

# PREVALENCE OF GINGIVITIS IN 5-6 YEAR OLD CHILDREN WITH EARLY CHILDHOOD CARIES - A RETROSPECTIVE STUDY

Anisha A Mahtani<sup>1</sup>, Ganesh Jeevanandan<sup>2</sup>, Ravindra kumar Jain<sup>3</sup>

<sup>1</sup>Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences Saveetha University Chennai-77

<sup>2</sup>Reader Department of Pedodontics Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences Saveetha University Chennai-77

<sup>3</sup>Reader Department of Orthodontics Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences Saveetha University Chennai-77

<sup>1</sup>[151501025.sdc@saveetha.com](mailto:151501025.sdc@saveetha.com)

<sup>3</sup>[ravindrakumar@saveetha.com](mailto:ravindrakumar@saveetha.com)

## ABSTRACT:

Having a broad knowledge about the association of gingivitis in children with caries will give us a better insight on what to expect when the patient arrives and how to proceed with the treatments. The purpose of this article was to evaluate the association of gingivitis in 5-6 year old children with Early Childhood caries. This would enable us to understand the prevalence of various diseases in a population and help us to devise appropriate treatment plans. A retrospective study was conducted amongst 755 children aged 5-6 years who were diagnosed with Early Childhood Caries upon reporting to a dental hospital in Chennai from June 2019 to March 2020. The gingival health status of these patients was evaluated based on the digital case records. The data of 755 children were reviewed and the data was extracted. Data Analysis was done using IBM SPSS Software Version 20 to run Chi Square tests. The results revealed the overall prevalence of gingivitis among 5-6 year old children with ECC to be 18.3% with 81.7% of children with clinically healthy gingiva and no incidence of periodontitis. Prevalence of gingivitis among 5-6 year old children with Early Childhood caries was 18.3%. The study also found a statistically significant relation between gingival health and age of the patients with ECC.

## Keywords:

Clinically healthy gingiva, Digital case records, Early childhood caries, Gingivitis.

## INTRODUCTION:

Dental caries affecting primary teeth in preschool children is also known as Early Childhood caries. (Tinanoff and Reisine, 2009) ECC is defined as the presence of one or more decayed, missing or filled teeth surfaces in any primary tooth in a child 71 months of age or younger. (Anil and Anand, 2017) It is recommended that the term 'Early Childhood caries' be used when describing any form of caries in infants and preschool children. (Colak et al., 2013)

ECC begins with a white spot lesion in the upper primary incisors along the margin of the gingiva. If the disease continues, caries can progress leading to complete destruction of the crown. (Kagihara et al., 2009), (Packiri et al., 2017) Factors, such as oral hygiene, fluoride, diet, dental visit patterns, socioeconomic status, ethnicity, and health literacy are some of the major reasons responsible for the development of caries. (Arora et al., 2011), (Lakshmanan et al., 2020) Parental education on the oral hygiene maintenance of their children is also a must. (Gurunathan and Shanmugaavel, 2016; Ravikumar et

al., 2017) Child oral health-care behavior, feeding and cleaning behavior are associated with ECC among children. These include night time bottle feeding and frequent consumption of cariogenic food; late commencement of child tooth brushing and irregular brushing habits.(Slabšinskienė et al., 2010),(Somasundaram et al., 2015),(*International Journal of Pharmaceutical Research*, 2018),(Govindaraju and Gurunathan, 2017)

Gingivitis in children occurs as a result of bacterial plaque accumulation on the cervical margins of the teeth.(López et al., 2006),(Govindaraju, 2017) The amount of plaque accumulation varies in accordance to their tooth brushing frequency, diet and dental caries. (Kolawole et al., 2011) In Mexico City, a study reported the prevalence of 39% of gingivitis amongst 4 to 5-year-old children.(Aranza and Peña, 2011) In India, 67% of rural and 33% of the urban population of 5 year old children had gingivitis. (Kaur et al., 2014) This depicts the association of socio economic status.

Since many studies have reported the prevalence of gingivitis in pre-school children, this study aims at assessing any association of gingival diseases in children diagnosed with Early Childhood caries.

## **MATERIALS AND METHODS:**

### **Study design and Study setting**

The present study was conducted in a hospital in Chennai to evaluate the status of gingival health in 5– 6 year olds, diagnosed with Early Childhood caries, from June 2019 to March 2020. The retrospective study was carried out with the help of digital case records of 755 children that reported to the dental hospital for treatment. Since it is a retrospective study, carried out using digital case records, no informed consent was required from the patient. Ethical clearance to conduct this study was obtained from the Scientific Review Board of the hospital with the following ethical approval number - SDC/SIHEC/2020/DIASDATA/0619-0320.

### **Sampling**

The type of study was Retrospective. The data of 755 children were reviewed and then extracted. Only relevant data was included to minimize bias. Non probability sampling method was carried out. Cross verification of data for errors was done with the help of clinical photographs. The study contained regional data generalised to the South Indian population.

### **Data Collection**

A single calibrated examiner evaluated the digital case records of the 755 patients from June 2019 to March 2020 and reviewed the diagnosis of gingival health status for the patients with ECC. They were categorised into Clinically healthy gingiva, Localised chronic gingivitis, Generalised chronic gingivitis, Mild marginal gingivitis, Plaque Induced gingivitis and Herpetic Gingivostomatitis.

### **Statistical Analysis**

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 20.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Categorical variables were expressed in frequency and percentage; and continuous variables in mean and standard deviation. Chi-square test was used to test associations between categorical variables. Chi Square tests were carried out using demographic data like age and gender as independent variables and gingival health status as the dependent variable. P value < 0.05 was considered statistically significant.

## **RESULTS AND DISCUSSION:**

This study was carried out to evaluate the association of gingivitis in 5-6 year old children with Early Childhood caries. Out of 755 children, aged 5 and 6 years diagnosed with ECC, the study found 18.3% of

the patients with gingivitis. The remaining 81.7% of patients had clinically healthy gingiva with no reported case of periodontitis.

The age group assessed for the study were 5 years(50.2%) and 6 years(49.8%) old children. 55.1% of the children were male and 44.9% were female. (Figure 1,2)

Among the diagnosis of gingival health assessed, maximum number of patients had Clinically healthy gingiva (81.7%). From the remaining 18.3% , diagnosed with gingivitis ; 9.8% had Generalised chronic gingivitis, 4.5% had Mild marginal gingivitis, 2.9% with Localised chronic gingivitis, 0.93% with Plaque Induced gingivitis and 0.13% Herpetic Gingivostomatitis. (Figure 3)

On comparison of age of the patients with their gingival health status, Clinically healthy gingiva had a higher prevalence in 5 year old children (87.3%) than 6 year olds (76%). 12.7% of 5-year-olds and 24% of 6 year old children were diagnosed with gingivitis showing 6 year old children had a higher prevalence of gingival disease than 5 year old children. Localised chronic gingivitis in 6 year olds was 3.1% and in 5 year old children it was 2.6%. Prevalence of Generalised chronic gingivitis was 12.5% in 6 year olds and only 7.1% in 5 year olds. Plaque induced gingivitis was 1.5% and 0.2% in 6 and 5 year old children respectively. Mild marginal gingivitis was 6.3% in 6 year olds and 2.6% in 5 year olds. Herpetic gingivostomatitis was only present in 6 year old children (0.2%) and absent in 5 year olds. The current study found a significant association between age of patients with ECC and occurrence of gingivitis, with  $p= 0.002$  (Figure 4). Other studies either depicted the prevalence of ECC or the prevalence of gingivitis in pre school children but not the prevalence of gingivitis in children diagnosed with ECC. Hence no study was found to support or oppose our finding.

When comparing the prevalence of ECC in countries, India had 54%(Mahejabeen et al., 2006), USA with 23%(Dye et al., 2015) and UK with 28%(Website, n.d.). A systematic review conducted by Duangthip D, reported the prevalence of ECC among 5 to 6 year olds in South East Asia with 25% to 95%.(Duangthip et al., 2017)(Website, n.d.)

A study done by Ohito FA,(Ohito et al., 1993) found that the severity of caries increased with age. Caries was found in 44% of children and gingivitis was found in 37% of children while plaque was present in all sites examined.

On comparison of gender of the patients with their gingival health status, Clinically healthy gingiva had a higher prevalence in females (83.1%) than males (80.5%). Localised chronic gingivitis had a higher prevalence in females (3.5%) than in males (2.4%). Prevalence of Generalised chronic gingivitis was however higher in males (11.5%) than in females (7.6%). Plaque induced gingivitis was again higher in males (1.2%) than females(0.5%). Prevalence of Mild marginal gingivitis was however higher in females (5.01%) than males (4.08%). Herpetic gingivostomatitis was only present in males (0.2%) and absent in females. 19.5% of males and 16.9% of females with ECC were diagnosed with gingivitis. However, the study did not find any significant association between gender and occurrence of gingivitis, with  $p=0.329$  (Figure 5). The prevalence of gingivitis in association with gender of patients who are not diagnosed with ECC was also found to be statistically insignificant by Rodan R.(Rodan et al., 2015)

Our study reported the maximum number of children with Generalised Chronic Gingivitis. However, another study reported that chronic mild gingivitis characterised by the presence of gingival inflammation without detectable loss of bone is common in children. (Jenkins and Papapanou, 2001),(Christabel and Linda Christabel, 2015) Again this study was done in children who were not diagnosed with ECC.

Early childhood caries is an infectious disease and *Streptococcus mutans* is the most likely causative agent. Acquisition of *S mutans* may occur via recital or horizontal transmission. Primary oral colonization by *S mutans* coupled with caries promoting feeding behaviours results in accumulation of these organisms to levels exceeding 30% of the total cultivable plaque flora which leads to rapid demineralisation of the tooth.(Berkowitz et al., 2009),(Jeevanandan, 2017)A subject based analysis reported, a number of bacterial

species in plaque increase until 5 years of age and then form a plateau at mixed dentition period.(Kumar et al., 2014),(Govindaraju et al., 2017a),(Govindaraju et al., 2017b) *P.nigrescens* which is detected in plaque, has its prevalence increased with age.(Pannu et al., 2013),(Panchal et al., 2019)

Colonisation of putative periodontopathic microorganisms occurs early in childhood with any clinical signs of periodontal disease.(Ooshima et al., 2003),(Subramanyam et al., 2018) A systematic review concluded that children were most likely to develop caries if MS was acquired at an early age, although this may be associated with factors such as good oral hygiene and a non-cariogenic diet. (Arora et al., 2011),(Jeevanandan and Govindaraju, 2018) Contardo MS (Contardo et al., 2011) found high *S.mutans* levels directly associated with increased severity of periodontal disease in untreated patients, hence bringing a relationship between ECC and gingival health.

Limitations of the study include a restricted population group due to it being a single centred study. Another limitation includes the data only being collected for a 10 month period. Also since it's a retrospective study based on digital records, the cases could not be reviewed clinically to perform a Gingival index. Hence we relied on the diagnosis uploaded onto the software by the dentists in the hospital however; the clinical photographs were reviewed by a single calibrated examiner. Future scope of the study could be improved by conducting it over a longer duration of time as a multi centered study.

#### **CONCLUSION:**

The prevalence of gingivitis in 5-6 year old children with ECC was 18.3%. Prevalence of gingivitis in children with Early Childhood caries was found to be dependent on the age of the patients but independent of gender.

#### **ACKNOWLEDGEMENTS:**

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#### **AUTHORS CONTRIBUTION:**

G.J contributed to study conception and design, data collection, analysis and interpretation and drafted the work. A.M. contributed to data interpretation, study design and data collection. R.J. contributed to study conception and design and data collection. All authors critically reviewed the manuscript and approved the final version.

#### **CONFLICT OF INTEREST:**

The authors declare no conflict of interest

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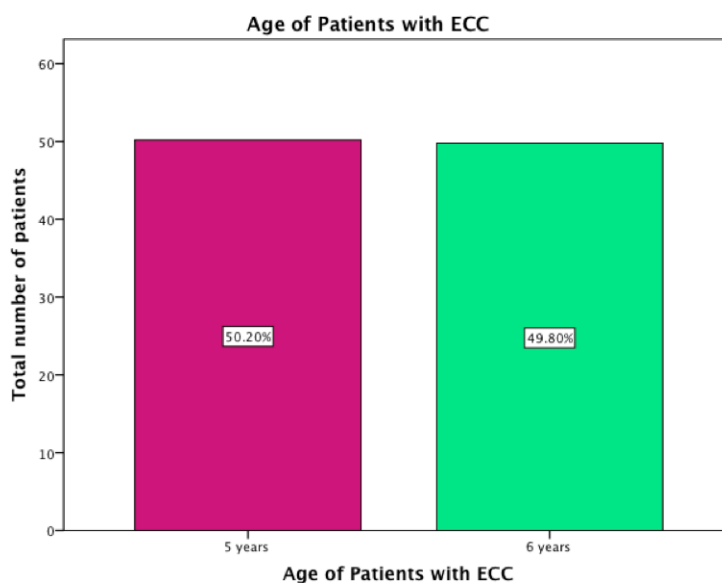


Figure 1: Bar graph depicting the age of patients with ECC assessed for gingival health. X axis represents the age of patients and Y axis represents the total number of patients in percentage. Majority of 5 year old children (magenta) at 50.2% followed by 49.8% of 6-year old school children (green) were included in the study.

Gender of Patients with ECC

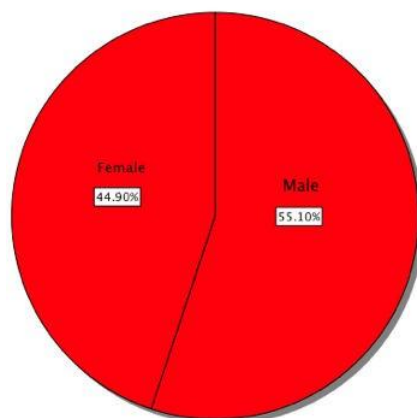


Figure 2 : Pie chart depicting the gender of patients with ECC. 55.1% of males and 44.9% of females were assessed in this study.

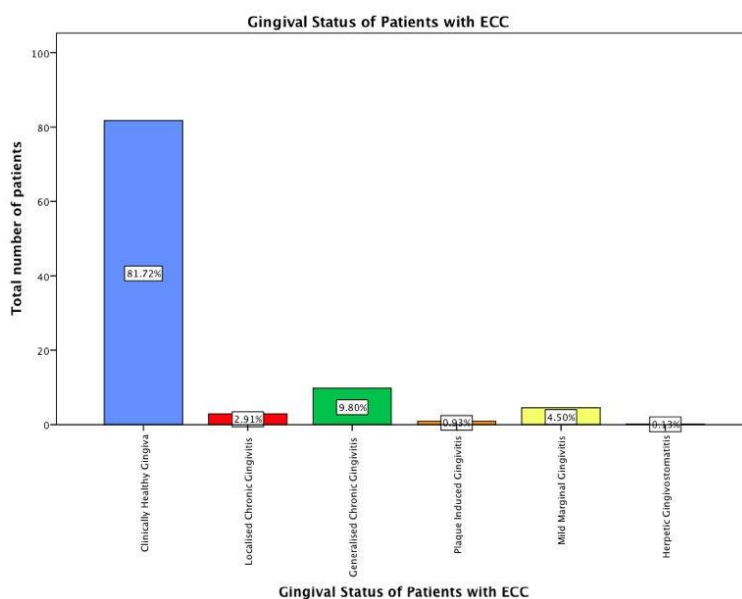


Figure 3: Bar graph depicting the overall diagnosis of gingival health status of patients. X axis represents Diagnosis of gingival health and Y axis represents the total number of patients in percentage. The graph shows the maximum number of children diagnosed with Clinically healthy gingiva (Blue). Generalised chronic gingivitis (Green) was found to be more compared to other gingival diseases in children with ECC.



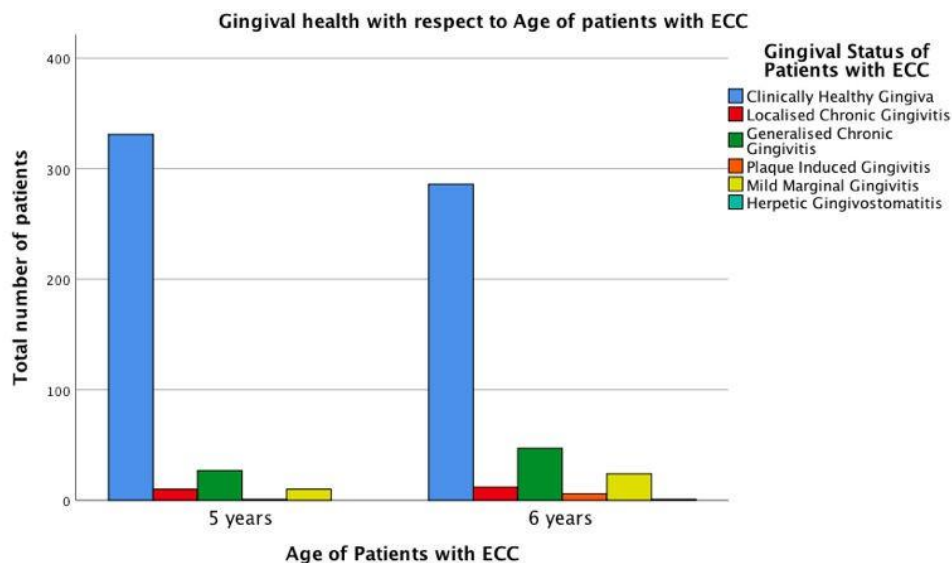


Figure 4: Bar graph depicting association between age of patients with ECC and diagnosis of gingival health status. X axis represents age of patients and Y axis represents the total number of patients. 6 year old children with ECC had a higher prevalence of gingival disease than 5 year old children with ECC. Chi square test;  $p=0.002 (<0.05)$ , statistically significant.

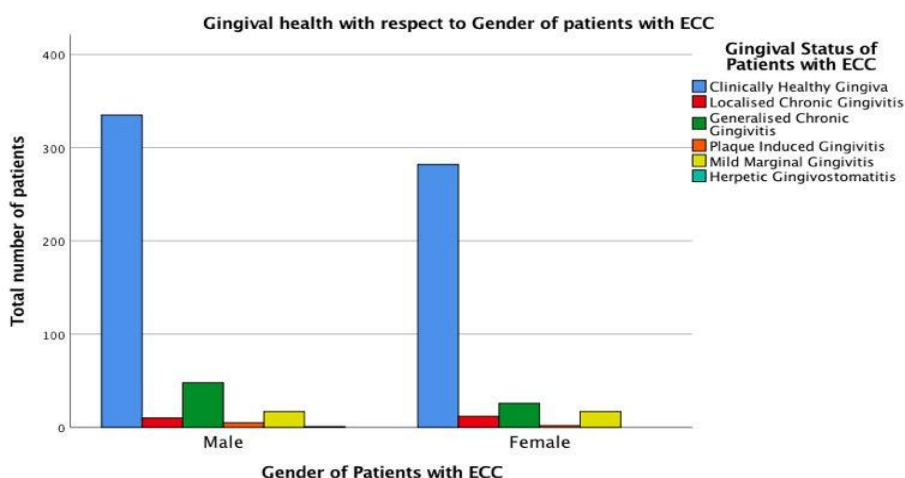


Figure 5: Bar graph depicting association between gender of patients with ECC and diagnosis of gingival health status. X axis represents gender of patients and Y axis represents the total number of patients. Prevalence of Generalised chronic gingivitis and Plaque induced gingivitis was higher in males compared to females. Prevalence of Mild marginal gingivitis was higher in females than males. Herpetic gingivostomatitis was present in males but absent in females. However there was no significant difference between the gingival health status and gender of patients with ECC. Chi square test;  $p=0.329 (>0.05)$ , statistically not significant.