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ORIGINAL ARTICLE

Sweetness Taste Preference Levels and Their Relationship to the Nutritional and Dental Caries Patterns among Brazilian Preschool Children

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Abstract

Objective: To evaluate the sweetness taste preference levels and their relationship with the nutritional and dental caries patterns among preschool children. **Material and Methods:** The participants of this cross-sectional study were 191 children aged 4 to 5 years, who were regularly attending public Child Education Centers of a city southern Brazil. Children's preference for sugar was evaluated by the Sweet Preference Inventory; caries prevalence, according to the World Health Organization criteria, and nutritional status, by anthropometric weight and stature measurements, in accordance with child growth standards of the World Health Organization. **Results:** High levels of sweetness preference were identified. The majority of children (67.5%) opted for the most concentrated sucrose solutions. Excess weight was recorded in 27.7% of the preschoolers. The prevalence of caries was 51.8%, with the mean dmf-t equal to 1.92 (± 2.72) and the decayed (c) component responsible for 94.2% of the index. No significant association between sweetness preference and the nutritional or the oral health patterns could be established. In addition, no association between excess weight and dental caries was identified. The diseases studied were only associated with sociodemographic variables. Excess weight was associated with maternal age (p=0.004) and caries experience with family income (p=0.013). **Conclusion:** No significant associations could be stablished between the sweetness taste preference and the diseases studied, nor between excess weight and dental caries. However, the findings of high patterns of sweet preference, excess weight and untreated caries experience, highlight the need for the implementation of integrated public policies aimed at controlling both nutritional and of oral health problems in the studied population.

Keywords: Oral Health; Dental Caries; Nutritional Status; Taste Perception.

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Introduction

The global epidemic of child obesity affects all regions of the world, including countries where undernutrition is still common [1]. In Brazil, official epidemiological surveys indicate a trend towards a decline in infant malnutrition and an accelerated increase in excess weight. The weight of one in three Brazilian children is above that recommended by the Ministry of Health [2].

In the field of Dentistry, in spite of the decline in dental caries prevalence in many countries, a Brazilian child, at 5 years of age, has a mean number of 2.43 teeth with caries experience [3]. Obesity, the diseases resulting from it and dental caries have in diet an important etiologic component in common, since both the amount and frequency of sucrose are important factors involved in their etiology [4]. According to the WHO, increased sugar intake may be related to unhealthy diet and the increase in the risk of various diseases, such as overweight, obesity, dental caries and other non-communicable chronic diseases [5].

Sugar consumption is influenced by a number of biological, psychological, cultural, social and environmental factors, including sweet taste preference [6]. Children have an innate pleasure response for sweetness, which has evolutionary origins and is inherent [7]. Individual differences in liking for sweet, besides of being influenced by genetics, may be influenced by early experience [8]. The problem of the high consumption of sucrose usually starts early in childhood. Young children's food preference increases as a function of exposure frequency [9]. Thus, habitual use of, and exposure to, sugary foods and beverages made available by carers from an early age, can be critical in determining the child's sweet preference and related sugar consumption pattern [10].

Taste perception has been linked to nutritional status [11] and oral health [12]. Sweet preference was found to be directly related to both snack and sweet intake occasions and inversely related to the number of main meals of children [13]. A higher risk of children becoming overweight/obese was associated with higher consumption of free sugars [14]. Liking for sweets was related to the weight status in children [8]. A recent multicentre study conducted with Italian, Mexican and Saudi Arabian schoolchildren reported a weak yet positive correlation between sweet taste perception (sweet taste threshold and sweet taste preference) and dental caries in all three countries [13].

Although they share common etiological factors, the literature addressing the relationship between obesity and dental caries shows conflicting results [15], and little has been explored about the relationship between these two health problems with the taste sensory characteristics in young children.

Considering the scarcity of dental researches that explore common risk factors to oral and systemic problems in early childhood, the aim of this study was to evaluate the sweet taste preference levels and their relationship with nutritional and dental caries patterns in Brazilian preschool children. In addition, the relationship between dental caries and excess weight was studied.

Material and Methods

Study Design and Sample

The target population of this cross-sectional survey was made up of 4-5-year-old children of both genders who, in 2012, were regularly attending the ten Municipal Child Education Centers (MCECs), located in the urban region of Londrina, PR, Brazil. These centers provided care for children from families of low socio-economic level.

To calculate the sample size, the total number of children in this age-range enrolled in the MCECs was considered, estimating the caries prevalence of 60,6% in Brazilian children aged 5 years, living in the southern region of the country [3], with 5% error and 90% confidence interval. The minimum sample size was estimated to be 191 children. To compensate eventual losses or refusals to participate in the study 10% were added to this number (N=210). The sample plan was constructed by means of information (names and addresses of the MCECs; total number of children at each unit, by age) provided by the Child Education management. The numbers of preschoolers in the call lists of their respective classrooms were used for the selection process by adopting the simple random sampling technique. Random numbers were chosen using a computer program.

Data Collection

The children and their respective mothers were invited to participate in the research by means of letters, in which the objective, procedures and importance of the study were explained. The inclusion criteria were: children aged 4-5 years old and having informed consent forms signed by mothers. Preschoolers with special needs (i.e. motor and mental disabilities or some type of syndrome) or with systemic disease were excluded.

A pilot study was conducted with 30 preschool children to test for feasibility of the study and training and calibration of the researchers in all data collection procedures. Some socio-demographic information (gender and age of the child; age, educational level of the mother; and family income) were obtained through interviews with mothers. Then, the preschoolers had dental examinations, taste preference tests and nutritional assessment.

The prevalence of dental caries on primary dentition was measured by using the dmf-t (decayed, missing, and filled teeth) index, in accordance with the criteria defined by the World Health Organization [16]. The same examiner (PL), who had been trained and calibrated in the examination system used, examined all children. In the intra-examiner agreement evaluation, the Kappa value obtained was 0.92.

The clinical exams were performed under natural light, in environmental conditions, with the help of a clinical mirror and CPI (ball point) probe, after tooth brushing had been performed. Biosafety regulations were strictly observed by the field team.

The sweetness taste preference was evaluated by using a modified version of the Sweet Preference Inventory [17] test, in which the children tasted five different concentrations of sugared tea solution: 0,075M; 0.15M; 0.3M; 0.6M and 0.9M. The solutions were prepared on the days of evaluation and kept in five thermos flasks, labeled with identification codes. When the test was

performed, five disposable cups (50 ml), with strategically inserted codes, were randomly distributed on a tray. Standardized instructions, appropriate for the children's age group, were given. After all the solutions had been tasted, the child indicated the one he preferred most, the most palatable. During the test process, a small amount of water was provided between the stimuli. In cases of children's doubts, the test was repeated after a certain time. Observations performed during the pilot phase showed that the explanation of the test procedures was suitable to facilitate the children's understanding and participation in the study.

The children's nutritional status was evaluated by taking anthropometric weight and stature measurements. The child's weight was measured by using the Seca® electronic scale with a split of 0.1 g, and height was measured by stadiometer wall (Seca Brasil, Coria, SP, Brazil) with two meters and centimeters and millimeters subdivision. Three consecutive measurements were taken and the average of them was established. The values of weight, height and body mass index (BMI) were transformed into z scores and percentiles based on the World Health Organization child growth standards [18]. Using BMI criteria overweight was defined as > 85th percentile, obesity > 95th percentile and underweight as < 5th percentile.

Data Analysis

Data analysis was performed with the Statistical Program of Social Science (SPSS), version 20.0 (IBM Corp., Armonk, NY, USA). Initially, descriptive univariate data analysis was performed by drawing up simple frequency tables. Afterwards, bivariate analysis was performed, using the non-parametric tests Chi-square and Kruskal-Wallis where appropriate. Statistical significance was considered at the 5% level. For statistical purposes, the sweet preferences were grouped into the following categories: "low" (0,075M and 0.15M), "intermediate" (0.3M) and "high" (0.6M and 0.9M).

Ethical Aspects

In accordance with the determination of the National Health Council, this study was approved by the Permanent Committee on Ethics and Research involving Human Beings, of the North University of Paraná (UNOPAR) and all procedures followed were in accordance with the Helsinki Declaration of 1975, as revised in 2000.

Results

A total of 191 children out of 210 completed all aspects of the research, a response rate of 91.0%. Among them, equal proportions of both genders (50%) were recorded, and the predominant age was 4 years (63.9%). The mean age of the mothers was 30.8 years and a high proportion of them had low educational levels (47.1%). The majority of the families studied (74.8%) survived on fewer than three monthly Brazilian Minimum Wage (BMW) (Table 1).

In response to the Sweet Preference Inventory, the highest sweetness level (0.9 M) was chosen by 38,7% of the children. The proportion of those who preferred the two higher concentrations of sugar was 67.5%. The moderately sweet solution (0.3 M) was selected by 18.3%

and only 6.3% and 7.9%, respectively, preferred the less sweet solutions (0.075 M and 0.15 M). It was diagnosed that the majority of children were in a eutrophic situation (68.6%), and the percentages of underweight and obese children were 3.7% and 4.7%, respectively. It is worth noting that 23.0% of them were overweight. The prevalence of caries was 51.8%. Each child had, on an average, two teeth affected by caries (dmft = 1.92 ± 2.72). The decayed (d) component accounted for 94.2% of the index (Table 1).

Table 1. Sociodemographic characteristics and biological indicators among preschool children enrolled in Brazilian MCECs.

Variables	N	%
Sociodemographic Characteristics		
Child's Gender		
Male	96	50.3
Female	95	49.7
Child's Age		
4 Years	122	63.9
5 Years	69	36.1
Maternal Age (Years)		
18 to 24	40	20.9
25 to 34	97	50.8
35 or More	54	28.3
Maternal Education (Years of Study)		
0 to 7	90	47.1
8 to 10	61	31.9
11 or More	40	20.9
Family Income (BMW)*		
≤ 1	47	24.6
> 1 ≤ 2	48	25.1
> 2 ≤ 3	48	25.1
> 3	48	25.1
Biological Indicators		
Sweetness Taste Preference		
0.075	12	6.3
0.15	15	7.9
0.3	35	18.3
0.6	55	28.8
0.9	74	38.7
Nutritional Status		
Underweight	7	3.7
Eutrophic	131	68.6
Overweight	44	23.0
Obesity	9	4.7
Caries Experience		
Caries Free	92	48.2
With Caries	99	51.8
Caries Severity		
Mean dmft (SD)	1.92 (± 2.72)	

BMW: Brazilian Minimum Wage

The children's preference for sweetness was not statistically associated with their sociodemographic characteristics. Despite the absence of association, it could be noted that the

higher the mother's educational level, the smaller the proportion of children (19.4%) who chose the solutions with higher sucrose contents. Also, that the solutions with the lowest concentrations of sugar were more selected by girls than by boys. The proportion of children who preferred the more sweetened solutions did not vary among the different income groups (Table 2).

Table 2. Sweet taste preference related to sociodemographic characteristics and biological indicators among preschool children enrolled in Brazilian MCECs.

Variables	Sweet Taste Preference			p-value
	Low N (%)	Intermediate N (%)	High N (%)	
Sociodemographic Characteristics				
Child's Gender				
Male	10 (37.0)	18 (51.4)	68 (52.7)	0.183†
Female	17 (63.0)	17 (48.6)	61 (47.3)	
Child's Age (Years)				
4	17 (63.0)	22 (62.9)	83 (64.3)	0.861†
5	10 (37.0)	13 (37.1)	46 (35.7)	
Maternal Age (Years)				
18 to 24	4 (14.8)	9 (26.5)	27 (20.9)	0.684†
25 to 34	17 (63.0)	15 (44.1)	64 (49.6)	
35 or More	6 (22.2)	10 (29.4)	38 (29.5)	
Maternal Education (Years of Study)				
0 to 7	15 (55.6)	10 (28.6)	65 (50.4)	0.064†
8 to 10	9 (33.3)	13 (37.1)	39 (30.2)	
11 or More	3 (11.1)	12 (34.3)	25 (19.4)	
Family Income (BMW)*				
≤ 1	7 (25.9)	9 (25.7)	31 (24.0)	0.131†
> 1 ≤ 2	12 (44.4)	6 (17.1)	30 (23.3)	
> 2 ≤ 3	2 (7.4)	9 (25.7)	37 (28.7)	
> 3	6 (22.2)	11 (31.4)	31 (24.0)	
Biological Indicators				
Nutritional Status				
Underweight	1 (3.7)	2 (5.7)	4 (3.1)	0.903†
Eutrophic	20 (74.1)	23 (65.7)	88 (68.2)	
Overweight	6 (22.2)	8 (22.9)	30 (23.3)	
Obesity	0 (0.0)	2 (5.7)	7 (5.4)	
Caries Experience				
Caries Free	16 (59.3)	17 (48.6)	59 (45.7)	0.441†
With Caries	11 (40.7)	18 (51.4)	70 (54.3)	
Caries Severity				
Mean dmft (SD)	1.44 (± 2.81)	2.60 (± 3.66)	1.84 (± 2.38)	0.349‡

†Chi-square Test; ‡Kruskal Wallis Test; p<0.05; * BMW: Brazilian Minimum Wage.

An interesting datum was that, no statistically significant association could be detected between the sweet preference and the children's nutritional condition and caries experience. However, it was observed that among children with high level of preference for sweet, there was a higher proportion of those with caries and, conversely, among those with low sweetness preference, the highest proportion was of caries free. The greatest severity of the disease (dmft = 2.60 ± 3.66) was observed in the group with intermediate sweet preference (0.3). Among those who opted for the less sweetened solutions, there was no record of cases of obesity (Table 2).

Higher proportions of underweight (57.1%) and overweight (52.3%) children were found in the male gender; a situation that was inverted when focusing on obesity, in which the highest rate (66.7%), was recorded in the female gender. As regards age, the highest records of underweight (57.1%), overweight (72.7%) and obesity (55.6%), occurred at 4 years of age. The highest rates of overweight and obesity were found among the mothers with lower educational levels. Among sociodemographic characteristics, despite the differences in the rates described, the only one that was significantly associated with the nutritional status was the maternal age (p=0.004). There was concentration of overweight (43.2%) and obese (55.6%) children in the group of more mature mothers (Table 3).

Table 3. Nutritional status related to sociodemographic characteristics and biological indicators among preschool children enrolled in Brazilian MCECs.

Variables	Nutritional Status				p-value
	Underweight N (%)	Eutrophy N (%)	Overweight N (%)	Obesity N (%)	
Sociodemographic Characteristics					
Child's Gender					
Male	4 (57.1)	66 (50.4)	23 (52.3)	3 (33.3)	0.744†
Female	3 (42.9)	65 (49.6)	21 (47.7)	6 (66.7)	
Child's Age (Years)					
4	4 (57.1)	81 (61.8)	32 (72.7)	5 (55.6)	0.480†
5	3 (42.9)	50 (38.2)	12 (27.3)	4 (44.4)	
Maternal Age (Years)					
18 to 24	4 (57.1)	26 (19.8)	8 (18.2)	2 (22.2)	0.004†
25 to 34	3 (42.9)	75 (57.3)	71 (38.6)	2 (22.2)	
35 or More	0 (0.0)	30 (22.9)	19 (43.2)	5 (55.6)	
Maternal Education (Years of Study)					
0 to 7	1 (14.3)	64 (48.9)	19 (43.2)	6 (66.7)	0.254†
8 to 10	5 (71.4)	41 (31.3)	14 (31.8)	1 (11.1)	
11 or More	1 (14.3)	26 (19.8)	11 (25.0)	2 (22.2)	
Family Income (BMW)*					
≤ 1	1 (14.3)	36 (27.5)	10 (22.7)	0 (0.0)	0.611†
> 1 ≤ 2	1 (14.3)	30 (22.9)	14 (31.8)	3 (33.3)	
> 2 ≤ 3	3 (42.9)	31 (23.7)	10 (22.7)	4 (44.4)	
> 3	2 (28.6)	34 (26.0)	10 (22.7)	2 (22.7)	
Biological Indicators					
Caries Experience					
Caries Free	3 (42.9)	63 (48.1)	21 (47.7)	5 (55.6)	0.721†
With Caries	4 (57.1)	68 (51.9)	23 (52.3)	4 (44.4)	
Caries Severity					
Mean dmft (SD)	2.71 (± 3.98)	1.87 (± 2.61)	1.83 (± 2.81)	2.57 (± 3.60)	0.977‡

†Chi-square Test; ‡Kruskal Wallis Test; p<0.05; *BMW: Brazilian Minimum Wage.

The nutritional status was not statistically associated with dental caries. But, among the underweight and obese children, the greatest severity of caries was noted: dmf-t equal to 2.71 (±3.98) and 2.57 (±3.60), respectively. Also, it was found that the caries experience was higher among children with underweight/ overweight and lower among the obese (Table 3).

When proceeding with the analysis of the relationship of the dental caries with the demographic characteristics, it was noticed that the proportions of children with caries were closer, both in the male and female genders and that the caries-free rates were reduced at 5 years of age.

The mother's educational level and the number of caries-free children were inversely proportional. It is pertinent to point out that the higher proportion of children with a history of caries (51.5%) was found among the mothers with a lower educational level. Nevertheless, a statistical association was found only between family income and caries experience (p = 0.013). It was interesting to note that with the rise in income, there was a decrease in the proportion of children with caries experience (Table 4).

Table 4. Caries experience related to sociodemographic characteristics among preschool children enrolled in Brazilian MCECs.

Variables	Caries Experience		p-value
	Caries Free N (%)	With Caries N (%)	
Sociodemographic Characteristics			
Child's Gender			
Male	48 (52.2)	48 (48.5)	0.665
Female	44 (47.8)	51 (51.5)	
Child's Age (Years)			
4	64 (69.6)	58 (58.6)	0.133
5	28 (30.4)	41 (41.4)	
Maternal Age (Years)			
18 to 24	19 (20.7)	21 (21.2)	0.570
25 to 34	50 (54.3)	47 (47.5)	
35 or More	23 (25.0)	31 (31.3)	
Maternal Education (Years of Study)			
0 to 7	39 (42.4)	51 (51.5)	0.215
8 to 10	35 (38.0)	26 (26.3)	
11 or More	18 (19.6)	22 (22.2)	
Family Income (BMW)*			
≤ 1	17 (18.5)	30 (30.3)	0.013
> 1 ≤ 2	21 (22.8)	27 (27.3)	
> 2 ≤ 3	25 (27.2)	23 (23.2)	
> 3	29 (31.5)	19 (19.2)	

†Chi-square Test; p<0.05; *BMW: Brazilian Minimum Wage.

Discussion

In the present study no significant associations between sweetness taste preference and nutritional and oral health patterns were found. However, higher rates of dental caries and excess weight were observed among the preschoolers with high level of sweet preference than those with low preference for sweet. Despite this lack of association between the studied variables, it is well known from the literature that both diseases can be affected by the dietary intake [19,20] and that poor dietary choices may be influenced by the high sweet preference [13].

A high pattern of liking for sweetness was recorded among the preschoolers. The choice of most of them was for solutions with higher sucrose concentrations (the sweetest). Such high levels of sweet preference may partly reflect the cultural and economic influence of the sugar industry across the country [10]. In Brazil, the amount of sucrose available in food has increased substantially [21]. The first National Dietary Survey, which was conducted in 2008-2009, indicated that 61% of the

population consumed more than >10% free sugars for their total energy intake [22]. It is worth mentioning that this high pattern of sugar consumption is contrary to the recommendation of the WHO, which states that the intake of free sugars for the prevention and control of unhealthy weight gain and dental caries in adults and children, should be reduced to less than 10% of the total number of calories from the diet [4]. A further reduction in the intake of free sugars to <5% of energy has been suggested [23].

The large availability of sugar in the country may have also contributed to the high prevalence of with excess weight and dental caries recorded in this research. Evidence on the association between high intake of dietary sugars and excess weight gain and caries in children has been published [4]. A meta-analysis revealed that children with the highest intakes of sugar-sweetened beverages have a greater likelihood of being overweight or obese than children with the lowest intakes [24]. The rising consumption of sweetened beverages such as soft drinks or artificial juices has contributed significantly for the consumption of added sugar in the diet and is associated with the prevalence of obesity in Brazilian preschoolers [25]. The high intake of free sugars is cause of concern as it may reduce the intake of foods containing more nutritionally adequate calories, leading to an unhealthy diet, weight gain and increased risk of non-communicable diseases [5], such as dental caries, which is considered the most common chronic disease in the world [20].

The lack of a significant association between the preschool preference for sugar and the occurrence of both excess weight and caries may have some explanations. One of them is the fact that taste preference is not the only determinant of the type of food consumed or establishment of eating habits. The foods choice is related to preferences developed and attitudes learned in childhood, as well as to environmental, personal, psychological and socioeconomic factors [26].

In early years of life, there is great influence exerted by the family [27], in which mothers play an important role in establishing their children foods preferences [10]. The finding that the highest proportions of children with excess weight (overweight and obesity) were found in the group of older mothers was surprising, as it is known that older women generally have more wisdom than younger ones and make better decisions about their children care and education. On the other hand, the trend of association between higher maternal schooling and lower preference of the preschoolers was expected. Consciousness of the harmful effects of sugar affects the pattern of consumption, particularly in groups in which mothers have high educational levels [28].

During the preschool years, there is also considerable influence on dietary behavior exerted by the institutional environment [29], where a large portion of the children generally remain full time for five business days a week. Perhaps the type of food provided by the MCECs of Londrina are partly responsible for the high rates of excess weight and caries experience observed.

Another possible factor that may have affected the analysis of the relationship between the preference for sweet and these health problems may be related to the knowledge that the more widespread a causative factor is, the less it explains the distribution of a disease [30]. Previous studies have mentioned that the association between sweetness preference and dental caries may be

hidden when the most common sweetness preference is high [12,31]. This may have occurred in the present investigation.

The high prevalence of caries in this study points out to the fact that the WHO target for 2010 [32], related to five years old (90% of caries free) is far from being achieved in Brazil. This epidemiological profile reflects, in part, the process of conformation of oral health policies in the country, which historically prioritized dental care for schoolchildren, in detriment of the other age groups. Although the Ministry of Health had implemented in 2004, the Smiling Brazil policy [33], with the objective of increasing access to dental treatment for the entire population, the composition of the dmf index of the preschoolers studied, almost exclusively by decayed teeth, makes it clear that there are still many difficulties in the implementation of a comprehensive oral health care, which is effectively universal. Regarding the presence of untreated teeth, besides the lack of access to dental services, cultural influences and devaluation of the deciduous dentition by some responsible for the children must be considered [34].

There is a greater chance of using dental services among preschool children with better socioeconomic conditions, suggesting social inequality [34]. Among the sociodemographic variables analyzed in this investigation, only the family income of the preschoolers was associated with their caries experience, making evident the social determination of the disease. Others study have reported higher prevalence of caries in pre-school children with poor living conditions [35]. Conditions of social and material disadvantages to which individuals are exposed can compromise their ability to provide self-care, among other factors. Although it was not the focus of this investigation, it is worth noting that the lower family income has also been related to the higher consumption of foods with low nutritional value by children, such as carbohydrate-rich foods [36].

Studies focusing on the relationship between excess weight (overweight and obese) and dental caries in preschool children have presented controversial and inconclusive results. In accordance with our findings, a previous study showed no relationship between obesity and dental caries [37]. However, a systematic review showed a positive association between obesity and increased risk of caries in children [15]. In addition, an inverse obesity- caries relationship has been reported in the literature [35,38]. This subject will clearly require more investigation as the relationship between overweight and dental caries in children is far more complex than can be explained by carbohydrate consumption alone [34]. Aside from free-sugars and socio-economic deprivation, there are many non-shared risk factors for both conditions. Obesity in children and young people is affected by many complex behavioral, psychosocial, biomedical and genetic factors, including overall calorie intake, physical activity levels, parenting practices and caregiver obesity [39]. On the other hand, dental caries is also affected by access to oral health services, exposure to fluoride, overall dietary composition, oral bacteria, salivary composition and flow rates, and tooth enamel structure [13].

A possible limitation of the present study is that important variables that would allow a better understanding of the results were not included, for example the analysis of food consumption,

inadequate alimentary practices, and behaviors in oral health. Also, it should be taken into account it's a cross-sectional design, in which no causal association could be made. Moreover, the sample selection was made only in public schools, which does not allow greater generalizations about the preference for sweet, prevalence of overweight and dental caries for children in this age group, in the general population.

Regarding the prevention and control of excess weight and dental caries policies aimed at reducing the intake of free sugars in childhood should be adopted by the National Authorities. Upstream interventions that impact upon the social determinants of health and foster supportive food environments are recommended as part of the common risk factor approach to health improvement [40]. These may include education, improved labelling, restriction of advertising, introducing standards for kindergarten and school meals that include limits on free sugars, and fiscal measures such as taxation for sugar-sweetened beverages/and sugar-rich foods and/or incentivizing the purchase of healthy food [9].

Conclusion

Although high rates of sweetness taste preference were identified, they were not associated with both the nutritional and oral health patterns of the preschool children studied. Also, no statistical association was recorded between the excess weight and their caries experience. However, the observed high level of sweet preference, coupled with high rates of excess weight and untreated caries highlight the need to plan and implement integrated public policies aimed at controlling both nutritional and oral problems in order to improve the quality of life of the preschoolers studied.

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