



Assessment of ECC Affecting Anterior Teeth in Children Visiting University Dental Hospital in India

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ABSTRACT

Dental caries is one of the most infectious diseases of childhood resulting in chronic progression rate. They are of different types and patterns being rampant caries, nursing bottle caries. These are known to spread from the mother to the baby during infancy. Early childhood caries in the presence of one or more decayed or filled tooth surfaces in any primary teeth in a child 72 months age or younger. It is generally associated with unusual dietary patterns. Caries in children are mainly caused by the bacteria *Streptococcus mutans*. One of the reasons identified for ECC in children is the improper feeding patterns in children and prolonged use of baby bottles for milk feeding, especially at night. The aim of this study is to assess the prevalence of ECC anterior teeth in children. A retrospective study was carried out using digital records of 731 subjects. These data were collected from DIAS and coded in MS Excel sheets. The collected data was analysed by computer software SPSS version 21 using Chi-square test and graphical illustration was done. From the above study, it was found that ECC was more prevalent in 2-4 years and predominantly in male children (54.61%). Therefore, from this study, it can be concluded that ECC is highly prevalent in the maxillary anterior teeth in children.



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INTRODUCTION

ECC or early childhood caries is the most prevalent disease in children. It is defined as presence of one

or more decayed, missed or filled tooth surfaces in children of 72 months or younger. It is a virulent form of dental caries. ECC can begin early in life and keeps rapidly progressing (Weinstein, 1994; Grinde-fjord *et al.*, 1995). They are also known as baby bottle caries, rampant caries, nursing caries etc., commonly seen in pre-school children. They are generally seen affecting the maxillary anterior teeth. This is mainly due to the feeding patterns and improper dietary snacking patterns (Dilley *et al.*, 1980; Weinstein, 1994; Grinde-fjord *et al.*, 1995), with *S.mutans* and *S.sobrinus* as the etiologic agents (Tanzer *et al.*, 2001; Weinstein, 1994; Grinde-fjord *et al.*, 1995). ECC is directly related to poor oral habits and poor diet (Berkowitz, 2003).

Feeding practices such as improper use of baby

bottles and its prolonged bedtime use is a main cause of this disease (Hallett and Rourke, 2002). Studies have shown that high frenal attachment can lead to midline diastema in children leading to increased space in between the tooth (Christabel, 2015). Increasing this time per day can shift the fermentable carbohydrates from re-mineralisation to demineralisation (Hallett and Rourke, 2002; Ramos-Gomez, 2010). ECC is also associated with poor socioeconomic status of the family. ECC is more commonly found in children belonging to poor economic conditions (Davies, 1998; Caufield and Griffen, 2000). Children also show prevalence of enamel hypoplasia and insufficient exposure to fluoride. Optimum fluoride content in water is 0.7-1.2 ppm, if decreased can lead to dental or skeletal fluorosis and whereas use of fluoridated toothpaste can prevent the progression for caries (Somasundaram, 2015; Govindaraju, 2017; Ramakrishnan and Bhurki, 2018). In case of fluoride deficiency, leading to defect in enamel and prone for caries, this can be treated by systematically applied fluoride in drinking water to reduce the severity of dental decay (JAMA, 2008). The main common cause for ECC is dental neglect where the parent or guardian fails to meet the child's basic oral health needs (Gurunathan and Shanmugaavel, 2016).

ECC is associated with infections leading to difficulty in chewing, malnutrition and difficulty in sleeping (Finlayson *et al.*, 2007). This can also be related to environmental factors like premature birth/ low birth weight and poor parental education. High sugar diet leads to caries formation. Lactobacilli along with *S. mutans* play a role in caries progression (Kawashita *et al.*, 2011; Weinstein, 1994; Grindejford *et al.*, 1995). Few non-mutans streptococci having acidogenic and aciduric properties are associated with caries. Saliva has a protective role against dental caries formation and decrease in salivary rate, buffering capacity and reduced antimicrobial properties can predispose to caries development (Jiang *et al.*, 2016). Therefore, the main aim of this study is to assess the prevalence of ECC affecting the anterior teeth in children.

MATERIALS AND METHODS

Study Design

This is a cross-sectional study conducted at a university setting. The data was collected from a digital case sheet record. The sample size of the study is 282 subjects from a total of 731 case sheet records. The pros of the study are similar ethnicity and cons are geographic limitations. The ethical approval was by the ethics committee and the data was reviewed

by 2 viewers. 731 cases sheets were reviewed of age group 2-6 years, irrespective of gender. Simple random technique was used to minimise sampling bias. Internal validity was the anterior teeth caries and external validity is that it can be generalizable.

Data Collection/ Tabulation

Data collected from the case sheet record was then transferred to MS Excel Sheet. Coding of data was done. Tabulation was done in excel spreadsheet. Data was then imported to SPSS by variable definition process.

Analytics

Data was analysed using SPSS IBM version 20.0. Descriptive and inferential statistics was used. List of dependent variables are caries in anterior teeth and those of independent variables are age and gender. Chi-square test was followed and data transferred to the host computer and graphical illustration was done.

RESULTS AND DISCUSSION

In Figure 1, X-axis representing the age and Y-axis representing the percentage of subjects treated. Majority of the subjects belonged to 2-4 years of age (80.5%). In Figure 2, X-axis representing the gender and Y-axis representing the percentage of subjects treated. Majority of the subjects were males (54.6%) whereas 45.4% were females. In Figure 3, X-axis representing the tooth site and Y-axis representing the percentage of subjects treated. Majority of the subjects had ECC treated in the maxilla (87.6%), whereas 7.1 % of subjects had treatments done in both mandible and maxilla and 5.3% in the mandible. In Figure 4, X-axis representing the age and Y-axis representing the percentage of patients treated. For subjects in the 2-4 years of age group, treatment was predominantly done in both mandible and maxilla (blue) (95%) whereas in 5-6 years of age group, treatment was predominantly done in mandible (red) (33.3%) giving a p-value of 0.307 (>0.05) which is statistically not significant, which means there is no significant association between age and the site of treatments done in patients with ECC. In Figure 5, X-axis representing the gender and Y-axis representing the percentage of subjects treated. In females, treatment was predominantly done in mandible (red) (60.0%) whereas in males, treatment was predominantly done in maxilla (green) (55.9%) giving a p-value of 0.379 (>0.05) which is statistically not significant, which means there is no significant association between gender and the site of treatment done, in patients with ECC. A total of 282 subjects were included in this study

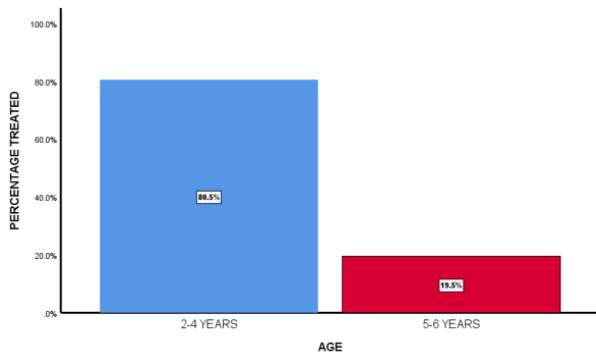


Figure 1: Bar chart representing the percentage of subjects treated based on age

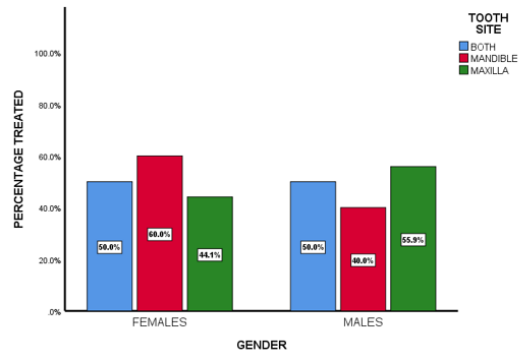


Figure 5: Bar chart representing the association between tooth site and gender in subjects treated for ECC

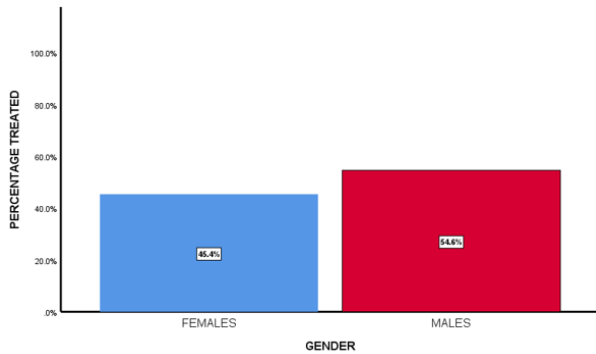


Figure 2: Bar chart representing the percentage of subjects treated based on gender

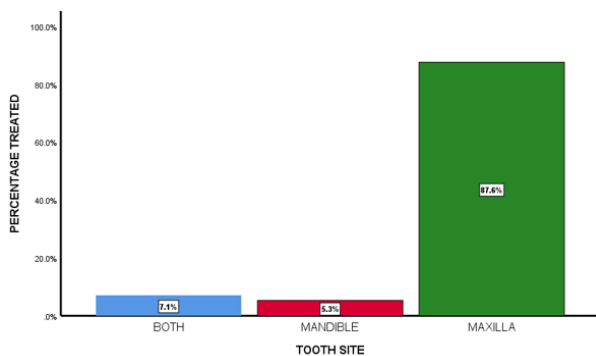


Figure 3: Bar chart representing the percentage of subjects treated based on tooth site

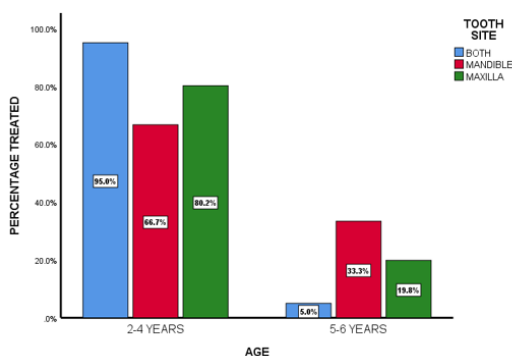


Figure 4: Bar chart representing the association between tooth site and age in subjects treated for ECC

of age group 2-6 years. From Figure 1, with X-axis as age and Y-axis as percentage treated, it is seen that 80.5% affected by ECC are in the age group 2-4 years and 19.5% are in 5-6 years of age. From Figure 2, with X-axis as gender and Y-axis as percentage treated it is seen that males (54.6%) are more affected than females. From Figure 3, with X-axis as the tooth site and Y-axis as percentage treated, it is seen that 87.6% of treatments were done in maxilla, 5.3% in mandible and 7.1% done in both maxilla and mandible. From Figure 4, on comparison between age and tooth site based on independent samples t-test, it is seen that 2-4 years age group (95%) is commonly affected by ECC with mean value of (2.7 ± 0.57) with a p-value of 0.307. From Figure 5, on comparison between gender and tooth site on independent samples t-test, it is seen that females are commonly affected by ECC (60%) with a mean value of (2.77 ± 0.57) with p-value 0.379. The comparisons were done using the chi-square test and were found to be statistically not significant as p-value was more than 0.05.

Prevalence of ECC is seen in the maxillary anterior region. Dental caries in toddlers and infants have a definite pattern. Primary maxillary incisors are generally affected than the four central maxillary anterior teeth (van Houte et al., 1982; Weinstein, 1994; Grindefjord et al., 1995). The pattern of destruction by ECC is generally seen along the gingival margin. Carious lesions are found on the labial or lingual surfaces of the teeth or arising the proximal areas (Kelly and Bruerd, 1987). Studies show that severity is more for 3 year olds ranging from 36 to 85% (Tsai et al., 2006). Our results were comparable and in concordance with their studies. Another study conducted in Kuwait showed children with caries-free or even more less lesions in 4-5 year olds (Al-Mutawa, 2010). The significant increase in oral morbidity in this age group is primarily due to the poor rate of unmet treatment needs. Treatment

and management of ECC can be achieved by intervention depending on disease progression. Children at low risk don't need any restorative therapy. Commonly done restorative treatments are class I GIC, Class I LCR, Root canal therapy, Pulpectomy/ Pulpotomy. These treatments are commonly done in children to prevent further progression of disease. Stainless steel crowns are the prefabricated crowns which can be adapted to the primary teeth mainly for molars and strip crowns for anteriors (Kindelan et al., 2008).

There are other studies conducted related to ECC, its management and prevention. Traumatic injuries can be one of the reasons for caries progression, one of the complications being the ranula, which is an extravasation cyst occurring rarely in children (Packiri, 2017; Ravikumar et al., 2017; Grinde-fjord et al., 1995). Studies have proven that MDA (salivary malondialdehyde) levels were high in children with ECC (Subramanyam et al., 2018). One of the foremost treatments for anterior teeth being the pulpectomy and root canal treatment is carried out by rotary instrumentation using the Ni-Ti files and Kedo files (Govindaraju et al., 2017c,a; Jeevanandan and Govindaraju, 2018). Few other studies showed that cleaning (Govindaraju et al., 2017b; Jeevanandan, 2017) and shaping of the canals were more efficient with the rotary system besides the conventional hand instrumentation technique (Nair et al., 2018; Panchal et al., 2019). Various complications encountered by dentists are the stresses during the endodontic treatment in cases of uncooperative children (Aishwarya and Gurunathan, 2017).

CONCLUSION

Primary dentition is required for proper mastication, aesthetics, phonetics and space maintenance. Therefore prevention of ECC is important and can be achieved by educating parents regarding tooth decay by maintaining oral hygiene. Within the limitations of this study such as the geographic limitations and small sample size, it can be concluded that ECC is highly prevalent in maxillary anterior teeth in children, commonly occurring in 2-4 years old.

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Conflict of Interest

The authors declare that there is no conflict of interest for this study.

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