Early Childhood Caries
A Continuing Epidemic Oral Health Problem in the United Arab Emirates

By Dr Mawlood Kowash, UAE

Early Childhood Caries (ECC) is a chronic, transmissible, infectious disease affecting the primary (milk) teeth. The etiology of the condition is a combination of factors including frequent consumption of fermentable carbohydrates as liquids, especially when the baby is sleeping, with on-demand breast- or bottle-feeding. Other factors include oral colonization by cariogenic bacteria (especially mutans streptococci), poor oral hygiene and poor parent-feeding. Other factors include oral colonization by cariogenic bacteria

Definition and Terminology of ECC
ECC has been defined as “the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces” in any primary tooth in a child 71 months of age or younger [2,3]. It can result in considerable suffering, pain, reduction of quality of life of affected children and disfigurement and frequently can compromise their future dentition. The etiology of the condition is a combination of frequent consumption of fermentable carbohydrates as liquids, especially at night, with on-demand breast- or bottle-feeding, oral colonization by cariogenic bacteria (especially mutans streptococci) and poor oral hygiene [4].

In most cases, the aetiology will be a combination of several of these factors. The prevalence has been reported to vary worldwide. Higher prevalence has occurred in children from lower socio-economic status families, migrant and ethnic minority populations [5].

In the United Arab Emirates (UAE), ECC is the most common childhood disease. The prevalence of ECC in the UAE has been reported as 93.8% in 5-year-old children [6]. Prevention of ECC can be achieved by the education of prospective and new parents, as well as by the identification of ‘high risk’ children [7]. Strategies have focused on the individual mother and child by preventing transfer of cariogenic bacteria from mother to her infant, using preventive agents such as fluoride and teaching good oral hygiene practices [8]. Community-based approaches have been attempted. An example of a successful program was reported by Kowash et al [9] which investigated the effect of dental health education provided by trained, non-professionals (not dentists) carrying out regular home visits in a low socio-economic area in Leeds, UK. The study was able to demonstrate a significantly reduced occurrence of ECC after three years.

The treatment of ECC is very costly, time consuming and in most cases, requires full dental rehabilitation under general anaesthesia by a paediatric dentist. Unfortunately, in many countries, even in the developed world, these carious teeth end up being extracted.

This paper provides an updated evidence-based review of ECC. The literature in regards to ECC definition and terminology, aetiology, prevalence, clinical picture and management is discussed. A solution to the continuing problem of ECC is suggested.

Introduction
Caries or dental decay in children has been known to exist for many centuries [1]. Early Childhood Caries (ECC) is a chronic, transmissible infectious disease affecting the primary (milk) teeth. It is defined as the presence of one or more decayed, filled or missing tooth surfaces in any primary tooth in a child 71 months of age or younger [2,3]. 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 three through five, one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth or a de-

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Andreas Richwine, Director Research and Development
cayed, missing, or filled score of 84 (age three), 115 (age four), or 165 (age five) surfaces constitutes 5-F [31].

Development of ECC in preschool children has several names including 1) early childhood caries”, “nursing bottle syndrome”, “baby bottle caries” and “baby bottle tooth decay”. The latter term is often used interchangeably in dental literature. They describe the condition and the main factors behind the decay of the maxillary incisors, of which may be due to a number of reasons. Among these, previous studies of Tinanoff and O’Sullivan used the term “Early Childhood Caries” which has been widely accepted by the dental community to describe caries in infants and young children. This term has been widely accepted and used by most dental clinicians and educators [10].

Pattern and Clinical Appearance of ECC

ECC has a specific pattern and clinical picture. It is a specific form of rampant caries with the only feature differentiating it from generalized rampant caries being the absence of decay of the mandibular incisors (Figure 1). The most commonly affected tooth is the maxillary left central incisor, followed by the maxillary right central incisor. Involvement of other teeth (the canines, first and second primary molars) depends on how long the carious process remains active but usually, when involved, these teeth are less than in the maxillary incisors. The mandibular incisors are least affected because the teat of the bottle is usually held above the tongue during sucking, so the saliva is not protected by the tongue and also by the flow of saliva from the submandibular glands [4]. The role of the innate infantile physiological tongue thrust pattern during sucking is to be important in protecting the lower incisors [4].

In most cases of ECC, the first clinical sign is a band of dull white demineralization along the gingival line of the maxillary incisors. These bands are the focal lesions of the dental enamel, which are visible with the naked eye. As the lesion progresses, the white bands often appear as well-defined lines of caries and the tooth surface becomes soft and eventually leads to the development of a white, soft, and rough area on the tooth surface. If the lesion progresses further, it can develop into a cavity and cause pain and discomfort, inability to perform normal functions, and the need for professional intervention [4].

Prevalence of ECC

The prevalence of ECC varies greatly in different parts of the world and in different age groups. In the United States, the prevalence of ECC in children ages 6 months to 5 years is 6.7%, with 20% of the population affected. In the United Kingdom, 23% of children aged 1 year and 30% of those aged 3 years and half have some experience of dental caries. In a study in Abu Dhabi in the UAE, ECC in 2, 4 and 5-year-old children was 15.9%, 18.7%, and 13.1%, respectively [6]. Other studies in Oman, UAE studied caries prevalence and severity of ECC in 5-6-year-old children. They reported high caries prevalence (78.1%) and high proportion of missing, filled and extracted surfaces (dmfs) score of 10.2 and the Emirati local children had higher caries severity than other children [8]. Al-Houssaini and Rugge-Giunch [8] examined year-old children in Al Ain city and reported a mean decayed, missing and filled teeth (dmft) score of 8.6 [6]. Recently, Kowash [9] in a cross-sectional study in the same city reported a higher mean dmft of 10.1 [6].

The aforementioned ECC prevalence results are clearly a cause of concern for dental professionals in the UAE especially when comparing it with the findings of the universally accepted definition of severe ECC [3, 4].

Etiology of ECC

The exact etiology of dental caries is still obscure. However, there is good scientific evidence to show that for ECC to occur, four main factors or some minor or the presence of a combinative factors have to be present. Thus, dental caries has a multi-factorial etiology [7]. The four main factors in the etiology of ECC and the developmental factors are the presence of fermentable carbohydrates in the diet, salivary factors (saliva), the state of the oral environment, and the presence of cariogenic bacteria [8].

1. The microorganisms involved are salivary starch-saccharifying bacteria, plaque, and saliva. A fermentative carbohydrate, mainly consumed in milk (galactose) content of human and lactobacilli (LB) are considered as the key cariogenic bacteria [9]. In contrast, other bacteria, they can also produce lactic acid when exposed to high factors. The main difference between ECC and the predominant microorganism of the carious lesions of caries is that, LB is responsible for the progression of the lesion and the absence of cariogenic bacteria, especially MS and LB can grow at reduced pH. Other contributing factors include oral colonization by cariogenic bacteria (episodic use of milk and other milk products) and poor oral hygiene [10]. In most cases of ECC, the etiology will be a combination of several of these factors.

2. There is a considerable debate in the literature regarding the effect of milk on the development of dental caries. Several studies considered it to be cariogenic under some conditions [9, 20, 21]. Others have found that milk is anti-cariogenic [12, 22, 23, Sorensen]. The reasons for this controversy are due to the difficulty of studying the effect of one item of food on dental caries. First, the difficulty of defining nutritive diet. Second, the difficulty of studying the effect of one item of food on dental caries. Finally, the difficulty of studying the effect of one item of food on dental caries.

In ECC, the etiology of tooth decay is complex and multifactorial. There are several factors that contribute to the development of ECC, including the type of food, the length of time the food is in contact with the tooth enamel, and the ability of the child to swallow the food. There are several factors that can affect the progress of the lesion and the progression of caries in ECC. These factors include the mother's open cavities and the presence of milk on the toothbrush, the use of antimicrobial agents, the use of fluoride, and the presence of oral bacteria [8].

Consequences and Complications of ECC

The consequences and complications of ECC include the severity and the extent of dental decay, the impact of caries on the child's quality of life, the difficulty in controlling the disease, and the impact on the child's self-esteem. More severe cases of ECC can lead to the loss of primary teeth, which can affect the development of the permanent teeth. In some cases, the decay can lead to the loss of all primary teeth, which can affect the child's ability to chew and speak properly. In severe cases, the decay can lead to the loss of all primary teeth, which can affect the child's ability to chew and speak properly. In severe cases, the decay can lead to the loss of all primary teeth, which can affect the child's ability to chew and speak properly. In severe cases, the decay can lead to the loss of all primary teeth, which can affect the child's ability to chew and speak properly.
Early Childhood Caries (ECC) is a chronic, transmissible infectious disease affecting the primary teeth. The etiology of the condition is a combination of frequent consumption of fermentable carbohydrates as drinks, especially when a baby is sleeping, with on-demand breast or bottle feeding. Oral colonization by cariogenic bacteria (especially mutans streptococci), poor oral hygiene and poor parenting are the most common chronic disease among children and is still considered a continuing oral health problem in developing countries and also in most developed countries. It can result in considerable suffering, pain, disfigurement, reduction of quality of life of affected children and frequently compromises their future destinies. The treatment of ECC is very costly, time consuming and in most cases, requires full dental rehabilitation under general anesthesia by a pediatric dentist. ECC, however, is a preventable disease and the solution for this continuing problem can be achieved by educating parents of young children and pregnant mothers. It is important that the dental health messages should focus on educating and changing the behavior of parents or caregivers. Moreover, the dental health messages should be practical, consider the socioeconomic status of the parents and be culturally sensitive. The benefit-cost (B/C) and cost-effectiveness (C/E) of a long-term dental health education program to mothers with young children through repeated home visits were evaluated [4]. Comparisons were made for B/C and C/E with results from a clinical trial of a slow releasing fluoride device, community water fluoridation and a school based fissure sealant program. The results showed that dental health education programs for mothers of young children starting at 8 months of age gave better B/C and C/E ratios than other preventive programs.

Restorative treatment of ECC

In recent years there has been a shift from the traditional (drill & fill) to a more conservative treatment modality (seal to heal) with better understanding of the caries process biology. Managing caries through minimally invasive and low-cost treatment modality such as atraumatic restorative technique (ART) is important especially in developing countries. It helps in slowing caries progression and hence minimizing the child’s discomfort and preventing other decay complications. Studies have shown that, although caries causes demineralization of dental hard tissues and dematuration of collagen, the inner layer is minimally or even not infected by bacteria [44]. The inner part of decayed dentine contains a high concentration of minerals and can be remineralized [45]. Management of ECC should take into consideration the biology of dental tissues, remineralization process and other protective mechanisms. The goal should be to minimize lifelong caries experience while performing the least possible intervention consistent with level of risk (Table 1).

The type of restoration chosen depends on the tooth to be restored, present and past caries history, child cooperation and medical history. For example a decayed primary molar in a special needs child is best restored with a durable restorative like stainless steel crowns (SSC). A multi-surface decayed primary molar also should preferably be restored with SSC [46]. Groovy decayed maxillary incisors are best restored with either composite strip or zirconia crowns with or without pulp therapy (Figure 3). Depending on patient cooperation, the severity and number of decayed teeth and medical history, dental treatment of paediatric patient can be performed under behaviour management and local analgesia, which is considered to be the best option in terms of cost, safety and acceptability to parents or caregivers. Other alternative options include oral or intravenous sedation and general anaesthesia (GA). Full dental rehabilitation under GA (Figure 2) is preferred by many clinicians in uncooperative preschool children requiring comprehensive dental care or those with special needs. All restorative techniques exhibit strengths and weaknesses for example:

- Glass ionomer Cement (GIC) is favorable for class I Cavities and in uncooperative children.
- Composites shows best long-term performance. The cooperation has to be sufficient, at least during bonding and layering.
- Resin composites after rubber dam application and correct technique – sensitive adhesion can reach the level of composites.
- In severely decayed teeth and after pulp therapy, preformed SSC should be the restoration of choice.

Conclusion

Early Childhood Caries (ECC) is a chronic, transmissible infectious disease affecting the primary teeth. The etiology of the condition is a combination of frequent consumption of fermentable carbohydrates as drinks, especially when a baby is sleeping, with on-demand breast or bottle feeding. Oral colonization by cariogenic bacteria (especially mutans streptococci), poor oral hygiene and poor parenting are the most common chronic disease among children and is still considered a continuing oral health problem in developing countries and also in most developed countries. It can result in considerable suffering, pain, disfigurement, reduction of quality of life of affected children and frequently compromises their future destinies. The treatment of ECC is very costly, time consuming and in most cases, requires full dental rehabilitation under general anesthesia by a pediatric dentist. ECC, however, is a preventable disease and the solution for this continuing problem can be achieved by educating parents of young children and pregnant mothers. It is important that the dental health messages should focus on educating and changing the behavior of parents or caregivers. Moreover, the dental health messages should be practical, consider the socioeconomic status of the parents and be culturally sensitive. The management of ECC should take into consideration the biology of the caries process and protective mechanisms and to be effective, the restoration of active lesions should be monitored through regular follow up and long-term preventive strategy.

References


The full list of references is available from the publisher.