal schooling was statistically associated with presence of caries disease in the children. Parents who reported not having any level of education were related with higher prevalence of caries in children.

Table 1. Association between dental caries, age, and gender of the children. João Pessoa, 2008.

	Without Caries		With Caries		P-value
	n	%	n	%	
Age (years)					
3-5	57	13.9	54	13.2	
6-9	46	11.2	119	29.0	P<0.05
10-13	31	7.60	103	25.1	
Gender					
Male	62	15.1	142	34.6	P=0.325
Female	72	17.6	134	32.7	

Table 2. Mean (± Standard Deviation) and confidence interval (CI) of dental caries index (dmf-t and DMF-T) according to age groups. João Pessoa, 2008.

Age (years)	dmf-t (±SD)	CI 95%	DMF-T (±SD)	CI 95%
3-5	2.38 (±3.27)	(1.40-3.36)	0.02 (±1.49)	(0.02-0.07)
6-9	2.97 (±3.12)	(2.46-3.47)	0.72 (±1.26)	(0.51-0.92)
10-13	0.89 (±1.73)	(0.49-1.29)	2.65 (±3.00)	(1.96-3.34)

Table 3. Association between dental caries and dietary and oral hygiene habits. João Pessoa, 2008.

	Without Caries		With Caries		P-value*
	N	%	N	%	
Toothbrushing frequency					
No	16	23.5	52	76.5	
Once a day	12	37.5	20	62.5	0.225
Twice a day	29	35.8	52	64.2	
3 times a day ou more	55	37.4	92	62.6	
Toothbrushing performance					
No toothbrushing	14	22.2	49	77.8	
With assistance/supervision	31	51.7	29	48.3	0.002
Alone	65	32.5	135	67.5	
Amount of toothpaste (% of bristles covered)					
25%	20	51.3	19	48.7	
50%	44	31.2	97	68.8	0.002
>50%	25	21.7	90	78.3	
Use of dental floss					
Yes	29	43.3	38	56.7	0.112
No	59	32.4	123	67.6	
Frequency of snacks and meals					
More than 3 times	21	38.9	33	61.1	
More than 5 times	59	30.4	135	69.6	0.465
More de 7 times	24	34.8	45	65.2	
Sugar ingestion					
Yes	104	33.8	204	66.2	0.232[†]
No	02	18.2	09	81.8	

* Chi-square test; [†] Fisher's Test.

Table 4. Association between dental caries and socioeconomic variables. João Pessoa, 2008.

	Without Caries		With Caries		P-value*
	N	%	N	%	
Family income					
Up to a minimum wage	30	25.2	89	74.8	
1-2 minimum wages	32	31.0	71	69.0	0.006
>3 minimum wages	35	47.3	39	52.7	
Maternal schooling					
No formal education	0	0	11	100.0	
Up to 8 years of study	40	27.6	105	72.4	N/A
Above 8 years of study	79	40.1	118	59.9	
Paternal schooling					
No formal education	02	12.5	14	87.5	
Up to 8 years of study	37	28.9	91	71.1	0.009
Above 8 years of study	76	42.0	105	58.0	

* Chi-square test

Discussion

This work aimed to assess individual factors for the development of dental caries using data from an important reference center for child oral health care in the city of João Pessoa, Paraíba, Brazil. Children aged 6 to 9 year-old had the highest dmf-t (dmf-t = 2.97) of the entire sample. Reports of the "Projeto SB Brasil 2003" revealed that the national mean dmf-t for 5 year-old children was 2.80, whereas the dmf-t was 3.21 in the Northeast region (6). Moreover, the present findings showed a mean DMF-T of 2.65 for 10-13 year-old children. In Brazil, the mean DMF-T for 12-year old children is 2.78, but for the Northeast region the DMF-T is 3.19 (6).

Comparing the DMF-T and dmf-t indexes in the different age groups of this sample, the higher mean DMF-T in older children can be explained by the presence of larger number of permanent teeth and the longer exposure to the deleterious effect of sucrose consumption. According to Bonanato et al. (10), age definitely influences the caries experience. As a consequence, 10-13 year-old children presented the lowest mean dmf-t among the studied age groups.

Knowledge on the behavioral habits of oral hygiene, diet, and socioeconomic aspects were collected through interviews with parents and children. Therefore, when interpreting the data one should take into account some possible bias due to the subjectivity of responses and the lack of health information by some interviewees.

Most variables of oral health were significantly related with caries experience in children, but the highest frequency of toothbrushing was not associated with the number of subjects with low prevalence of dental caries, since similar percentages were found for children who brushed their teeth one, two, three or more times daily. On the other hand, toothbrushing supervision and the establishment of healthy habits were important strategies for health promotion of children. Parents are models for their children, and it is essential the health education of parents to achieve

optimal results in children. The present results identified that the variable person responsible for toothbrushing was significantly related with caries in children. The highest percentage of caries-free children was found for those subjects who had the supervision or assistance of an adult to brush their teeth. Bonanato et al. (10) also found a higher caries-free frequency among children with oral hygiene performed by mothers in comparison with children that brushed their teeth by themselves.

Most children in this sample did not use dental floss but had similar percentage of caries to that of subjects who used this mechanical method to remove dental biofilm. Thus, this variable may not be considered a risk factor for the presence of dental caries. Azevedo et al. (11) compared the oral health habits among students with and without caries experience and also showed that more than half (57.5%) of the subjects in both groups did not use dental floss.

In relation to diet, most children reported sugar intake between meals, but there was no association with the presence of caries. For over 40 years, many studies have identified the consumption of cariogenic foods as a risk factor strongly associated with the disease (1,2,12,13) and the relationship between preference for sweet foods with the highest number of carious lesions (14). The disease is related to the presence of refined carbohydrates in the diet, and the disaccharide sucrose is considered the most cariogenic sugar (2,14). Although sugar consumption is a necessary factor for the development of caries lesions, it is not a sufficient factor alone.

In this study, family income was a socioeconomic risk factor for caries, in agreement with previous studies that found a larger number of teeth with caries and more severe lesions in children belonging to the lowest socio-economic level (12,13,15,16). High income and knowledge may nurture more favorable conditions for decision making towards healthier choices including access to health care professionals (17). The schooling level of parents seems to be important for the children oral health as low paternal

education was found to be associated with presence of dental caries. The maternal education also was associated with presence of caries in previous studies, where mothers with low educational level were related to children with high prevalence of caries (17,18) and to children with more severe disease (12). Access to information through education allows individuals to be aware of the importance of continuous health care and to make choices to prevent diseases and treat them at early stages.

The different habits and lifestyles among families in the same community may explain why the distribution and severity of dental caries are unequal in the individual level. Understanding the specific risk factors has a key role for the establishment of preventive and interventional programs targeted to the groups most exposed and vulnerable to risk factors to ensure better life quality. Studies using secondary sources are limited as data analysis can only include information previously collected, and some variables often associated with dental caries could not be explored in the present research. Another limitation is that data were obtained from the dental charts filled by students under the supervision of dental faculty according to a standardized clinical protocol, but no formal calibration was designed for this specific study in a non-random sample. Thus, there is a need for further comprehensive epidemiological and controlled prospective studies to investigate not only the prevalence of dental caries, but especially the relationship with behavioral and social risk factors for this disease.

Conclusions

Within the limitations of this study, the results showed a high prevalence of dental caries in both deciduous and permanent dentitions and a significant association with a lack of protective factors of oral hygiene in this sample. Family income and parental education were risk factors for the presence of caries in 3-13 year-old children. These findings suggest that it is necessary to strengthen the oral health education of children and their parents and improve the mechanical control of dental biofilm through toothbrushing supervision and early treatment when necessary.

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