

Prevalence of enamel white spots and risk factors in children up to 36 months old

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Abstract: The aim of this study was to determine the prevalence of enamel white spots and the quality of oral hygiene in children up to 36 months old, in municipalities with different fluoride levels in the water supply, analyzing the contribution of several variables. After approval of the Ethics Committee, the parents signed an informed consent form and were interviewed about their educational level, economic classification of the family, nursing habits, use of toothpaste, access to dental service and other information. The children were clinically examined using the same codes and criteria established by the WHO (World Health Organization) and ADA (American Dental Association). The data were processed and analyzed with the Epi-info software program, version 3.2, and Microsoft Excel. Fisher's exact test ($p < 0.05$) was applied to assess the association among the variables. The enamel white spot prevalence was 30.8% and the age group, duration of the bedtime milk feeding habit, age of initial practice of oral hygiene and presence of caries lesions with cavitation were considered statistically significant with regard to enamel white spot prevalence ($p < 0.05$). No association was found between oral hygiene quality and the study variables.

Descriptors: Oral health; Dental caries; Oral hygiene.

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Introduction

Dental caries is defined as an infectious disease that consists of the demineralization of dental tissues exposed to acidogenic microorganisms and fermentable carbohydrates, being influenced by several factors.¹⁻³

At an initial stage, the mineral loss produces microporosities that can be recognized clinically by the formation of white, opaque and rough areas. These white spot lesions inevitably develop into lesions with cavitation, if the mineral loss continues.^{1,4}

The expression “early childhood caries” has been used to refer to any stage of caries lesion, on any deciduous tooth surface of children up to 71 months of age.¹ Because it is considered a public health problem,^{1,5,6} the need to know the actual prevalence of the disease is justified, including information about all its stages, in the different population groups, as well as the risk factors connected with its occurrence.⁷

The aim of this study was to determine the prevalence of tooth enamel white spots and the quality of oral hygiene in children up to 36 months old, registered in public daycare centers of two municipalities with different fluoride concentrations in the water supply, evaluating the contribution of biological, socio-economic and behavioral variables to the occurrence of this incipient lesion.

Material and Methods

The study was conducted during 2006 in two municipalities in the State of São Paulo, Brazil. In the municipality of Clementina (Low Fluoride Content - LFC) fluoride is not added to the water supply and the natural content is lower than 0.40 mg F/L.² During the study period, the only municipal daycare center had 47 children registered, ranging from 6 to 35 months of age. The municipality of Gabriel Monteiro (Adequate Fluoride Content - AFC) has fluoride added to its water supply. Fluoride content is constant and considered optimum, ranging from 0.60 to 0.75 mg F/L.² In the study period, the only municipal daycare center had 41 children registered, ranging from 6 to 36 months of age.

Neither of the centers provides any kind of educational or preventive program with regard to oral health and the caregivers showed no awareness

about the need for cleaning the teeth of children up to 36 months old, who take baby bottles sweetened with sugar daily.

After approval of the Human Research Ethics Committee, São Paulo State University (UNESP), the parents or caregivers signed an informed consent form allowing the children to take part in the study. Next, they were interviewed with the aid of a structured questionnaire, which included questions about the family's economic classification,⁸ the parents' ages and educational level, whether the children had any brothers or sisters, their nursing habits, consumption of water from the public water supply, use of toothpaste, access to dental service and guidance about oral health care.

The exclusion criteria were: absence of parental consent to examine the child or absence of teeth.

The clinical examinations were carried out at the daycare centers, under natural light, by a single examiner, trained and calibrated (kappa 0.91 for lesions with cavitation; 0.90 for lesions without cavitation and 0.97 for hygiene index), who assumed a knee-to-knee position and was helped by an assistant and a note taker.

Oral hygiene quality was assessed using the Greene and Vermillion index⁹ (1960). It was decided that all fully erupted teeth would be included, because of the ages of the children examined and the chronology of tooth eruption. A plaque-disclosing solution was applied to the buccal and lingual surfaces.

Two days later the conditions of the dental crowns were assessed with the use of an oral mirror and a WHO (World Health Organization) probe. Before examination, the children's teeth were cleaned and dried with gauze. The same codes and criteria established by the WHO¹⁰ (1997) and used in the national survey¹¹ were applied. White spot lesion identification was conducted separately, according to the criteria proposed by the ADA (American Dental Association).¹

The data were processed and analyzed with the Epi-info software program, version 3.2. The means and standard deviations (mean \pm SD) of the examined children's ages, and the means, standard deviations and 95% confidence interval (mean \pm SD; 95% CI) of the dmft and dmfs were calculated. Fisher's

exact test, with significance level at 5%, was applied to assess the association between the variables studied, using the BiosEstat 4.0 software program.

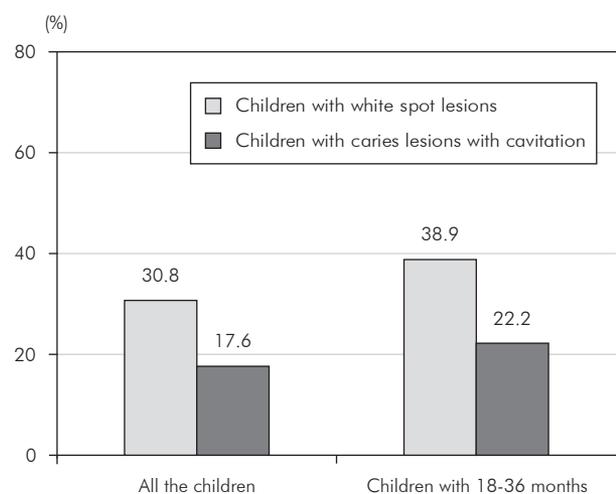
Results

In the two daycare centers, 68 children were examined. In the LFC municipality 38 children ranging between the ages of 8 and 36 months (23.70 ± 8.30) participated in the study. In the AFC municipality there were 30 children ranging between the ages of 8 and 36 months (23.63 ± 9.28).

The dmft and dmfs indices were higher in the LFC municipality. These data are presented in Table 1.

The prevalences of white spot lesions and caries lesions with cavitation are shown in Graph 1.

The association between white spot lesions and the variables studied is presented in Table 2. Re-



Graph 1 - Prevalence of white spot lesions and caries lesions with cavitation in the children examined.

Table 1 - Mean, standard deviation and 95% confidence interval of the dmft and dmfs indices of the children examined in each municipality.

Municipality	Age (months)	Mean \pm SD (95% CI)	
		dmf-t	dmf-s
LFC	18 to 36	0.84 \pm 2.00 (0.36 – 1.31)	1.39 \pm 4.70 (0.27 – 2.50)
	Up to 36	0.68 \pm 1.83 (0.10 – 1.27)	1.13 \pm 4.26 (0.00 – 2.49)
AFC	18 to 36	0.74 \pm 2.16 (0.23 – 1.25)	1.30 \pm 4.04 (0.34 – 2.26)
	Up to 36	0.57 \pm 1.91 (0.00 – 1.25)	1.00 \pm 3.56 (0.00 – 2.27)
Total	18 to 36	0.80 \pm 2.05 (0.31 – 1.28)	1.35 \pm 4.39 (0.31 – 2.39)
	Up to 36	0.63 \pm 1.85 (0.19 – 1.07)	1.07 \pm 3.94 (0.14 – 2.01)

LFC: low fluoride content; AFC: adequate fluoride content.

garding the fluoride contents in the two communities, Fisher's exact test revealed no statistically significant differences between them ($p = 0.601$).

Fisher's exact test revealed no statistically significant differences among children's oral hygiene quality and the same study variables tested for white spot lesions shown in Table 2.

As regards the oral hygiene practices, 82.3% of the parents related that they clean their children's mouths, and 71.4% of them do so daily. Table 3 presents the oral hygiene quality of the children examined.

Discussion

The first official data about the oral health status of Brazilian children younger than 3 years old were collected in the national survey carried out in 2002-2003.¹¹ The survey revealed that 26.8% of the children from 18 to 36 months old had already experienced dental caries. Among the residents of the southeastern region, the prevalence was 23.2% in the same age group. The caries prevalence observed in this study was similar to the national and the southeastern region prevalence (Graph 1).

However, the national survey did not include data about caries lesions without cavitation.¹¹ When these lesions are considered in the clinical exam, the caries prevalence in children up to 36 months of age can reach 55%.¹² In the present study the presence of white spots was strongly associated ($p < 0.001$) with the presence of caries lesions with cavitation (Table 2), proving the relevance of including white spot lesions in the clinical exam of this age group.⁷

As reported by other authors,^{7,12-17} dental caries

Table 2 - Prevalence of white spots in the 68 children examined, according to the variables studied.

Variables		With white spots		Without white spots		Total		P
		n	%	n	%	n	%	
Age group (months)	Up to 17	0	0.0	14	100	14	100.0	0.003*
	18 to 36	21	38.9	33	61.1	54	100.0	
Economic classification [†]	B and C	12	27.9	31	72.1	43	100.0	0.588
	D and E	9	36.0	16	64.0	25	100.0	
Father's educational level (years of schooling)	Up to 8	14	32.6	29	67.4	43	100.0	0.789
	9 or more	7	28.0	18	72.0	25	100.0	
Mother's educational level (years of schooling)	Up to 8	11	32.4	23	67.6	34	100.0	0.800
	9 or more	10	29.4	24	70.6	34	100.0	
Father's age (years)	Up to 25	7	23.3	23	76.6	30	100.0	0.294
	26 or more	14	36.8	24	63.2	38	100.0	
Mother's age (years)	Up to 25	12	33.3	24	66.7	36	100.0	0.793
	26 or more	9	28.1	23	71.9	32	100.0	
Existence of brothers or sisters	Yes	7	33.3	14	66.7	21	100.0	0.783
	No	14	29.8	33	70.2	47	100.0	
Duration of breast feeding (months)	Up to 12	15	31.9	32	68.1	47	100.0	0.527
	13 or more	6	42.9	8	57.1	14	100.0	
Duration of bedtime feeding (months)	Up to 12	0	0.0	14	100	14	100.0	0.003*
	13 or more	21	38.9	33	61.1	54	100.0	
Duration of nighttime feeding (months)	Up to 12	7	25.9	20	74.1	27	100.0	0.783
	13 or more	10	29.4	24	70.6	34	100.0	
Oral hygiene	Yes	18	32.1	38	67.9	56	100.0	0.742
	No	3	25.0	9	75.0	12	100.0	
Frequency of oral hygiene (times a day)	None / occasionally	8	28.6	20	71.4	28	100.0	0.794
	At least 1	13	32.5	27	67.5	40	100.0	
Age of initial practice of oral hygiene (months)	Up to 11	3	13.0	20	87.0	23	100.0	0.019*
	12 or more	15	45.5	18	54.5	33	100.0	
Hygiene quality classification	Good or fair	14	35.0	26	65.0	40	100.0	0.433
	Poor	7	25.0	21	75.0	28	100.0	
Use of toothpaste	Yes	17	35.4	31	64.6	48	100.0	0.259
	No	4	20.0	16	80.0	20	100.0	
Age of initial use of toothpaste (months)	Up to 11	1	14.3	6	85.7	7	100.0	0.396
	12 or more	16	39.0	25	61.0	41	100.0	
Fluoride content in water	AFC	8	26.7	22	73.3	30	100.0	0.601
	LFC	13	34.2	25	65.8	38	100.0	
Caries lesions with cavity	Yes	11	91.6	1	8.4	12	100.0	< 0.001*
	No	10	17.9	46	82.1	56	100.0	
Access to dental service	Yes	4	50.0	4	50.0	8	100.0	0.240
	No	17	28.3	43	71.7	60	100.0	
Guidance about oral health care	Yes	5	26.3	14	73.7	19	100.0	0.772
	No	16	32.7	33	67.3	49	100.0	

[†]economic classification: ABEP[®] (2003). Average monthly family income: U\$213 to U\$1,402 - classes B and C; U\$103 to U\$212 - classes D and E. * (p < 0.05) - Fisher's exact test.

Table 3 - Hygiene score in relation to tooth surface and classification of the children according to oral hygiene quality in the two communities.

Oral hygiene	Municipality				Total	
	LFC		AFC			
Score by surface	n	%	n	%	n	%
0	51	4.1	84	9.2	135	6.3
1	410	33.2	326	35.7	736	34.3
2	495	40.0	410	45.0	905	42.1
3	280	22.7	92	10.1	372	17.3
Total	1,236	100.0	912	100.0	2,148	100.0
Hygiene quality classification by children	n	%	n	%	n	%
Good	1	2.6	0	0.0	1	1.5
Fair	18	47.4	21	70.0	39	57.3
Poor	19	50.0	9	30.0	28	41.2
Total	38	100.0	30	100.0	68	100.0

had an early onset in this young population. The prevalence of white spots increased with age (Table 2) and presented statistically significant difference ($p = 0.003$) with regard to age group.

The relationship between caries and milk feeding is controversial in literature. While some authors consider nighttime breastfeeding or bottle-feeding a factor linked to early caries,^{18,19} other researchers did not observe this association.^{5,12,17,20} In the present study, the children beyond 12 months of age who were breastfed at any time, breast- or bottle-fed during the night, or before going to sleep presented a higher prevalence of white spot lesions. Only the last variable (breast- or bottle-fed before going to sleep) was considered statistically significant ($p = 0.003$).

Children from economic classes D and E, from parents with a lower educational level, from younger mothers and from families with more than one child, presented a higher white spot prevalence; however, neither of those variables were considered statistically significant.

According to the parents, in the municipality with AFC in the water supply, only 54.5% of the children consume this water. At the daycare center in that municipality, only mineral water without fluoride is consumed. Perhaps this is the reason why water fluoridation, which has a proven action of reducing dental caries,²¹ did not present a statistically significant difference in this study.

The use of fluoridated toothpaste was also not related to a lower white spot prevalence. This can be explained by the length of time the children stay at the daycare center, the whole day, five times a week, bearing in mind that during that time their teeth are not brushed. In fact, as mentioned above, neither of the centers provides any kind of preventive care to the children. Furthermore, 72.1% of the parents affirmed that they had never received guidance with regard to the oral health of their children. Even so, the early use of fluoridated toothpaste seems to have contributed to reducing the prevalence (Table 2).

The presence of visible biofilm has been associated with caries prevalence.^{12,18,20} However, in this study no relationship between the quality of oral hygiene and the prevalence of white spots or caries lesions with cavitation was observed, as in some other studies.^{13,16}

This result can be explained by the methodological differences in the classification of hygiene and because the population examined in this study presented a large amount of bacterial plaque (Table 3).

Santos *et al.*²² (2007) observed that, for young children, a more frequent habit of toothbrushing may not reflect a better oral hygiene quality. Of the total number of children examined in the present study, only 1 (1.5%) had good oral hygiene (Table 3). Nevertheless, most of the parents related that they clean their children's mouths daily, and those who started

oral hygiene before 12 months of age presented a lower prevalence of white spots ($p = 0.019$).

Access to dental care presented no relationship with white spot prevalence or oral hygiene quality, since 88.2% of the children examined had never been to the dentist.

Research conducted in Brazil has detected caries lesions with cavitation in more than 40% of the 48-month-old children examined.^{6,23} If the children who participated in this study are not offered proper treatment they may reach that level within a short period of time.

The need to instruct the parents about their children's oral health care and adequate use of fluoridated toothpaste became evident, as well as the need to instruct and train the caregivers with regard to the children's oral hygiene during their stay at the day-care centers.²⁰ Thus, after data collection had been completed, the parents and daycare center employees and caregivers participated in guidance meetings

and individual educational activities to see practical demonstrations of how to perform the children's oral hygiene.

Conclusions

Considering the subjects' ages, a high prevalence of tooth enamel white spots was found in this research, mainly associated with age group, duration of bedtime milk feeding habit, age of initial practice of oral hygiene and presence of caries lesions with cavitation. Although the water fluoride level did not represent a statistically significant difference in relation to the presence of white spots, the children in the municipality with adequate fluoride content presented a lower prevalence.

The children examined presented a large amount of biofilm and there was no association between the quality of oral hygiene and the same study variables tested for white spots lesions.

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