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Is severe early childhood caries predictive of caries and fluorosis in permanent teeth? Ten-year follow-up

A cárie severa da infância é um fator preditivo para cárie e fluorose na dentição permanente? Acompanhamento por 10 anos

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Resumo

Introdução: Cárie severa da infância (S-ECC) é definida como a presença de qualquer sinal de cárie em crianças menores de três anos. **Objetivo:** Este estudo observacional longitudinal retrospectivo objetivou avaliar cárie e fluorose em crianças com S-ECC de uma cidade com água fluoretada. **Material e método:** Foram incluídas crianças com idade inferior a três anos acompanhadas em um programa de atendimento odontológico materno e infantil entre os anos de 1997 e 2003. As crianças foram divididas em 2 grupos: grupo 1 (S-ECC) e grupo 2 (sem cárie). Os responsáveis foram contatados por telefone ou correio. Os exames clínicos dentários foram realizados no consultório odontológico para avaliar a experiência de cárie e fluorose dentária. Regressão linear múltipla foi utilizada para determinar os fatores associados ao CPOD, e análise multivariada por regressão logística múltipla foi utilizada para determinar os possíveis fatores independentes associados com a ocorrência de fluorose. **Resultado:** A amostra foi composta por 126 pacientes com idade entre 8 e 12 anos, dos quais 52,4% eram do sexo masculino. A presença de S-CEC aumentou o CPOD em média de 0,84 (p = 0,02). Tanto a frequência de limpeza, uso de dentifrício padrão foram fatores de proteção para desenvolvimento de cárie na dentição permanente (p <0,05). As crianças cujos pais relataram que se recusaram a escovar os dentes tinham 70% menos chance de desenvolver fluorose (p = 0,02). **Conclusão:** A presença de S-ECC não foi fator de risco para o desenvolvimento de fluorose, mas foi para cárie na dentição permanente.

Descritores: Cárie dentária; fluorose dentária; criança.

Abstract

Introduction: Severe early childhood caries is defined as the presence of any sign of decay in children younger than three years. **Objective:** This retrospective longitudinal observational study investigated caries and fluorosis in children with S-ECC from a city with fluoridated water. **Material and method:** We included children under the age of three years who followed a maternal and child dental care program between the years of 1997 and 2003. The children were divided into 2 groups: group 1 (S-ECC) and group 2 (no caries). Guardians were contacted by telephone or mail. Caregivers completed questionnaire on socio-demographic and behavioral variables. The clinical dental examinations were performed in a dental clinic to assess caries experience and dental fluorosis. Multiple linear regression was used to determine factors associated with DMFT, and multivariate analysis by multiple logistic regression was used to determine the possible independent factors associated with the occurrence of fluorosis. **Result:** The sample consisted of 126 patients aged 8-12 years, of whom 52.4% were male. The presence of S-ECC increased the DMFT by an average of 0.84 (p = 0.02). Both the frequency of tooth brushing and the use of standard toothpaste were protective factors from the development of caries in the permanent dentition (p <0.05). Parents who reported that their children refused to brush their teeth had 70% less chance of developing fluorosis (p = 0.02). **Conclusion:** The presence of S-ECC was a risk factor for the development of caries in the permanent dentition, but not for the development of fluorosis.

Descriptors: Dental caries; dental fluorosis; child.

INTRODUCTION

Severe early childhood caries (S-ECC) is defined as the presence of any sign of decay in children younger than three years[1]. S-ECC is associated with irregular eating habits, high sugar consumption, late initiation of tooth brushing, low socioeconomic status, low maternal education and structural defects in enamel[2,3].

Despite the fact that the world's population has achieved better oral health indices in recent decades[4,5], dental caries remains the most common chronic disease in childhood[2]. Greater control of the disease has been observed in the young permanent dentition, mainly due to the widespread use of fluoride[6]. However, the use of fluoride should be controlled because while it reduces caries risk it increases fluorosis risk[4].

Children who ingest high doses of fluoride ions while their teeth are in the formation phase are at risk of developing dental fluorosis. This fluoride intake can occur by the direct consumption of fluoridated water[7], foods prepared with such water[8] and by the accidental or inadvertent toothpaste ingestion[9] in children under six years of age.

Severe Early Childhood Caries develops at an early age, due to the lack of tooth brushing in the same period in which calcification of the permanent incisor crowns occurs, suggests that these children have lower risk of fluorosis. The aim of this study was to investigate caries and fluorosis in children with S-ECC from a city with fluoridated water. The hypothesis of this study is that patients with severe childhood caries present lower rates of fluorosis in permanent incisors when compared to children who were caries-free in childhood.

MATERIAL AND METHOD

Population and Study Design

This retrospective longitudinal observational study included children aged eight to twelve years, which were divided into two groups according the presence of severe early childhood caries (S-ECC) (Group 1) and no caries (Group 2), under the age of three years, born between 1997 and 2003, who had attended a dental prevention program for pregnant women and babies[10]. Children, whose dental records were incomplete, were not included. About 10 years after diagnosis of severe early childhood caries, the children were re-examined. The children live in Teresina, Piauí, Brazil, a city with access to fluoridated water, adjusted in accordance with Brazilian regulations.

Data collection was conducted from August to December 2012, and was divided into four steps: (1) obtaining information from patient records; (2) invitation to participate in the study; (3) distribution of the questionnaire, which was specially formulated for this study, to the parents or legal guardians of the children; and (4) a clinical dental examination.

Some information was obtained from the patient's medical records, such as date of birth, date of first visit, number of decayed primary teeth, frequency of tooth brushing and dietary habits. Secondary information not contained in the medical records was obtained by questionnaire, for example, the type of toothpaste if the child had ingested toothpaste.

Initially, parents or guardians were contacted by telephone. If they did not reply, an invitation letter was sent to the address contained in the patient's records, requesting that the parent/guardian contact the researchers to schedule an appointment at the UFPI Children's Clinic.

Questionnaire for the parents or legal guardians

The socio-economic and demographic data questionnaire contained multiple-choice style and open-ended questions such as family income (income per capita based on the Brazilian minimum wage - approximately $220), education level of parents, use of a fluoridated public water supply, and behavioral and dietary variables.

Educational and preventive procedures adopted by individuals or families were analyzed by the age of initiation of oral hygiene, the number of daily brushings and the use of fluoridated toothpaste. The risk of developing fluorosis was assessed with questions about the habit of ingesting fluoride toothpaste, the child's acceptance of dental hygiene over the first three years of life and / or the use of fluoridated toothpaste for children.

Clinical dental examination

Clinical examinations were performed by a previously trained and calibrated examiner, and aided by a person to record data. Before the start of the examinations, guidance on the health / disease process and methods of prevention of oral diseases were provided to children and caregivers.

The subjects were examined in conventional dental chairs under a dental operatory light. After prophylaxis with prophylactic paste and a Robinson brush, dental examination with dental mirror and WHO probe was performed with the teeth dried with compressed air[11].

The examination for the fluorosis diagnosis was carried out using the Tylstrup-Fejerskov (TF) protocol (Fejerskov, 1988). The buccal surfaces of the upper and lower incisors were examined using cotton roll isolation. The teeth were dried with compressed air for one minute. The TF index classifies the appearance of enamel fluorosis to a degree that varies from 0 (no fluorosis) to 9 (maximum fluorosis). In accordance with the severity of fluorosis, the tooth appearance ranges from small diffuse opacities in mild cases, to whiter opaque lines corresponding to the perikymata running across the tooth surface in moderate cases, to chalky white enamel in severe cases, with enamel breakdown in the most severe cases[12]. Each obtained tooth value was recorded in the patient's clinical record. The caries experience was evaluated previously by the DMFT index (decayed, missing due to caries and filled) following World Health Organization protocol[11].

Calibration and pilot study

After several hours of theoretical and practical training with slide projections, the intra-examiner calibration was performed in a group of 20 patients, who were examined twice within an interval of one week. Kappa indexes of 0.84 to 0.73 for caries and fluorosis, respectively, were obtained.

A pilot study was conducted with 20 children aged 8-12 years, who were not part of this study, to evaluate the questionnaire and study methods.

Statistical Analysis

The data was processed using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, USA) version 18.0 for Windows. Descriptive analysis was performed using means and standard deviations for quantitative variables, and proportions for qualitative variables. Kolmogorov-Smirnov test was performed to verify normal distribution, determining the types of statistical tests to be used. Nonparametric tests were used because the variables did not follow normal standards.

The Kruskal-Wallis test was used to evaluate the presence of S-ECC and levels of fluorosis, and the Mann-Whitney test was used to analyze the association between S-ECC and DMFT.

To verify the existence of associations between qualitative variables and the presence of fluorosis, the chi-square test was used to provide potential predictors for the composition of the multivariate model among those with $p \leq 0.20$.

Multiple linear regression was used to determine factors associated with DMFT, and multivariate analysis by multiple logistic regression was used to determine the possible independent factors associated with the occurrence of fluorosis and was adjusted for potential confounding variables. The goodness of fit of the model was tested with the Hosmer-Lemeshow test, and its significance was verified using the Wald test.

The significance level was 5%. The data adhered to a normal curve with the expected sequence and the presence of some outliers, indicating homoscedasticity. The conclusion, therefore, was that the models did not exhibit biases. The value of $r^2 = 0.447$; that is, 40% of the factors associated with the development of caries were identified by the study.

Ethics approval and consent to participate

This study followed the Helsinki Declaration guidelines (2008) that regulate research involving human subjects and was approved by the Universidade Federal do Piauí - UFPI Ethics Committee (protocol 204060). All parents or guardians signed a consent form prior to beginning the research.

RESULT

The initial population consisted of 395 patients, and 126 were enrolled, yielding a 31.8% response rate. Of the 314 letters sent, 240 recipients (71.4%) did not contact the researchers. Of the 81 telephone contacts made, 52 parents (64.2%) agreed to participate and presented for examination. The power of the sample was 90.73% for caries and 70.7% for fluorosis.

Socioeconomic, demographic and behavioral characteristics of the sample are described in Table 1. There were differences between the groups with respect to gender, duration of breastfeeding, acceptance of oral hygiene and the presence of caries in the permanent teeth. Eighty-one (64.3%) patients had S-ECC and 56 (44.4%) had caries in the permanent dentition, while 105 (83.3%) had fluorosis in the incisors (Table 1).

In this study, caries in the primary dentition was a risk factor for caries in the permanent dentition ($p = 0.024$). Over half of the subjects without dental caries in childhood remained free of caries

Table 1. Sample distribution according to the presence of S-ECC

Variables	S-ECC		No caries		p-value[a]
	n	%	n	%	
Gender					0.043*
Male	44	73,3	16	26,7	
Female	37	56.1	29	43.9	
Age (years)					0.298
8-10	41	64.1	23	35.9	
11-13	23	57.5	17	42.5	
14-15	17	77.3	5	22.7	
Mother's education	**Average = 2.3**		**SD = 2.68**		0.236
≤ 8 years	22	73.3	8	26.7	
> 8 years	59	61.5	37	38.5	
Per capita income	**Average=1.75**		**SD = 1.06**		0.400
≤ 0.25 MW	33	71.7	13	28.3	
0.25-0.5 MW	24	61.5	15	28.3	
≥0.5 MW	24	58.5	17	41.5	

[a]Qui-square test; *p-value <0.05; SD – Standard Deviation; S-ECC Severe Early Childhood Caries.

Table 1. Continued...

Variables	S-ECC		No caries		p-value[a]
	n	%	n	%	
Resides in fluoridated area					0.288
No	2	100	0	0	
Yes	79	63.7	45	36.5	
Breastfeeding duration (months)	**Average = 21.6**		**SD = 17.1**		0.01*
≤ 6	13	43.3	17	56.7	
7-12	9	56.2	7	43.8	
> 12	59	73.8	21	26.2	
Bottle use – Total time (months)					0.456
≤ 6	45	68.2	21	31.8	
7-12	6	50	6	50	
> 12	30	62.5	18	37.5	
Nighttime bottle use (months)					0.778
≤ 6	51	65.4	27	34.6	
7-12	6	54.5	5	45.5	
> 12	24	64.9	13	35.1	
Daily sugar intake					0.336
Low(1-3)	30	69.8	13	30.2	
Medium (4-5)	49	60.5	32	39.5	
High (≥6)	2	100	0	0	
Beginning oral hygiene					0.146
before tooth eruption	71	67	35	33	
after tooth eruption	10	50	10	50	
Brushing frequency					0.202
Once	12	70.6	5	29.4	
Twice	35	70	15	30	
3 times or more	31	55.4	25	44.6	
Irregular	3	100	0	0	
Who brushes child's teeth					0.552
Child	2	66.7	1	33.3	
Child + Adult	8	80	2	20	
Adult	71	62.8	42	37.2	
Accepted oral hygiene					0.014*
No	54	58.1	39	41.9	
Yes	27	81.8	6	18.2	
Toothpaste					0.827
Child	57	63.3	33	36.7	
Standard	23	67.6	11	32.4	
Child + Standard	1	50	1	50	

[a]Qui-square test; *p-value <0.05; SD – Standard Deviation; S-ECC Severe Early Childhood Caries.

Table 1. Continued...

Variables	S-ECC		No caries		p-value[a]
	n	%	n	%	
Beginning of the use of toothpaste (months)					0.184
≤ 6	21	55.3	17	44.7	
7-12	47	65.3	25	34.7	
> 12	13	81.2	3	18.8	
Ingesting toothpaste					0.425
Always	17	65.4	9	34.6	
Sometimes	36	59	25		
No	28	71.8	11	28.2	
Oral care without supervision (years)					0.855
< 6	60	63.8	34	36.2	
≥ 6	21	65.6	11	34.4	
Dental Fluorosis in Permanent Dentition					0.081
No	17	81	4	19	
Yes	64	61	41	39	
Dental Caries in Permanent Dentition					0.025*
No	39	55.7	31	44.3	
Yes	42	75	14	25	

[a]Qui-square test; *p-value <0.05; SD – Standard Deviation; S-ECC Severe Early Childhood Caries.

in the permanent dentition (69%). However, 48% of subjects who had S-ECC had a DMFT of zero. The mean DMFT of patients who presented S-ECC (1.3), group 1, was significantly higher than the average DMFT of caries-free patients in the primary dentition (0.8), group 2 (p = 0.035 - Table 2).

In this study, a high daily sugar intake (> 6 times a day) increased the DMFT value to 3.10 compared to patients who had a low sugar intake (1 to 3 times a day). Individuals with caries in the primary dentition exhibited an increased DMFT value in the permanent dentition of 0.84 compared to caries-free children (p= 0.022 – Table 3).

Statistically significant associations were shown between frequency of oral hygiene, type of toothpaste and caries in the permanent dentition. Children whose parents or guardians reported brushing their teeth twice a day exhibited a reduced DMFT of 0.78, and the reduction was even greater (0.93) in children whose teeth were brushed three times a day compared to children who brushed once a day. Children who used standard toothpaste had an average DMFT value of 0.73, which was lower than that of children who used a children's toothpaste (toothpaste flavoring) (Table 3).

There was no difference in the distribution of fluorosis among the incisors. Cases of mild and very mild fluorosis (TF = 1 or 2) accounted for 62.6%. The lower incisors had the highest percentage of TF = 1. And no association was observed between the degree of fluorosis and the presence of S-ECC.

The non-acceptance of dental hygiene on the part of the child during the first three years of life decreased the chance of developing fluorosis by 70%. In other words, children who did not cooperate with oral hygiene probably had their teeth brushed fewer times by their parents, which reduced the risk of developing fluorosis.

DISCUSSION

The results of this study confirm previous reports that the presence of caries in the primary dentition is a predictor for caries in the permanent dentition[13], despite the reduction in caries prevalence in the transition between dentitions[14]. National data show a decline in the severity of caries in the permanent dentition that is greater than that observed for the primary dentition[14]. However, the mean DMFT of patients who presented S-ECC was significantly higher than the average DMFT of patients free of caries in the primary dentition. This confirms the importance of having good habits during childhood, in order to avoid unwanted consequences in the permanent dentition.

Free sugars play a key role in the development of caries and this was demonstrated in this study[15]. A high intake of sugar at an early age was associated with the development of caries in the permanent dentition. Children with a high daily sugar intake had an increase in the mean DMFT value compared to others with low intake.

Toothbrushing has a dual role in caries control because it disrupts the biofilm, whose accumulation is necessary for the development

Table 2. Multiple linear regression to identify factors associated with dental caries in the permanent dentition

	β (IC95%)	*p*
Constant	1.53	0.404
Gender		
Male	ref.	0.073
Female	0.52 (-0.05;1.09)	
Mother's education		
≤ 8 years	ref.	0.117
> 8 years	0.56 (-0.14;1.27)	
Per capita income		
≤ 0.25 MW	ref.	
0.25-0.5 MW	-0.03 (-0.72;0.66)	0.932
≥0.5 MW	-0.43 (-1.07;0.21)	0.189
Resides in fluoridated area		
No	ref.	
Yes	-0.79 (-3.04;1.47)	0.491
Breastfeeding duration (months)		
≤ 6	ref.	
6-12	-0.21 (-1.23;0.81)	0.686
> 12	0.15 (-0.65;0.95)	0.771
Nighttime bottle use (months)		
≤ 6	ref.	
6-12	1.08 (-1.23;3.38)	0.357
> 12	0.07 (-0.57;0.71)	0.838
Daily sugar intake		
Low(1-3)	ref.	
Medium (4-5)	0.36 (-0.23;0.96)	0.229
High (≥6)	3.10 (1.28;4.91)	**0.001**
S-ECC		
No	ref.	**0.022**
Yes	0.84 (0.13;1.55)	
Beginning oral hygiene		
before eruption	ref.	0.487
after eruption	0.28 (-0.51;1.07)	
Brushing frequency		
Once	ref.	
Twice	-0.78 (-1.47;-0.10)	**0.025**
3 times or more	-0.93 (-1.57;-0.029)	**0.005**
Who brushed		
Child	ref.	
Child + Adult	-0.28 (-2.38;1.81)	0.789
Adult	-0.06 (-1.87;1.75)	0.947

r^2=0.447 S-ECC Severe Early Childhood Caries.

Table 2. Continued...

	β (IC95%)	*p*
Accepted oral hygiene		
No	ref.	0.710
Yes	-0.13 (-0.80;0.54)	
Toothpaste		
Child toothpaste	ref.	**0.039**
Standard F toothpaste	-0.73 (-1.42;-0.04)	
Beginning of the use of toothpaste (months)		
≤ 6	ref.	
6-12	0.02 (-0.63;0.67)	0.944
> 12	0.24 (-0.79;1.26)	0.648
Ingesting toothpaste		
No	ref.	
Sometimes	-0.47 (-1.32;0.39)	0.280
Always	0.04 (-0.68;0.64)	0.947
Oral care without supervision (years)		
< 6	ref.	0.947
≥ 6	-0.02 (-0.68;0.64)	
Dental Fluorosis		
No	ref.	0.639
Yes	0.19 (-0.60;0.97)	

r^2=0.447 S-ECC Severe Early Childhood Caries.

Table 3. Multivariate analysis developed by multiple logistic regression to indicate the possible independent factors associated with the occurrence of fluorosis

	N (%)	OR_{crude} (IC95%)	*p**	OR_{adjust} (IC95%)	*p*#
Gender					
Male	49 (46.7)	ref.	0.632		
Female	56 (53.3)	1.26 (0.49-3.21)			
Mother's education					
≤ 8 years	25 (23.8)	ref.	0.636		
> 8 years	80 (76.2)	0.75 (0.23-2.45)			
Per capita income					
≤ 0.25 MW	38 (36.2)	ref.	0.208		
0.25-0.5 MW	35 (33.3)	3.00 (0.83-10.1)			
≥0.5 MW	32 (30.5)	0.58 (0.22-1.52)			
Resides in fluoridated area					
No	01 (1.0)	ref.	0.202		
Yes	104 (99.0)	5.2 (0.31-86.6)			
Breastfeeding duration (months)					
≤ 6	27(25.7)	ref.	0.533		
6-12	13 (12.4)	0.85 (0.22-3.28)			
> 12	65 (61.9)	0.65 (0.23-1.81)			

Crude OR: unadjusted variables - bivariate analysis adjusted OR: adjusted variables, 95% CI: confidence interval of 95%; *Chi-square test (χ 2); #Wald test for trend; Hosmer-Lemeshow (final model) p = 0.238; S-ECC Severe Early Childhood Caries.

Table 3. Continued...

	N (%)	OR_{crude} (IC95%)	$p^{\star}$	OR_{adjust} (IC95%)	$p^{\#}$
Nighttime bottle use (months)					
≤ 6	62 (59.0)	ref.	0.310		
6-12	02 (1.9)	-			
> 12	41 (39.0)	2.05 (0.70-6.02)			
S-ECC					
Yes	41 (39.0)	ref.	0.081	ref.	0.353
No	64 (61.0)	0.37 (0.11-1.17)		0.55 (0.16-1.94)	
DMFT					
DMFT = 0	61 (58.1)	ref.	0.200	ref.	0.329
DMFT ≠ 0	44 (41.9)	0.54 (0.21-1.40)		0.60 (0.21-1.69)	
Beginning oral hygiene					
before eruption	88 (83.8)	ref.	0.827		
after eruption	17 (16.2)	1.16 (0.31-4.37)			
Brushing frequency					
Once	14 (13.3)	ref.	0.923		
Twice	41 (39.0)	0.85 (0.33-2.21)			
3 times or more	50 (47.6)	1.21 (0.47-3.12)			
Who brushes child's teeth					
Child	01 (1.0)	ref.	0.058	ref.	
Child + Adult	08 (7.6)	0.78 (0.15-3.98)		4.61 (0.18-18.2)	0.356
Adult	96 (91.4)	2.51 (0.69-9.01)		10.1 (0.61-16.9)	0.106
Accepted oral hygiene					
Yes	22 (21.0)	ref.	**0.003**	ref.	**0.020**
No	83 (79.0)	0.24 (0.09-0.64)		0.30 (0.09-0.82)	
Toothpaste					
Child toothpaste	74 (70.5)	ref.	0.597		
Standard F toothpaste	31 (29.5)	0.60 (0.45-3.98)			
Beginning of the use of toothpaste (months)					
≤ 6	34 (32.4)	ref.	0.344		
6-12	57 (54.3)	0.48 (0.17-1.32)			
> 12	14 (13.3)	1.46 (0.31-6.97)			
Ingesting toothpaste					
No	34 (32.4)	ref.	0.733		
Some times	50 (47.6)	0.80 (0.26-2.43)			
Always	21 (20.0)	0.82 (0.32-2.11)			
Oral care without supervision (years)					
≥ 6	04 (3.8)	ref.	0.838		
< 6	101 (96.2)	1.26 (0.13-11.9)			

Crude OR: unadjusted variables - bivariate analysis adjusted OR: adjusted variables, 95% CI: confidence interval of 95%; *Chi-square test (χ 2); #Wald test for trend; Hosmer-Lemeshow (final model) p = 0.238; S-ECC Severe Early Childhood Caries.

of the disease, and exposes the teeth to beneficial fluoride present in toothpastes[6]. The frequency of brushing is a protective factor for the development of dental caries. Several studies have associated a low frequency of brushing with the development of caries in the permanent dentition[13,16]. In this study, a frequency of two or more brushings per day functioned as a protective factor against the development of caries in the permanent dentition. A longitudinal study that assessed children from 7-10 years of age noted that a frequency of less than one daily brushing was related to caries in permanent first molars[13].

The type of toothpaste used was also associated with the development of caries in the permanent dentition. Children under three years who used adult toothpaste regularly had significantly lower DMFT scores. That is, they must use toothpaste with optimum fluoride concentration. With the increased prevalence of fluorosis, the use of toothpastes without fluoride or with reduced concentrations (500 ppm F) has become widespread. However, studies have confirmed the recommendation of toothpastes with standard fluoride concentrations (1000-1500 ppmF) for both the primary dentition and for the permanent dentition[17].

Toothpastes were not the only source of fluoride among the study population since it is located in an area with fluoridated drinking water (0.6 to 0.8 ppmF). Any use of systemic fluoride for a long period may cause fluorosis[18]. In addition, these children are exposed to a tropical climate, where the minimum temperature is rarely below 20 °C and the mean maximum is often above 32.5 °C, which favors a higher water intake by the population[19]. The fact that parents of children with S-ECC did not brush their children's teeth could explain the lower risk of fluorosis in the permanent dentition of these children, however, since they were exposed to a fluoridated water supply, there was no significant difference between the groups.

Several risk factors for the development of fluorosis have been studied. The most common were the comparison between the use of children's and standard toothpaste[20] and water consumption in areas with or without fluoridation[7,21]. In the present study, the non-acceptance of oral hygiene by the children decreased the chance of developing fluorosis by 70%. The American and Brazilian Associations of Pediatrics and Pediatric Dentistry recommend toothbrushing with fluoride toothpaste, beginning with the eruption of the first tooth. This promotes control of early childhood caries and does not produce an increase in the severity of fluorosis since the toothpaste is used in small quantities[16].

Despite the high prevalence of fluorosis, low severity was observed. Only a fifth of the sample had TF ≥ 3. This value is smaller than that found in a previous study of the same population, which reported a percentage of 12.1% of TF degrees higher than 3[22]. TF grades 1 and 2 were not associated with aesthetic problems[8], whereas TF degrees of 4 or higher influenced the quality of life[23]. This indicates that the use of fluoride in the population studied has had a beneficial effect on caries (reduction of prevalence in the transition of the dentition), and does not cause severe levels of fluorosis, which was observed in only mild degrees.

The results of this study showed no association between the experience of fluorosis and the presence of caries in the permanent dentition, as in the study of Hoffmann et al.[24]. However, the average DMFT in patients with fluorosis with TF ≥ 3 was 1.35 higher than the average TF in patients with lower grades, in accordance with a study by García-Pérez et al.[7] Perhaps the presence of fluoridated water in a city with a tropical climate caused a higher prevalence of fluorosis in the population, due to greater water intake, and consequently, greater fluoride intake.

All possible efforts were made to locate the children selected for this study based on the inclusion criteria. However, the loss of contact was the main limitation of the longitudinal study. This loss can be explained by changes of address and telephone number.

CONCLUSION

The presence of S-ECC was a risk factor for the development of caries in the permanent dentition, but not for the development of fluorosis.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interest.

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