

Early Childhood Caries: Epidemiology, Aetiology, Clinical Features, Prevention and Management

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Received: June 14, 2019; Published: June 27, 2019

Abstract

Early childhood caries (ECC) is one of the most prevalent diseases in children, in both developing and industrialized countries. ECC is the presence of one or more decayed, missing, or filled primary teeth in children aged 71 months (5 years) or younger. ECC is driven by a dysbiotic state of microorganisms mainly caused by a sugar rich diet. Poor oral hygiene and insufficient plaque removal leads to rapid progression of ECC. ECC can begin early in life, progresses rapidly and often goes untreated, and can affect the immediate and long-term quality of a child's life. Relationship between breast feeding and ECC is likely to be complex and confounded by many biological variables such as *Streptococcus mutans*, enamel hypoplasia, intake of sugars, as well as social variables such as parenteral education and socioeconomic status, which may affect oral health. The etiology, clinical features and management of ECC are discussed.

Keywords: Early Childhood Caries; Children; Feeding

Introduction

ECC is one of the most common chronic infectious disease of childhood present worldwide. ECC does not only affect children's oral health, but also their general health [1,2]. The major contributing factors for ECC are improper feeding practices, familial socio-economic background, lack of parental education and lack of access to dental care. It has several unique characteristics in clinical appearance such as rapid development of caries, affecting larger number of teeth, involving tooth surfaces that are less prone to dental caries. Children with ECC are at high risk to develop caries with permanent dentition [3] or will have other problems with speaking/eating, which may lead to iron deficiency anemia [4] orthodontic problems [5] and enamel defects. ECC is associated with other health problems ranging from local pain, infections, abscesses, leading to difficulty in chewing, malnutrition, gastrointestinal disorders and difficulty in sleeping [6].

Epidemiology of ECC

Even though there is a decline in prevalence of ECC in children in Western countries, caries in preschool children remains a major problem in both developed and developing countries [7]. A review of the literature states that in most of the developed countries the prevalence rate of ECC is between 1 and 12% [8]. In less developed countries and among the disadvantaged groups in the developed countries, the prevalence has been reported to be high as 70%. The prevalence ranged from 11.4% in Sweden to 7 - 9% in Italy [9,10]. A high prevalence of ECC has been reported in some Middle Eastern Countries, such as Palestine (76%) and UAE (83%) [11,12]. The national surveys from few countries such as Greece (36%), Brazil (45.8%) and India (51.9%), Qatar (89.2%) [13-16] showed inconsistent prevalence of ECC. According to a study, the highest prevalence of ECC is found in 3 - 4 year old age group and that boys are significantly more affected than girls, aged between 8 months and 7 years [17]. A recently published study from Germany shows even 10% (up-to 26% with initial lesion) of 3 year old children with ECC and an increase up-to about 50% in 6 - 7 year old children [18]. Not only children, but also their parents should be motivated to take care of the primary dentition to prevent ECC and consequently further caries development in the secondary dentition.

Etiology of ECC

Dental caries results from multiple factors, among which there are 4 main factors that are concurrently present to initiate and progress the disease. They are pathogenic microorganisms [19], fermentable carbohydrate substrate [20], susceptible tooth surface [6] and time [21]. *S. mutans* and *Streptococcus sobrinus* are the main cariogenic microorganisms [22,23]. These pathogens produce acid, in the presence of fermentable carbohydrates such as sucrose, fructose and glucose and causes damage to tooth structure [24,25]. Lactobacilli also participate in development of caries lesion by playing important role in progression of lesion, but not its initiation [26]. *S. mutans* constitutes about 60% of cultivable flora of dental plaque obtained from preschool children with ECC [27]. Horizontal and vertical transmission of microbes can be seen. Horizontal transmission occurs between siblings and care givers [28,29]. Vertical transmission is also known as mother to child transmission [30]. Poor maternal oral hygiene and frequent snacking and sugar exposure increases chances of vertical transmission [31]. Infants delivered by cesarean section acquire *S. mutans* earlier than vaginally delivered infants since these deliveries are more aseptic and atypical microbial environment increases the chance of *S. mutans* colonization [32].

In appropriate feeding practice can prolong the exposure of teeth to fermentable carbohydrates which in turn may aggravate the chances of ECC [33]. Bottle feeding during bedtime or sleeping [34] is the most important cause of ECC and hence also known as nursing bottle caries, baby bottle caries. Frequent exposure to sugar, frequent snacking, taking sweetened drinks to bed, sharing foods with adults, as well as maternal caries status, oral hygiene and dietary habits predispose to early *S. mutans* colonization and establishment of its high counts [33].

Diagnosis

ECC is diagnosed as a dull, white band of demineralised enamel that quickly advances to obvious decay along the gingival margin [35], which progresses to complete destruction of crown, leading to root stumps. Caries is first seen in primary maxillary incisors [36]. Lesions can also be seen either in labial or lingual surfaces of teeth and sometimes both [37]. In moderate stage, caries begins to spread to maxillary molars. In severe stage, the caries process destroys maxillary teeth and spreads to mandibular molars. Mandibular incisors are more resistant to decay, due to their close proximity to secretion area of submandibular glands as well as cleansing action of tongue during suckling [21].

Prevention and management of ECC

Prevention of ECC should begin with prenatal education of expectant parents, progress through perinatal period, and continues with the mother and infant. Effective approach in the prevention is suppression of *S. mutans* in the mouth of child's primary caregiver, usually the mother. Chemical suppression by use of chlorhexidine gluconate in the form of mouth rinses, gels and dentrifices has been shown to reduce oral micro-organisms [38,39]. Minimise saliva sharing activities between children and parents including sharing of utensils, food and drinks. Regular use of fluoride toothpaste constitutes a cornerstone in child dental health, reducing the chance of caries [40]. Fluoride products such as tooth paste, mouth rinse and dental office topical have shown to reduce caries between 30% and 70% compared with no fluoride therapy [41,42].

The treatment objective for ECC are commonly to improve oral hygiene to eliminate carious teeth and to improve functioning and aesthetics of the child. Topical anti-microbial therapy using povidone iodine has been reported effective in the prevention of ECC [43]. Restorative care may involve restoration of carious teeth with dental materials like silver amalgam, composite resins, or glass ionomer cement. A stainless steel crown can be used to restore large multi surface carious lesions [44]. Pulpotomy [45] and pulpectomy are treatments for the pulpally involved carious teeth. Another important approach is Atraumatic Restorative Treatment (ART). This is a procedure based on removing carious tooth tissues using Hand instruments and restoring the cavity with an adhesive restorative material [46]. At present, the restorative material used is glass ionomer [47]. Teeth with poor prognosis should be extracted to prevent pain and spreading infection.

Conclusion

ECC is a chronic disease affecting young children and constitutes a serious public health problem. It is one of the most preventable diseases worldwide. In addition to a low sugary diet, children should brush their teeth twice a day under parental supervision. Pediatricians should check both the oral hygiene and fluoride anamnesis of the children while also asking about the parents about child's oral hygiene. Oral health has been recognised as an essential component of general health and quality of life. Hence both oral disease prevention and oral health promotion should be included as an integral part of chronic disease prevention and general health promotion programs.

Conflicts of Interest

The authors declare no conflicts of interest.

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