

PREVENTION OF EARLY CHILDHOOD CARIES- A PUBLIC HEALTH APPROACH

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<https://doi.org/10.51847/r8boPxSjOf>

ABSTRACT

Early childhood caries (ECC) is a type of dental decay which occurs in deciduous dentition of infants and pre-school children below the age of 6 years. It is considered as the most eminent oral health issue of children world-wide. As soon as it begins to develop in the mouth, it can progress quickly and affect several teeth. More than 70% of children below 6 years of age are found to be commonly affected with dental caries in developing countries which often lead to pain and infection. As it is a major oral health problem, different strategies should be developed which will help in preventing the disease from the early stage of life. The main objective of this paper is to discuss about different public health approaches that can be taken at community level for the prevention of ECC so that most of the children can have the benefit of not being affected with this major oral health problem.

Key words: Dental caries, Early childhood caries, Dietary habits, Fluoride varnishes, Oral health.

Introduction

Early childhood caries (ECC) has now become a significant oral health issue all over the world and specially for those who belong to low socio-economical background. When there is presence of one or more than one decayed, missing or filled teeth surfaces in deciduous dentition of children below 6 years of age, it is considered as early childhood caries. It can rapidly progress and involve a number of teeth just after initiating on one tooth in the oral cavity. Those surfaces of the tooth which are not more prone to caries can also be affected by these lesions. Nursing bottle caries, rampant caries, baby bottle tooth decay, milk bottle syndrome and prolonged nursing habit caries are various terminologies which are used to refer to these lesions. Multiple factors like diet, oral micro-organisms, tooth integrity and various social determinants of health play important role in the causation of disease [1, 2].

If ECC is not treated early it may lead to cause more rampant form of disease, which in turn may lead to malocclusions, abscess and pain. Although permanent teeth will eventually replace primary teeth, it has been proposed that ECC may be a possible risk factor for caries in the permanent dentition [3]. The nutritional status, growth and oral health related quality of life of children can also be affected negatively if there is severe form of early childhood caries [4]. It has been found that most of the children of remote and interior areas where oral care facilities are not available, and those who belong to lower economic background are getting affected more as compared to urban area children where they have access to every facility and not limited by financial constraints. As it is a major oral health issue during early childhood, knowing about its prevalence, aetiology, proper

treatment and developing different strategies in order to prevent the ECC will be helpful in arresting the disease.

Prevalence of early childhood caries (ECC)

Both in developing and developed countries ECC is a chief oral health issue specially in case of pre-school children. Various factors like ethnicity, culture, race, pattern of life style, oral hygiene maintenance, food habits, socio-economic status are the factors which may influence the prevalence of ECC. It has been found that in most of the developed countries the prevalence rate of ECC is around 1 to 12% whereas in developing countries the percentage is more which is almost around 70% [5]. Those people who belong to lower economic strata cannot afford the proper maintenance of oral hygiene are more prone to develop ECC [6, 7]. It has also been reported that some middle eastern countries like United Arab Emirates and Palestine show greater prevalence rate around 70% to 80%. Some studies have also concluded that in India almost 49.6% children are affected with ECC and states like Andhra Pradesh show highest prevalence rate around 63% and Sikkim has shown lowest prevalence rate almost around 41.92% [8].

Aetiology of ECC

There are four major factors which are responsible for causing ECC. They are:

1. Diet
2. Oral microorganism
3. Environmental factors
4. Tooth or host

Besides these, other associated factors which are responsible for causing ECC are lower economic status, children with malnourishment, lack of awareness regarding maintenance

of oral hygiene, irregular tooth brushing, improper feeding pattern of infants, long time bottle feeding specially during night, and less exposure to fluoride etc.

Diet

Development and progression of ECC depends upon the consumption and type of food. If the food contains higher amount of sugar and fermentable carbohydrates, there is higher risk of development of caries in children [9]. Bottle feeding during bed time and sleeping, prolong breast feeding are the factors which aid in the initiation and progression of caries. Oral hygiene and caries status of mother and high microbial count play important role in transfer of caries from mother to baby [10].

Oral microorganism

There are certain microbial flora present in the oral cavity which helps in initiation and progression of dental caries. Most common microorganisms responsible for development and initiation of ECC are *Streptococcus mutans* and *Streptococcus sobrinus*. *Lactobacilli* helps in progression of caries [11]. Besides this other microorganisms like *Actinomyces gerencseriae*, *Bifidobacterium*, some non-mutans streptococci are also responsible for progression of dental caries. *Streptococcus mutans*, the major bacteria which is associated with dental caries initiation releases acids by utilizing the sugar and causes loss of tooth structure thereby enhancing demineralization process [12]. High *Streptococcus mutans* count in the oral cavity of mother can transmit to child especially during first 12-24 months. The pre-school children who are having higher content of *Streptococcus mutans* are more prone to develop ECC.

Environmental factors

Lack of awareness and knowledge regarding oral hygiene practices, improper brushing habits will lead to cause ECC. Children should be given oral hygiene care after the eruption of first deciduous molar [13]. Along with this race, ethnicity and socio-economic status also comes in play in causing ECC. Children who belong to lower economic background are two times more prone to develop ECC as compared to those who belong to higher economic background [14]. Lack of maternal education, and poverty can act as a barrier against maintenance of oral health. Premature babies, children with malnutrition and any chronic illness can cause ECC.

Tooth or host

ECC mainly affects the deciduous dentition of pre-school children. The surfaces of tooth which are less prone to develop dental caries like labial surfaces of upper incisor teeth and lingual and buccal surfaces of upper and lower molars are mainly affected with ECC. Initially it appears as dull white and brown spots on upper incisors which will progress and cause destruction of crown completely. Upper molars are usually affected moderately. Then they will be completely destroyed and lower molars will be affected when the caries spreads and affected severely. Patients may

suffer from pain, speech and eating difficulty [15]. Besides these factors such as inadequate exposure to fluoride, children belonging to below poverty line who cannot afford to maintain proper oral care and high debris score can be considered as contributing factors for the development of ECC.

Management of ECC

For the management of ECC the main aetiological factor responsible for causing it should be identified and treatment should be aimed accordingly. It can be treated through restorative procedures and those teeth which are completely decayed and cannot be restored, they need surgical removal. Acid etched composite and glass ionomer cements restoration, pedo strip crown and stainless-steel crown are the different restorative procedures for ECC. If there is involvement of pulp, then pulpotomy and pulpectomy can be done. In case of hopeless tooth, the tooth has to be removed surgically.

Steps to be taken for the prevention of ECC

Different strategies are followed in order to prevent ECC. Steps should be taken at community level, through professional approach and through detailed home care instructions.

At community level

Oral health education

The first and foremost measure in the prevention of ECC is educating the public regarding maintenance of oral hygiene. The main goal behind this is to guide and encourage the public about adopting correct oral hygiene practice, educating mother regarding the importance of maternal oral health care which is required for the infant's oral health thereby preventing transfer of microbes from mother's oral cavity to that of child, explaining the consequences of long-time breast feeding, and using pacifier or bottle-feeding during bed time. Parents should be taught about the importance of taking proper oral health care during pre-natal and post-natal period [16, 17]. There should be provision of providing oral health care in every primary health centre specially in remote areas where access to oral health is limited. Dentists, public health nurses and dental hygienists should be appointed in all the primary health centres so that expectant and lactating mother, infants and toddlers can be benefitted by this in seeking the dental treatment. Public health nurses, ASHA and anganwadi workers should be encouraged to arrange screening and treatment camps where maximum young children, and their parents can be screened and provided treatment at same time, oral health information regarding tooth decay can be given directly or through pamphlets, templates, and by doing learning activities [18]. These activities can be conducted in combination with other health programmes specially with vaccination programmes where infants, toddlers, young children can have access to oral care which will helpful in identifying and preventing ECC.

Water fluoridation

Though water contains some amount of fluoride, sometimes that will not be sufficient enough to prevent dental caries. So, fluoride should be added in public water supply in right amount which will be beneficial for every individual and children in preventing tooth decay [19]. It is the most efficient and cost-effective way to deliver fluoride to everyone in a community, regardless of their age, income or education.

Community and personal development

Programmes based on oral health should be conducted on those locations where screening large number of people at a time is feasible and resources are available readily. Oral health care professionals and nurses can do door to door visit in order to deliver proper information about maternal and child oral health care in order to prevent dental decay both in mother and child. Implementing the interventions with low cost and by using limited materials and equipment ensures more number of individuals receiving benefit. Dental health care professionals can apply fluoride varnish in those children who are coming for screening which will be helpful in preventing ECC or any dental decay further in future. There should be more opportunities available for conducting community-based interventions [20].

Through professional care

By early detection of caries

If the caries in children can be detected in early stage, and referred to the dentist, then it can be treated in early phase which will be helpful in prevention of tooth decay further in future [21]. Dentists can administer fluoride varnish on surfaces of teeth in order to prevent dental decay in early stage of tooth demineralization [22]. Generally ECC starts in upper incisors and if they are not arrested in early stage, it will progress and lead to cause extensive cavitation. So, detection of caries in early stage is really important in prevention of ECC.

By maintaining proper diet

Presence of sugar in food is the major contributing factor for the development of ECC. Physicians and oral health professionals should pay attention to the diet modification of child and educate their parents specially the mothers regarding the proper maintenance of diet and feeding practices of infants. Parents should be advised to take proper care of their child's diet by avoiding excess consumption of cariogenic foods like sugar and starchy foods, products containing added sugar, fermentable carbohydrate, beverages and frequent snacking. Microorganisms present in the oral cavity will metabolize these food and release acids which in turn causes loss of tooth structure and lead to dental decay. Long term breast feeding, infant bottle feeding and use of pacifier should be avoided during bed time. Dentists should properly explain the parents regarding the main purpose of the diet counselling, consequences of improper diet both in oral

and general health, and what all food they should prefer for their child to have a balanced diet [23].

Fluoride application

Topical application of fluoride will be helpful in arresting the caries specially for those children who have the habit of using pacifier, or have developed white spot lesions and incipient caries on upper anterior teeth. Professionally applied topical fluoride, and fluoride mouth rinse are helpful in prevention of ECC [21]. Use of fluoride has the ability to reduce the risk of caries by 30-70% [24]. Besides this chlorhexidine varnish and povidone iodine which have antimicrobial property can also be applied for arresting the caries.

Pit and fissure sealants

Pit and fissure sealants are considered as the most cost-effective intervention for those children who are at greater risk of developing caries and surfaces of the tooth who are more susceptible to caries. Application of sealants is based on degree of risk of caries in children and fissure anatomy. Therefore, sealants can be considered as a preventive measure in arresting ECC.

Through home care

Dietary habits

Proper habit of feeding of infants, and a balanced diet are really important for a healthy life style and good oral health. To avoid ECC to occur it is important to reduce the consumption of food containing more amount of sugar and snacks between the meals. Use of pacifier and bottle feeding of infants during bed time should be avoided. Increase consumption of fruits and vegetables, and having milk with the help of cup instead of using bottle after 1 year of birth will be helpful in reducing caries significantly.

Use of fluoridated toothpaste and proper brushing habits

Use of fluoridated toothpaste on regular basis will have significant impact on reduction of caries for which it is considered as the keystone of child's oral health. Children can swallow around 30% of paste so pea size amount of tooth paste should be used. Its amount should not be more than the size of a rice grain for those children whose age is around 6-12 months. Besides this oral health professionals either through health programmes or through personal visit should educate the parents about proper technique of brushing and should demonstrate the correct brushing technique both for the children and adults which will be effective in arresting ECC.

Conclusion

ECC is the most commonly occurring disease in pre-school children, so its prevention is really necessary from early phase of life to maintain a good oral health. All the caries prevention modalities should be included in the insurance programmes so that every individual irrespective of their economic background can have the benefits. Dentists should

be given incentives by reimbursement of insurance programmes for preventing the dental decay not just for treating it. By conducting various oral health education programmes, screening and treatment camps, parents and caregivers should be taught about the importance of maintaining good oral health specially in children, and in detail about the aetiology, management and prevention of ECC.

Acknowledgments: We acknowledge the support of the library staff and post graduate trainees of Department of Public Health Dentistry, Institute of Dental Sciences, Bhubaneswar.

Conflict of interest: None

Financial support: None

Ethics statement: None

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