



# The Relationship of Early Childhood Caries with Childhood Obesity

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## Abstract

Early Childhood Caries (ECC), which is a chronic, irreversible, multifactorial and infectious disease, is one of the most common diseases seen in children. Oral health plays an important role in general health and welfare of young children in early childhood. Recently, the relationship between childhood caries and childhood obesity has been investigated. Current evidence suggests that severe caries is associated with malnutrition and may be expressed as deviation from mean Body Mass Index (BMI) values. Many studies have been conducted to evaluate the relationship between BMI and ECC with various and sometimes conflicting results. Some studies on this issue have associated ECC with low weight children, suggesting that low BMIs may be a result of ECC. On the other hand, some studies have established significant relationships between ECC and overweight, and concluded that the two results may be based on common risk factors. In order to establish a healthy society in terms of oral health, prevention of disease should be the main objective rather than fighting diseases. Combating obesity also means combating many diseases. Therefore, early prevention of the effects of chronic diseases such as obesity, tooth decay and gingivitis on the rest of the child's life will be an important step in terms of improving the general health of the society.

**Keywords:** Dental caries; Obesity; Childhood; Primary teeth

**Abbreviations:** AAPD: American Association of Pediatric Dentistry; S-ECC: Severe Early Childhood Caries; BMI: Body Mass Index; WHO: World Health Organization.

## Introduction

### Definition of early childhood caries

American Association of Pediatric Dentistry (AAPD); defined caries lesion, with or without cavity, loss of tooth due to caries or the presence of a filled tooth surface in any primary tooth in children aged 72 months or younger.

In children younger than 3 years of age, any sign of smooth-surface caries is indicative of severe early childhood caries (S-ECC). From ages 3 through 5, one or more cavitated, missing teeth (due to caries), or filled smooth surfaces in primary maxillary anterior teeth, or decayed, missing, or filled score of  $\geq 4$  (age 3),  $\geq 5$  (age 4), or  $\geq 6$  (age 5) surfaces constitutes S-ECC [1,2].

### Prevalence of early childhood caries

Despite preventive procedures to prevent tooth decay, ECC remains a health problem that concerns the whole world [3]. ECC is frequently encountered, especially in

developing countries and in low socioeconomic regions of some developed countries [4].

### Etiology of early childhood caries

ECC is a multifactorial disease that is affected by many conditions such as cariogenic microorganisms, fermentable carbohydrates and inappropriate eating habits, and socioeconomic status of families [5]. Factors such as fluoride intake frequency and oral care habits are also included in the etiology of the ECC in addition to the socioeconomic status and educational level of the families. It has been found that there is a strong relationship between caries development and mothers' oral care habits, education levels and number of lost teeth in their mouths [6].

### Carcinogenic Microorganisms and Transmission Routes

*S. Mutans* plays an active role in the first stage of caries development. The most important reservoir for *S. mutans* transmission for infants is their mothers or caregivers [7,8]. The main transmission mechanism of *S. mutans* is the vertical transmission of infected saliva due to untreated decayed teeth in the mother's mouth [9]. The vertical passage can be as follows: kissing on the lips means that the mother takes the bottle to the mother's mouth to measure the temperature of the food, chewing something (especially babies' food) in order to give child. It is thought that infants gain these organisms from infected individuals, especially their mothers, in the process called "window of infectivity which corresponds to the interval of approximately 19-31 months [10].

### Improper nutritional habits

Nutritional habits before and during sleep are risk factors for development of ECC [11]. It has been reported that in addition to frequent and long-term night feeding, cariogenic foods are given to the child and the use of the pacifier is dipped in sugar or honey [12]. The relationship between breast milk intake and ECC is controversial. In some studies, it was reported that breast milk was not carcinogenic, and that breastfed children were less affected than ECC [13-15] while there were studies reporting that there was a risk of developing ECC in breastfed children longer than 12 months [16,17]. It has been reported that breastfeeding during the night increases the prevalence of ECC in children who are breastfeed [16,18]. Fruit juice and fruit flavored drinks have a much greater cariogenic potential because of their high sugar content. Another factor is night feeding with bottle and the contents of the food. Bottles' containing

highly fermentable sugars, acidity of these contents, fermentable carbohydrates are important factors [19].

### Clinical appearance of early childhood caries

As soon as the primary teeth erupted, they begun to be affected by ECC, firstly, the upper incisors affected as white spot lesions and if it continues to demineralization vestibule and occlusal surfaces of primary molars and vestibule surfaces of primary canines could be affected by ECC [20]. However, lower incisors are generally not affected because of the protective effect of the tongue [12]. Since young and immature enamel of primary teeth are porous, they can easily be dissolved by acids until their maturation is completed [21]. ECC, begins as a white decalcification area depending on the localization of the plaque on the surface of the teeth close to the edge of the gum or occlusal surfaces [22]. In case of progression of demineralization; yellow, brown or black. As the lesion progresses, the cavity spreads to the tooth surface in the form of a black band and causes loss of hard tissue [23]. This can sometimes cause crown fractures [2,22,24].

### Early childhood caries problems

ECC may adversely affect the physical and psychological development of children as well as their families. Pain, caused by untreated teeth can affect the chewing function of the child and may lead to malnutrition and physical development disabilities [20]. Children's quality of life can be seriously affected by severe caries because of pain and discomfort which could lead to disfigurement, acute and chronic infections, and altered eating and sleeping habits, as well as risk of hospitalization, high treatment costs, and loss of school days with the consequent diminished ability to learn [1]. Loss of anterior upper teeth at an early age due to ECC may cause speech disorders [20,25]. At the same time, early loss of primary teeth, can lead to orthodontic and also periodontal problems [26].

### Prevention of early childhood caries

In order to prevent the disease, families should be informed about the existing and possible situations and a strategy based on education should be developed [22]. Prevention begins in the prenatal period. In this period, mothers should be aware about sugar consumption, caries, gingivitis, poor oral hygiene, evaluation of teeth loss [27]. It has been suggested that fluoride and antimicrobial agents can be applied topically to prevent children from an increase in *S. mutans* to pathological levels [28]. In 2007, it was reported that casein-containing agents could be used in the prevention from ECC [22]. Improper eating habits of the child should be regulated in order to prevent ECC. Families should be aware that bottle feeding should be stopped when their

babies are 12-14 months old [29]. Since long-term breastfed infants are candidates for the development of ECC, it is recommended to regulate breastfeeding at night [30]. The teeth of the babies' mouths should be cleaned with dental wipes before the teeth are applied. The teeth of the child should be brushed with water with a soft bristled toothbrush or specially prepared finger brushes until the age of 2 years [31], and from the age of 2-3 it is recommended to brush with lentil-sized fluoride toothpaste [30]. Flossing should be used with tooth brushing between the ages of 3-6 [14,29].

### Treatment of early childhood caries

Treatment of children with ECC depends on the extent of the lesions, the age of the child, the capacity of behavior and the degree of cooperation of the parents. When these factors are not taken into consideration, the first step in the treatment of these children is to recognize and eliminate harmful habits [12]. In addition to the extent of the disease process, the developmental level of the patient, comprehension skills, affect the treatment approach of the physician [22]. In the early stages of the ECC, treatment should stop or at least reduce the activity of the disease. Radical methods should be preferred for treatment under general anesthesia. Processing time should be kept as short as possible. In this way, the possible risks of general anesthesia are minimized. In addition, procedures that may not have good prognosis after treatment should be avoided [32].

### Obesity

Nowadays, with the effect of developing technology and changing social structure, spending time on television, computer, mobile phones and tablets and with the change in feeding habits, the prevalence of obesity increases gradually in childhood and adolescence. Obesity is an important nutritional problem affecting 25-30% of children and adolescents. Childhood obesity, especially in developed countries, has an increasing prevalence all over the world. It is reported that approximately 30% of obese individuals in childhood will become obese adults in the future [33].

### Definition of obesity

The definition of obesity by the World Health Organization (WHO) is: "Abnormal or excessive amounts of fat accumulation in the adipose tissues to the detriment of health". In other words, obesity is a multifactorial disease characterized by increased body fat and behavior, endocrine and metabolic changes [34].

### Diagnosis of obesity in children

Exogenous obesity is the most common type of obesity in children, also called "simple" or "primary obesity [35]. In addition, there are more rare varieties with different conditions such as genetic and / or endocrine diseases. Diagnosis of obesity is more complex than in adults, as growth and development continue in children and adolescents. Fat mass in the body varies according to developmental level, age and gender. Waist circumference, skinfold thickness, body mass index (BMI) is the most commonly used non-invasive measurement methods. Waist circumference width and waist-hip ratio gives an idea about the percentage of fat in the upper body; however, it does not provide information about visceral obesity [35].

### Factors Causing Obesity Development in Children

1. Genetic Factors
2. Environmental Factors
  - a) Intrauterine Environment
  - b) Family and Psychosocial Factors
  - c) Nutrition
  - d) Physical Activity
  - e) Sleeping Habits

### Common Risk Factors for Obesity and Caries Development

#### Obesity and saliva parameters

The structural features of saliva have great importance for the oral cavity to remain health. Phosphate, sialic acid, protein and peroxidase activity changes were observed in the saliva of overweight and obese children and all these affects have buffering capacity on saliva [36]. Decrease in salivary buffering capacity means increased risk of caries [37]. In a study evaluating clinical, microbiological and inflammatory parameters in terms of carious tooth and periodontal disease parameters in obese children; decrease in salivary flow rate in obese children, higher secretory immunoglobulin A levels, more caries and more severe gingivitis have been detected [38].

#### Inadequate consumption of breast milk

Nowadays, breastfeeding time allocated to babies by working mothers is decreasing due to intensive work pace. This is replaced by mixtures that are fed with formula and bottle. All of these products contain carbohydrates which are more fermentable than breast milk. As the frequency of this type of nutrition increases, common caries are encountered in early ages [39].

### Difficulty accessing healthy foods

Healthy food consumption is important for preventing obesity and maintaining oral health. Children with poor eating habits are at higher risk of developing obesity and dental caries [40].

### Consumption of sweetened beverages

The addition of fruit juices, energy drinks and carbonated drinks aroma, sugar, sweetener and so on. Increased consumption is among the factors that cause obesity and caries. In particular, sucrose is the major risk factor. In addition, high carbohydrate content of food and drinks can affect the viscosity and content of saliva has been proven by studies [40].

### Children in the low income population

The economic status of families, access to the nutrients necessary for a healthy diet, is important for the general health of the child and oral health. As access to these elements becomes difficult, the risk of disease and bruise increases when healthy foods are replaced by foods with high sugar content and low nutritional value [39].

### Strategies to prevent obesity

The American Academy of Pediatrics, the American Academy of Pediatric Dentistry, the Center for Disease Prevention and Control, and other authorities have identified some interrelated priorities in the prevention of obesity and dental caries in children [39]. These; to consume fruits and vegetables, to encourage breast milk and breastfeeding, to seek nutritional counseling, to reduce the consumption of sugary drinks. In some countries, "Healthy Nutrition and Active Life Programs" have been prepared. Within the scope of the program, it was aimed to provide adequate and balanced nutrition and regular habit of physical activity to preschool and school age children, adolescents and young people by including obesity in formal and non-formal education programs in schools and to contribute to the education of healthy and productive generations.

### Conclusion

Combating obesity also means combating many diseases. Particularly, combating childhood obesity is extremely important for the future in the field of health. In order to create a healthy society in terms of oral health, prevention of disease should be the main objective instead of fighting against diseases. Therefore, early prevention of the effects of chronic diseases such as obesity, tooth decay and gingivitis on the rest of the child's life will be an important

step in terms of improving the general health of the society.

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