

Review Article

Transdisciplinary Approach in Management of Children with Early Childhood Caries

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Abstract: Early childhood caries (ECC) is preventable but is still a major public health problem affecting children in all communities due to lack of awareness about prevention. It is multi-factorial in origin and diet and feeding plays a critical role in the acquisition and clinical expression of this infection. It not only leads to poor oral health but also affects the overall general health of children. Treatment of ECC is costly because the cooperative capacity of babies and preschool children usually necessitates the use of general anesthesia. In transdisciplinary care, practitioners work together as a health-care team, viewing the patient and not the disease as the center of the process. This team includes Pediatricians, Pedodontist, General practitioners and even nurses who can perform simple ECC screening and detection techniques and take part in prevention techniques. By learning about the seriousness of ECC, parents and caregivers can take proper steps to prevent or seek recommended treatment in time.

Keywords: Transdisciplinary approach, Early Childhood Caries.

INTRODUCTION

Dental caries affect Children belonging to all strata of society worldwide which leads to cavitations in teeth [1]. Early childhood caries is more serious form of disease affecting children and is defined as “The presence of one or more decayed (non cavitated or cavitated), missing (due to caries) or filled tooth surfaces in any primary tooth in a child under the age of 6.” [2]. Early Childhood Caries (ECC) affects maxillary primary incisors rapidly after eruption and affects other teeth as well.

ETIOLOGY

Initially it was thought that prolonged breast feeding and faulty bottle feeding were the chief cause of ECC, however it is now established that ECC affects tooth surfaces which are not prone to decay by plaque retentive areas like labial surface of maxillary anterior teeth [3]. These lesions are produced from the interaction of variety of factors like cariogenic microbes, fermentable sugars, and susceptible tooth surface which causes incipient carious lesions with time.

RISK FACTORS

Early childhood caries is multi-factorial in origin and is caused by various factors.

Substrate

Sucrose in food and milk is broken down by *mutans streptococci* [4, 5] to produce lactic acid which causes demineralization of tooth structure. When milk is fed at night it remains in the oral cavity for a longer period of time because the salivary flow is reduced during sleep [6, 7]. This leads to more acid production. Sugars like lactose and fructose are present in milk and fruits naturally or may be even artificially added in them. When these sugars remain in oral cavity for longer period of time caries develop [23].

Susceptible tooth/host

Newly erupted teeth are more prone to caries as their maturation is not complete [8]. Reduced salivary flow, immunological factors like IgA, enamel defects like hypoplasia and characteristics of the tooth like size, alignment in oral cavity, surface, depth of pits and fissures causes ECC [6, 7].

Cariogenic microorganisms

Mutans streptococci, *sobrinus* and *lactobacillus* causes dental caries [9, 10]. Bacteria are transmitted from mother or caregiver to child both vertically during birth and breastfeeding and horizontally by saliva sharing behaviors like kissing,

sharing food and eating utensils, cleaning pacifiers with tongue, sharing spoon between children [6, 11]. This can be prevented.

Dental Plaque

Cariogenic plaque bacteria produce organic acids by fermentation of plaque causing demineralization of tooth surface and result in caries [6].

ASSOCIATED RISK FACTORS

Bottle feeding

Bottle feeding causes ECC mainly because of the stagnation of the bottle contents in the mouth for a long period of time which causes caries around the neck of the teeth. Milk bottles used at night are more harmful as there is reduction in salivary flow and buffering capacity. The mandibular incisors are protected as they are close to the salivary gland ducts opening and the cleansing action of tongue protects them. Milk based formula drink, fruit juices, carbonated beverages are implicated in children diagnosed with ECC. Syrups used in chronically ill children contains sugar also causes ECC. The use of bottle feeding should be discontinued by 1 year of age and child is encouraged to drink from cup [23].

Breastfeeding

Prolonged and at will Breastfeeding is associated with ECC. This is more if the frequency is high and especially at night [6]. If the oral cavity is not cleaned at this time milk gets pooled around in oral cavity and remains constant over a period of time thus making teeth more susceptible to decay. Oral hygiene measures as brushing teeth with fluoridated toothpaste, cleaning the oral cavity with damp cloth and reducing the frequency of feedings, stop feeding at will should be incorporated. Weaning should be done by 2 years of age [23].

Oral hygiene

Dental plaque produces caries in children [12, 13]. Improper brushing techniques will not remove plaque effectively causing ECC [14].

Fluoride

Fluoride increases enamel resistance by inhibiting demineralization and accelerating remineralization [15]. Regular and efficient plaque removal measures maintains the levels of Fluoride in saliva [23].

Parental Education

Educated parents understand the importance of good dental health and its effect on overall health [16]. Educated parents do not neglect the health of their child. They are in a better position to take timely decision regarding oral health of their children.

Children's of parents who have high caries activity will have more caries susceptibility [17, 18].

Socioeconomic factors

Poor socio economic status have adverse health events on children [19, 20]. The first visit of the child of poor family is usually very late in life only when any dental problem arises. The means to maintain regular dental care are also sparse. Limited available resources makes it impossible for parents to get costly dental treatment done thus their dental problems keeps on increasing. Child taking birth in poor family will tend to have low birth weight which affects oral health [23].

CLINICAL CONSIDERATIONS

ECC is classified into following types

Type I (mild to moderate) ECC

Presence of isolated carious lesions involving molars and /or incisors caused mainly because of cariogenic food and poor oral hygiene [23].

Type II (moderate to severe) ECC

The maxillary incisors are carious, molar caries may or may not be present and mandibular incisors are unaffected. This is caused mainly because of faulty feeding habits with or without poor oral hygiene [23].

Type III (severe) ECC

All teeth including mandibular incisors are affected with caries caused by cariogenic food and poor oral hygiene [23].

Early childhood caries

It progresses with severe consequences wherein the management is not only cumbersome but also costly to treat. Severe pain causes difficulty in mastication, phonation and affects day to day activities like sleeping and playing [21]. Loss of front teeth at an early age leads to poor esthetics and loss of self-esteem and there may be a delay in speech development as articulation is hampered. There is delay in physical development in height and weight as there is decrease in less intake of food due to pain which causes malnutrition. Early extraction of teeth causes psychological trauma to child. High caries in primary teeth is a predisposing factor for increased caries risk in permanent teeth as well.

TREATMENT PROTOCOL

Care should begin at the level of anticipatory guidance to pregnant and lactating mothers and the treatment protocol is divided in two parts as preventive care and

Restorative care which can further be divided into Professional Care and Home Care which includes

- Educating parents regarding importance of deciduous teeth
- Diet counseling. Repetitive consumption of any liquid containing fermentable carbohydrate including fruit juices from bottle should be avoided. Parents should encourage infants to drink from a sippy cup as they approach their 1st birthday and weaning should be done by 18 months of age.
- Parents giving children fruit juices should dilute the contents by addition of water and limit the quantity to 4 to 6 oz of fruit juices during meal per day. Fizzy soft drinks should be avoided as they lower the salivary pH and has added sugar in it.
- Infant should not be put to sleep with bottle in their mouth and when teeth erupts night feeding should be avoided.
- Cleaning of gum pads of infants with clean damp cloth and brushing of teeth using finger brush should be encouraged.
- Child should be brought for Dental visit within 6 months of eruption of 1st tooth and no later than 1 year of age [22].
- Children occasionally have to take medications that contain sugar to increase its palatability. These hidden sugars need to be brought to the attention of parents and it is advisable to brush the child's teeth after administration of medicines or to rinse the mouth.
- Mother's or care giver's mutans streptococci levels should be decreased to reduce the transmission of cariogenic bacteria to infants thus reducing the risk of developing ECC. Early colonization of dental flora in their infants is prevented by avoiding sharing of utensils i.e., shared spoons, cleaning a dropped pacifier with their saliva, etc.
- Review a dietary sheet which records at least 1 week and one week diet. This is used to assess the nutritional value of the child's hidden sugars. Use this sheet as a basis for discussion and not to criticize the parents.
- Referred to a dentist should be done for an examination and treatment of all carious lesions. Chewing a cube of Cheese or Paneer increases salivary pH and increases the salivary concentration of calcium and phosphorous and decrease the streptococcus mutans count. This can be consumed by both mother and child; it helps in remineralization process and helps to control caries.
- Xylitol chewing gum significantly decreases the child's caries rates by stimulation of salivary flow rate.
- Regular recall for routine monitoring for dental health should be emphasized.

CONCLUSION

Early childhood caries is a silent epidemic affecting children. Prevention is the gold standard in

management of any disease. Lack of knowledge about the etiopathogenesis of ECC is the main cause for its widespread prevalence. If all health care professionals realize that maintaining oral health gives good overall health and are trained to recognize the signs of early childhood caries and, then steps can be taken to identify and prevent this disease. The effort must be a transdisciplinary one, including both medical and dental professionals together help in render good overall treatment to children.

REFERENCES

1. Loesche WJ; Role of *Streptococcus mutans* in human dental decay. Microbiol Rev., 1986; 50(4): 353-380.
2. Davies GN; Early Childhood Caries-a synopsis. Community Dent Oral Epidemiol., 1998; 26(Suppl 1): 106-16.
3. Hattab FN1, Al-Omari MA, Angmar-Månsson B, Daoud N; The prevalence of nursing caries in one-to-four-year old children in Jordan. ASDC J Dent Child., 1999; 66(1): 53-58.
4. Douglass JM; Response to Tinanoff and Palmer: Dietary determinants of dental caries and dietary recommendations for preschool children. J Public Health Dent., 2000; 60(3): 207-209.
5. Paes Leme AF1, Koo H, Bellato CM, Bedi G, Cury JA; The role of sucrose in cariogenic dental biofilm formation- new insight. J Dent Res., 2006; 85(10): 878-887.
6. Seow KW; Biological mechanisms of early childhood caries. Community Dent Oral Epidemiol., 1998; 26(1 Suppl): 8-27.
7. Schafer TE, Adair SM; Prevention of dental disease. Pediatr Clin North Am., 2000; 47(5): 1021-1042.
8. Milgrom P, Riedy CA, Weinstein P, Tanner ACR, Manibusan L, Bruss J; Dental caries and its relationship to bacteria infection, hypoplasia, diet and oral hygiene in 6 to 36 month old children. Community Dent Oral Epidemiol., 2000; 28(4): 295-306.
9. Kaste LM, Drury TF, Horowitz AM, Beltran E; An evaluation of NHANES III estimates of early childhood caries. J Public Health Dent., 1999; 59(3):198-200.
10. Berkowitz RJ; Cause, treatment and prevention of early childhood caries. J Can Dent Assoc., 2003; 69(5): 304-307.
11. Caufield PW, Griffen AL; Dental Caries: An infectious and transmissible disease. Pediatr Clin North Am. 2000; 47(5):1001-1019.
12. Karjalainen S, Söderling E, Sewón L, Lapinleimu H, Simell O; A prospective study on sucrose consumption, visible plaque and caries in children from 3 to 6 years of age. Community Dent Oral Epidemiol., 2001; 29(2): 136-142.

13. Alaluusua S, Malmivirta R; Early plaque accumulation, a sign for caries risk in young children. *Community Dent Oral Epidemiol.*, 1994; 22(5Pt 1):273-276.
14. Emanuelsson L, Wang X; Demonstration of identical strains of Mutans streptococci within Chinese families by genotyping. *Eur J Oral Sci.*, 1998; 106(3): 778-794.
15. Davies GN; Early Childhood Caries-a synopsis. *Community Dent Oral Epidemiol* 1998; 26(Suppl 1): 106-116.
16. Al-Hosani E, Rugg-Gunn A; Combination of low parental educational attainment and high parental income related to high caries experience in pre-school children in Abu Dhabi. *Community Dent Oral Epidemiol* 1998; 26(1): 31-36.
17. American Association of Pediatric Dentistry (AAPD); Dental care for your baby. 2009. Available from <http://www.aapd.org/publications/brochures/babycare.asp>.
18. Twetman S, Garcia-Godoy F, Goepferd SJ; Infant oral health. *Dent Clin North Am.*, 2000; 44(3): 487-505.
19. Du M, Bian Z, Guo L, Holt R, Champion J, Bedi R; Caries patterns and their relationship to infant feeding and socioeconomic status in 2-4-year-old Chinese children. *Int Dent J.*, 2000; 50(6): 385-389.
20. Susan FO, Gansky S, Platt L, Weintraub JA, Soobader MJ, Bramlett MD *et al.*; Influences on children's oral health: A conceptual model. *Journal of the American Academy of Pediatrics*, 2007; 120(3): 510-520.
21. Casamassimo PS, Thikkurissy S, Edelstein BL, Maiorini E; Beyond the dmft: the human and economic cost of early childhood caries. *Journal of the American Dental Association*, 2009; 140(6): 650-657.
22. Gussy MG1, Waters EG, Walsh O, Kilpatrick NM; Early childhood caries: Current evidence for aetiology and prevention. *J Paediatr Child Health*, 2006; 42(1-2): 37-43.
23. Zafar S, Harnekar SY, Siddiq A; Early childhood caries: etiology, clinical considerations, consequences and management. *International Dentistry SA*, 2011; 11(4): 24-36.