

DENTAL EROSION: PREVALENCE IN PRIMARY DENTITION OF AMAZON CHILDREN

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ABSTRACT

Today tooth erosion is the situation commonly found in patients of pediatric dentistry offices. Facilities consumption of foods that promote erosion became frequent, bringing with it a percentage rather worrying about the appearance of the problem. The amount of citrus drinks and high-frequency soft drinks consumed is awakening to new information that is part of the set of methodologies for preservation of otherwise healthy dentures. This work, according to its results, is of great importance when you want to avoid dental erosion in children and maintain healthy teeth. AIM: Dental erosion used to be considered an oral finding in adult patients, but nowadays it is known that deciduous teeth are more susceptible to it because of their thinner tissues found in primary dentition. The aims of the present study were to find the prevalence of dental erosion in patients with primary dentition undergoing treatment at the UFPA Dental School and evaluate the influence of acidic beverage on the development of such a disease. STUDY DESIGN: The present study is a standardized clinical report. METHODS: Fifty children who were attending the Children's Clinic of the Dental School of the Federal University of Para were included in the research, with mean age of 4.6 years old among boys and girls. RESULTS: 42% of the children studied had dental erosion and according to the BEWE index, all of them had lower or no risk of disease development. STATISTICS: A chi-square statistic test ($p > 0.05$) showed that the intake of carbonated drinks ($p = 0.025$) and acidic juices ($p = 0.01$) were related to dental erosion in this population. MAIN CONCLUSION: It was found to be necessary to investigate dental erosion and intake of acidic beverages in early ages to prevent possible damage to the permanent dentition.

KEYWORDS: Erosion, prevalence, acid, beverages, children.

1. INTRODUCTION

The acid dental erosion is considered a clinical finding which is related to a progressive and irreversible loss of dental tissues, not involving bacteria but associated with acid presence. The mineral loss in dental hard tissues

could cause painful sensation, micro-hardness and structural defects in the teeth^{1,2,3}.

Citric acid represents the main acid found in fruits and vegetables, showing pH > 5 and > 3 for lemon, for example. The phosphoric acid, which is present in "Cola" drinks and carbonated waters, also has a pH > 3 , on average^{4,5}.

Both *in situ* and *in vitro* studies have shown that the intake of acidic beverages, mostly carbonated drinks and fruit juices, were related to the development of dental erosion^{6,8}. Other factors could influence the loss of dental hard tissues, such as saliva rates, emotional disturbances, systemic conditions and patterns of acidic beverage intake^{2,5,7,9}.

However, it is necessary to evaluate how these factors influence dental erosion. Clinically, the first signs of dental erosion are the loss of enamel brightness and translucency, and micro-hardness³.

In fact, the dentin could be affected by the development of dental erosion. However, it is necessary a histological study to evaluate which tissue was affected. Thus, to identify dental erosion lesions it is necessary to use an accurate index^{10,12,13}.

Studies have shown that mineral loss is greater in primary than in permanent dentition. This finding could be related to the thinner tissues in deciduous teeth^{3,5,13}.

The prevalence found in clinical studies ranges from 32 to 100%, and this great variability is explained by the different methodologies used and cultural variances as well. More studies on primary dentition seem to be necessary to define and compare the prevalence and etiologic factors involved^{7,14,15,16}.

The aims of the present study were to determine the prevalence of tooth wear caused by acid dental erosion in a group of 50 children undergoing treatment at the Federal University of Para Dental School and determine the relationship between erosion and acidic beverage and dietary constituents.

2. MATERIAL AND METHODS

Based on ethical principles set by the Declaration of Helsinki, this study was approved by the research ethical committee of the Federal University of Para. All caregivers signed an informed consent form allowing their children to participate in the present study.

The study involved 50 children who were attending the Children's Clinic of the Dental School of the Federal University of Para. They were given routine dental care or referred to specialists for other reasons, but they were not found to have any tooth tissue loss.

The children of both genders had a mean age of 4.6 years old, all presenting exclusively primary teeth and no dental loss. An informed consent form was signed by their parents or caregivers if they really wished to participate.

One examiner (CMLO) carried out the clinical examinations under the same conditions at Children's Clinic of the Dental School of the Federal University of Para. All the children were examined on a dental chair in a dorsal decubitus position, and only oral mirror and artificial light were used. The examiner is a paediatric dentist and was calibrated on the basic erosive wear examination index (BEWE) by using photographs.

The BEWE index is easy to use for ranking dental hard tissues according to a score ranging from 0 to 3 (Table 1) and the results can be compared to other indexes^{6,17,18}.

Table 1: Criteria for ranking erosive wear according to Bartlett D, Ganss C, Lussi A, 2008.

Score	
0	No erosive tooth wear
1	Initial loss of surface texture
2*	Distinct defect, hard tissue loss <50% of the surface area
3*	hard tissue loss > or = 50% of the surface area

*for scores 2 and 3, dentine is often involved.

Although all teeth were examined, only the highest score of each sextant was considered. Next, the scores were added up and the risk of dental erosion was obtained for each patient.

Because this index was set for permanent dentition, we suggested an adaption to the primary dentition. Table 2 lists the total scores, whereas Table 3 lists dental erosion risk and management required.

The data collected were recorded and then a question-

naire about drinking habits was applied to parents or caregivers of the children examined.

Table 2: Total scores to calculate the patient's risk of developing dental erosion. Adapted from Bartlett D, Ganss C, Lussi A, 2008.

Sextant examined	
A	Highest score between 55-53
B	Highest score between 52-62
C	Highest score between 63-65
D	Highest score between 75-73
E	Highest score between 72-82
F	Highest score between 83-85
Cumulative Score=Patient Dental Erosion Risk	
A+B+C+D+E+F	

Table 3: Risk levels as a guide for clinical management according to Bartlett D, Ganss C, Lussi A, 2008.

Risk Level	Cumulative scores of All sextants	Management
None	> or = 2	Routine maintenance and observation.
Low	Between 3 and 8	Dietary assessment, routine maintenance and observation.
Medium	Between 9 and 13	Identify the main aetiological factors for tissue loss and strategies to eliminate impacts.
High	= or < 14	Identify the main aetiological factors for tissue loss and strategies to eliminate impacts.

A descriptive method was used to evaluate the prevalence of dental erosion, whereas the relationship between presence of dental erosion and drinking habits was analyzed by using chi-square test at significance level set at $p < 0.05$.

According to the risk level found in each child and the data collected from the questionnaire, one can state that appropriate management was done in each case.

3. RESULTS

Of the 200 children seen between the second semester of 2009 and the first semester of 2010 at the Children's Clinic of the Dental School of the Federal University of Para, 50 met the inclusion criteria to participate in the present study. The prevalence found was 42% for this population.

According to the BEWE index, risk level among children with dental erosion was 71% compared to 29% among those with no dental erosion.

With regard to carbonated drinks, it was demonstrated that 100% of the children who drank such beverages less frequently (up to four times a week) did not have dental erosion, whereas those who frequently drink carbonated beverages had varied prevalences (Table 4). It was found a positive relationship between presence of dental erosion and intake of carbonated drinks ($p = 0.025$).

In the present study, the intake of juices by children involved lemon, acerola cherry, and orange. All children

who frequently drink lemon juice (4 times a week or more) presented dental erosion, whereas varied results were found regarding the other fruits (Table 5). According to the statistic analysis, it was found that the frequent intake of acidic juices is positively related to dental erosion in the children examined ($p = 0.01$).

Table 4: Percentage of carbonated beverages frequently drunk by children with dental erosion, Belém- PA, 2010.

Dental Erosion	Most frequently drunk carbonated drinks				
	None	Cola	Guaraná	Orange juice	Total
No	100.00	70.00	33.33	57.14	58.00
Yes	0	30.00	66.67	42.86	42.00
Total	100.00	100.00	100.00	100.00	100.00

Table 5: Percentage of acidic juices frequently drunk by children with dental erosion, Belem-Pa 2010.

Dental Erosion	Acid juices frequently drunk				
	None	Acerola	Orange	Lemon	Total
No	33.33	83.33	64.00	0.00	58.00
Yes	66.67	16.67	36.00	100.00	42.00
Total	100.00	100.00	100.00	100.00	100.00

When the intake of carbonated drinks and acid juices were compared in terms of dental erosion, it was observed that the intake of guarana carbonated drink was the only beverage, independent of the concomitant acidic juices intake, associated to dental erosion in this population.

To investigate whether abundant intake of water prevents erosive lesions, it was found no statistically significant difference between children who drink abundant amount of water and those who do not ($p=0.66$).

In Pará, there's a regional habit to drink a beverage based on açaí fruit. Thus, it was also decided to investigate whether this beverage affects the probability of dental erosion development. Even considering that people who drink açaí everyday have no dental erosion (Table 6), no statistic difference was found between intake of this beverage and dental erosion in the children examined.

Table 6: Dental erosion related to açaí drunk by children examined at the Federal University of Pará, Belém, PA, 2010.

Dental Erosion	Açaí daily consumption		
	No	Yes	Total
No	50.00	68.18	58.00
Yes	50.00	31.82	42.00
Total	100.00	100.00	100.00

4. DISCUSSION

Even with all the difficulty of conducting a clinical examination in children, it is necessary to encourage this kind of study because of the scarce literature on dental erosion in primary dentition. Although there are many *invitro* and *in situ* studies, they have limited results on the amount of oral cavity variables^{4,11}.

The present study has found a high prevalence of dental erosion (42%) in the children who participated in the research and were on dental treatment without any reference of dental erosion. Similarly, it was found a prevalence of 32% in children examined in Germany¹⁹.

Other prevalence studies relating age and diagnostic criteria are very different, with their results ranging from 30 to 100%^{7,14,15}. In some of these studies, the children were included specifically because of tooth wear problems, which explains the high prevalence found⁹.

Some cultural variances could influence this variability, for example, studies conducted in Saudi Arabia investigated only boys^{10,19}.

The prevalence of dental erosion in Europe is very high, probably because of the dietary constituents or the importance given to the theme, which is corroborated by most important and original studies^{2,6,14,16,18,19}.

Although the high prevalence found in the present study, the risk level in children with dental erosion lesions was none or low. This could be explained by the lower age and shorter time of dental exposure to the acid action. However, studies conducted in Saudi Arabia showed that 5-6-year-old children have moderate to extensive lesions, rates ranging from 34 to 51%^{15,20}. Moreover, in Europe such rates are virtually the same, ranging from 35 to 40% in children aged between 2-7 years old²⁰.

In Brazil, a cross-sectional study with children aged 12 years old reported a dental erosion prevalence of 13%, but the index used was different and the children were examined at schools without appropriate condition to conduct a good clinical exam¹⁶.

According to the literature, the intake of acid beverage is the most important etiological factor regarding dental erosion in children, and the present study confirms this^{1,2,3,7,21}. The frequent intake of carbonated drinks and acidic juices were statically related to the presence of dental erosion in the children examined.

In previous studies on carbonated drink, it was found a relationship between development of dental erosion and other acidic beverage^{18,22}. The drinking habits regarding these beverages appear to influence this relationship, however this was not the focus of the present study¹⁵. In other studies, the intake of carbonated drinks was not related to dental erosion^{9,19}.

The finding that guarana carbonated drink is more involved in the development of dental erosion diverges

from previous studies^{4,5,8}. However, this could be explained by the high consumption of this kind of carbonated drink because of its lower price compared to others. In addition, the present study was not aimed at investigating the economic situation of the population studied.

With regard to the acidic juices, it was observed that all of them have acid pH. But the prevalence of dental erosion corresponded to the acidic pattern of the beverage⁶. Lemon juice, when frequently drank, was fully associated with the presence of dental erosion in the children evaluated. This finding is corroborated by other studies available in the literature⁴.

Abundant water intake was not related to a decreased dental erosion in this population, which diverges from other studies reporting a negative association between these variables^{3,20}.

Despite the lack of previous knowledge in the literature about the characteristics of Açaí, a regional beverage in Pará. In fact, this fruit should be investigated to know whether it has any influence on dental erosion in the Amazon child population studied. The statistic test showed no relationship between both variables, although it was observed among the children drinking Açaí every day that there was no case of dental erosion. This finding could stimulate further research on the Açaí properties.

A good diagnosis of the disease and simple diet recommendations could help treat an initial lesion of dental erosion, avoiding complications in permanent dentition. Thus, it is necessary to stimulate further prevalence studies and etiological considerations about dental erosion, especially in Brazil, because the scarce amount of such studies on primary dentition.

5. CONCLUSION

This study shows high prevalence of dental erosion in the children examined (42%), with rate ranging from low (29%) and absent (71%).

Intake of soft drink and acidic fruit juice presented a statistically significant relationship with dental erosion ($p=0.025$ and $p=0.01$).

According to these results, early diagnoses should be stimulated as well as further clinical research on deciduous dental erosion treatment and prevention, including diet orientations.

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