Full Length Research Article

EARLY CHILDHOOD CARIES AS A POSSIBLE PREDICTOR FOR CARIES IN FIRST PERMANENT MOLARS

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ARTICLE INFO	ABSTRACT

AIM: The purpose of the present study was to investigate whether early childhood caries can be a predictor for caries development in the permanent first molars.
METHODS: One hundred and eighty five children were examined and divided into two groups: those with Early Childhood Caries or ECC (G1) and those that were caries free up to 71 months old (G2). Data about age, gender, race/ethnicity, history of breastfeeding, treatment and follow up were obtained in a personal interview with the patient's parents or guardians. The Chi-square and Fisher's tests were conducted to evaluate the relationship between ECC and caries status of the permanent first molars (P< 0.05).
RESULTS: There was no association between ECC and caries development in the first permanent molars (Fisher's exact test p>0.05). Also relationships between race/ethnicity, history of breastfeeding, treatment and follow up with ECC also did not show any statistical significance between the two groups (x 2; p > 0.05).
CONCLUSION: Results suggested that ECC cannot be used as a single predictor for future caries development in first permanent molars.

INTRODUCTION

The America Academy of Pediatric Dentistry (2005) defines early childhood caries (ECC) as: the presence of $\geq$ 1decayed, missing (because of caries), or filled tooth surface (dmfs) in any primary tooth in a child $\leq$71 months old. Despite advances in children's oral health in recent years, early childhood caries (ECC) is still a significant health problem because of its high prevalence, and its impact on young children's quality of life (Tinanoff and Reisine, 2009). Prevalence of ECC varies widely with several factors such as demographic, socio-economic status, race/ethnicity and dietary practices (Virdi *et al*., 2010). The 2010 national survey data showed that (on average) 5-year-old Brazilian children have more than two caries lesions per child and that among these children 80% of decayed tooth surfaces were untreated (Roncalli, 2011). Treatment of ECC is expensive, often requiring extensive restorative treatment and extraction of teeth at an early age (Tinanoff and Reisine, 2009). Strategies for managing caries in young children emphasize increasingly the concept of risk assessment (Topaloglu-AK and Eden, 2010). Studies on caries risk assessment in permanent dentition have shown that past caries experience can be a predictor of future caries levels (McDonald and Sheiham,1992; van Palenstein Helderman *et al*., 2001; Sheiham and Sabbah, 2010). However, the relationship between caries in the two dentitions has not been properly elucidated and remains unexplained. The purpose of this study was to investigate whether data of early childhood caries in a group of Brazilian children can serve as a predictor of future caries lesions development in their permanent first molars.

MATERIALS AND METHODS

Study design and subjects

Prior to beginning this cross-sectional study, ethical approval was obtained from the local Ethics and Research Committee

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and written informed consent was obtained from parents/guardians of the children. At baseline, 2,459 dental records of children who had been examined at the Department of Pediatric Dentistry of the Federal University of Rio de Janeiro, Brazil between January 1995 and January 2008 were analyzed. One hundred and eighty five healthy patients were included in the present study and divided into: Group 1 (G1): 95 patients who had ECC and Group 2 (G2): 90 patients who were caries-free patients until 71 months old. The flow diagram of the subject selection process is presented in Figure 1.
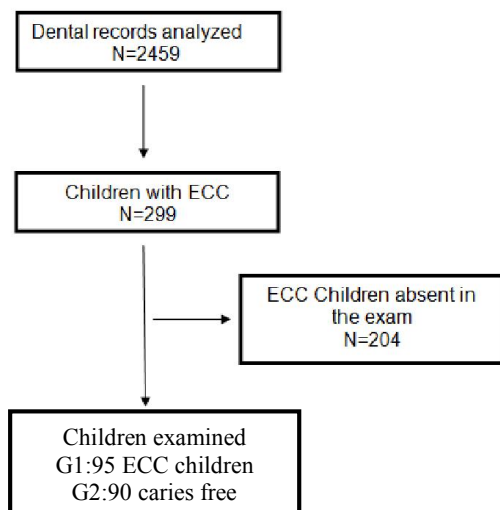

Fig. 1. Flow chart of the study population selection process

Variables investigated

Potential associations with ECC were analyzed including age, gender, race/ethnicity, history of breastfeeding, treatment and follow up visits. This information was obtained from the parents/guardians of the children during an in-person interview prior to the dental exam.

Caries examination

A dental visual/tactile examination was performed by a trained and calibrated pediatric dentist (Kappa intra and interexaminer were 0.96 and 0.98 respectively). The children's caries status, decayed, missing due to caries and filled teeth in primary (dmft) and permanent dentition (DMFT) was measured according to the criteria defined by the World Health Organization (WHO, 1997).

Statistical analysis

The degree of correlation between the ECC and the caries status of the permanent first molars was evaluated with the chi-square test and Fisher's exact test. The analyses were performed with the SPSS software version 11.0. Statistical significance was defined as $P \leq 0.05$.

RESULTS

Of the 2.459 dental records analyzed, 299 were from children who had early childhood caries. Since 204 ECC children were absent on the examination day, 95 ECC children and 90 children who were caries-free up to 71 months old (G2) were

included in this study. The ECC group (G1) consisted of 49.5% males and 50.5% females with a mean age of 8.56 ± 2.35. The control group (G2) consisted of 48.9% males and 51.1% females with a mean age of 9.47 ± 1.65. The relations between race/ethnicity, history of breastfeeding, treatment and follow up with ECC did not show any statistical significance when these two groups were compared (x^2; $p > 0.05$). No association existed between ECC and caries development in the first permanent molars (Fisher's exact test $p > 0.05$). The distribution of the study variables and dmft and DMFT indices for ECC (G1) and Control Group (G2) are presented in Table 1.

Table 1. Distribution of study variables for ECC (G1) and Caries-free Group (G2)

Variable	ECC (G1)		Caries-free (G2)	
	Sample size (n)	Prevalence (%)	Sample size (n)	Prevalence (%)
Gender				
Male	47	49.5	44	48.9
Female	48	50.5	46	51.1
Race/Ethnicity				
Caucasian	59	62.1	58	64.4
African American	36	37.9	32	35.6
Breastfeeding				
Exclusive up to 6 months	31	32.6	15	16.7
Artificial	64	67.4	75	83.3
Treated				
Yes	91	95.8	63	70
No	4	4.2	27	30
Followed up				
Yes	68	71.6	54	60
No	27	28.4	36	40
Permanent first molar caries				
Yes	30	31.6	33	36.7
No	65	68.4	57	63.3
dmft*				
≥ 6	30	31.6	11	12.2
< 6	65	68.4	79	87.8
DMFT**				
≥ 6	1	1.1	6	6.7
< 6	94	98.9	84	93.3

* dmft = decayed, missing due to caries, and filled primary teeth; ** DMFT = decayed, missing due to caries, and filled permanent teeth.

DISCUSSION

In the present study, no association was found between early childhood caries experience and caries development in the permanent first molars of a group of Brazilian children. The same findings have been reported in other pediatric populations (Poulsen and Holm, 1980; Ter Pelkwijk *et al.*, 1990; Helfenstein *et al.*, 1991; Raadal and Espelid, 1992; Topaloglu-AK and Eden, 2010). In the current study, the pediatric sample presented low early childhood caries prevalence (12.1%). Previous studies with Brazilian children have reported an ECC prevalence index of 36% (Azevedo *et al.*, 2005) and 53.9% (Feldens *et al.*, 2010). This difference is also in part because the sample population in this study was from children attending in a department of pediatric dentistry. Results of a cohort study (Li and Wang, 2002) with Chinese children demonstrated a significant correlation between caries experience in the primary and permanent teeth. The same study also showed that a combination of caries present on primary molars and caries-free primary maxillary anterior teeth would be the best predictor for distinguishing children as high- or low-risk for caries. One explanation for the

differences in the findings may be the age of the subjects. In the Li and Wang (2002) manuscript, fifty-seven of the children had passed their 13th birthday when the oral examination was conducted while in the current study, the mean age of the pediatric sample was 8.56 ± 2.35(G1) and 9.47 ± 1.65 (G2).Thus the first permanent molars had only been exposed for a short time to caries risk factors in the present research. Our data confirm previously studies (Dye *et al*., 2004; Iida *et al*., 2007) that did not reported correlation between breastfeeding and increased risk for ECC.

Although the relationship between caries and milk feeding is controversial in the literature, the epidemiologic evidence linking infant breastfeeding and ECC is very limited (Iida *et al*., 2007). It is important to mention that, in the present study the parents were asked about breastfeeding up to six months and information about others factors such as bedtime breastfeeding or quantity of breastfeeding were not investigated. Others studies (Dye *et al*., 2004; Weerheijm *et al*., 1998) have investigated these factors but the results remain inconclusive. No relationship between ECC and sex, race/ethnicity, as well as treatment and follow up was observed. In a longitudinal study of the dental caries risk of young children, Warren *et al*. (2009) also included these sociodemographic variables and failed to find any association between them and ECC. They demonstrated that early colonization by Streptococcus mutans and consumption of sugar-sweetened beverages were the only significant predictors for ECC.

The results of this study showed low DMFT levels for both groups. It must be pointed out that this study did not fully assess some potential caries risk factors including Streptococcus mutans; fluoride exposures other than water or dentifrice; parental health, health knowledge or beliefs and exposure to sweet beverages. Moreover, the absence of caries is not a useful caries risk predictor for infants and toddlers because even if these children are at high risk, there may not have been enough time for carious lesion development (Tinanoff and Reisine, 2009). The major strength of this study is the finding that although ECC children presented higher dmft scores than children who were caries free up to 71 months old they presented similar scores for caries in first permanent molars. Thus it can be suggested that past caries experience in primary dentition is not the best single indicator for future caries development in permanent dentition.

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