

Dental Caries and Nutritional Status in Preschool Children of a City in the Interior of the State of Amazonas, Brazil

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Abstract:

This study evaluated the relationship between dental caries and nutritional status of preschool children enrolled in public day care centers in Manacapuru, Amazonas State. A cross-sectional study was conducted, with the study population composed of preschoolers between 2 and 5 years old enrolled in public schools (n = 263); The ceod index (carious, indicated extraction, obturation, per tooth) was used to assess dental caries and the Body Mass Index was used to assess nutritional status (WHO). Statistical analysis was conducted descriptively using frequencies, proportions and means and Pearson and Kruskal Wallis Correlation tests (p < 0.05) were used. A ceod of 1.89 (± 2.71) and a Significant Caries Index of 5.13 (± 2.41) were found indicating polarization of dental caries. It was observed that children with low body mass index and obesity showed a mean of 3.25 and 3.6, almost twice as high as those with overweight or normal nutritional status, but no statistically significant relationship was found. between the ceod is the nutritional state. This study did not identify a relationship between nutritional status and dental caries. Studies should be conducted to elucidate such a relationship.

Keywords —dental caries, nutritional status, oral health

I. INTRODUCTION

Early childhood caries is a public health problem in developing countries, where malnutrition is still a problem. This pattern of destruction develops very rapidly in preschoolers, affecting dental surfaces

that are naturally prone to tooth decay. Considering that the disease is influenced by the social context, the discussion about its causes goes beyond the limits of oral health¹ In the national epidemiological survey conducted in 2003², at the age of 5 years, an average of 2.8 with 2.30 decayed teeth was found.

More recently, data from the 2010 national survey³ showed a decline of 13.9% in the occurrence of the disease, with an average of 2.43, of which less than 20% were treated and the decayed component was responsible for more than 80% of the index at the age of 5 years, results that showed high occurrence of the disease and need for curative and preventive treatment in this age group.

Thus, preschool age is a critical period in the occurrence of dental caries, and more and more ways to elucidate risk factors and their consequences throughout life are being studied.⁴ Also according to the survey, there are huge regional inequalities, and in the North region, at five years old, was found an average ceo-d of 3.37, higher compared to other regions of the country. In addition, the proportion of decayed teeth is higher in the North and Northeast regions than in other regions. In Manaus, the average CEOD found at 5 years of age was 2.88, with an average decayed component of 2.30. In general, the values found can be considered high, particularly as it is a deciduous dentition.³

Although early childhood caries is recognized by its multifactorial nature, there is a need for further clarification on the interaction of risk factors and the cause of some children suffering more from the disease than others.⁵ The important role of diet in the diet cannot be denied. Etiology of dental caries, being indispensable and unquestionable the need for its participation in the onset of the disease. Similar to dental caries, nutritional status in children has a multifactorial etiology with diet as a common risk factor.⁶ The onset of early caries results in several factors, such as the onset of severe pain, infections and abscesses, making it difficult for children to chew, and even the refusal of food.⁷ The literature has sought to highlight the relationship between nutritional condition and dental caries in children. However, the reports in the literature are conflicting, especially regarding the association between Body Mass Index (BMI) and dental caries in various parts of the world.⁸

Such a relationship is complex and epidemiological research strongly suggests that it

involves a two-way causal relationship. It also indicates that preventing and treating early childhood caries can lead to improvements in oral health, nutrition and general health that could benefit children in the short and long term⁹. The investigation of oral health in preschoolers, highlighting the need for dental treatment and planning of educational-preventive actions is relevant, considering the high prevalence of caries in this age group and the fact that caries in the primary dentition is the most common. strong predictor of this disease in permanent dentition.¹⁰ The evaluation of oral health conditions and nutritional status of children becomes essential for the planning of public policies directed to their real needs, allowing their knowledge and monitoring of health conditions over time. Thus, this study aimed to evaluate the prevalence of dental caries and its correlation with body mass index in preschool children in the municipality of Manacapuru, in the state of Amazonas.

II. METHODOLOGY

A cross-sectional observational study was conducted in the city of Manacapuru, Manaus Metropolitan Region, Amazonas State, with an estimated population of 96,236 inhabitants in 2018.¹¹ The city has six active day-care centers. For this study, three day care centers were selected: Joaquim Lula Early Childhood Education Center, Lígia Maria Silva Marinho Early Childhood Education Center and Marlúcia Dantas da Silva Early Childhood Education Center. The study included pre-school children of both sexes who were regularly enrolled in these day care centers, whose parents authorized their participation by signing the Informed Consent Form (ICF) and who were in the day care center at the time of the study. Children whose parents did not authorize their participation, children who refused to participate in the exam and those who were not in day care on the day of the exam were excluded from the sample, making a total of 263 preschool children between 2

and 5 years old. participants, with a 59% response rate. Data collection took place between July and August 2018. Clinical oral health examinations were performed by a single examiner and a single annotator duly calibrated by theoretical class and practical training following the recommendations of the World Health Organization (1997).¹² The children were examined in their daycare facilities, with the examiner sitting in front of the child, under natural light, without previous prophylaxis, during the period appropriate to the beginning of the class (both morning and afternoon) and not exceeding the time of the day. snack so that they would not interfere with the analyzes due to food ingestion. The following instruments were used to perform the examinations: Wooden spatulas to assist in the removal of soft tissues, mouth mirrors and spherical tip probes (WHO) were used to confirm the visual evidence of dental caries. The evaluation of the children's oral condition followed the criteria recommended by the World Health Organization¹², using the ceo-d index (number of decayed deciduous teeth, with indicated extraction and obturation).

Anthropometric assessment was performed by calculating Body Mass Index (BMI), where weight was divided by the square of height. The children were weighed using a precision digital scale and a measuring tape to measure their height. Age-based body mass index charts recommended by the World Health Organization were used to calculate the nutritional status of children according to male and female gender,¹³ and thus the child's diagnosis. Data were tabulated and descriptively calculated using means, absolute and relative frequencies and were stratified according to age and gender analyzed and processed using Excel spreadsheets (Microsoft 2010). The Significant Caries Index (SiC Index) - Proposed for assessing caries inequality in the study population is represented by the mean value of ceod or DMFT calculated for one third of the examined group that had the highest values of tooth decay.¹⁴

The test Pearson's correlation was used to relate the dmft with nutritional status. Kruskal Wallis test was used to compare CEOD between ages and

Mann Whitney test was used to compare ceod between sexes. To perform the statistical tests, a significance level of 5% was adopted. The tests were calculated using the Statistica 9.1 software. This study was submitted and authorized by the Manacapuru Municipal Secretariat of Education and the managers of the participating day care centers. It was also submitted and approved by the Research Ethics Committee of the Northern University Center (Uninorte) accredited to the National Health Council (CAAE 80716617.4.0000.0010.)

III. RESULTS

The present study was conducted in three municipal day care centers in Manacapuru, AM. A total of 518 informed consent forms were distributed to the parents or guardians of the children and 308 signed terms were returned. Forty-five children were not examined because they were not in school at the time of the examination, making a total of 263 children participating in the study, with a response rate of 59%. There was a higher percentage of male and 5-year-old children as described in Table 1.

TABLE I
 Children examined according to gender and age, Manacapuru, 2018.

Sex		
	n	%
Masculine	146	55,51
Feminine	117	44,49
Age		
2 years	4	1,52
3 years	20	7,60
4 years	102	38,78
5 years	137	52,09
Total	263	100,00

The results regarding the children's ceod are shown in table 2. The prevalence of dental caries found was 79%. A ceod of 1.89 (+2.71) with higher expressiveness of the decayed component can be observed, both in relation to gender and age. There was a statistically significant difference between the different ages in the decayed component, lost component and in the dmft. A high Sic Index was also observed in the group studied, almost three times higher than the ceod found in the general sample. Table 2- ceod and components according to sex and age of children examined, Manacapuru, 2018.

TABLE II
Ceod and components according to sex and age of children examined, Manacapuru, 2018..

	ceod (±dp)	carie (±dp)	lost (±dp)	Obtured (±dp)	Sic índice 1/3(±dp)	Sic Índice 2/3(±dp)
Gender						
M	2,01 (±2,87)	1,84 (±2,64)	0,14 (±0,54)	0,03 (±0,27)	5,56 (±2,33)	0,28 (±0,64)
F	1,74 (±2,50)	1,45 (±2,22)	0,17 (±0,55)	0,12 (±0,55)	4,62 (±2,43)	0,31 (±0,52)
Age						
2y	0,00 (±0,00)	0,00 (±0,00)	0,00 (±0,00)	0,00 (±0,00)	0,00 (±0,00)	0,00 (±0,00)
3 y	0,95 (±1,61)	0,90 (±1,62)	0,05 (±0,22)	0,00 (±0,00)	2,83 (±1,83)	0,14 (±0,36)
4y	1,44 (±2,42)	1,33 (±2,34)	0,05 (±0,29)	0,06 (±0,44)	4,18 (±2,49)	0,07 (±0,26)
5y	2,42 (±2,97)	2,07 (±2,62)	0,26 (±0,69)	0,09 (±0,45)	6,09 (±2,22)	0,63 (±0,93)
p	0,0023*	0,0066*	0,0099*	0,4537	--	-
Total	1,89 (±2,71)	1,66 (±2,47)	0,16 (±0,54)	0,07 (±0,43)	5,13 (±2,41)	0,29 (±0,59)

Table 3 describes the results of the body mass index of the children. It is possible to observe a higher percentage of eutrophic and overweight children, without significant statistical difference between ages and between males and females ($p > 0.05$).

TABLE III
Body Mass Index according to sex and age of children examined, 2018.

	Low BMI	Eutrop hic	Overw eight	Obe sity	Total
	n (%)	n (%)	n (%)	n (%)	n (%)
Gender					
M	1 (0,38)	115 (43,73)	27 (10,27)	3 (1,14)	146 (55,51)
F	3 (1,14)	87 (33,08)	25 (9,51)	2 (0,76)	117 (44,49)
Total	4 (1,52)	202 (76,81)	52(19,77)	5 (1,90)	263 (100,00)
Age					
2y	0 (0,00)	3 (1,14)	1 (0,38)	0 (0,00)	4 (1,52)
3y	0 (0,00)	12 (4,56)	7 (2,66)	1 (0,38)	20 (7,60)
4y	3 (1,14)	81 (30,80)	18 (6,84)	0 (0,00)	102 (38,78)
5y	1 (0,38)	106 (40,30)	26 (9,89)	4 (1,52)	137 (52,09)
Total	4 (1,52)	202 (76,80)	52 (19,77)	5 (1,90)	263 (100,00)

No significant correlation was found between ceod and body mass index of the children examined. ($p > 0.05$), however, a higher mean dmft was observed in children with low BMI and obesity compared with eutrophic and overweight children

IV. CONCLUSIONS

Tooth decay is highlighted as one of the most common diseases in adults and children and is an important public health problem, therefore, the identification of groups at higher risk for the development of the disease is of fundamental importance for its prevention and early treatment.¹⁵

Moreover, the study of the factors involved in the occurrence of caries at this time of life is of

importance, since the experience of caries in deciduous dentition is a predictor of permanent dentition injury.¹⁶

In the present study, a ceod of 1.89 was found in the general sample, 1.44 at 4 years of age and 2.42 at 5 years of age, which is superior to the studies by Nogueira et al. (2012)¹⁷ with ceod of 1.37 and Xavier et al. (2013) 6 with a ceod of 1.65 and differed from the results found by Negreiros et al. (2018),¹⁸ who found a ceod of 3.57 at 4 years and 2.23 at 5 years of age in the municipality of Manaus-AM.

There was a statistically significant difference between the different ages in the decayed component, lost component and in the dmft. The decayed component corresponded to the greater expressiveness of the dmft, both regarding sex and different ages, demonstrating that the children examined presented most of the teeth affected by untreated dental caries, in need of curative treatment, in addition to preventive and treatment educational.

Also, 79% of the children evaluated had at least one deciduous tooth with caries experience and 21% were free of the disease. The result of this study was similar to that found in the national survey of oral health conditions in 2010, whose proportion of decayed component at 5 years of age was 80.2% in Brazil and 79.9% in the capital of Amazonas, Manaus, however. was lower than the percentage found in the Northern Region with 90.2%.³

In a study conducted in another city in Brazil, Recife (2011),¹⁹ there was a high prevalence of untreated decayed teeth in children aged 18-36 months with 93.8% and 81.7% at 5 years of age, with the obturated component having minimal expressiveness. These results showed that preschool children are not having adequate access to preventive and curative actions. These high percentage results of untreated dental caries in deciduous dentition can be explained by the fact that parents do not understand the relevance of maintaining oral health in deciduous dentition as well as the risks to children's oral and general health.

Still, there may be difficulty in accessing public services because professionals do not feel safe to care for children in this age group. There was a higher mean of ceod in males than in females, however there was no statistically significant difference between genders, corroborating the studies by Maia et al. (2007).²⁰

When analyzing the body mass index, the study population did not show a statistically significant correlation between the ceod and the body mass index (BMI) of the children examined ($p > 0.05$), which was also found in the studies by Foschini and Campos (2012)²¹, Dias and Nurseries (2014)²² and Assi et al. (2016)²³; Such a result can be explained by the small sample size. Nevertheless, it was observed that those children who had low BMI and obesity were nearly twice as high as those children who were overweight or with normal nutritional status, which may demonstrate that further studies should be conducted to elucidate this relationship, coinciding with studies by Oliveira et al. (2008)²⁴ who found an increased risk for dental caries in children aged 12 to 59 months with low BMI.

Porcelli et al. (2016)²⁵ found higher caries severity in primary dentition in the obese group in the city of California - PR, southern Brazil, different from the data found in other studies, which showed that in all anthropometric indicators of nutritional status, the probability of Thus, no statistically significant differences were found in mean dmft in the different BMI classes, and there was only a tendency to have a higher average in the group of underweight and obese children.

The hypothesis of a common etiology between obesity and dental caries is defined in the literature. Dias et al. (2011)²⁶ point out that obesity-related eating habits may determine a higher prevalence of dental caries, since both the amount of sucrose and carbohydrate ingested and the frequency of ingestion are factors that are frequently involved in its etiology. Therefore, food choices at risk for dental caries should be disregarded and the consumption of foods with low nutritional density and high energy density should not be advised.²²

Still, children with low BMI had a ceod of 3.25, a condition that can be equally the target of reflection. Dias e Viveiros (2014) showed that factors such as chewing difficulties related to decayed tooth pain, ingestion of poorly chewed foods that may lead to a reduction in nutrient intake and absorption or a tendency to opt for easier chewing foods, may contribute to a reduction in the intake of good protein sources, and may be responsible for a still undisclosed reduction in food intake in children with dental caries.²²

The SB Brazil 2010 data show a high prevalence of early childhood caries in all regions of Brazil, as well as highlighting important regional inequalities.³ In the present study, a high Sic Index was observed, which demonstrates polarization of dental caries, where in the Polarized group (one third of the sample with higher values of ceod) was found to have a mean ceod of 5.13 (\pm 2.41), which means that there is great inequality in the distribution of the disease in the population studied.

This phenomenon of polarization is characterized by the greater number of dental caries affecting a small part of the population, especially the less favored, with greater treatment needs.²⁷ Similar results were found in studies conducted in Manaus AM (2018)¹⁸ and Sobradinho RS (2014)²⁸ whose results were 6.72 and 7.23 respectively. Study of

Dias et al. (2014)²² showed that the most vulnerable students were those who most frequently had dental caries, which may show that polarized groups may be related to worse socioeconomic conditions. Moreover, the municipality of Manacapuru does not benefit from water fluoridation networks, which could contribute to reducing the prevalence of dental caries in the municipality.

As a limitation of this study, it is worth mentioning that this is a cross-sectional study and causal relations cannot be established, suggesting that longitudinal studies should be developed in order to deepen knowledge and elucidate possible cause and effect relationships.

Another limitation is the sample, which is not representative for the population of the municipality,

so such results cannot be generalized to the entire population of Manacapuru, however, this study provides evidence demonstrating the need for monitoring and access to activities, educational, preventive and curative for children and parents as well as monitoring of general health conditions.

The present research revealed that dental caries remains a serious health problem in the children participating in the study, with high expressiveness of teeth with untreated dental caries and polarization of the disease. This study did not identify a significant correlation between dental caries and nutritional status in preschoolers; however, children with low BMI and obesity had a higher prevalence of dental caries than those with normal or overweight nutritional status. Research should be conducted to clarify such a relationship. Public health programs should be conducted to plan strategies for the prevention and treatment of nutritional disorders and to improve oral health standards

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