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Original Article

Assessment of Potential Risk Factors Associated with Early Childhood Caries in a Subpopulation of Children from Thrace Region of Turkey

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Abstract

Introduction: Early childhood caries (ECC) is considered a global health concern due to its high prevalence and effect on the overall health of children.

Aim: The present study aimed to investigate prevalence of ECC and associated risk factors in a Turkish subpopulation of children.

Materials and methods: Five hundred forty-two (299 boys, 243 girls) children were enrolled in this study. Caries experience on primary teeth was measured using decayed or filled teeth (dft) index and the presence of caries was diagnosed if dft >0. A structured questionnaire was employed to mothers through interview.

Results: ECC was significantly associated with increased age (OR=1.032; 95% CI, 1.018–1.047; $p<0.001$), low level of family income (OR=2.91; 95% CI, 1.567–5.404; $p=0.001$), low educational level of mother (OR=2.602; 95% CI, 1.509–4.485), night-time frequent breastfeeding (OR=1.695; CI, 1.07–2.685; $p=0.024$) and bottle feeding with sugary beverages (OR=1.689; CI, 1.002–2.847; $p=0.049$). First dental visit age (OR=1.482; 95% CI, 1.254–1.753; $p<0.001$) and initial age of tooth brushing (OR=2.062; 95% CI, 1.324–3.209; $p=0.001$) were found to be protective against ECC development.

Conclusions: The current study highlights potential factors that are commonly associated with the risk of developing ECC. From the perspective of public health, a better understanding of socioeconomic, environmental, maternal and behavioural risks factors for ECC will aid improving maternal and child-based health promotion and preventive programmes.

Keywords

early childhood caries, prevalence, children

INTRODUCTION

Dental caries is one of the most common childhood disease affecting young children.[1] It is defined as a multifactorial disease that occurs as a result of prolonged acid formation from tooth adherent bacteria due to excessive sugar intake that leads to a reduction of biofilm pH and mineral loss from tooth surface.[2,3] Early childhood caries is described as other forms of caries, as a biofilm-mediated, sugar-driven, multifactorial, progressive disease that develops because of

demineralization and remineralization imbalances of dental hard tissues, regulated by biological, behavioural, social, and environmental factors.[4]

The most recent term early childhood caries (ECC) implies a more complex disease that is associated with frequent sugar consumption in an environment of tooth adherent bacteria that is not only related to bottle feeding.[5] Therefore, dietary habits play an essential role in the formation of this ECC, especially if high levels of fermentable carbohydrates are included in the diet.[6] Improper nutrition such as frequent exposure to sugar, constant sweet snacking, bottle feeding with sugar-containing liquids, night time bottle feeding with sweetened beverages, prolonged night-time breastfeeding can extend the exposure of tooth structures to carbohydrates, which increases the risk of developing ECC.[6,7] Genetic predisposition, environmental, and socioeconomic factors, parental education, family size, mother's oral hygiene and dietary habits are also reported as predisposing factors that can influence the development of ECC.[8,9]

The latest evidence emphasized the importance of preventive measures such as dental counselling and early oral hygiene practise before age one since ECC is a preventable disease when early intervention is provided.[10,11] Still, if left untreated, it can cause pain, growth and developmental disorders, premature tooth loss, speech disorder, and exert adverse effects on the permanent tooth.[12] Children with dental caries on their primary teeth in younger age are also more prone to develop dental caries in their permanent dentition.[12,13] Therefore, assessment of caries risk in the first years of life and follow-up with regular intervals are strongly advised for children with increased risk of dental caries.[13]

Edirne province is located in the northwestern border of Turkey, in the region of Thrace bordering Greece and Bulgaria. This is the first study conducted in this region investigating the prevalence of ECC together with the relevant risk factors as a result of the high dental caries rates observed in young children admitted to the university-based pediatric dental clinic.

AIM

The aim of the present study was to evaluate the prevalence of ECC and characterize potentially associated demographic, behavioral, and environmental factors in a subpopulation of Turkish children residing in the Thrace Region of Turkey.

MATERIALS AND METHODS

Study population

Ethical approval was obtained from the Ethics Committee of the Trakya University, Faculty of Medicine (TÜTF-BAEK 2020/256) and the study was carried out in agreement with the Declaration of Helsinki principles. The participants were recruited from the Department of Pediatric Dentistry, Faculty of Dentistry, Trakya University between 2016 and 2018. Five hundred forty-two children (299 boys, 243 girls) aged less than 72 months without any systemic disease and residents of this region since birth were included in this study. The sample size was determined based on the findings of a previous study[13] at 5% alpha error and 95% confidence level. Written informed consent was obtained from the parents of children participating in this study.

Study design

Intraoral examinations were performed by a calibrated pediatric dentist at the dental chair. ECC was diagnosed according to the requirements described by the American Academy of Pediatric Dentistry (AAPD).[14] The status of dental caries was recorded using the guideline of World Health Organization (WHO) Oral Health Survey Basic Methods 1997.[15] Caries experience on primary teeth was measured using the dft index and the presence of caries was diagnosed if dft > 0. The children were further evaluated in two groups according to their caries status: caries-free children and children with ECC. Approximately 10% of the participating children were randomly re-examined to assess intra-rater reliability and kappa value was calculated as 0.92.

Based on the aetiology of ECC and associated potential risk factors reported in the literature, a questionnaire was designed that consists of questions including child's socioeconomic background, mother's oral health-related habits, questions regarding pregnancy, child's dietary habits, oral hygiene-related behaviour and medical history.[16-18] The questionnaire was administered to the mother through an interview by the same pediatric dentist who performed the child's dental examination.

This questionnaire featured six sections:

I. The child's socioeconomic background information: sex, age, parental education levels, and family monthly income;
II. Mother's oral health behaviour: toothbrushing frequency, tooth flossing, toothpaste use;
III. Mother's prenatal and postnatal period-related information: smoking status, use of medication, systemic disorder;
IV. Child's oral health-related behaviour: toothbrushing frequency, toothpaste use, initial tooth brushing age, first dental visit age, fluoride intake;
V. Feeding practices and dietary habits: night-time breastfeeding, bottle-feeding habits, sweet snacking habits;
VI. Child's previous medical history related information: childhood disease with fever, otitis media or respiratory disease until age 1, medication use until age 1.

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Statistical analysis

Statistical analyses were performed with the IBM SPSS® version 23 (IBM Corp., NY, USA). The intra-examiner agreement was assessed using Cohen's kappa statistics. Descriptive statistics, percentage, mean, and standard deviation and frequency distributions were calculated for all variables. Compatibility with normal distribution was assessed with the Kolmogorov-Smirnov test. Bivariate analyses using a chi-squared test by comparing participants based on their dental status was performed. In the comparison of quantitative data according to the binary group, two independent sample t-tests were used for normally distributed data, and Mann-Whitney U test was used for non-normally distributed data. One-way analysis of variance (ANOVA) was used for the normally distributed data, and the Kruskal Wallis test was used for non-normally distributed data for the comparison of quantitative data according to groups of three and above. Binary logistic regression analysis was used to evaluate the independent risk factors affecting ECC and associations between different risk factors and their relationships with ECC were analysed by univariate logistic regression model. The significance level was taken as $p<0.05$.

RESULTS

A total of 542 children at the mean age of 55.66±15.13 months were included in the study. Caries prevalence and mean ± SD dft index scores of independent variables are shown in **Table 1**. Most of the children 444 (81.9%) had dental caries with a mean dft±SD and dfs±SD of 7.67±5.17 and 18.22±16.44, respectively. Statistically significant difference was found between different age groups according to mean dft scores ($p<0.001$) and most of the children of the 49-72 months of age had a high caries prevalence of 73.4% **(Table 1)**. Dental caries were significantly more prevalent among children from a relatively lower socioeconomic background characterised by lower mother education level ($p<0.001$) and lower family income ($p<0.001$) **(Table 1)**. Comparison of independent variables according to caries status is shown in **Table 2**. The results showed that nighttime breastfeeding affected ECC formation significantly ($p=0.023$) and the first tooth brushing age likewise was associated with ECC ($p=0.001$) **(Table 2)**. Exposure to cigarette smoke during the prenatal period or mother's smoking habit was not significantly associated with ECC ($p>0.05$) and there was also no significant association between ECC and mother's oral health attitudes ($p>0.05$) **(Table 2)**. No significant associations were found between the fever, otitis media, respiratory disease or medication use until age one and ECC ($p>0.05$) **(Table 2)**. According to the results of univariate logistic regression analysis presented in **Table 3**, the prevalence of ECC was associated with increased age (OR=1.032; 95% CI, 1.018–1.047), low family income (OR=2.91; 95% CI, 1.567–5.404), lower education level of mother (OR=2.602; 95% CI, 1.509–4.485) and also father (OR=1.912; 95% CI, 1.097–3.332). Initial tooth brushing at a younger age (OR=2.062; 95% CI, 1.324–3.209) and first dental visit age (OR=1.482; 95% CI, 1.254–1.753) were protective against ECC **(Table 3)**. Night-time breastfeeding (OR=1.695; 95% CI, 1.07–2.685) and bottle feeding with sugary drinks (OR=1.689; 95% CI, 1.002–2.847) was also associated with ECC **(Table 3)**.

DISCUSSION

The present study that consists of a sample of 18-to-71-month-old children was aimed to evaluate potentially associated risk factors with ECC. Globally, the burden of ECC is still very high. For that reason, a comprehensive investigation of ECC, together with the potential risk factors including dietary habits, oral-hygiene related behavioural attitude, socioeconomic status and other relevant risk factors may be useful for planning and promoting prevention and early interventions.[4,5]

According to the results of this study, ECC prevalence was found to be 81.9% with a mean dft±SD of 7.67±5.17. The prevalence of ECC showed a significant association with age. According to the univariate model, as a risk factor age increased the caries risk 1.032 times ($p<0.001$). This association can be explained with the accumulative effect of caries-related factors which are persistently present in affected children and may result in an increase caries severity with age. A significant association between age and ECC was also reported in a previous study by Li et al.[16] Similar to previous studies, there were no significant association between ECC and gender.[6,16,17] In the present study, instead of evaluating socioeconomic status as a single factor to reflect the socioeconomic background, we investigated the family impact with several variables including parental educational level, family income, and the number of siblings. Our findings were consistent with the findings of other studies that demonstrated an association between the education level of parents and the presence of ECC in children.[18-21] Higher ECC prevalence was seen in children whose parents had a low level of education. Development of EEC risk increased 2.602 times with the low educational level of the mother and 1.9 times with the decreased educational level of the father. In the present study, it was found that family income was strongly associated with ECC. According to univariate analysis, children from families with a low level of income had 2.91 times greater risk to develop ECC. Similar to our findings, in another study it was reported that children with the low socioeconomic background are two times more likely to develop dental caries than those with high socioeconomic level.[22] Their findings were consistent with our study results; however, there are also studies where family income was not associated ECC.[16,20]

According to our study results, the risk of developing ECC increased 1.482 times as the age of the first dental visit delayed. Schroth and Cheba[24] also reported that late first

Table 1. Caries prevalence and dft index scores (mean±standard deviation) of independent variables

	n (%)	Children with dental caries (n %)	dft (Mean±SD)	dft Median (Min-Max)		*p*
Age						
0-24	20 (3.7)	10 (2.3)	3.4±3.8[a]	3 (0–12)		
25-48	143 (26.4)	108 (24.3)	7.1±5.6[b]	6 (0–20)	F=14.575	<0.001
49-72	379 (69.9)	326 (73.4)	8.1±5[b]	8 (0–20)		
Sex						
Girl	243 (44.8)	200 (45)	7.7±5	8 (0–20)	t=-0.011	0.991
Boy	299 (55.2)	244 (55)	7.7±5.3	8 (0–20)		
Number of siblings						
0-1	368 (67.9)	300 (67.6)	7.4±5.2	8 (0–20)	t=-1.904	0.057
≥2	174 (32.1)	144 (32.4)	8.3±5.1	9 (0–20)		
Education level of mother						
Primary school	205 (37.8)	180 (40.5)	9.2±5[a]	10 (0–20)		
High school	175 (32.3)	145 (32.7)	7.5±5[b]	8 (0–20)	F=20.852	<0.001
University	162 (29.9)	119 (26.8)	5.8±4.9[c]	5 (0–20)		
Educational level of father						
Primary school	186 (34.3)	161 (36.3)	9.1±5.1[b]	10 (0–20)		
High school	190 (35.1)	155 (34.9)	7.9±5.3[b]	8 (0–20)	F=18.154	<0.001
University	166 (30.6)	128 (28.8)	5.9±4.6[a]	6 (0–20)		
Family income						
Low level	158 (29.2)	141 (31.8)	9.3±4.8	10 (0–20)		
Middle level	230 (42.4)	189 (42.6)	7.8±5.2	8 (0–20)	F=18.703	<0.001
High level	154 (28.4)	114 (25.7)	5.9±4.9	5 (0–16)		
Brushing frequency (times per day)						
0-1	267 (49.3)	217 (48.9)	7.7±5.3	8 (0–20)	t=0.235	0.814
≥2	275 (50.7)	227 (51.1)	7.6±5	8 (0–20)		
Toothpaste use						
Yes	426 (78.6)	356 (80.2)	7.7±5.1	8 (0–20)	t=0.063	0.950
No	116 (21.4)	88 (19.8)	7.6±5.5	8 (0–20)		
Age of initial tooth brushing						
≤2	225 (41.5)	170 (38.3)	7.1±5.4	7 (0–18)	t=-2.180	0.030
≥3	317 (58.5)	274 (61.7)	8.1±5	8 (0–20)		
Frequency of daily snacking (times per day)						
0-2	392 (72.3)	321 (72.3)	7.4±5.1	8 (0–20)	t=-2.084	0.038
>2	150 (27.7)	123 (27.7)	8.4±5.3	9 (0–20)		
Frequency of sugary snack intake (times per day)						
0-2	375 (69.2)	293 (66)	7.1±5.2	8 (0–20)	t=-3.758	<0.001
>2	167 (30.8)	151 (34)	8.9±4.9	9 (0–20)		
Smoking						
Yes	110 (20.3)	93 (21)	8.3±5	9 (0–19)	t=1.507	0.132
No	431 (79.7)	350 (79)	7.5±5.2	8 (0–20)		
Smoking during pregnancy						
Yes	66 (12.2)	52 (11.7)	8.1±5.2	9 (0–16)	t=0.750	0.454
No	476 (87.8)	392 (88.3)	7.6±5.2	8 (0–20)		

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Use of medication during pregnancy						
Yes	110 (20.3)	91 (20.5)	7.8±5.1	8 (0–20)	t=0.205	0.838
No	432 (79.7)	353 (79.5)	7.7±5.2	8 (0–20)		
Systemic disorder of mother						
Yes	47 (8.7)	37 (8.3)	7.7±5.1	9 (0–16)	t=0.069	0.945
No	495 (91.3)	407 (91.7)	7.7±5.2	8 (0–20)		
Tooth brushing frequency of mother						
0-1	174 (32.1)	148 (33.3)	8.2±5.2	8 (0–20)	t=1.492	0.136
≥2	368 (67.9)	296 (66.7)	7.4±5.2	8 (0–20)		
Tooth flossing						
Yes	77 (14.2)	56 (12.6)	6.1±5.3	6 (0–20)	t=-2.990	0.003
No	465 (85.8)	388 (87.4)	7.9±5.1	8 (0–20)		
Mother tasting the pacifier before use						
Yes	35 (6.5)	26 (5.9)	7.4±5.2	9 (0–16)	t=-0.289	0.773
No	507 (93.5)	418 (94.1)	7.7±5.2	8 (0–20)		
Mother tasting the spoon before use						
Yes	172 (31.7)	148 (33.3)	8.3±5.1	8 (0–20)	t=1.844	0.066
No	370 (68.3)	296 (66.7)	7.4±5.2	8 (0–20)		
Pacifier put in sugary beverage						
Yes	36 (6.6)	34 (7.7)	10.1±5.4	10 (0–20)	t=2.946	0.003
No	506 (93.4)	410 (92.3)	7.5±5.1	8 (0–20)		
Night-time breastfeeding						
Yes	388 (71.6)	327 (73.6)	8.1±5.2	8 (0–20)	t=2.810	0.005
No	154 (28.4)	117 (26.4)	6.7±5.1	7 (0–20)		
Bottle feeding with sugary drinks						
Yes	161 (29.7)	140 (31.5)	8±4.9	8 (0–20)	t=0.955	0.340
No	381 (70.3)	304 (68.5)	7.5±5.3	8 (0–20)		
Night-time bottle use						
Yes	143 (26.4)	114 (25.7)	8.1±5.3	9 (0–20)	t=1.257	0.209
No	399 (73.6)	330 (74.3)	7.5±5.1	8 (0–20)		
Sweet beverage at night-time bottle feeding						
Yes	300 (55.4)	246 (55.4)	7.3±5.1	8 (0–20)	t=-1.656	0.098
No	242 (44.6)	198 (44.6)	8.1±5.2	8 (0–20)		
Fluoride usage						
Yes	42 (7.7)	32 (7.2)	6.1±4.6	7 (0–18)	t=-2.001	0.046
No	500 (92.3)	412 (92.8)	7.8±5.2	8 (0–20)		
Childhood disease with fever						
Yes	82 (15.1)	68 (15.3)	7.9±5.1	8 (0–18)	t=0.481	0.631
No	460 (84.9)	376 (84.7)	7.6±5.2	8 (0–20)		
Otitis media until age 1						
Yes	56 (10.3)	47 (10.6)	7.5±4.9	8 (0–18)	t=-0.265	0.791
No	486 (89.7)	397 (89.4)	7.7±5.2	8 (0–20)		
Respiratory disease until age 1						
Yes	160 (29.5)	129 (29.1)	7.4±5.3	7 (0–20)	t=-0.705	0.481
No	382 (70.5)	315 (70.9)	7.8±5.1	8 (0–20)		
Medication use of child until age 1						
Yes	53 (9.9)	44 (10)	7.9±5.1	8 (0–18)	t=0.284	0.776
No	483 (90.1)	398 (90)	7.7±5.2	8 (0–20)		

t: t-test; F: analysis of variance; U: Mann-Whitney U test; χ^2: Kruskal Wallis test, a-c: different lowercase letters show a significant difference; *p<0.05 statistical significance

Table 2. Comparison of independent variables according to dental caries status

	Caries-free	ECC	Total		*p*
Sex					
Girl	43 (43.9)	200 (45)	243 (44.8)	χ^2=0.044	0.833
Boy	55 (56.1)	244 (55)	299 (55.2)		
Age					
0-24	10 (10.2)	10 (2.3)	20 (3.7)		
25-48	35 (35.7)	108 (24.3)	143 (26.4)	χ^2=21.999	<0.001
49-72	53 (54.1)	326 (73.4)	379 (69.9)		
Number of siblings					
0-1	68 (69.4)	300 (67.6)	368 (67.9)	χ^2=0.122	0.727
≥2	30 (30.6)	144 (32.4)	174 (32.1)		
Education level of mother					
Primary school	25 (25.5)	180 (40.5)	205 (37.8)		
High school	30 (30.6)	145 (32.7)	175 (32.3)	χ^2=12.731	0.002
University	43 (43.9)	119 (26.8)	162 (29.9)		
Educational level of father					
Primary school	25 (25.5)	161 (36.3)	186 (34.3)		
High school	35 (35.7)	155 (34.9)	190 (35.1)	χ^2=5.312	0.070
University	38 (38.8)	128 (28.8)	166 (30.6)		
Family income					
Low level	17 (17.3)	141 (31.8)	158 (29.2)		
Middle level	41 (41.8)	189 (42.6)	230 (42.4)	χ^2=12.205	0.002
High level	40 (40.8)	114 (25.7)	154 (28.4)		
Brushing frequency (times per day)					
0-1	50 (51)	217 (48.9)	267 (49.3)	χ^2=0.148	0.700
≥2	48 (49)	227 (51.1)	275 (50.7)		
Toothpaste use					
Yes	70 (71.4)	356 (80.2)	426 (78.6)	χ^2=3.655	0.056
No	28 (28.6)	88 (19.8)	116 (21.4)		
Age of initial tooth brushing					
≤2	55 (56.1)	170 (38.3)	225 (41.5)	χ^2=10.517	0.001
≥3	43 (43.9)	274 (61.7)	317 (58.5)		
Daily snacking (times per day)					
0-2	71 (72.4)	321 (72.3)	392 (72.3)	χ^2=0.001	0.976
>2	27 (27.6)	123 (27.7)	150 (27.7)		
Sugary snack intake (times per day)					
0-2	82 (83.7)	293 (66)	375 (69.2)	χ^2=11.775	0.001
>2	16 (16.3)	151 (34)	167 (30.8)		
Smoking					
Yes	17 (17.3)	93 (21)	110 (20.3)	χ^2=0.659	0.417
No	81 (82.7)	350 (79)	431 (79.7)		
Smoking during pregnancy					
Yes	14 (14.3)	52 (11.7)	66 (12.2)	χ^2=0.497	0.481
No	84 (85.7)	392 (88.3)	476 (87.8)		
Use of medication during pregnancy					
Yes	19 (19.4)	91 (20.5)	110 (20.3)	χ^2=0.061	0.805
No	79 (80.6)	353 (79.5)	432 (79.7)		

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Systemic disorder of mother					
Yes	10 (10.2)	37 (8.3)	47 (8.7)	χ^2=0.355	0.551
No	88 (89.8)	407 (91.7)	495 (91.3)		
Tooth brushing frequency of mother					
0-1	26 (26.5)	148 (33.3)	174 (32.1)	χ^2=1.704	0.192
≥2	72 (73.5)	296 (66.7)	368 (67.9)		
Tooth flossing					
Yes	21 (21.4)	56 (12.6)	77 (14.2)	χ^2=5.119	0.024
No	77 (78.6)	388 (87.4)	465 (85.8)		
Mother tasting the pacifier before use					
Yes	9 (9.2)	26 (5.9)	35 (6.5)	χ^2=1.472	0.225
No	89 (90.8)	418 (94.1)	507 (93.5)		
Mother tasting the spoon before use					
Yes	24 (24.5)	148 (33.3)	172 (31.7)	χ^2=2.898	0.089
No	74 (75.5)	296 (66.7)	370 (68.3)		
Pacifier put in sugary beverage					
Yes	2 (2)	34 (7.7)	36 (6.6)	χ^2=4.085	0.043
No	96 (98)	410 (92.3)	506 (93.4)		
Night-time breastfeeding (>2)					
Yes	61 (62.2)	327 (73.6)	388 (71.6)	χ^2=5.133	0.023
No	37 (37.8)	117 (26.4)	154 (28.4)		
Bottle feeding with sugary beverages					
Yes	21 (21.4)	140 (31.5)	161 (29.7)	χ^2=3.924	0.048
No	77 (78.6)	304 (68.5)	381 (70.3)		
Nighttime bottle use					
Yes	29 (29.6)	114 (25.7)	143 (26.4)	χ^2=0.634	0.426
No	69 (70.4)	330 (74.3)	399 (73.6)		
Sweet beverage at nighttime bottle feeding					
Yes	54 (55.1)	246 (55.4)	300 (55.4)	χ^2=0.003	0.956
No	44 (44.9)	198 (44.6)	242 (44.6)		
Fluoride usage					
Yes	10 (10.2)	32 (7.2)	42 (7.7)	χ^2=1.009	0.315
No	88 (89.8)	412 (92.8)	500 (92.3)		
Childhood disease with fever					
Yes	14 (14.3)	68 (15.3)	82 (15.1)	χ^2=0.066	0.797
No	84 (85.7)	376 (84.7)	460 (84.9)		
Otitis media until age 1					
Yes	9 (9.2)	47 (10.6)	56 (10.3)	χ^2=0.170	0.680
No	89 (90.8)	397 (89.4)	486 (89.7)		
Respiratory disease until age 1					
Yes	31 (31.6)	129 (29.1)	160 (29.5)	χ^2 =0.257	0.612
No	67 (68.4)	315 (70.9)	382 (70.5)		
Medication use of child until age 1					
Yes	9 (9.6)	44 (10)	53 (9.9)	χ^2=0.013	0.911
No	85 (90.4)	398 (90)	483 (90.1)		

ECC: early childhood caries; χ^2: chi-square test; *p<0.05 statistical significance

Table 3. Univariate logistic regression analysis of ECC related risk factors

					Univariate	
	Beta	**SE**	**Wald**	**Df**	**OR (%95 CI)**	***p***
Age	0.032	0.007	19.843	1	1.032 (1.018–1.047)	<0.001
Sex	0.047	0.225	0.044	1	0.954 (0.614–1.482)	0.833
Number of siblings	0.084	0.241	0.122	1	1.088 (0.678–1.747)	0.727
Education level of mother (University*)						
Primary	0.956	0.278	11.84	1	2.602 (1.509–4.485)	0.001
High	0.558	0.268	4.325	1	1.746 (1.033–2.954)	0.038
Educational level of father (University*)						
Primary	0.648	0.283	5.228	1	1.912 (1.097–3.332)	0.022
High	0.274	0.263	1.083	1	1.315 (0.785–2.201)	0.298
Family income (High level)						
Low level	1.068	0.316	11.447	1	2.91 (1.567–5.404)	0.001
Middle level	0.481	0.252	3.644	1	1.617 (0.987–2.65)	0.056
First dental visit age (years)	0.394	0.085	21.21	1	1.482 (1.254–1.753)	<0.001
Brushing frequency (times per day)	0.086	0.223	0.148	1	1.09 (0.703–1.688)	0.701
Age of initial tooth brushing (≥ 3)	0.723	0.226	10.269	1	2.062 (1.324–3.209)	0.001
Frequency of daily snacking (times per day)	0.008	0.25	0.001	1	1.008 (0.618–1.644)	0.976
Sweet snack intake (times per day) (>2*)	0.971	0.291	11.133	1	2.641 (1.493–4.673)	0.001
Smoking	0.236	0.291	0.656	1	0.79 (0.446–1.398)	0.418
Smoking during pregnancy	0.228	0.324	0.496	1	1.256 (0.666–2.372)	0.481
Use of medication during pregnancy	0.069	0.281	0.061	1	0.933 (0.538–1.619)	0.805
Systemic disorder of mother	0.223	0.375	0.354	1	1.25 (0.599–2.608)	0.552
Tooth brushing frequency of mother	0.325	0.25	1.695	1	0.722 (0.442–1.179)	0.193
Mother dental flossing (no)	0.636	0.285	4.997	1	1.89 (1.082–3.301)	0.025
Mother tasting the pacifier before use	0.486	0.404	1.447	1	1.626 (0.737–3.589)	0.229
Mother tasting the spoon before use	0.433	0.256	2.869	1	0.649 (0.393–1.07)	0.09
Pacifier put in sugary beverage	1.381	0.736	3.519	1	0.251 (0.059–1.064)	0.061
Night-time breast feeding (>2)	0.528	0.235	5.063	1	1.695 (1.07–2.685)	0.024
Bottle feeding with sugary beverages	0.524	0.267	3.864	1	1.689 (1.002–2.847)	0.049

ECC: early childhood caries; $p<0.05$ statistical significance; OR: Odds ratio, adjusted for all other factors listed in the table; **95% confidence interval; *reference category.

dental visits were associated with increased risk of caries severity. Since early dental examination could give dentists a chance to educate parents about oral health care and proper feeding practices as well as assess the caries risk the first dental visit age has an essential role to provide early intervention to prevent caries formation. In the current study, the relation between ECC and oral hygiene practices of children were evaluated. Our results indicated that the brushing frequency was not significantly related to caries development, whereas the initial age of tooth brushing was significantly associated with ECC. It was found that children with the first tooth brushing age ≥ 3 have 2.062 times higher caries risk than those who started tooth brushing before the age of 2 years. Previous studies have confirmed that children who start brushing at an early age have significantly lower ECC experience, and the first tooth brushing age has a significant effect on ECC prevention.[17,21,25] In our study, children with a brushing frequency of at least twice a day had lower dft scores; however, we were unable to show any significant association with ECC. Similar to our results, Li et al.[16] also reported that the brushing frequency was not significantly related to caries development; however, initial age of brushing was significantly associated with less caries experience. This may be explained by the parental bias risk to respond toward the question "children's brushing frequency" as what is more socially desirable as at least twice a day. Although children may be brushing at least twice a day, parents were not actively supporting the brushing process; for that reason, brushing was not sufficient in some children. This can be considered as one of the limi-

tations of this study since only brushing frequency was inquired without the active dental care support of parents. According to Pieper et al.[25], children who received active help from their parents for brushing their teeth after the third year of life had a significantly lower dmft score than children whose parents did not support their brushing beyond the third year of life.

Mother's oral health-related behaviour often indicates her characteristics together with familial, cultural factors and her educational background.[26] Many factors are affecting a mother's behavioural patterns that can influence a child's oral health. In this study association between mothers' oral health and ECC were evaluated. There was a statistically significant difference between the mean dft values of children according to the tooth flossing status of mother (p=0.003). Interdental cleaning with dental floss is an efficient measure to prevent dental caries and periodontal disease and flossing can be considered as an indicator of a certain level of importance given to oral hygiene. Mothers with dental flossing behaviour can care more about their children's oral health which results in better oral hygiene practice. It was found that ECC risk of children whose mothers were not flossing increased 1.89 times.

ECC is generally associated with improper infant feeding practices. Li et al.[16] declared that dmft scores showed an increased correlation with a higher frequency of sweet snack intake. In another study it was also reported that ECC prevalence significantly increased at children who were bottle-feeding with sugary beverages.[27] Ozen et al.[17] have also shown that moderate to high sugar intake (≥2/day) was associated with ECC. According to our study results, bottle feeding with sugary beverages and sugary snack intake more than two times a day was related to ECC development similar to previous studies.[16,17,27]

Another independent risk factor which was significantly associated with caries development was found to be the frequent night-time breastfeeding. Children who were breastfed more than two times during night had more risk for ECC development. Peiper et al.[27] pointed that children who had been breastfed at night for prolonged periods exhibited a significantly higher dmft scores compared to children without this habit. Ozen et al.[17] also showed that frequent breastfeeding on demand was correlated with ECC development.

In the present study, association between ECC and prenatal and postnatal period were also evaluated with questions inquiring presence of systemic disorder, medication use and smoking habit of the mother during pregnancy and childhood diseases with fever or any medication use before age one. However, any significant relation was not found between ECC and these potential risk factors which need further investigation. Furthermore, parental smoking was not significantly associated with ECC similar to a previous study.[17] However, according to Williams et al.[28], second-hand smoking is related to an increased risk for dental caries, therefore further research is needed regarding its potential influence on caries formation.

Dental caries in children has been attributed to many aetiologies and risk factors over the years. Cross-sectional studies which involve surveying a population about an outcome and the independent variables carried at one point in time were mostly used to document potentially associated risk factors with ECC formation. The cross-sectional study design was used to reveal the associations, and there was the risk of potential recall bias which is a limitation of this study. Furthermore, this study was conducted on children recruited from university-based pediatric dental clinic which can be considered as another limitation of the study.

CONCLUSIONS

Within the limitations of this study, the development of ECC seems to be strongly associated with socioeconomic factors, including low income and parental education level. Associations were also found between ECC and feeding practices. Populations can present different risk determinants for ECC due to cultural, environmental, and behavioural habits. The high prevalence of ECC in this subpopulation highlights the need for comprehensive oral health interventions to improve the oral health of children living in this region.

Conflicts of Interest

The authors have no conflicts of interest relevant to this article.

Authors Contribution

S.G.O. and B.K. conceived the ideas; S.G.O collected the data; S.G.O and B.K did the writing.

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Оценка потенциальных факторов риска, связанных с ранним детским кариесом, в подгруппе детей из региона Фракия в Турции

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Резюме

Введение: Кариес в раннем детстве (КРД) считается глобальной проблемой здравоохранения из-за его высокой частоты и влияния на общее состояние здоровья детей.

Цель: Настоящее исследование направлено на изучение частоты КРД и связанных с ним факторов риска среди подгруппы детей из Турции.

Материалы и методы: В исследование были включены пятьсот сорок два ребёнка (299 мальчиков, 243 девочки). Наличие кариеса во временных зубах измеряли с помощью индекса DFT для кариеса, а наличие кариеса диагностировали, если DFT> 0. Использовалась структурированная анкета для матерей посредством интервью.

Результаты: КРД был достоверно связан с возрастом (OR=1.032; 95% CI, 1.018–1.047; p<0.001), низким семейным доходом (OR=2.91; 95% CI, 1.567-5.404; p=0.001), низким уровнем образования матери (OR=2.602; 95% CI, 1.509–4.485), частым грудным вскармливанием в ночное время (OR=1.695; CI, 1.07–2.685; p=0.024) и кормлением из бутылочки с подслащёнными напитками (OR=1.689; CI, 1.002–2.847; p=0.049). Было установлено, что возраст первого посещения стоматолога (OR=1.482; 95% CI, 1.254–1.753; p<0.001) и начальный возраст чистки зубов (OR=2.062; 95% CI, 1.324–3.209; p=0.001) действуют профилактически при развитии КРД.

Заключение: Настоящее исследование подчеркивает важность потенциальных факторов, которые часто связаны с риском развития КРД. С точки зрения общественного здравоохранения, лучшее понимание социально-экономических, поведенческих факторов риска КРД и факторов, связанных с окружающей средой и матерями, поддержит программы по улучшению и профилактике заболеваний матерей и детей.

Ключевые слова

кариес в раннем детстве, распространённость, дети