



## Risk factors for dental problems: Recommendations for oral health in infancy

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### ARTICLE INFO

#### Keywords:

Oral health  
Dental caries  
Risk factors  
Infant  
Prevention

### ABSTRACT

Primary care providers, gynaecologists and paediatricians have to be aware of the importance of oral health in infancy and possible consequences for child's development, growth, health and quality of life. Oral diseases, particularly dental caries, developmental defects of the dental tissues and periodontal or orthodontic issues have a complex and interrelated aetiology with common, primarily behavioral based risk factors. A sugar-rich diet is the key risk factor with detrimental consequences for general and oral health, particularly in combination with an insufficient oral hygiene. Therefore, daily tooth brushing with fluoride toothpaste and reducing of sugar intake are the key pillars to prevent oral diseases, including a positive effect on numerous chronic diseases. Future preventive approaches should focus on pregnant women and mothers of infants with a common vision of health and a shared responsibility for children's oral health care to promote healthy lifestyles and self-care practices in families.

### 1. Introduction

Recently there has been an increased awareness of the role of oral health for the development and quality of life of infants and toddlers, particularly their general health and well-being [1,2]. Problems in oral health, especially dental caries, developmental defects of the dental tissues and periodontal or orthodontic issues can have a major impact on both dentitions and affect child's health and growth (Fig. 1) [1–3]. The objective of this article is to review risk factors for dental problems in infancy and to highlight strategies and recommendations for its prevention.

### 2. Early childhood caries

The World Health Organization (WHO) announces that the prevalence of dental caries is growing rapidly throughout the world and that early childhood caries (ECC) is a serious health problem [1]. ECC is a rampant caries form of primary dentition and is the current and most used term to describe dental caries in very young children (Fig. 1) [2]. It is defined as the presence of one or more decayed, missing or filled tooth surfaces in any primary tooth in a child under the age of six [2]. Any sign of smooth-surface caries in children under the age of three is known as severe ECC (S-ECC) [2].

Worldwide up to 90% of preschool children are affected with the most severe forms in low- and middle-income countries [1,2,4]. In

Europe, North America and Australia 5 to 40% of children aged 1 to 5 years have caries whereas in Africa, Latin America and South-East Asia virtually all children are affected [1,2,4].

Unfortunately, most carious lesions remain untreated with devastating consequences for oral and general health (Fig. 2) [1,2,5]. Widespread tooth destruction soon after tooth eruption may cause dental pain, odontogenic infections and difficulties with eating, speaking and sleeping [1,2,5–7]. Children with ECC may suffer from gastrointestinal disorders, malnourishment, underweight, and iron deficiency anemia and an increased risk of caries in the permanent dentition [1,2,5–7]. Treatment of ECC is very expensive and often requires comprehensive, time-consuming full-mouth rehabilitation with multiple tooth extractions under general anesthesia [1,2,5–7]. Frequent antibiotic and analgetic medications, hospitalizations and emergency room visits are additional burdening factors [1,2,5–7].

The aetiology of ECC with interaction of host, agent and environment over time is the same as for caries at later ages, but more complex due to age-specific feeding practices and the specific characteristics of primary teeth [1,2,4,8,9]. Primary teeth have a thinner and less mineralized enamel than permanent teeth, and a large pulp close to tooth surfaces promoting caries susceptibility and its rapid progression [8].

ECC is a multifactorial disease with many interacting individual, cultural, social and socioeconomic factors (Fig. 3) [1,2,4,9–13]. In the meantime, more than hundred risk factors have been identified [10]. Key factors are primarily behavioral-based and include presence of a

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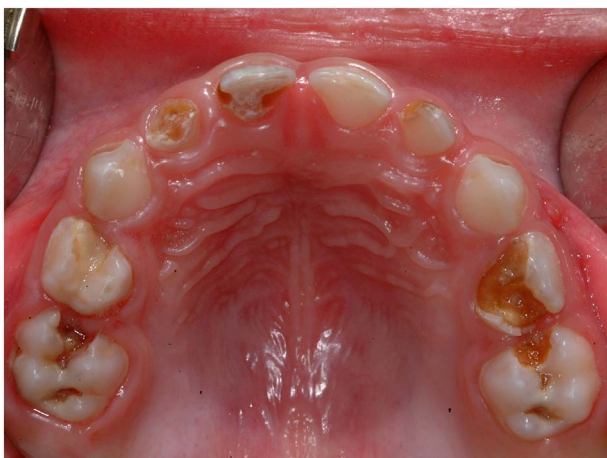


Fig. 1. Early childhood caries in a 3,5-year-old child.

dental biofilm with acid-generating microorganisms (*Streptococcus mutans*) over a prolonged period in combination with dietary sugars [1,2,4,9–13].

Age-specific feeding practices like frequent use of nursing bottles with sugary content while sleeping or between meals, and prolonged ad libitum and nocturnal breastfeeding beyond the first year of life are possible risk factors for caries development, particularly in combination with an insufficient oral hygiene [1,2,4,9–16].

Relevant factors for oral hygiene are the age of the child brushing started, parental involvement in child's tooth cleaning, and fluoride use [1,2,4,9–16].

Late start of tooth brushing, no regular oral hygiene behaviour as well as no second brush by the parents are detrimental for removal of the biofilm and promote caries development [1,10–16].

Vitamin D deficiency may also be associated to increase risk of caries including developmental defects of the dental tissues by influenced calcium metabolism and calcification of teeth during hard tissue

formation [17,18]. Children with developmental dental defects such as enamel hypoplasia seem to be at high risk for caries and coined the term hypoplasia-associated early childhood caries [1,2,19].

### 3. Developmental defects

Developmental defects of the dental tissues can affect all teeth, groups of teeth and single teeth in one or both dentitions resulting from disturbances in the pre-, peri- and postnatal tooth developmental process (Fig. 4) [20]. In recent years, non-fluoride-associated developmental defects of enamel (DDE) are in the focus of interest (Fig. 5) [21,22].

DDE are variations in quality and quantity of the enamel presenting alterations in enamel translucency, opacity and/or thickness (hypomineralisation, enamel hypoplasia) [20,22]. The currently best-described DDE is molar-incisor hypomineralisation (MIH) in the permanent dentition or hypomineralised second primary molar (HSPM) in the primary dentition [21–23].

DDE can have a substantial effect on oral health because it is associated with tooth sensitivity, increased caries susceptibility, altered occlusal function and aesthetic appearance [20–23]. Typical characteristic signs are post-eruptive enamel loss and atypical caries [20–23]. Less mineralisation, porosity, thinner enamel and irregular surfaces of teeth are predisposing factors for tooth wear (attrition, abrasion, erosion), and plaque accumulation in consequence of limited oral hygiene [20–23].

The prevalence of DDE varies between 4% and 75% in the primary dentition, depending on the population studied and the criteria used for scoring [21,23–25].

Currently, the aetiology of DDE with the underlying causative mechanism is inconclusive [20–25]. Local, systemic, genetic and environmental conditions are assumed to affect the amelogenesis of the primary dentition beginning during pregnancy to the end of the first year of life [20–25]. During this timeframe, several factors have been suggested to affect the ameloblasts and disrupt dental matrix formation or maturation (Fig. 4) [20–25]. Relevant maternal and child risk factors

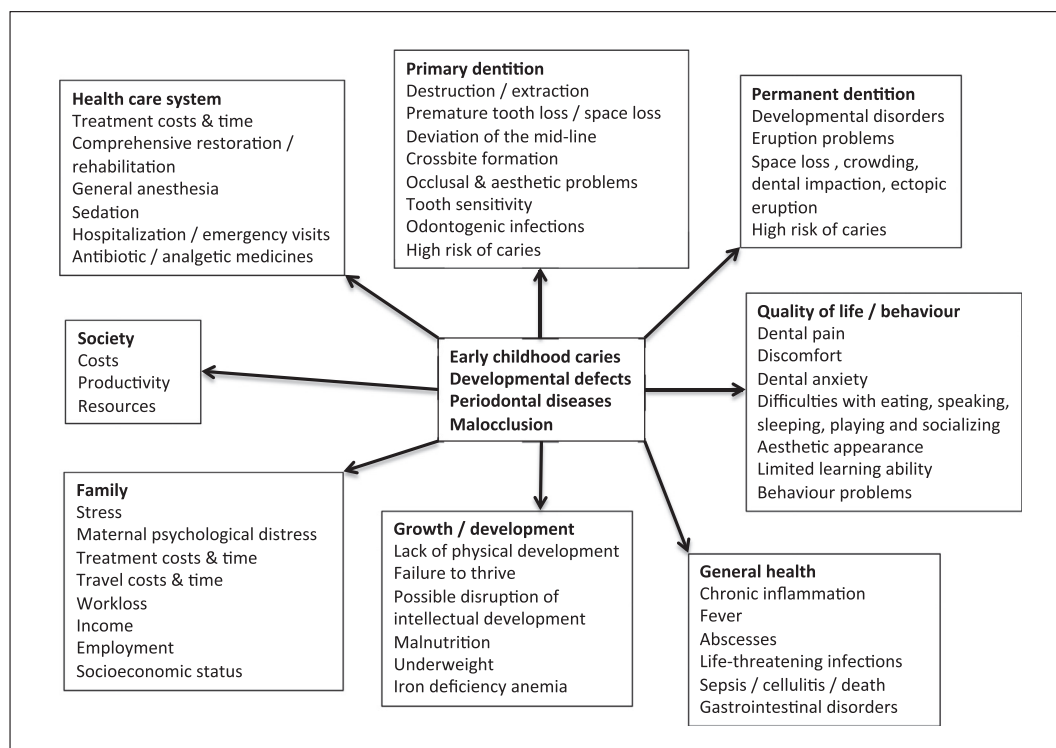


Fig. 2. Consequences of dental problems in infancy.

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