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# Risk factors for early childhood caries

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**Abstract**
**Introduction:** Early childhood caries is one of the most prevalent childhood diseases worldwide. Objective: To analyze the literature on factors associated with susceptibility to caries, such as dietary factors, factors related to breastfeeding, factors related to hygiene, factors related to oral microflora, sociodemographic factors.
**Methodology:** Current literature review carried out using Pubmed and SCOPUS, with emphasis on the last 5 years". The search was performed using Boolean logical operators, with the keywords of: "risk factors of caries"," diet AND caries", "caries AND hygiene", "caries AND socioeconomic", "caries AND bacteria", "caries AND breastfeeding".
**Results:** There are factors associated with susceptibility to caries such as dietary factors due to high frequency of sugar intake, factors related to breastfeeding due to intake after 12 months, factors related to hygiene due to poor hygiene, factors related to oral microflora as they break its homeostasis and socio-demographic factors such as low socioeconomic level.
**Conclusion:** The oral cavity contains bacteria which can break the homeostasis producing demineralization of the hydroxyapatite crystals of the teeth giving rise to dental caries. Several factors such as breastfeeding after 12 months of age, low socioeconomic level, deficient oral hygiene, frequent ingestion of sugars is strongly linked to dental caries.

**Keywords:** Risk factors of caries, diet, caries, hygiene, bacteria, breastfeeding, socioeconomic

## 1. Introduction
Early childhood caries is one of the most prevalent childhood diseases worldwide; with a prevalence of 8.2% [1] to 85% for disadvantaged groups [2]. This chronic infectious disease has been described as a public, social, political, behavioral, medical, psychosocial, economic and dental problem [3]. The American Academy of Pediatric Dentistry defined early childhood caries (ECC) as: "the presence of one or more decayed, missing or filled tooth surfaces on any primary tooth in children 71 months of age or younger [4].
Although not life-threatening, early childhood caries has a negative impact on quality of life when associated with pain [5]. It affects the function, social interactions, and cognitive and neurological development of affected children, whose parents also suffer economic and emotional stress [6].
Several studies have evaluated and categorized risk factors for ECC, such as sociodemographic factors, dietary factors, oral hygiene factors, and factors related to oral bacterial flora and breastfeeding/bottle feeding [4, 7].
Although evidence has been observed on the risk factors that cause ECC, the vast majority of these are from a long time ago and none is focused on articles with emphasis on the last 5 years, therefore, the objective of this study is to analyze the literature about the factors associated with susceptibility to caries such as dietary factors, factors related to breastfeeding, factors related to hygiene, factors related to oral microflora, sociodemographic factors.

## 2. Methodology
Articles on the subject published through the PubMed, SCOPUS and Google Scholar

Databases were analyzed, with emphasis on the last 5 years. The quality of the articles was evaluated using guidelines, i.e., identification, review, choice and inclusion. The quality of the reviews was assessed using the measurement tool for evaluating systematic reviews. The search was performed using Boolean logical operators AND, OR and NOT. The search was performed using Boolean logical operators AND, OR and NOT; with the keywords: "risk factors of caries", "diet AND caries", "caries AND hygiene", "caries AND socioeconomic", "caries AND bacteria", "caries AND breastfeeding". The keywords were used individually, as well as each of them related to each other.

## 3. Results

### 3.1 Dietary factors

Caries is caused by changes in the structure of the microbial communities present in the oral cavity; it is driven by specific inputs from the host: the diet [8]. For years, the WHO has been recommending less than 10% of energy intake from free sugars. Reducing free sugars in the diet may be part of a strategy to reduce the prevalence of caries, since as mentioned above it is "triggered" by improper dietary habits [9].

Diet is an important factor not only in the incidence of caries since a nutritional deficiency can cause different dental diseases such as delayed eruption of teeth due to protein deficiencies; hypoplasia due to vitamin A deficiency, hypomineralization and delayed eruption due to vitamin D deficiency, causing caries more easily [10]. To date, it is unclear whether a vegetarian diet can have impacts on dental health, but it was found to be associated with a higher risk of dental erosion but a lower number of decayed teeth [11].

Factors associated with caries are the frequency of sucrose consumption [7]. The daily frequency of consumption of sweetened foods is associated with a higher incidence of caries [12, 13], limiting the frequency of consumption of sweets is a very important factor in the prevention of caries [14]. Another factor of prevention would be a higher frequency of consumption of drinking water in fluoridated areas [13], as well as the intake of vegetables (excluding potatoes); whole grains; and omega-3 fats which were inversely associated with dental caries [15].

For this reason, good eating habits should be promoted from an early age. In fact, we must teach parents to help their children develop a healthy lifestyle [16]. Teach to prefer slowly absorbed sugars and drastically reduce the intake of free sugars with the diet, and as soon as the child can chew, the diet should include foods rich in fiber and water should be preferred to any sweetened beverage [9].

Frequent intake of sugars is proportional to the risk of caries, it is necessary to limit the consumption of free sugars in the diet and for parents to teach parents their children a healthy lifestyle for their children.

### 3.2 Factors related to breastfeeding/bottle feeding

Children who were ever breastfed have a reduced risk of early caries compared to those who were never breastfed. Children who are breastfed = 12 months significantly increase the risk of caries compared to those breastfed <12 months [17]. Nighttime breastfeeding after 18 months is considered a risk factor for caries [18, 19]. Children who are breastfed for ≥24 months are associated with a higher prevalence of caries [20, 21]. The risk of caries is increased in children 3-5 years of age by living in a rural area, exclusive breastfeeding, higher frequency of daily snacking, high frequency of snacking before bedtime and starting to brush teeth at an older age; the risk of caries decreases when parents helped their children to brush their teeth [16, 22].

Exclusive breastfeeding does not significantly decrease the risk of ECC compared to bottle feeding [17] at 38 months the prevalence of ECC is 1.8 times higher in children breastfed more than three times / day, 1.4 times higher in children bottle fed more than three times a day and 1.5 times higher with combined high frequency of bottle and breastfeeding together [23]. There is no clear impact on the high prevalence of caries in terms of duration of breastfeeding and prolonged use of a bottle (about 2.5 years) [24].

Breastfeeding after 12 months begins to increase the risk of caries, no benefit is found after 38 months compared to bottle feeding. It is important that parents brush their children's teeth to reduce the risk.

### 3.3 Factors related to oral hygiene

Infrequent tooth brushing is significantly associated with dental caries [1, 25]. Among all the factors studied, visible plaque and brushing teeth less than once a day are the two most important oral hygiene factors related to caries7. The occurrence of dental caries seems to be increasing in schoolchildren in rural areas due to poor oral hygiene status [26]. There is only one study showing evidence of an association between flossing and reduction of proximal caries in the primary dentition. However, flossing should never be discouraged [27].

The likelihood that the child will brush regularly is greater when the parent brushes regularly; therefore, parent-centered tooth brushing interventions are necessary to reduce early childhood caries rates [28]. Regardless of whether the child is autistic or not since according to studies the prevalence of caries in autistic children is lower compared to another control group due to parental perseverance [29].

Accumulated dental plaque and untreated caries appear to be independently associated with mortality [30], hence the importance of oral hygiene, and the proportion of children with poor oral hygiene and caries who have developmental dental anomalies is twice that of children with good oral hygiene and no caries respectively [31].

Poor oral hygiene is strongly related to the development of caries and various diseases, parent-centered brushing interventions should made.

### 3.4 Factors related to oral bacterial flora

Bacteria in the oral cavity are found in the form of a biofilm [32]. The primary conquerors of oral areas are predominantly facultative anaerobes such as streptococci and Actinomyces [33, 34]. ECC is an aggressive form of dental caries characterized by a colonization of mutans streptococci, which sometimes exceeds 30% of the culturable plaque-biofilm flora [35]. Generally, 2 species of Streptococcus are found in human wounds, Streptococcus mutans (serotypes c, e, f and k) and less frequently Streptococcus sobrinus (serotypes d and g) [36].

Oral pathologies are not caused by the introduction of exogenous pathogens into the oral environment, but rather by a degradation of homeostasis leading to changes in the composition of the microbial societies present in healthy states [8]. In the presence of sugar and other fermentable carbohydrates, the dynamic loss of minerals (demineralization) is initiated by the acid produced by bacteria [34]. Their presence produces a decrease in pH below 5.5, resulting in demineralization of the hydroxyapatite crystals of the enamel and proteolytic degradation of the hard tissue composition of the tooth [37].

The oral cavity contains acid-producing bacteria such as Streptococcus mutans, Streptococcus sobrinus and Actinomyces spp. which can break the homeostasis of the oral cavity and produce demineralization of the hydroxyapatite crystals of the teeth leading to dental caries.

### 3.5 Socioeconomic factors

The highest prevalence of caries is in boys more than girls, aged 8 months to 7 years and in low socioeconomic groups [2, 38, 39]. There is a significant association between income inequality and oral health [40, 41]. Lifetime family income trajectories are affecting increases in treated and untreated dental caries from infancy to adulthood [42].

Maternal educational level is the most relevant indicator in the association with caries [38, 39]. It is now accepted that the reactions and behaviors of the mother are affecting the quality of life of her child, as well as general and oral health. Maternal obesity and smoking during pregnancy were predictors of dental caries in preschool children [43]. Therefore, it is important to educate and provide data on the value and sequalae sequels of childhood caries in order to raise awareness among mothers.

Teaching, earnings and other socioeconomic components are difficult to change in the short term. Therefore, tactics have to be developed to increase the motivation and self-efficacy of parents to give them the decision, reasoning and tools for the prevention of dental caries [43].

There is an important relationship between low socioeconomic level and the appearance of caries, as well as the educational level of the mother and her condition during pregnancy. It is important to provide education to make parents aware of these issues for prevention.

## 4. Conclusions

The oral cavity contains bacteria which can break the homeostasis producing demineralization of the hydroxyapatite crystals of the teeth giving rise to dental caries due to the frequent ingestion of sugars, as well as poor oral hygiene. Several factors such as breastfeeding after 12 months of age, low socioeconomic level, the mother's educational level and her condition during pregnancy are strongly linked to dental caries. It is important to provide education for prevention.

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