

## BREASTFEEDING AND DENTAL CARIES IN CHILDREN – A REVIEW

Maura Adelina Hincu<sup>1</sup>, Geanina Besliu<sup>2</sup>, Oana-Maria Rosu<sup>3</sup>, Gabriela Ildiko Zonda<sup>4,5</sup>,  
Smaranda Diaconescu<sup>4,6</sup>, Daniela Anistoroaei<sup>4</sup>, Luminita Paduraru<sup>4,5</sup>

<sup>1</sup>Ph. D. student, University of Medicine and Pharmacy „Gr. T. Popa” Iași, România

<sup>2</sup>Fellow in Pediatrics - „Sf. Maria” Clinical Emergency Children’s Hospital, Iași, România

<sup>3</sup>Ph. D. student, University of Medicine, Pharmacy, Sciences and Technology, Târgu Mureș, România

<sup>4</sup>University of Medicine and Pharmacy „Gr. T. Popa” Iași, România

<sup>5</sup>Neonatal Intensive Care Unit, „Cuza-Vodă” Clinical Hospital of Obstetrics and Gynecology, Iași, România

<sup>6</sup>Department of Pediatric Gastroenterology –“Sf. Maria” Clinical Emergency Children’s Hospital, Iași, România

Corresponding author: Oana-Maria Roșu, e-mail:oana7772@yahoo.com

Corresponding author: Daniela Anistoroaei, e-mail:anistoroaei\_daniela@yahoo.com

### ABSTRACT

Breastfeeding is the best method of providing infants with the all the nutrients they need for healthy growth and development. In addition to being an ideal nutritional source for infants, exclusive breastfeeding is associated with a multitude of benefits for both child and mother. Breastfeeding plays a role in preventing malocclusion, but caries is one condition unfavourably associated with it. While breastfeeding is a protective factor for childhood caries before 1 year of age, by contrast, breastfeeding beyond the age of 12 months is associated with an increased risk of caries. Most recent recommendations of pediatric and dental societies advise breastfeeding until the age of 2 years, accompanied by dental hygiene and optimal nutrition. The prevention of early childhood caries depends on multidisciplinary efforts, involving different healthcare professionals who could provide dental care information to expectant mothers.

**Key words:** newborn, breastfeeding, dental caries

### Introduction and benefits of breastfeeding

Breastfeeding is the best method of providing infants with the all the nutrients they need for healthy growth and development. WHO recommends that oral feeding should be initiated within the first hour after birth followed by exclusive breastfeeding up to 6 months of life. Breastfeeding can be continued along with appropriate complementary foods up to two years of age or beyond [1].

Critically-ill preterm infants who cannot be breastfeed can still benefit from the advantages of their mothers’ milk preserved by refrigeration or freezing to be administered later. These guarantee microbiological safety, however refrigeration for more than 72 hours or long-term freezing decreases protein and fat content [2].

In addition to being an ideal nutritional source for infants, exclusive breastfeeding is associated with a lower rate of mortality

from gastrointestinal infections and acute respiratory infections [3], urinary, and middle ear infections [4], as well as atopic diseases and strengthens the infant immune system. It also protects against chronic diseases such as obesity and diabetes but depending on race and ethnicity coupled with healthy feeding practices in infancy and early childhood [5,6].

A specific and concerning issue for our country is the birth rate for teenage mothers which is extremely high. In some cases, teen birth is the consequence of child abuse, another concern in Romania. Teen mothers have lower rates of breastfeeding duration and exclusivity than older mothers [7,8].

However, UNICEF recently communicated that many countries continue to underestimate the benefits of breastfeeding even when the evidence supports its short- and long-term effects. Improving breastfeeding rates around the world could save the lives of more than 820,000 children under age 5 every year, as well as preventing an additional 20,000 maternal deaths from breast cancer [9,10,11].

Improved neurocognitive development, intelligence, memory performance, early language, and motor skills at 14 and 18 months have also been described [12,13] in the case of breastfed children, but new evidence in a 16-year follow-up study of a large randomized trial of 13 557 participants showed little evidence on beneficial effect of breastfeeding on overall neurocognitive function at age 16 years, suggesting limited but persistent benefit only on verbal ability. These benefits were small in magnitude compared to other family and birth factors and appeared to decrease with age from childhood to adolescence [14].

Dental caries (tooth decay) is a major public health problem affecting 60–90% of school aged children, with higher prevalence

in children with low socio-economic status. It is caused by multifactorial and complex interactions between cariogenic bacteria in the mouth and dietary carbohydrates that lead to the demineralization of the teeth. The pain and infection caused by dental caries can be extremely distressing and produce an impact on the quality of life and ability to function, leading to loss of productivity and involve high health care costs including general anesthesia for treatment of severe cases. This accounts for one of the most common causes of child hospitalization in industrialized countries and is among the most common causes of avoidable child hospitalizations. Early loss of deciduous dentition can lead to ongoing dental problems in the permanent dentition.

Human milk with a rich microbiome helps establish optimal oral and intestinal flora and may mediate protection from early childhood caries. A 2016 *Lancet* global collaboration gathered information from 28 systematic reviews and meta-analyses and analyzed the implications of breastfeeding in oral health. While a role was suggested for breastfeeding in preventing malocclusion, caries was the only included disease condition unfavorably associated with breastfeeding [15].

The French Society of Pediatrics conducted in 2019 a review of publications and meta-analyses dating from the past 10 years regarding early childhood caries and breastfeeding, and concluded that extended breastfeeding is a protective factor for childhood caries before 1 year of age. By contrast, breastfeeding beyond the age of 12 months has an increased risk of caries in infants not taking into account factors such as eating habits of the mother or infant (feeding during the night, number of meals per day, eating sweet foods etc.), dental hygiene, or the socio-cultural context.

Most recent recommendations of

pediatric and dental societies advise breastfeeding until the age of 2 years, accompanied by dental hygiene and better nutrition, reducing the frequency and consumption of sugary foods, aiming to help mothers into prolonged breastfeeding [16]. However, concern has been raised that breastfeeding and its duration may increase the risk of early childhood caries.

### **Risk factors for development of early childhood caries**

Early childhood caries (ECC) represent a complex and multifactorial disease that is impacted by biomedical factors and unmet social needs.

The bacteria that causes dental caries is most often *Streptococcus mutans*, that strongly adheres to the teeth and produces acids as waste products of fermentable carbohydrate metabolism that demineralize tooth enamel, progressing into the dentin. Weakened enamel and dentin can result in cavitation. Left untreated, caries can extend to the pulp and destroy the entire tooth. Early childhood caries are a risk factor not only for dental caries in primary teeth, but in permanent dentition as well [17].

However, not all children who carry *Streptococcus mutans* manifest caries, even with similar oral hygiene, diet, and other environmental factors. This suggests that host susceptibility plays a role in the development of dental caries. *IL32*, *GALK2*, and *CELF4* were identified as potentially plausible genes that may play a role in the development of dental caries and interact with *Streptococcus mutans* through their involvement in galactose and carbohydrate metabolism, and host immune response [18]

An initial protective effect of breastfeeding against early childhood caries may be related to breast milk's immunomodulatory factors and rich microbiome. Breast milk contains *Lactobacilli*, human casein and secretory

IgA that inhibit growth and attachment of *Streptococcus mutans*.

It is believed that *Streptococcus* and *Actinomyces* acquired at delivery and after birth induce selective growth of other species (including more strictly anaerobic bacteria like *Veillonella* and *Fusobacteria*). Thus, as the baby grows microbial species evolve and increase in diversity, reaching adult-like stability around 2 years of age. Most evidence available today shows that the early oral environment is strongly shaped by the mother and maternal oral microbiota has been proposed to colonize the placenta where it could influence fetal immune tolerance towards the mother's microbiome. Further transition into a more mature and complex microbial ecosystem is mainly influenced by the external environment, as well as vertical transmission from the parents. Children's oral microbiome changes with the emergence of primary teeth and the density of bacteria increases significantly with age [19].

The natural sugars in human milk may become the substrate for cariogenic bacteria causing early childhood caries to develop and progress rapidly.

Vitamin D status may influence childhood dental health. Low maternal vitamin D levels are associated with early childhood caries and mothers with higher prenatal vitamin D intakes are more likely to report that their children were caries-free [20]. Additionally, the children's vitamin D levels were found to influence the development of caries [21]. The presence of caries was significantly associated with 25(OH) levels < 75 nmol/L and < 50 nmol/L along with lower household education and poor oral hygiene. Improving children's vitamin D status may be an additional preventive consideration to lower the risk for caries.

Exposure to carbohydrates which is the

essential substrate for cariogenic bacteria is a key factor in early childhood caries development. Refined sugars contribute considerably to tooth decay. Frequency of feeding and feeding practices, such as prolonged nocturnal feeding (either breast or bottle) may increase early childhood caries risk. A number of studies reported significant correlations between breastfeeding during the night [22,23], on demand [24], or sleeping with the nipple in the mouth and increased prevalence of dental caries [25]. One cohort study found an increased adjusted risk of dental caries with increased daily breastfeeding frequency including nocturnal feeding [26].

Prolonged (>18-24 months) breastfeeding in preterm babies and in children who started tooth brushing after 1.5 years of age was associated with an odds ratio for severe childhood caries of 5.31 (CI 1.50, 18.79) and 0.41 (CI 0.18, 0.93), respectively [27, 28]. Sugar and fruit-juice consumption and lack of periodic dental examination, nocturnal bottle feeding and nocturnal breastfeeding also affected early childhood caries formation significantly [29].

Nocturnal breastfeeding often used to comfort infants leads to prolonged exposure of the teeth surfaces to the cariogenic bacteria, hence increasing the risk of dental caries. Thus, oral hygiene practices to remove bacterial plaque are paramount as more teeth erupt.

#### **Breastfeeding and ECC**

Although studies report that the cariogenicity of human milk alone is low, plaque from solid foods together with frequent and prolonged exposure to human milk complicates the analysis of caries risk [30].

All breastfeeding mothers could benefit from individualized oral hygiene instruction, especially once teeth begin to erupt around 7 months of life. Mothers who breastfeed

children with teeth throughout the night need to know how important it is to start out with a “clean slate” at bedtime.

Nighttime brushing routine is effective to remove plaque from every surface of the teeth [31] and mothers should be instructed to wipe the teeth off at the end of the feeding, rather than letting the milk residue sit on the teeth. A clean washcloth and water could be kept next to the bed and used to rub as many of the surfaces of the teeth as possible once the child finished feeding. Although not as thorough as brushing the teeth, this practice could help to eliminate excess milk residue from the teeth without completely disrupting the child.

#### **Oral health recommendations**

To optimize the benefits of breastfeeding and minimize early childhood caries, parents should follow recommendations for proper oral hygiene regarding their children, appropriate fluoride exposure, regular dental visits, and a healthy diet.

Parents should be advised to avoid saliva-sharing behaviors (eg, sharing utensils with their children or cleaning a pacifier with their mouth), as these may increase early colonization of *Streptococcus mutans* in infants and to seek regular preventive dental care and attend to caries, both for their children and themselves.

In addition prenatal counseling should include a discussion of the importance of good maternal oral health and diet – including an adequate vitamin D intake.

An oral health risk assessment and evaluation of fluoride exposure should be performed by 6 months of age. Parents should be advised to establish a routine by the time the child is 12 months of age, to clean their children’s mouths after feedings (before teeth arrive) with a clean, wet, soft cloth and to brush their children’s teeth, once they erupt, twice daily using a soft toothbrush. Use of fluoridated toothpaste in

small amounts provides the benefits of fluoride without increasing the risk of fluorosis, especially for children at risk for caries.

Also, parents should be advised to avoid giving their children sugar-containing snacks and drinks to reduce ECC risk.

The prevention of early childhood caries depends on multidisciplinary efforts,

involving different healthcare professionals (dentists, pediatricians, nurses, primary healthcare workers, gynecologists) who could provide dental care information during pregnancy.

**Contribution of authors:** all authors equally contributed to this study.

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