

Risk factors of early childhood caries in Turkish children

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This study was performed to determine the relationship between infant feeding habits, oral hygiene patterns, parents' education level and early childhood caries (ECC) in nine-to 59-month-old Turkish children. Clinical examinations were carried out by a pediatric dentist using dmft indices, and the dmft was found to be 5.8. In the other part of the study, the mothers completed questionnaires for information related to risk factors. Father's education level and fluoride consumption showed statistical associations with caries. Breast - bottle-feeding together was more common, and these children had a higher prevalence of caries than the children who were only breast-fed. Also, children who were bottle-fed at night developed more caries lesions. Frequent consumption of sugar-containing beverages was a common habit among children. Brushing habit did not have any effect on carious development in this study. Based on these associations it is concluded that ECC is a risk factor for general health of children in Turkey.

Key words: early childhood caries, risk factors.

Early childhood caries (ECC) is a specific form of rampant caries attributed to the prolonged use of a nursing bottle containing fermentable carbohydrate liquids. Not only bottle abuse but also prolonged breast-feeding is considered to be a contributing factor to the development of caries in early childhood²⁻⁷. This condition is also attributed to frequent use of sweetened medicaments^{8,9} and to sweetened pacifier usage¹⁰.

The syndrome has been characterized as first affecting the labial and lingual surfaces of the four maxillary incisors followed by maxillary molars, mandibular molars and, rarely, mandibular incisors¹⁰ (Fig. 1a, b, c). More extensive patterns of caries are observed in toddlers with prolonged nursing habits and lack of oral hygiene.

Despite considerable advances in the prevention of dental caries, it is still a problem among infants and toddlers living in poor economic circumstances in both developing and industrialized countries in which undernutrition is common¹. The number of children suffering from this form of dental decay ranges between 1-70% among different cultural and ethnic groups¹¹. In industrialized countries the

prevalence, severity and patterns of caries are thought to relate to determinants that include social and educational background, and dietary and oral hygiene practices^{12,13}. These factors may not affect caries development in the same way in developing countries. The prevalence of ECC in Turkey has been determined as 8% in a population of high socio-economic groups and might be high as 10% for the country as a whole¹⁴.

A child who has poor oral health is not a healthy child, and any efforts to improve child health which do not address oral health are certain to fail¹⁵. An understanding of the relationship between etiological factors and ECC is necessary to better comprehend the situation and to develop new public health programs. The purpose of this study therefore, was to evaluate factors related to ECC to find out successful solutions to the public health challenges.

Material and Methods

One hundred and twenty children aged nine to 59 months and their parents who were seen in our clinic in Ankara were eligible to participate in this study. The participants live in the area



(a)



(b)



(c)

Fig. 1 a, b, c. Intraoral view showing early childhood caries.

where the fluoride level in the drinking water is less than 0.3 ppm. In the first part of the study the mothers were asked to complete a questionnaire comprised of four sections. The first section covered general information concerning the health condition of the child and the ages and education levels of the parents. The second section was devoted to aspects concerning the child's teeth. In the third section all suspect nutritional habits that might have contributed to the condition of the teeth were recorded. The last section of the questionnaire concerned the prevention of oral infections through brushing, and the use of fluoride by topical or systemic administration.

In the second part of the study one pediatric dentist examined the children using # 23 explorers, front surface mirrors and flashlights. Before the clinical examination, the dentist brushed the child's teeth. Any remaining plaque

was cleaned with a sterile gauze during the examination. For each child the number and location of caries teeth were recorded. When two or more maxillary teeth were affected by dentine caries and the caries in the other teeth followed the pattern of caries with regards to the time of eruption, the caries was considered to be ECC³.

The relationships between the variables of the questionnaire were analyzed using the two-way chi-square test statistics.

Results

Of the total 120 children included in this study 58 were boys (48.3%) and 62 were girls (51.7%). Early childhood caries was seen in 83 (69.1%) children. The mean dmft was 5.8 per child. Seventeen children (14.1%) showed caries in four maxillary incisors. The more extensive

Table I. Number and percentage of children (n=120) with caries experience and relation to children's age and gender

	Total		Caries-free		With caries	
	n	n%	n	n%	n	n%
9-24 months	49	40.8%	28	57.1%	21	42.9%
25-59 months	71	59.2%	9	12.7%	62	87.3%
Gender						
Boys	58	48.3%	16	27.6%	42	72.4%
Girls	62	51.7%	21	33.9%	41	66.1%

patterns of caries involving incisors and/or canines and primary molars were seen in 50.8% (n=61) of the children. Only five children had less than two caries (Table I).

Prevalence of caries in relation to age and gender is shown in Table I. Caries was seen in 21 (42.9%) of the 9 to 24-month-old children and in 62 (87.3%) of the 25 to 59-month-old children. Analysis using the chi square test confirmed differences with age to be statistically significant ($\chi^2=26.88$, $p=0.000$) (Table I).

The relation between education level of the parents and caries is shown in Figure 2. The education level of the sample showed that while 76 (63.3%) of the mothers and 63 (44.2%) of the fathers were either illiterate or had finished primary school, 44 (36.6%) of the mothers and 67 (55.8%) of the fathers were educated at high school or university level. Analysis using the chi-square test showed differences between father's education level and prevalence of caries to be statistically significant ($\chi^2=9.294$, $p=0.002$). However, mothers' education level and prevalence of caries did not confirm differences to be statistically significant. In accordance with findings in relation to fathers'

education, children whose fathers were educated at the high school or university level showed more nursing caries than children whose fathers were educated at a lower level (Fig. 2).

The pattern of basic factors in ECC formation, i.e. weaning habits, consumption of sugar-containing beverages, use of sugar-containing medication, tooth-brushing habit and fluoride consumption, is shown in Figures 3, 4 and 5. Thirty-eight children had been solely breast-fed and 82 had been fed using both breast and bottle. There were two children who had been only bottle-fed. For those who were breast-fed, 73.6% of the children continued breast-feeding beyond one year of age. The duration of breast-feeding and bottle usage was not significantly associated with caries development, but both breast- and bottle-feeding was a risk factor when used for one year or more. Sixty-eight children were using the bottle most often at night, and 73.5% of these children on average, who used bottle at nighttime, suffered from caries.

According to replies in the questionnaires, 65.8% of the children with ECC were still being

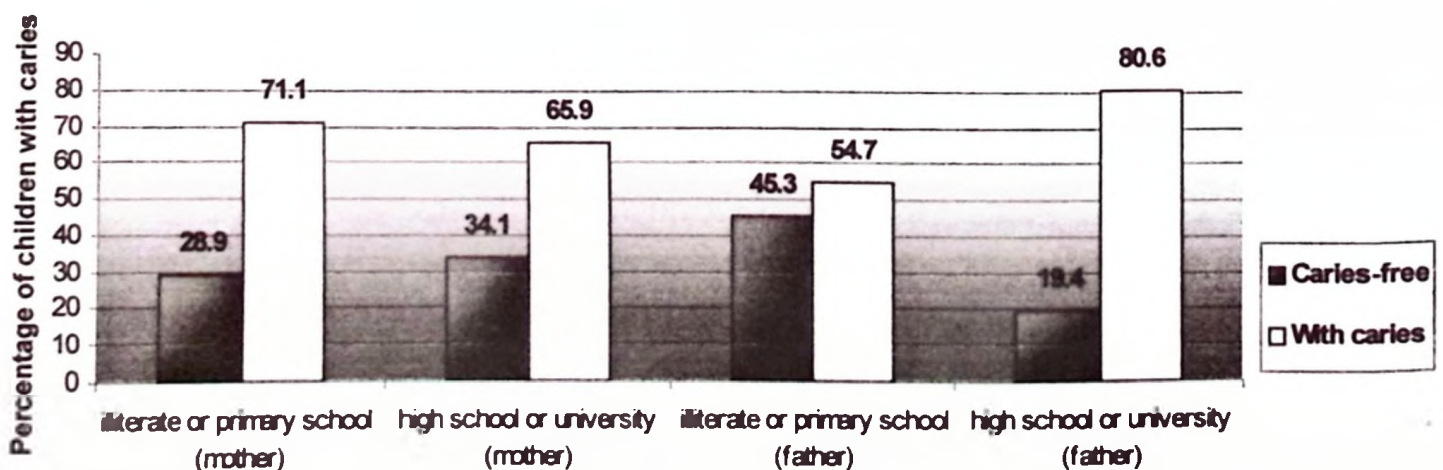


Fig. 2. Percentage of children with caries experience according to education level of the parents.

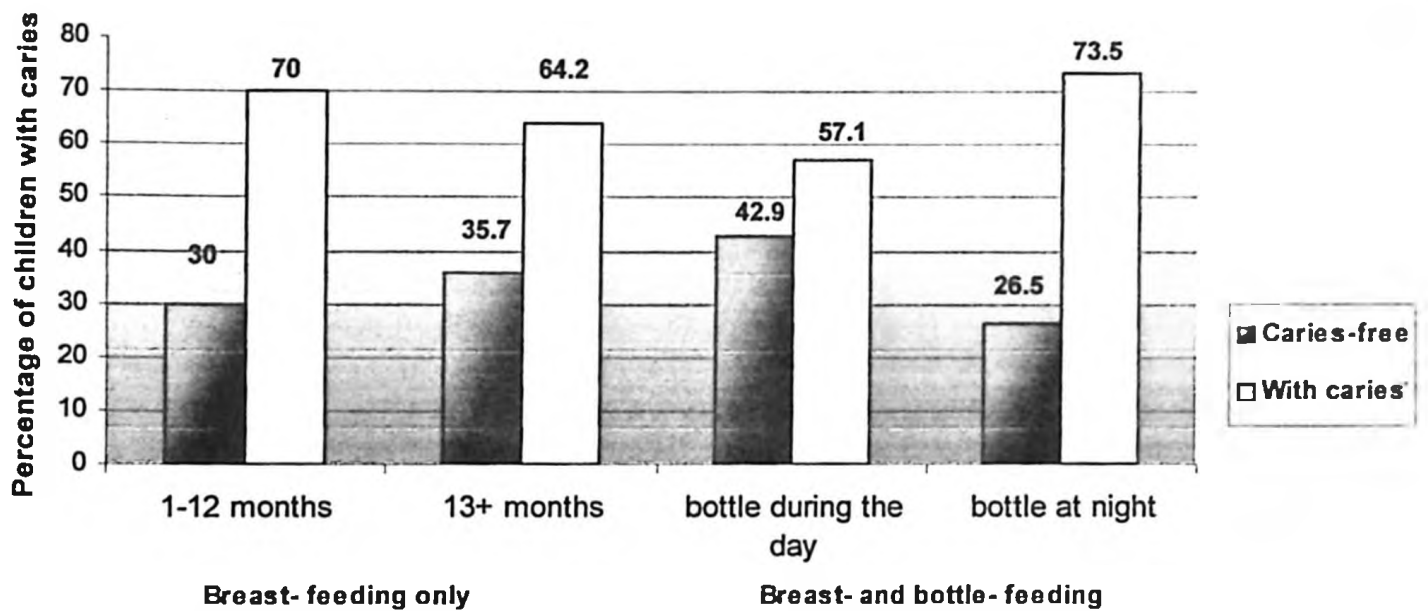


Fig. 3. Percentage of children with caries experience according to nursing habits.

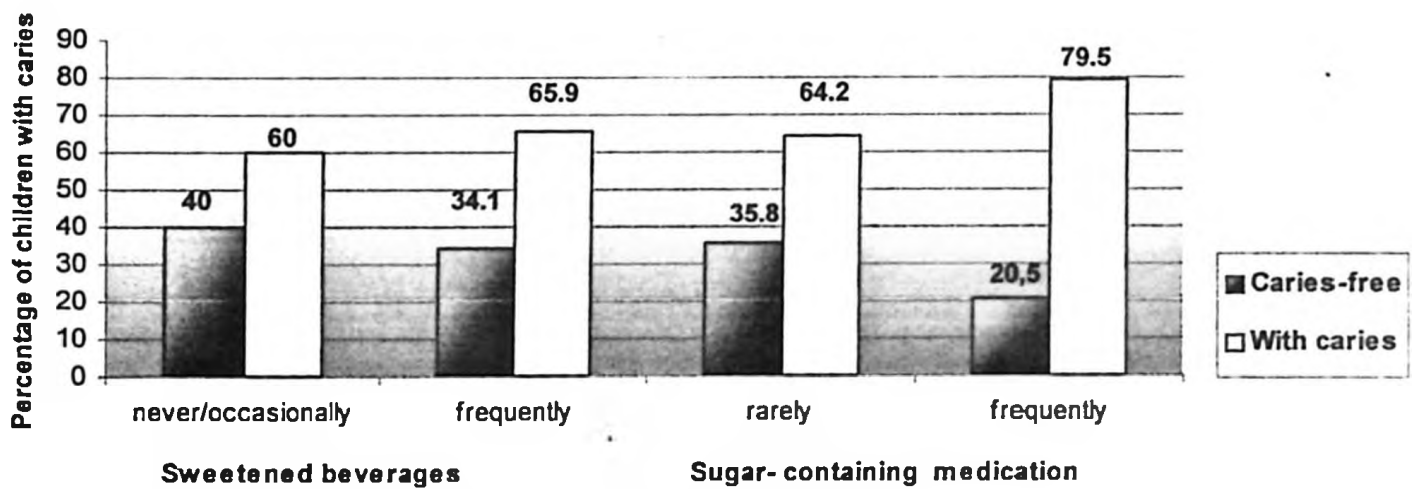


Fig. 4. Percentage of children with caries experience according to sweetened beverages and sugar-containing medication intake.

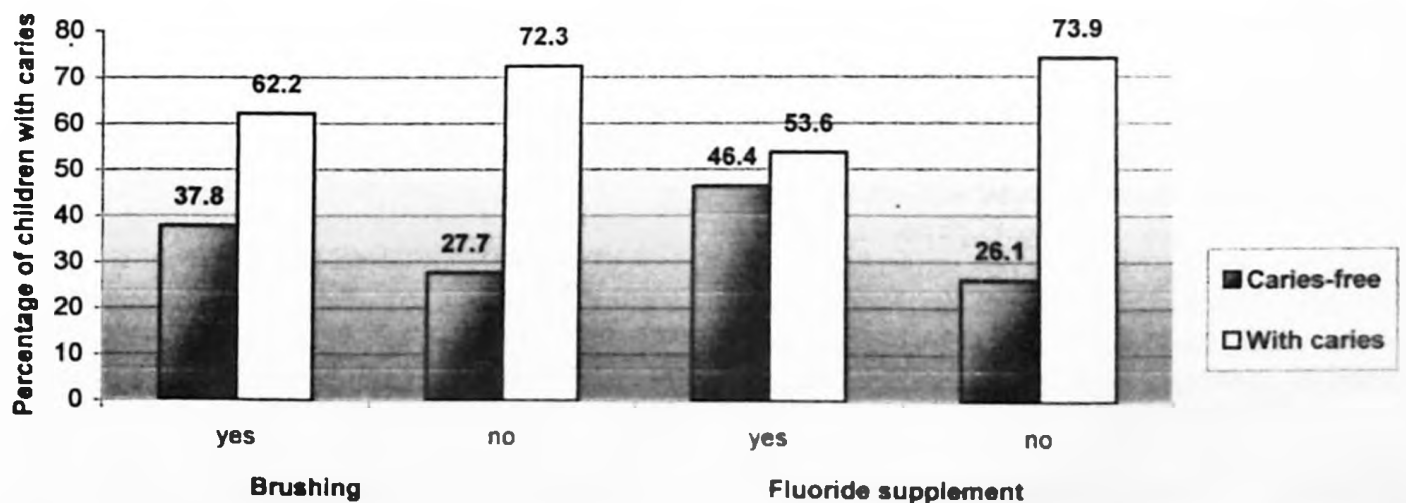


Fig. 5. Percentage of children with caries experience according to brushing and fluoride supplement usage.

given milk in an infant bottle with sugar, honey or other sweet items added, two or more times a day. Children who never/occasionally or frequently used sweetened beverages in the bottle developed caries lesions at rates of 60% and 65.9%, respectively. Although sweetened beverages are a risk factor for caries development, there was no statistically significant relationship between consumption frequency of sweetened beverages and ECC.

No significant association between the usage of sugar containing medicine and development of caries was found in our study.

An examination of brushing habit revealed that 30.8% of children brushed their teeth with fluoridated toothpaste. Of these children 62.2% developed ECC, while 72.3% of the non-users developed ECC. The brushing habit did not show differences in nursing caries development statistically ($\chi^2=1231$, $p=0.267$).

Finally, 73.9% of the children with ECC had never taken fluoride supplement. The difference between the fluoride supplement consumption and caries development was significant ($\chi^2=4.163$, $p=0.041$).

Discussion

This study considered prevalence of ECC and association with caries risk factors in nine-to-59-month old Turkish children. The mean dmft of this population was 5.8. According to three other studies conducted in our country, the mean or percentage of dmft of preschool children were found to be 1.08¹⁶ 0.68¹⁷ 16.5¹⁸. The mean dmft in this study was found to be higher than the other studies, perhaps because as the study group was chosen from the patients who applied to our clinic.

Appropriate breastfeeding is well recognized as the best diet for infants. However, both uptake and duration of breast-feeding varies within and between countries and depends on several factors, such as medical professionals' guidelines, traditions, and cultural and social contexts¹². For example, 31.6% of the children in this study had been solely breast-fed and 73.6% of them had been breastfeeding beyond 13 months. In a Swedish study, only 7% of the Swedish infants were breastfed at twelve months¹⁹. The average duration of breast-feeding among Jordan children is 8.9 months¹³.

Under normal dietary conditions, milk is not considered to be cariogenic agent, but repeated and prolonged exposure leads to a larger decrease in plaque pH²⁰. Although both plaque and enamel dissolutions are less for bovine and human milk compared to lactose and sucrose solutions, it was found that in comparison to bovine milk, more enamel dissolution was caused by human milk²¹.

From the reported findings, the impression may be gained that breastfeeding is undesirable. However, the clinical reports attributable to on-demand breastfeeding are extremely rare, and the benefits of breastfeeding overweight any possible harmful effects. Simple preventive measures such as tooth cleaning from an early age should do much to prevent onset and development of breastmilk caries²².

In this study, 73.6% of the children were breast-fed beyond 13 months. Duration of breastfeeding did not significantly relate to the presence of caries, and the mean caries scores were high in all groups. Like some other authors, we concluded that it is not the breastfeeding necessarily that causes dental caries, but rather other caries-promoting habits like poor oral hygiene, intake of sugar-containing beverages or low fluoride consumption²³⁻²⁷.

According to the results of the study, breastfeeding and bottle usage together was more common among children. Children who were using a bottle at night developed more caries lesions than those the others who only used a bottle during the day.

Reports on the subject have shown that the manner in which a child falls asleep is the most important factor in ECC development²⁸. The mouth volume of milk obtained from the artificial nipple is not enough to stimulate the swallowing reflex. Thus, in bottle feeding the milk accumulates in the mouth around the teeth until the swallowing reflex is stimulated²⁵. This finding supports the basic theoretical mechanism of why bottle feeding at night is a risk factor of ECC. Because usage of a bottle containing sweetened milk and/or beverages is the main risk factor, it is recommended to substitute a cup for the bottle by 12 months of age²⁹.

Studies in many parts of the world have consistently recorded that caries was higher among children of mothers with the lowest

levels of education^{12,13}. According to our study, mothers' education level had no effect on the percentage of ECC. This might be due to the lack of oral health education among Turkish mothers. Another interesting finding is that the higher the education level of the father, the higher the incidence of the caries. Generally, mothers are the primary promoters of oral hygiene practices, and they have a major influence on the dietary habits and food choices of infants, toddlers and children³⁰⁻³⁴. An education program should be developed in order to change the parents' and especially mothers' attitudes and behaviors towards dental hygiene of their children in our country.

According to Horowitz²⁹, children who receive frequent exposure to sugar containing antibiotics are at risk of ECC. According to the results of our questionnaire, 81% of the children were using sugar containing medicine; however, a significant association between sugar-containing medicine usage and caries development was not found.

It is recommended that parents clean their children's teeth with a sterile gauze daily and begin brushing their teeth by the age of one year without using a dentifrice³⁵. A fluoridated dentifrice should be used by the age of three. Although a high percentage of children (69.2%) did not brush their teeth, there was no significant difference between brushing habit and caries development. We concluded that the brushing was not done after each feeding, thus allowing early caries lesions to form. These results are in accordance with the findings of Muller⁸, who defined poor oral hygiene as one of the risk factors of ECC. Ankara is a non-fluoridated area. According to İsmail³¹, children who live in non-fluoridated communities may benefit from professional fluoride applications as well as the use of fluoride tablets and drops. However, both topical application and fluoride supplement usage are very rare in Turkey. Our study confirms this finding, as 23.3% of the children benefited from the effect of fluoride.

As a result, we conclude that ECC is a risk factor for Turkish children. Very young children who are unable to cooperate when receiving restorative care for the most part require costly treatment in a hospital under sedation or general anesthesia^{36,37}. Unfortunately, it is impossible to treat every child suffering from

ECC in such conditions³⁸. Since prevention rather than treatment is the best solution of ECC, the education and training of parents about healthy dietary feeding and oral hygiene habits before the eruption of the first teeth and treatment of infants diagnosed with early signs of ECC are essential to prevent ECC.

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