

## ASSESSING THE RELATIONSHIP BETWEEN HEI INDEX AND EARLY CHILDHOOD CARIES

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### Abstract

**Introduction:** Early Childhood Caries (ECC) is a form of dental caries occurring in the primary dentition of young children and includes noncavitated lesions as well as cavitated lesions. ECC is commonly associated with incorrect feeding habits such as putting a child to bed with a bottle, bottle feeding with sweetened beverages and prolonged breastfeeding. Eating habits and diets used by children from the first year of life are also risk factors for development of Early Childhood Caries. The Healthy Eating Index (HEI) is one index of overall diet quality based on the food pyramid. The HEI is used to assess adequacy, moderation, and diversity of food choices. HEI is used for the first time in this study. It was not known in our pediatric dentistry literature and not used in any other study before.

**The aim:** This study assess the relationship between dietary quality measured by the Healthy Eating Index (HEI) and Early Childhood Caries (ECC), in children 3-5 years old in Tirana, Albania.

**Materials & Methods:** This study was carried out in University Dental Clinic and in 4 private dental offices for a period of 2 years. A total of 120 preschool-children, aged 3-5 years were selected for this study and divided in two equal groups. The criterion for selection was the presence of ECC for the first children group and non ECC children were selected in the second group. ECC evaluation

was made by clinical examination as defined by the American Academy of Pediatric Dentistry. Evaluation of feeding habits and measurement of HEI was realized by analyzing the information taken from parents about infant feeding habits and the daily diet that their children consume after the first birthday.

**Results:** The study found that HEI values were lower in children affected by ECC in comparison with non ECC children.

**Conclusion:** The method of nutrition and dietary habits are closely related to the spread and development of Early Childhood Caries. HEI is an indicator that reflects the quality of the diet used by children. Based on our study low values of this indicator are associated with the presence of ECC, so the diet and eating habits of infants need to be improved.

**Key words:** *Early Childhood Caries; Healthy Eating Index; dietary habits.*

### Introduction

Early Childhood Caries (ECC) is a form of dental caries occurring in the primary dentition of young children and includes non-cavitated lesions as well as cavitated lesions (1,2). ECC is commonly associated with incorrect feeding habits such as putting a child to bed with a bottle, bottle feeding with sweetened beverages, and prolonged breastfeeding (3,4). It is well known that certain feeding practices, such as bedtime bottle feeding, prolonged breast feeding, frequent intake of sugary snacks and drinks contribute to the development of ECC (14). Even though prolonged baby bottle use seems

to be a rather widely used practice among infants and young children, not all children with the nursing bottle habit develop ECC (5). Eating habits and diets used by children from the first year of life are also risk factors for development of Early Childhood Caries (6). Not eating breakfast daily and eating fewer than 6 fruits or vegetables a day were also associated with dental caries in very young children (6). The Healthy Eating Index (HEI) is one index of overall diet quality based on the food pyramid (8). The HEI is used to assess adequacy, moderation, and diversity of food choices (14). HEI is used for the first time in this study. It is not known in our pediatric dentistry literature and not used in any other study before.

### Aim

This study assess the relationship of dietary quality, measured by the Healthy Eating Index (HEI), to the presence of Early Childhood Caries (ECC) in 3 to 5 years old children in Tirana, Albania.

### Materials & Methods

This study was carried out in University Dental Clinic and in 4 private dental offices for a period of 2 years. A total of 120 preschool-children were selected for this study and divided in two equal groups. The criterion for selection was the presence of ECC for the first children group and non ECC children were selected in the second group. ECC evaluation was made by clinical examination as defined by the American Academy of Pediatric Dentistry (15).

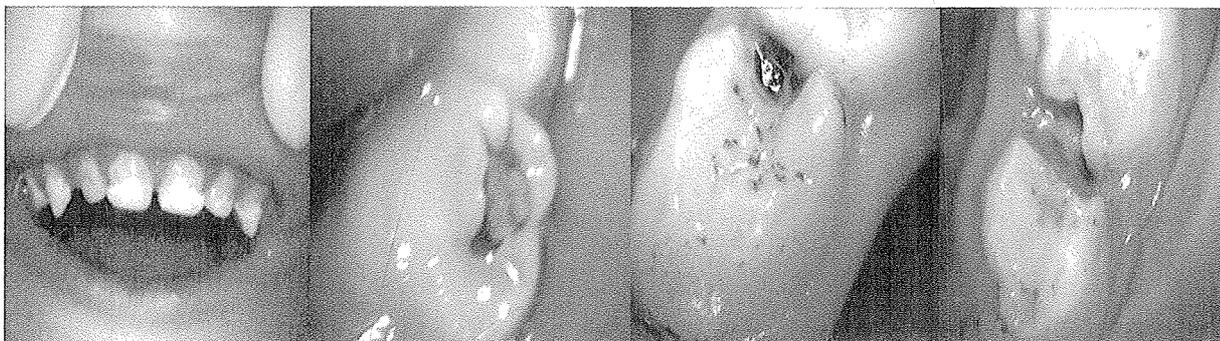


Figura nr. 1. Patient E.B. 3 yr

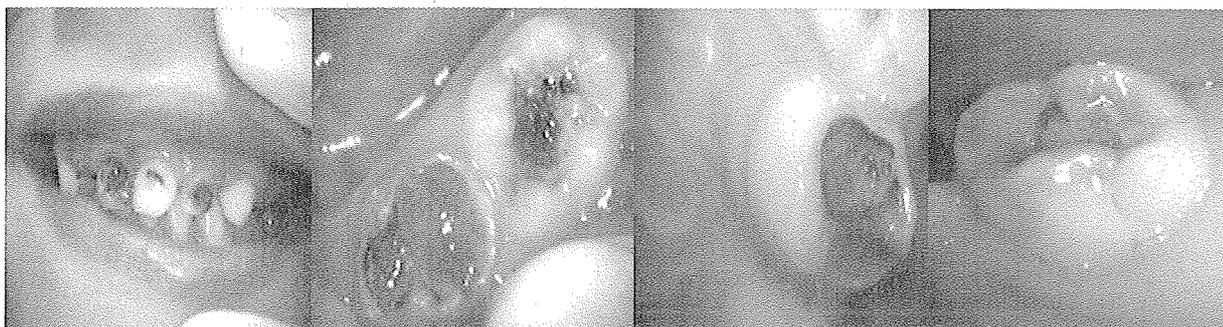


Figura nr. 2. Patient J. H. 4 yr

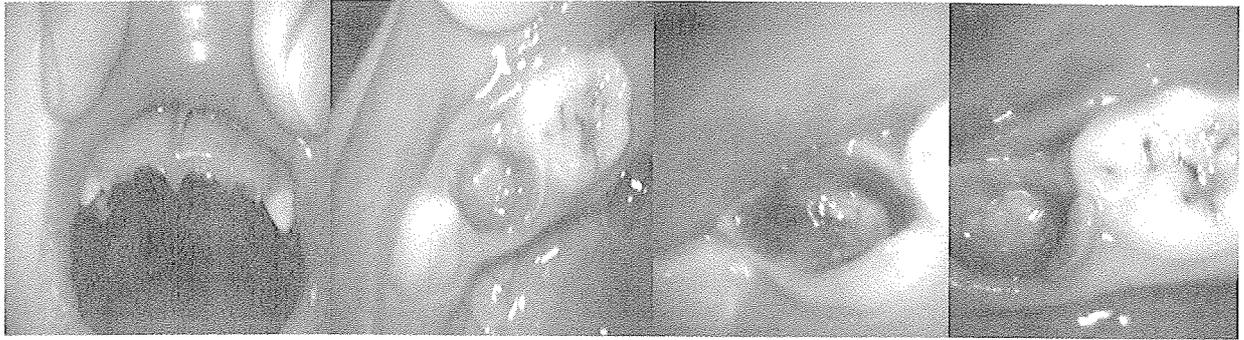


Figura nr. 3. Patient N.S. 5 yr

HEI scores were calculated by using one day of dietary intake information, obtained in interviews with the child's parent. From these questionnaire we also took information about infant feeding habits of children selected for this study.

The first 5 components of HEI measure the degree to which a person's diet conforms to the Food Guide Pyramid serving recommendations for *Grain, Vegetable, Fruit, Dairy, and Meat* groups (7,8,9). Components 6 and 7 measure compliance with recommended intake of *Total fat* and *Saturated fat*, respectively as a percent of total food energy intake (7,8,9). Components 8 and 9 reflect compliance with recommended *Cholesterol* and *Sodium* intakes (7,8,9).

The final component, *Variety*, represents the number of different food items in a person's diet *per day* (7,8,9). Criteria are set for each component for a score of 10, indicating good compliance, as well as for a minimum score of 0. The food group scores are based on recommended energy intake for age and gender (7,8,9). *Overall HEI* is a sum of the components with a possible score of 0 to 100. Overall HEI score indicates:

- "poor diet" - less than 51
- "need improvements" - between 51 and 80
- "good diet" - over 80

The collected data were entered into a personal computer and analyzed using the statistical package *SPSS 15.0*. *Z-test* for proportions was used to compare the percentages of ECC with non ECC children

that were responded the questions for all variables of feeding habits. We used the indicator *yes/no* to determine if there is/there is not a significant difference between ECC and non ECC children.

Descriptive statistics and appropriate *student t-test* was used to analyze the data to assess the difference between ECC and non ECC groups. Means, standard deviations and 95% confidence intervals were calculated for each component of HEI and total HEI by ECC status for each group of the children. The *p-value*  $\leq 5\%$  is considered statistically significant.

#### Results

The mean dmft of ECC children was  $8.70 \pm 2.15$ . Non ECC children were caries-free and were selected from children that come to our private dental offices for preventive procedures as sealants or topical fluoridation. All children were 3-5 years old. The mean age of children was  $4.10 \pm 0.88$  years for ECC group and  $4 \pm 0.82$  years for non ECC group. Some clinical cases of children with ECC selected for this study are shown in figures nr.1,2,3.

Certain feeding habits, such as sleeping with a bottle, added sugar or honey to the bottle of milk and not eating breakfast every day were significantly associated with the presence of ECC. On the other hand, there was no significant association between bottle feeding, prolonged bottle use, prolonged breastfeeding and the presence of ECC. The association between infant feeding habits and ECC is shown in table nr. 1.

**Table nr.1. Association between infant feeding habits and ECC**

Feeding habits	ECC (%) (n=60)	non ECC (%) (n=60)	significant difference*
<b>Infant feeding</b>			
Breast only	15	18.3	No
Bottle only	27.5	23.3	no
Breast and bottle	7.5	8.3	no
<b>Stopped breast feeding by 12 months?</b>			
Yes	9.1	11.6	no
No	13.3	15	no
<b>Stopped bottle feeding by 12 months?</b>			
Yes	22.5	25.8	no
No	12.5	24.1	no
<b>Sleeping with a bottle ?</b>			
Yes	28.3	5	no
No	6.6	26.6	no
<b>Add sugar or honey to the bottle of milk?</b>			
Yes	25.8	3.3	yes
No	9.1	28.3	yes
<b>Eating breakfast every day?</b>			
Yes	10.8	35	yes
No	39.1	15	yes

Through dietary intake information, obtained in interviews with the child's parent, resulted that children had started to eat foods such as a soup or mixture containing meat, carrot, potato, green vegetables, rice or cereal and butter all mashed and without additives, yogurt with bread, mashed fruits and a snack with rice after one year of age. Than from 2 to 5 years children started to eat the same foods and snacks as the other family members. The most consumed products were bread, butter, cheese, ham, sausages, pasta,

rice, eggs, fried potatoes, milk and fruit juices. For HEI components, with the exception of *Fat, Cholesterol and Sodium*, the other scores were significantly lower among children with ECC, compared with non ECC children. The *Overall HEI* score was also significantly lower among children with ECC, but the scores were less than 51 (*"poor diet"*) for the two groups of children. The association between dietary quality, measured by the Healthy Eating Index and ECC is given in table 2.

**Table nr. 2. Association between component of Healthy Eating Index and ECC**

Component of HEI	ECC	non ECC	<i>p-value</i>
	Mean (95% CI)	Mean (95% CI)	
Grain HEI	5.40±1.17	6.40±0.80	0.0421*
Vegetable HEI	2.90±1.45	4.90±1.10	0.0027*
Fruit HEI	3.80±1.23	5.10±1.20	0.0277*
Dairy HEI	3.10±1.20	4.60±1.35	0.0170*
Meat HEI	4.30±1.77	6.10±1.60	0.0279*
Total fat HEI	3.30±1.25	3.60±1.35	0.6126
Saturated fat HEI	3.60±1.43	4.20±1.55	0.3800
Cholesterol HEI	3.20±1.40	3.70±1.34	0.4246
Sodium HEI	2.90±1.52	3.60±1.65	0.3369
Variety HEI	2.70±1.34	4.50±1.58	0.0132*
Overall HEI	35.20±6.43	46.70±9.96	0.0006*

\**t-test*,

### Conclusion and Discussions

HEI is a reflection of an overall dietary quality and a strong indicator of the development of ECC (7). Early Childhood Caries was historically attributed to inappropriate and prolonged bottle use (10,11). Bottle-feeding and sleeping with a bottle have been considered cariogenic in several reports (12,13). Whereas certain feeding patterns have long been known to be risk factors for ECC, current research has demonstrated that other factors may also play a role (7,6). Based on our study, sleeping with a bottle, sugar or honey added to the bottle of milk and not eating breakfast every day were high risk factors for Early Childhood Caries because it was found a significant difference between ECC and non ECC children for sleeping with a bottle, sugar or honey added to the bottle of milk and not eating breakfast every day. Our study investigated the relationship of dietary quality, measured by the Healthy Eating Index and Early Childhood Caries and found a

strong association between both of them. All HEI components were lower among the ECC children, although there was a significant difference only for the Grain, Fruit, Vegetable, Dairy, Meat and Variety components. The overall HEI score was also significantly lower among children with ECC, but the scores were less than 51 ("poor diet") for the two groups of children. So the dietary habits of young Albanian children need to be immediately improved by modification of infant feeding habits and diet through information of their parents. In order to improve the eating habits of young children in our country and also prevent ECC, we recommend that fruits, vegetables, grains, and dairy products have to be consumed more frequently.

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