Exploring oral health and childhood obesity in children from the shantytowns of São Paulo

Explorando a saúde bucal e a obesidade infantil em crianças de favelas de São Paulo – Obesidade e cárie dentária

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ABSTRACT

Objective: To measure the relationship between childhood obesity and dental caries in preschool children, by means of two anthropometric growth curves. Methods: A cross-sectional study of caries was conducted in 119 children in the age range from 3 to 5 years, resident in shantytowns in São Paulo, SP, Brazil. Clinical oral exams, nutritional evaluation and record of frequency of food, behavioral and social data collection were performed. For dental caries the dft index (carious and filled teeth)) was used. In the nutritional evaluation, the *National Center of Health Statistics – NCHS* classification was used, and *World Health Organization – WHO* reference with regard to dietary intake, the frequency of food record was used. To evaluate the data, logistic regression analysis was used. Results: Obese children presented a high prevalence of dental caries of 81%, higher than the other groups, when evaluated by the NCHS criteria, and for this parameter they presented Prevalence Ratio - PR of 1.23 IC 95% (1.00 – 1.50) for dental caries, frequency of food PR 0.94 IC 95% (0.76 – 1.17), maternal schooling PR 1.07 IC 95% (0.81–1.40) and visits to the dentist PR 1.03 IC 95% (0.78-1.37). Conclusions: For the *NCHS* criterion there was association of dental caries with obesity, irrespective of the other factors evaluated. No association was found when evaluated by the WHO. Caution is needed on the decision about the method for nutritional diagnosis.

KEYWORDS: Dental caries; Nutritional status; Obesity; Dentition primary; Child preschool.

INTRODUCTION

Contemporary epidemiological transition presents a population with a nutritional characteristic that differs from the past. In some countries, obesity has been shown to be a public health problem. In the United States, childhood obesity has increased three-fold in the last two decades[1]. At present there is a trend towards increasing obesity in both developing and developed countries.

Obesity, like dental caries, is a disease with multifactorial etiology, with diet as a common factor. Food intake according to adequate patterns plays an important role in determining oral health, and may therefore, help to preserve an individual health throughout life[2]. The real etiology of the diseases obesity and dental caries are complex and multifactorial, and are not only due to easy food consumption and ingestion of many sweets. Other factors such as, lifestyle, behavior, standard of physical activity and school lunch contribute to the development of diseases[3]. However, Mathus-Vliegen, Nikkel and Brand[4] (2007), affirmed that obesity presents important aspect in oral health, such as: caries, periodontitis and xerostomia, and added that obesity must have implications on the dental treatment plan.

The association of obesity with dental caries has not frequently been studied. The first research conducted to evaluate this relationship explored the possibility of predicting the incidence of caries and obesity in children in the age range from 5 to 13 years, in Finland. The criterion used was the growth table of this country, in which the individual who exceeded the weight in the highest line of the table, represented by the value of 97.5%, was considered obese. Tuomi[5] (1989) considered caries experience in these children, and observed that obesity alone was not a good indicator of dental caries.

Kantovitz *et al*[6]., (2006), conducted a systematic review of the association between obesity and dental caries in children and adolescents, and found only one study with a high level of direct evidence between obesity and dental caries, and recommended further studies on this association. In the same year, Mark, Macek and Mitola[7] (2006) collected research data in children in the United States and also found this association.

In Germany, Willerhausen *et al*[8]., (2007), evaluated 1290 school children to examine the possibility of the relationships between the presence of caries and body mass index, and their results presented a significant association between body and high frequency of caries in primary and permanent dentition. In addition, in the study of Vázquez-Nava *et al*[9]., (2009), in Mexico by means of the logistic regression model, they verified significance in the association between obesity and dental caries.

Some Brazilian researchers have sought to discuss childhood obesity and its relationship with dental caries disease.

In a research with Brazilian children from 3 to 5 years of age, with a low socio-economic level, they verified the relationship with dental caries in a different nutritional status. The authors observed that the median of carious surfaces was higher in obese children than in those that were undernourished and eutrophic[10]. Thus, as presented in other studies[11-13] they observed this relationship, but found no association.

The aim of this study was to measure the relationship between childhood obesity and dental caries in pre-schoolchildren, by means of two anthropometric growth curves.

METHODOLOGY

This is a cross-sectional study that forms part of a larger project denominated "*FAVELA PROJECT*", which was developed by the Federal University of São Paulo/"Escola Paulista de Medicina", and acted at the teaching-learning and extension interface in the communities of 4 favelas in the Vila Mariana region. The Project developed primary attention to health, with activities of promotion and basic health actions, with the goal of promoting mother-infant health. As undernourished children were hospitalized the whole day at a recovery and nutritional education center "Centro de Recuperação e Educação Nutricional – CREN", which is a day Hospital.

For the present study children from 3 to 5 years of age were selected; they were identified by means of a Census held in 1995, as well as children from CREN, and invited to participate in the study.

The study methodology was characterized by a home visit that moved the multiprofessional team to the day to day reality, allowing an overal view and stimulating perspectives for intervention. At CREN, all the children that were hospitalized and within the age-range of this study during that period, were selected.

Thus the population of this study was 119 children from 3 to 5 years of age, of both genders, among whom 106 were residents in shantytowns in the Vila Mariana region, and 13 children followed up by CREN. Data collection occurred in a period of 12 months. Initially a home visit was made to confirm residence, and the mother or person responsible for the child filled out a form of identification, questionnaire on the dental history and record of frequency of cariogenic food consumption. On conclusion of the questionnaires, clinical exam and nutritional evaluation were scheduled. Clinical exams were performed in collective spaces with the aid of a clinical mirror and exploratory probe, under artificial light. The examiner used individual protective equipment (apron, masks, protective eyewear and gloves). All the children were examined by a single examiner. Intra-examiner calibration was satisfactory with a Kappa value = 0,96. The dental caries index used was dft (carious and filled teeth). The World Health Organization Manual/OMS[14] (1987) criteria were followed. For nutritional evaluation, the child was weighed standing on an electronic scale, Kratos brand. To measure stature, a flexible metric tape, fixed to the wall was used, and the child stood in front of it barefooted with his/her heels touching the wall. The modified Waterlow[15] (1976) classification was used, in addition to the reference standard from the *National Center of Health Statistics* – NCHS[16] (1977) and that recommended by the *World Health Organization – WHO*[17] (2006). For this calculation *ANTHRO/2010* software was used. The Food Inquiry performed with those responsible for the children was by means of recording the frequency of foods, in which the cariogenic foods were listed and the frequency of their daily consumption was noted.

Univariate analysis was initially performed, calculating the gross odds-ratios and their respective Intervals of Confidence - IC of 95%. The independent variables that were associated with the closure of a level of significance of $p \leq 0.25$ were included in the multivariate logistic regression model. The backward stepwise method of variable selection was used, based on evaluation of the vero similarity ratio logarithm. Analyses were performed with the statistical package SPSS (*Statistical Package for the Social Sciences*) version 18.0.

This study was approved by the Research Ethics Committee of the Federal University of São Paulo – UNIFESP/EPM, Protocol No. 0326/97, in accordance with Ministry of Health Resolution 196/96. All the persons responsible for the children signed the Term of Free and Informed Consent.

RESULTS

In this study, 119 children from 3 to 5 years of age, whose parents authorized the exams participated, representing 59.5% of the children located by the Census in the shantytowns of the Vila Mariana – SP region. Acceptance of the study by the children's' mothers was 100%, none refused to participate, since it is difficult for this population to have access to this professional.

Table 1 presents characterization of the studied population, in which 119 children in the age range from 3 to 5 years were evaluated, with a percentage of 53.8% girls, and 46.2% boys. The nutritional status classification by means of the NCHS showed the following percentages: undernourished 26.0%, eutrophic/normal 56.3% and obese 17.7%; and by the WHO criterion, undernourished 8.4%, eutrophic 63.0% and obese 28.6%. BMC for this age was shown to be sensitive, presenting important alterations in the prevalence of obese children.

Dental caries appeared in 62.0% of the children. Only 16.8%, of the children visited the dentist. As regards mothers' schooling, only 32.7% had more than 4 years of schooling, and the frequency of cariogenic food consumption was 43.7% for consumption exceeding 5 times a day.

In Table 2 one observes the prevalence of dental caries in the anthropometric methods analyzed, with high values in all groups, with the highest prevalence, 81% being shown in the obese group, and undernourished children with a lowest prevalence in comparison with the others, nevertheless being a high value for this age-range

In Table 3 presents the studied factors associated with obesity, according to the anthropometric criteria.

DISCUSSION

There were important differences in the results of nutritional evaluation when various growth curves were used. Children classified as obese by the NCHS criteria presented a higher prevalence of caries in comparison with the other groups: 81.0%. Whereas, for the WHO, this prevalence was 67.7%. Gerdin *et*

Table 1 – Characteristics of the sample according to age-range, gender, nutritional status (*NCHS* and *WHO* classifications), dental caries, visits to the dentist, mothers' schooling and frequency of cariogenic food consumption of children resident in shantytowns in São Paulo, SP.

Study Variables	N	%
Age-range		
3 – 5	119	100.0
Gender		
Girls	64	53.8
Boys	55	46.2
Nutritional Status		
NCHS		
Undernourished	31	26.0
Eutrophic	67	56.3
Obese	21	17.7
WHO		
Undernourished	10	8.4
Eutrophic	75	63.0
Obese	34	28.6
Dental caries1		
dft = 0	45	37.6
dft > 1	74	62.4
Visit to Dentist1		
Yes	20	16.8
No	99	83.2
Mothers' schooling		
<4 years	80	67.3
>4 years*	39	32.7
Frequency of cariogenic foods1		
< 5 time a day	67	56.3
> 5 times a day	52	43.7

[1] evaluated by the NCHS.

Table 2 – Presence of dental caries and nutritional status, according to anthropometric growth curves in children - São Paulo.

	NCHS dft > 1 n	%	WHO dft > 1 n	%
Eutrophic	41	(61.2)	49	(65.3)
Undernourished	16	(51.6)	2	(20.0)
Obese	17	(81.0)	23	(67.7)

al[18]., (2008), also found this result in a cohort study with Swedish children. In their study they observed a weak positive association between dental caries and obesity. However, among preschoolers from 1 to 5 years, from public and private schools in the city of Recife – Pernambuco, Brazil, only 9.0% of children were found to be obese and presented a caries prevalence of 19%, with much lower values when compared with this population[13]. In a national health and nutrition survey in the United States among children from 2 to 6 years old. Hong, et al.[19] (2008) they presented a caries prevalence with the value of 42.0% and an obese population of 11.0%, and found no significant association between obesity and dental caries. In Mexico[9], they verified that children presented a caries prevalence of 17.9%, and obesity of 32.1%, much lower values when compared with the present study.

Table 3 - Factors associated with obesity, according to growth curves, values obtained by logistic regression.

Variables	NCHS Adjusted PR (IC 95%)	ANTHRO Adjusted PR (IC 95%)
Dental caries dft = 0 dft > 1	1.23 (1.00 – 1.50)[1]	1.27 (0.68 – 2.35)
Mothers' Schooling < 4 years > 4 years	1.07 (0.81 – 1.40)	
Visit to Dentist yes no	1.03 (0.78 - 1.37)	
Cariogenic Foods < 5 times a day > 5 times a day	0.94 (0.76 – 1.17)	1.55 (0.87 – 2.77)

[1] $p < 0.05$ PR= Prevalence Ratio

As regards the occurrence of caries at an early age, Oliveira, Sheiham and Bonecker[12] (2008), evaluating children under the age of 5 years in Diadema, during a vaccination campaign, verified a caries prevalence of 23.4%.

The high prevalence of caries in the present study, 62.4%, in children under the age of 5 years, exceeds the World Health Organization recommendation, which fixed a global target for the year 2000 considering that 50% of these children should be caries-free. In a more recent study[20], with the same age-range, in the State of Santa Catarina a value of 64.3% was found, a very high caries prevalence bearing in mind that the present study was conducted 14 years ago.

There are other factors involved in this study: the presupposition of a population presenting low income, with difficulty in obtaining access to health services, and low scholarity are confusing factors, which were controlled in this study.

With the implementation of fluoridated water supplies in the city of São Paulo since 1985, all the children were exposed to fluoride; that is to say, in spite of exposure to this factor, the children presented a very high prevalence of untreated dental caries disease. This indicates the absence of access to health services, attention or assistance with oral health.

Peres, et al.20 (2003) in a cohort study in Pelotas verified that children whose mothers had schooling of 8 years or less, and whose family income was lower than 6 minimum wages were at greater risk of presenting caries. The mothers' schooling, showing 67.3% with schooling of less than 4 years, reflects the precarious conditions of these mothers. Oliveira, Sheiham and Bonecker12 (2008), also verified that when the mother had less than 8 years of schooling, and low socio-economic status, the children presented an increase in risk of high rates of dental

caries. Traebert et al21., (2009), who evaluated the association of dental caries prevalence in children from 3 to 5 years of age and the mothers' level of schooling, found a high prevalence of 64.3% associated with the mothers' low level of schooling.

With regard to diet, it was verified that children who consumed sweets at least once a day had greater risk of caries disease20. A study with 3 to 5 year-old children conducted by means of a food frequency record, observed that the consumption of cariogenic foods by these children was also significantly higher in this group. In the present study there was no evidence of significant association between cariogenic food consumption and dental caries10.

With regard to visiting a dentist, effectively 83.2% of these children had never been to this professional. This does not differ much from the data of Brazil where, in the age-range from 0 to 4 years, 77.9% of the children had never been to the dentist, IBGE22. The mothers' justification about not visiting the dentist was based on the affirmation that they would only seek curative treatment in the event of necessity. The lack of access to and information about oral health seem to be the reasons for not seeking a dentist, as they do not know about the importance of prevention. Marshall et al23., (2007), verified that caries and obesity coexisted in children who presented an unfavorable economic situation.

There is need for a multiprofessional discussion with the intention of proposing programs that include information on dietary habits, physical activities and other proposed for promoting the general health of children, to prevent the onset of chronic diseases in the future. The theory of the common risk factor is the rational basis for oral health promotion, in which all the factors must be taken into consideration when evaluating an individual's health24.

These include changes in habits, availability of parents and lack of understanding by the child about problems that may arise from obesity, considering that it is not easy to deal with this child25. Thus, Pinheiros, Freitas and Corso26 (2004) suggested monitoring nutritional status by anthropometry in children, considering the school a healthy space for the early diagnosis of overweight and childhood obesity.

Tavares and Chomitz27 (2009), conducted a pilot study with the participation of oral health, in addition to a proposal of recommending behavioral strategies to promote healthy weight in the child. The results were positive with regard to the ease and acceptability in pediatric dentistry. It is fundamental to understand obesity as a diseases, and that it is a common risk factor for various chronic diseases, in order to promote public policies integrated with specific actions for this sector of the population. All health professionals and educators must consider nutrition and oral health as important components in their activities, in order to become models for the scientific community28,29.

Obesity presented a very high percentage for the age group in the two anthropometric criteria evaluated. The prevalence of dental caries in the primary teeth of the studied children was also very high. In this study, association was found between obese children and dental caries when the reference of the NCHS was used. With regard to the variables: visits to the dentist, mothers' schooling and frequency of cariogenic food consumption, there was no association between obesity and the criteria of the nutritional status analyzed.

Few studies are performed in slums: Santos, Martins e Sawaya (2008), assessed the nutritional state of children in the slums of the area of Paraisopolis in São Paulo, e Silveira et al (2010), have performed also an nutritional assessment in the children in slums in Maceió (AL) city. In this present study, the research was made with children who were in the CREN and in the universe of the children who lived in the slum visited in that period of the collection.

The population at this work is not commonly studied. As a vulnerable group, oral health and nutrition status should be known. However, it is a convenience sample, and it was not possible to examine all children due to climatic limitations and violence in the shantytowns.

At present, increasing childhood obesity world wide has been shown to be a public health problem causing concern, with understanding of the need for public policies with multidisciplinary actions in health promotion and protection against chronic diseases in the future of children. Early dietary counseling needs to be reinforced among obese children. Important differences were observed between the studied growth curves, and it is necessary to be cautious when making comparisons with other studies in the evaluation of the nutritional status in relation dental caries and other diseases.

There is a need for longitudinal studies to gain better knowledge about how this association behaves.

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RESUMO

Objetivo: medir à relação entre a obesidade infantil e a cárie dentária em pré-escolares, através de duas curvas antropométricas de crescimento. Métodos: Foi realizado um estudo transversal de cárie em 119 crianças na faixa etária de 3 a 5 anos, residentes em favelas de São Paulo, SP. Foram efetuados exames clínicos bucais, avaliação nutricional e o registro de frequência de alimentos, coleta de dados comportamentais e sociais. Para cárie dentária foi utilizado o índice ceo-d (dentes cariados, extraídos e obturados), na avaliação nutricional, a classificação da National Center of Health Statistic - NCHS, e a referência da World Health Organization - WHO, em relação à dieta alimentar, utilizou-se o registro de freqüência de alimentos. Para avaliar os dados, utilizou-se a análise de regressão logística. Resultados: As crianças obesas apresentaram uma prevalência alta da cárie dentária de 81%, maior que os demais grupos, quando avaliados pelo critério do NCHS e para este parâmetro elas apresentaram Razão de Prevalência - RP 1,23 IC 95% (1,00 – 1,50) para cárie dentária, frequência de alimentos RP 0,94 IC 95% (0,76 – 1,17), escolaridade maternal RP 1,07 IC 95% (0,81–1,40) e visita ao dentista RP 1,03 IC 95% (0,78-1,37). Conclusões: Para o critério do NCHS houve associação da cárie dentária e a obesidade, independente dos demais fatores avaliados. Não foi encontrada nenhuma associação quando avaliados pelo WHO. É necessário cautela na decisão do método para o diagnóstico nutricional.

PALAVRAS-CHAVE: Cárie dentária; Estado nutricional; Obesidade: Dentes decíduos; Pré-escolar.

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