DENTAL CARIES PREVALENCE IN CHILDREN UP TO 36 MONTHS OF AGE ATTENDING DAYCARE CENTERS IN MUNICIPALITIES WITH DIFFERENT WATER FLUORIDE CONTENT

Ana Valéria Pagliari TIANO[1], Suzely Adas Saliba MOIMAZ[2], Orlando SALIBA[3], Nemre Adas SALIBA[3]

1- DDS, MSc, Graduate Student, Preventive and Community Dentistry Program, Dental School of Araçatuba, São Paulo State University, Araçatuba, SP, Brazil.
2- DDS, MSc, PhD, Associate Professor, Preventive and Community Dentistry Program, Dental School of Araçatuba, São Paulo State University, Araçatuba, SP, Brazil.
3- DDS, MSc, PhD, Full Professor, Preventive and Community Dentistry Program, Dental School of Araçatuba, São Paulo State University, Araçatuba, SP, Brazil.

Corresponding address: Dra. Ana Valéria Tiano - R. José Bonifácio, 1193, Vila Mendonça, 16015-150 Araçatuba, SP, Brazil - Phone: 55-18-36363249 e-mail: anapagliari@yahoo.com.br

ABSTRACT

*T*his study determined the prevalence of cavitated caries lesions (CCL) and early childhood caries (ECC), and the contribution of some variables in children up to 36 months of age attending daycare centers in municipalities with different fluoride levels in the water supply: AFC (adequate fluoride content) and LFC (low fluoride content). After approval of the Ethics Committee, the parents were interviewed. The children were clinically examined using the same codes and criteria established by the WHO (World Health Organization) and the ADA (American Dental Association). Fisher's exact test (p<0.05) was applied for statistical analysis of data. The dmft indices calculated in the LFC and AFC municipalities were 0.57 and 0.68, respectively. Considering all children examined, 17.6% presented CCL and 33.8% ECC. The economic classification, mother's education level and duration of breastfeeding were considered statistically significant with regards to CCL prevalence. The age group, duration of the habit of drinking milk before bedtime and age at which oral hygiene started were considered statistically significant with regards to ECC prevalence.

Key words: Oral health. Dental caries. Early childhood caries.

INTRODUCTION

The expression "early childhood caries" (ECC) is used to refer to any stage of caries lesion in any surface of primary teeth of children up to 71 months of age[7,11].

The national survey carried out in 2002-2003[2] revealed a caries prevalence of 26.8% among 18-36-month-old Brazilian children, and 23.2% among the inhabitants of the southeastern region of the country. Using the criteria proposed by the World Health Organization (WHO)[19], in which a tooth is considered carious only if there is a visible evidence of a cavity, this national survey included data referring only to cavitated caries lesions (CCL) and non-cavitated caries lesions were not considered. Although the inclusion of the initial stages of caries in epidemiological surveys is questionable because of the possibility of lesion reversal, its identification is socially relevant, as it gives the opportunity of early intervention [1,7,18].

This study aimed to determine the prevalence of CCL and ECC, evaluating the contribution of different variables in its occurrence in children up to 36 months of age attending public daycare centers in municipalities with different fluoride concentration in the water supply.

MATERIAL AND METHODS

The study was conducted with children up to 36 months of age in public daycare centers of two municipalities located in the southeastern region of Brazil: Clementina, in which fluoride is not added to the water supply and the natural fluoride content is lower than 0.40 mg F/L[17] (low fluoride content - LFC), and Gabriel Monteiro, in which fluoride is added to the water supply in an optimal concentration that ranges from 0.60 to 0.75 mg F/L[17] (adequate fluoride content - AFC).

In the daycare centers, the children take cow's milk from nursing bottles sweetened with sugar, and are fed sugar-containing snacks like biscuits and sweetened drinks (juices and tea) daily. Neither the caregivers were aware of the need to brush the children's teeth, nor the daycare centers offered preventive oral health programs.

After approval by the Research Ethics Committee of the São Paulo State University, the parents were invited to participate in the survey and, upon acceptance, they were interviewed about the following issues: the economic classification of the family, using the classification proposed by the Brazilian Association of Research Companies, the parents' age and educational level, nursing habits, consumption of water from the public water supply, use of dentifrice, access to dental assistance and background knowledge of oral health care. Exclusion criteria were the refusal to answer the questionnaire, absence of parental consent for clinical examination of the children or absence of teeth in the child.

Clinical examinations were carried out under natural light, by a single examiner, trained and calibrated, who assumed a knee-to-knee position and was helped by an assistant and by a note taker. Oral hygiene quality was assessed using the Greene and Vermillion index[9]. All fully erupted teeth were included in the evaluation. A plaque-disclosing solution was applied to the buccal and palatal/lingual surfaces. The dental crowns were examined two days later for the presence of caries lesions. For CCL, the same codes and criteria established by the WHO[19] were applied. Therefore, a tooth was considered carious only if there was a visible evidence of a cavity. Since there was a need to include early caries lesions in this study, the criteria proposed by the American Dental Association (ADA)[7] for ECC were used. Therefore, in pits and fissures, a distinct chalky white enamel directly adjacent to or into a pit or fissure or a light to dark brown discolored area was considered ECC, while in smooth surfaces, a distinct chalky white enamel adjacent or close to the gingival margin was considered ECC.

The data were processed and analyzed using Epi-info software program. The means and standard deviation (mean ± SD) of the examined children's ages and the means, standard deviation and 95% confidence interval (mean ± SD; 95% CI) of the dmft and dmfs were calculated. Fisher's exact test (a=0.05) was applied to access the association

between variables studied, using BiosEstat 4.0 software program.

RESULTS

From a total of 88 children, 68 (77.3%) were examined. In the LFC municipality, 38 children aged 8 to 36 months (23.70 ± 8.30) participated in the study, while in the AFC municipality, 30 children aged 8 to 36 months (23.63 ± 9.28) were examined.

The dmft and dmfs indices calculated for the study sample are presented in Table 1.

Considering all children examined in this study, 17.6% presented CCL and 33.8% presented ECC. The association between CCL and the studied variables is presented in Table 2. Fisher's exact test revealed the existence of statistically significant differences (p<0.05) regarding the economic classification, mother's educational level and duration of breastfeeding. Higher prevalence of CCL was associated with lower economic classification, lower mother's education level (8 years of study) and higher duration of breastfeeding (> 12 months of age).

Table 3 shows the prevalence of ECC. Fisher's exact test revealed statistically significant differences (p<0.05) regarding to age group, duration of the habit of drinking milk before bedtime, and age at which oral hygiene started. Higher prevalence of ECC was associated with the older age group, higher duration of the bedtime feeding habit (>12 months of age), and later start of oral hygiene (>12 months of age).

DISCUSSION

Although a reduction in the prevalence of caries in preschoolers has been observed[12], ECC is still considered a public health problem because its a predisposing factor to the occurrence of caries disease in the permanent dentition, impairs normal feeding, leading to growth alterations, causes pain and discomfort, and may bring communication and psychosocial problems, affecting the child's life quality[4,6,10].

Considering only the 18-36-month age group, 22.2% of the children presented CCL (Table 2), which is a higher

TABLE 1- Mean, standard deviation and 95% confidence interval of the dmf-t and dmf-s indices, 2006

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

AFC = with adequate fluoride content; LFC = with low fluoride content.

TABLE 2- CCL prevalence regarding the studied variables

Variables		with caries		caries free		Total		p
		n	%	N	%	n	%	
Age group	Up to 17	0	0	14	100.0	14	100.0	0.059
(months)	18 to 36	12	22.2	42	77.8	54	100.0	
Economic	High	4	9.3	39	90.7	43	100.0	0.044*
classification**	Low	8	32.0	17	68.0	25	100.0	
Father's education level	Up to 8	10	23.3	33	76.7	43	100.0	0.187
(years of study)	9 or more	2	8.0	23	92.0	25	100.0	
Mother's education level	Up to 8	10	29.4	24	70.6	34	100.0	0.013*
(years of study)	9 or more	2	5.9	32	94.1	34	100.0	
Father's age	Up to 25	3	10.0	27	90.0	30	100.0	0.204
(years)	26 or more	9	23.7	29	76.3	38	100.0	
Mother's age	Up to 25	4	11.1	32	88.9	36	100.0	0.203
(years)	26 or more	8	25.0	24	75.0	32	100.0	
Duration of breast	Up to 12	6	12.8	41	87.2	47	100.0	0.022*
feeding (months)	13 or more	6	42.9	8	57.1	14	100.0	
Duration of bedtime	Up to 12	0	0	14	100.0	14	100.0	0.059
feeding (months)	13 or more	12	22.2	42	77.8	54	100.0	
Duration of nighttime	Up to 12	3	11.1	24	88.9	27	100.0	0.197
feeding (months)	13 or more	9	26.5	25	73.5	34	100.0	
Oral hygiene	Yes	10	17.9	46	82.1	56	100.0	1.000
	No	2	16.7	10	83.3	12	100.0	
Frequency of oral	None / occasionally	5	17.9	23	82.1	28	100.0	1.000
hygiene (times a day)	At least 1	7	17.5	33	82.5	40	100.0	
Age at which oral	Up to 11	2	8.7	21	91.3	23	100.0	0.172
hygiene started (months)	12 or more	8	24.2	25	75.8	33	100.0	
Hygiene classification	Good or fair	8	20.0	32	80.0	40	100.0	0.748
	Poor	4	14.3	24	85.7	28	100.0	
Use of dentifrice	Yes	9	18.8	39	81.3	48	100.0	1.000
	No	3	15.0	17	85.0	20	100.0	
Age at which oral	Up to 11	2	28.6	5	71.4	7	100.0	0.600
hygiene started (months)	12 or more	7	17.1	34	82.9	41	100.0	
Fluoride content	AFC	3	10.0	27	90.0	30	100.0	0.204
on water	LFC	9	23.7	29	76.3	38	100.0	
Access to dental service	Yes	3	37.5	5	62.5	8	100.0	0.141
	No	9	15.0	51	85.0	60	100.0	
Instructions about oral	Yes	3	15.8	16	84.2	19	100.0	1.000
health care	No	9	18.4	40	81.6	49	100.0	

* (p<0.05); ** economic classification proposed by the Brazilian Association of Research Companies. Average monthly family income: High - U$ 213 to 1,402 - classes B and C; Low - U$ 103 to 212 - classes D and E.; AFC = with adequate fluoride content; LFC = with low fluoride content.

incidence than that reported by Brandão, et al.[1] (2006). However, the children taking part in that study had had an easy access to dental care, which demonstrates the importance of early dental care. When data were collected from children who had not had access to dental care, such as those taking part in the present study, CCL prevalence is the same or higher[2,13,16].

As reported elsewhere [4,13,15], in the present study, dental caries had an early onset in the examined children. Caries prevalence increased with age and ECC prevalence presented a statistical significance (p<0.05) with regards to age group (Table 3). This can be explained by the so called "window of infectivity", defined as that period between the ages of 16 and 32 months, in which the children is infected with *Streptococcus mutans,* although some studies indicate that infection may occur at a younger age, even before 14 months of age[14].

In the present study, the parents were only asked about

TABLE 3- ECC prevalence regarding the studied variables

Variables		with caries		caries free		Total		p
		n	%	N	%	n	%	
Age group	Up to 17	0	0	14	100.0	14	100.0	0.001*
(months)	18 to 36	23	42.6	31	57,4	54	100.0	
Economic	High	12	27.9	31	72.1	43	100.0	0.195
classification**	Low	11	44.0	14	56.0	25	100.0	
Father's education level	Up to 8	16	37.2	27	62.8	43	100.0	0.596
(years of study)	9 or more	7	28.0	18	72.2	25	100.0	
Mother's education level	Up to 8	13	38.2	21	61.8	34	100.0	0.609
(years of study)	9 or more	10	29.4	24	70.6	34	100.0	
Father's age	Up to 25	6	30.0	14	70.0	20	100.0	0.782
(years)	26 or more	17	35.4	31	64.6	48	100.0	
Mother's age	Up to 25	12	33.3	24	66.7	36	100.0	1.000
(years)	26 or more	11	34.4	21	65.6	32	100.0	
Duration of breast	Up to 12	17	36.2	30	63.8	47	100.0	0.756
feeding (months)	13 or more	6	42.9	8	57.1	14	100.0	
Duration of bedtime	Up to 12	0	0	14	100.0	14	100.0	0.001*
feeding (months)	13 or more	23	42.6	31	57.4	54	100.0	
Duration of nighttime	Up to 12	7	25.9	20	74.1	27	100.0	0.579
feeding (months)	13 or more	12	35.3	22	64.7	34	100.0	
Oral hygiene	Yes	19	33.9	37	66.1	56	100.0	1.000
	No	4	33.3	8	66.7	12	100.0	
Frequency of oral	None / occasionally	9	32.1	19	67.9	28	100.0	1.000
hygiene (times a day)	At least 1	14	35.0	26	65.0	40	100.0	
Age at which oral	Up to 11	4	17.4	19	82.6	23	100.0	0.044*
hygiene started (months)	12 or more	15	45.5	18	54.5	33	100.0	
Hygiene classification	Good or fair	15	37.5	25	62.5	40	100.0	0.603
	Poor	8	28.6	20	71.4	28	100.0	
Use of dentifrice	Yes	18	37.5	30	62.5	48	100.0	0.405
	No	5	25.0	15	75.0	20	100.0	
Age at which oral	Up to 11	2	28.6	5	71.4	7	100.0	0.696
hygiene started (months)	12 or more	16	39.0	25	61.0	41	100.0	
Fluoride content	AFC	8	26.7	22	73.3	30	100.0	0.310
on water	LFC	15	39.5	23	60.5	38	100.0	
Access to dental service	Yes	4	50.0	4	50.0	8	100.0	0.428
	No	19	31.7	41	68.3	60	100.0	
Instructions about oral	Yes	6	31.6	13	68.4	19	100.0	0.966
health care	No	17	34.7	32	65.3	49	100.0	

* (p<0.05); ** economic classification proposed by the Brazilian Association of Research Companies. Average monthly family income: High - U$ 213 to 1,402 - classes B and C; Low - U$ 103 to 212 - classes D and E.; AFC = with adequate fluoride content; LFC = with low fluoride content.

nursing habits, but it is important to mention that the children consumed sugar-containing snacks daily in the daycare centers.

The relationship between caries and milk feeding is controversial in the literature. In the present study, the children who were breastfed beyond 12 months of age presented higher prevalence of CCL (p<0.05), confirming the findings of Dini, et al.[6] (2000). In children that presented ECC, prolongation of the habit of milk feeding at bedtime

beyond the age of 12 months was considered statistically significant (p<0.05), corroborating the findings of Milgrom, et al.[13] (2000). Nighttime milk feeding, mainly bottle-feeding, seems to be associated with the beginning of colonization of the baby's mouth[10], presence of a large number of cariogenic microorganisms[13,14], increase in sucrose consumption, mainly by baby bottle, and reduction in oral hygiene practices[8].

Children who started oral hygiene earlier presented a

lower prevalence of ECC (p<0.05), which corroborates the findings of previous studies[4,5]. Relationship between the quality of oral hygiene and caries prevalence was not observed in the present study. Fraiz and Walter[8] (2001) and Santos and Soviero[18] (2002) observed a relationship between the presence of caries lesions and the amount of biofilm visible without the use of disclosing agents in children younger than 36 months old. These results can be explained by the methodological differences and by the fact that, although the population examined in this study presented great amount of bacterial biofilm, it may not contain cariogenic bacteria.

Among the socioeconomic variables, when only CCL were considered, the economic classification of the children examined and the mother's educational level were significantly different (p<0.05). A higher prevalence of CCL was associated with a lower economic classification and a lower mother's educational level, confirming the findings of Dini, et al.[6] (2000). Economically deprived individuals living under less privileged social and environmental conditions, usually have a poorer health behavior and are therefore are more susceptible to diseases, including oral diseases.[3]

According to the parents, in the AFC municipality, only 54.5% of the children consumed water from the public supply. This is probably the reason why water fluoridation, which has a recognized action to reduce dental caries[5], did not showed a statistical significance in the present study.

The use of fluoridated dentifrice did not determine a lower caries prevalence, which might be explained by the time that the children stay in the daycare center, without brushing their teeth. Furthermore, most parents affirmed that they had never been instructed with regards to their children's oral health. Access to dental care did not present a relationship with caries prevalence, corroborating the findings of Cariño, et al.[4] (2003). Many of the children examined in the present study had never been to the dentist. After completion of data collection, parents and daycare center employees attended lectures about oral health care and dietary habits.

CONCLUSIONS

Considering the children's age (≤36 months old), a high prevalence of dental caries (CCL and ECC) was observed in the present study. Higher prevalence of CCL was associated with lower socioeconomic status, lower mother's educational level and higher duration of breastfeeding. Higher prevalence of ECC was associated with older age group, higher duration of bedtime feeding habit, and later start of oral hygiene. Although the water fluoride content did not show statistical significance with respect to the presence of caries lesions, the children presented a lower caries prevalence in the municipality with adequate fluoride content. Caries prevention strategies on this population should include instructions parents and daycare center employees about oral hygiene, dietary habits, in addition to access to dental care services.

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