ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

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Prevalence of early childhood caries among preschool children - A retrospective study

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Article History:

Received on: 01 Sep 2020
Revised on: 05 Oct 2020
Accepted on: 07 Oct 2020

Keywords:

Preschool Children, Early Childhood Caries, Cariogenic Diet, Prevalence

ABSTRACT

Dental caries is one of the most common diseases affecting young children mainly caused by the streptococcus mutans when they act on sugary deposits on the enamel. The bacteria produces an acidic environment after breaking down the sugars, resulting in the onset of caries. When this affects children at a very young age, it is known as early childhood caries and it is a serious threat in developing countries. When left untreated it can affect the quality of life of a child. This study aims to determine the prevalence of early childhood caries among preschool children. A retrospective cross sectional study with a sample size 478 preschool children with early childhood caries who were randomly selected from June 2019 to March 2020 from the patients records. Data collected were tabulated with parameters: age, gender, number of affected anterior teeth, Number of missing teeth and number of filled teeth. The results were analysed using Chi-square test in SPSS software. The analysed data is represented as graphs. The most affected age group was five years [31.7%]. Boys seem to be affected more than girls [53.7% > 46.3%]. Affected anteriors were highest in age group 5. Average number of teeth affected were four. The most number of missing teeth was seen in children aged 5 years and the average number of missing teeth was 2. The average number of filled teeth in children aged 3 to 6 years was 5. This necessitates the need to implement preventive and curative oral health programs for preschool children.

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ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v11iSPL3.3411

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INTRODUCTION

The increase in the prevalence of dental caries affecting very young children is a troubling matter among the developing countries. They have a distinct pattern (Douglass *et al.*, 2004; Tinanoff, 1998). They are also called early childhood tooth decay, nursing bottle caries, rampant caries, etc. (Dilley *et al.*, 1980). Nursing bottle caries actually refers to the teeth getting affected due to constant bottle feeding of milk (Lacroix *et al.*, 1997). But early childhood caries is the most preferred term (Drury *et al.*, 1999; Ismail and Sohn, 1999). Early childhood caries is described as white demineralization of the

enamel that immediately transcends to decay along the gingival margins (Berkowitz, 2003). Early childhood caries can be defined as the presence of two or more decayed anteriors, missing or filled tooth surfaces in the primary dentition of children upto 5 years of age (Grauwe *et al.*, 2004). The anteriors of the maxilla were the most commonly affected (van Houte *et al.*, 1982). The streptococcus mutans and S.Sobrinus are the main causative agents of dental caries (Nurelhuda *et al.*, 2010; Tanzer *et al.*, 2001). The acid produced by fermenting the sugars results in dissolving of the tooth layers (Schafer and Adair, 2000).

Practice of baby bottle feeding can be labeled as the prime cause for Early childhood caries. Bedtime use of bottles, sleeping with the bottle etc. greatly increases the risk of Early Childhood Caries (Azevedo *et al.*, 2005; Hallett and Rourke, 2002). Similarly, uncontrolled diet of sugars and carbs that is evident in young children along with failure to maintain oral hygiene is also a major factor contributing to Early Childhood Caries in children (Jensen, 1999; Luke *et al.*, 1999).

Apart from caries children may develop various other complex disorders or diseases if they do not maintain their diet and oral hygiene (Gheena and Ezhilarasan, 2019; Sridharan *et al.*, 2017; Thangaraj *et al.*, 2016). Sometimes it may not be in the hands of the children (Gupta and Ramani, 2016; Jangid *et al.*, 2015; Sherlin *et al.*, 2015) or patients for example, developmental or functional disorders (Sivaramakrishnan and Ramani, 2015; Swathy *et al.*, 2015; Viveka *et al.*, 2016). In adults, the failure to maintain oral health in the long (Jayaraj *et al.*, 2015a,b,c) and harmful habits like smoking, chewing tobacco, etc., has resulted in the development of malignant conditions (Shree *et al.*, 2019; Sridharan *et al.*, 2019).

A comprehensive study suggested that the highest prevalence of Early Childhood Caries was seen in Africa and Southeast Asia (Milnes, 1996). Among the preschool children in the US, the prevalence of Early Childhood Caries increased from 24% to 28% in a span of five years (Szatko *et al.*, 2004). Studies also show the prevalence of Early Childhood Caries is 22% in the Middle East, 45% in Africa, 44% in India and is considered to be an increasing concern by the date (Jose and King, 2003; Kiwanuka *et al.*, 2004; Rajab and Hamdan, 2002). Prevalence of Early Childhood Caries in a study conducted in South India was found to be 40.6% (Henry *et al.*, 2017). The present study is an effort to evaluate the prevalence of Early Childhood Caries among preschool children.

MATERIALS AND METHODS

This is a hospital-based retrospective study conducted in a private dental institution in Chennai to determine the prevalence of Early Childhood Caries among preschool children aged 3 to 6 years with the approval from the Institutional Review Board. All cases from June 2009 to March 2020 were collected from patients records. The sample size collected consisted of 478 children between the age 3 to 6 years having early childhood caries. The child was considered to have Early childhood caries if they had more than two affected anterior, missing and filled teeth. The exclusion criteria being children with developmental enamel defects and systemic diseases. The data was tabulated with following parameters:

1. Age
2. Gender
3. Number of affected anteriors
4. Number of missing teeth
5. Number of filled teeth

The dependent variables were clinical cases of Early Childhood Caries. The independent variables were age and gender. The data collected were analyzed using SPSS software. The test used was the Chi-square test to determine the correlation where P value < 0.05 is considered statistically significant. The pros were easy availability of data and the Cons were small sample size and restricted geography.

RESULTS AND DISCUSSION

Out of the 478 children, the age group with the most number of affected children were seen in age group 5 (31.8%) followed by age group 4 (29%), age group 6 (24.2%) and age group 3 (14.8%) (Figure 1). Similar results were seen in two other studies: Kuriakose et al. in 2015 reported (32.6%) that the most number of cases was found in five year olds and Shilpi S et al. also reported the same (32.6%). Previous literatures are in consensus. The reason for this could be because of dietary habits and exposure to cariogenic diets at this age (Kuriakose *et al.*, 2015; Singh *et al.*, 2012).

Out of the 478 children, the number of girls affected (46.3%) were less than the number of boys affected (53.7%). Kuriakose et al. showed similar results, females (49%) and males (51%) and Shilpi et al., mentioned similar results as well, females (44.2%) and males (55.8%). Thus boys seem to be affected

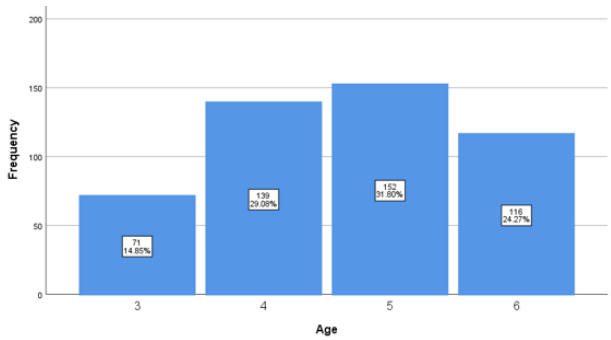

Figure 1: Bar graph depicts the percentage distribution of the age of children affected by early childhood caries

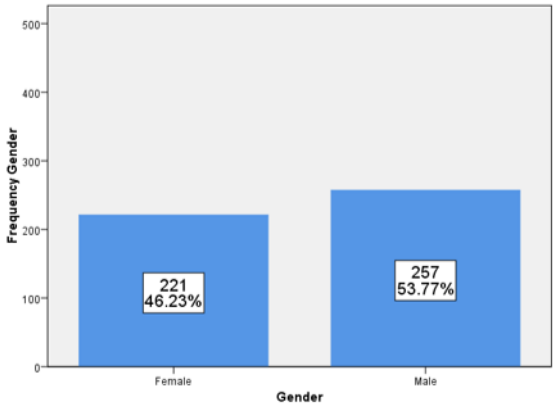

Figure 2: The Bar chart depicts the percentage distribution of girls and boys from the collected data

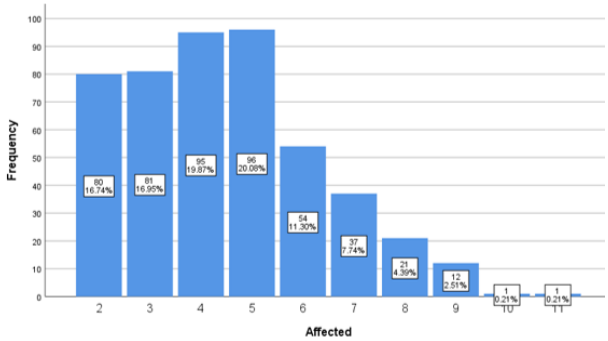

Figure 3: Bar chart depicts the percentage of no. of affected anteriors

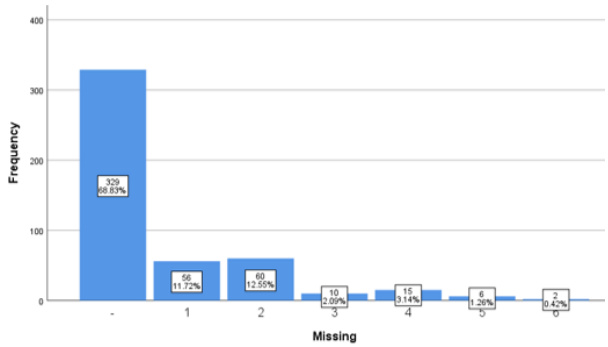

Figure 4: The Bar chart depicts the percentage distribution of missing teeth in the children

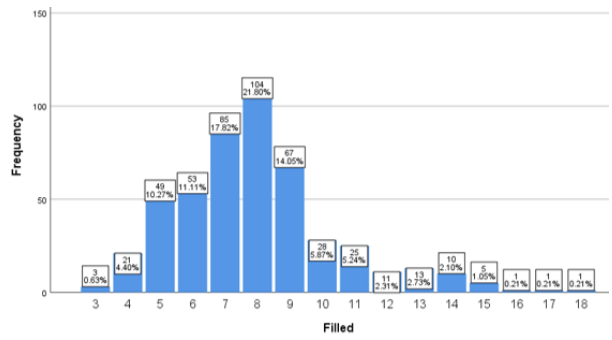

Figure 5: The Bar chart depicts the percentage distribution of filled teeth in the children

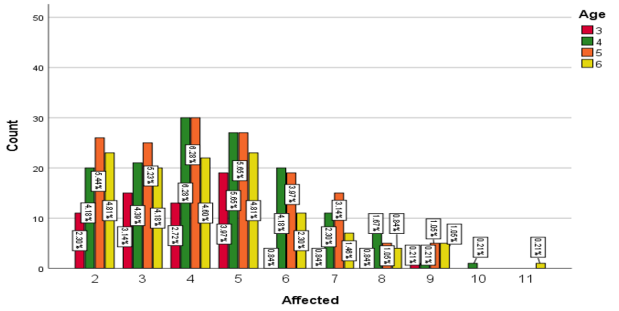

Figure 6: The Bar chart depicts the correlation between the number of affected anteriors and the age of the children

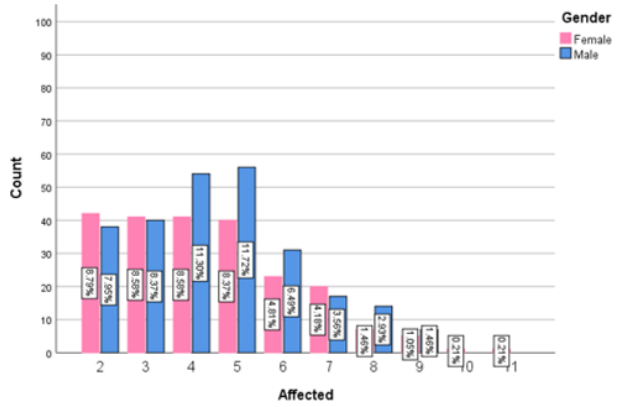

Figure 7: The Bar chart depicts the correlation between the no. of affected anteriors and gender

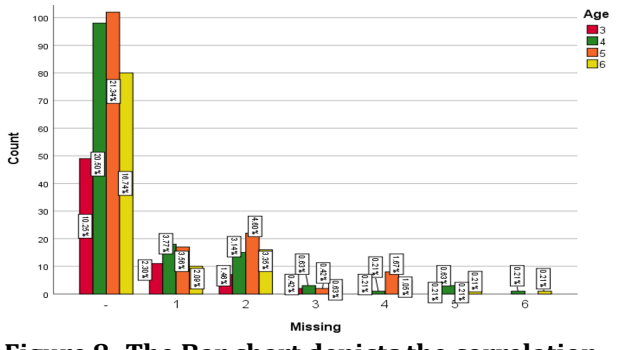

Figure 8: The Bar chart depicts the correlation between the number of missing teeth and the age of the children

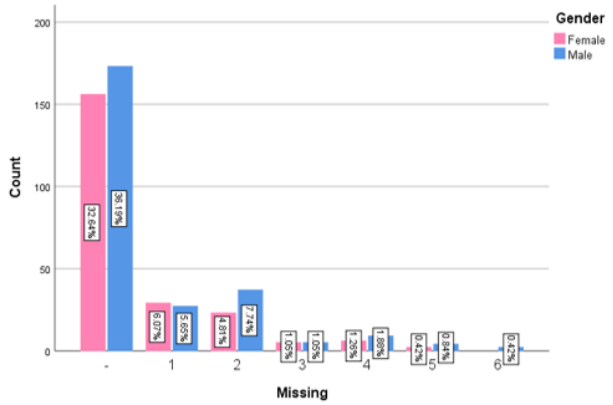

Figure 9: Bar chart depicts the correlation between no. of missing teeth and gender

more than girls (Figure 2). The Previous literatures are in consensus. Reason could be because boys are more difficult to control due to their aggressive nature. So their intake of sugary foods may not be easily restricted (Kuriakose *et al.*, 2015; Singh *et al.*, 2012).

From the present study, it was found that the highest number of affected anteriors were seen in the age group 5 and the average number of teeth affected per individual was 5 (20.08%) (Figure 3). Kuriakose et al. reported that most cases were observed in children between 4 to 5 years and Shilpi et at also reported most cases to be in 5 year olds. Previous literatures are in consensus. It could be due to dietary habits, oral hygiene habits, etc. (Kuriakose *et al.*, 2015; Singh *et al.*, 2012).

The most number of missing teeth were also seen in age group five. The average number of missing teeth being 2 (Figure 4). Studies were done by Shakr A et al. at and Syed et al. reported most number of missing teeth to be present in ages 5 to 6 years. The previous literatures are in consensus. This could be because of delayed eruption, oral habits, etc. (Achmad *et al.*, 2018; Syed *et al.*, 2015).

The average number of filled teeth in children aged 3 to 6 years was found to be 8 (Figure 5) in the present study. A study by JE Kelly at al. said the average number of filled teeth in a child was 5 to 8. Aziz Z et al. also reported that the average number of filled teeth in children between age 5 to 6 years was 6 to 8. The Previous literatures are in consensus. This could be because it corresponds to the number of affected teeth and children easily get caries at a young age due to their diet and oral hygiene habits (Anil and Anand, 2017; Pascalis and Kelly, 2008).

Correlating the number of affected teeth with age of the children we found that, most no. of affected anteriors were found in age groups 4-5 (Figure 6) with p-value = 0.000 [p<0.05], which is statistically significant. Correlating the number of affected teeth with gender, boys had 5 missing teeth while most girls had 2 missing teeth (Figure 7).

Correlating the number of missing teeth with the age, we found that, children below the age of 3 showed more number of missing teeth. The average no. of teeth missing in young children was 2 (Figure 8). Correlating the number of missing teeth with the gender, males had the most number of missing teeth comparatively (Figure 9). P=0.000 [p<0.05], statistically significant.

Early Childhood Caries has been increasing in many countries and causes a major health problem among the children (Inglehart and Bagramian, 2002; Livny *et al.*, 2007). Early childhood caries is a complex disease involving interplay of factors like oral hygiene practices and its supervision by parents and adopted feeding practices which has a marked effect on the prevalence of Early childhood caries. Therefore Early Childhood Caries preventive strategies should begin with prenatal education, adequate treatment and oral hygiene and comprehensive diagnosis (Gordon, 2007; Hannah *et al.*, 2018).

The limitations could be the small sample size, the geographical distribution and the underestimation of caries since the initial caries lesions were not taken into consideration. Future scope of the present study can help identify the need for awareness in dietary control of sugar intake of children and the need for prenatal education on the children's oral hygiene.

In Figure 1, the X-axis denotes the age of the children and the Y-axis denotes the frequency of the children. The most number of affected children were seen in age group 5 (31.8%) . In Figure 2, the X-axis denotes the gender of the children and the Y-axis denotes the frequency of the children. The number of girls affected (46.3%) were less than the number of boys affected (53.7%). In Figure 3, the X-axis denotes the no.of affected anteriors in each child and Y-axis denotes the frequency of children having ECC. The average number of affected anteriors in a child was 5 (20.08%).

In Figure 4, the X-axis denotes the no. of missing teeth and the Y-axis denotes the frequency of the children. The average number of missing teeth in children was 2 (12.5%). In Figure 5, the X-axis denotes the no. of filled teeth and the Y-axis denotes the frequency of children. The average number of filled teeth in children aged 3 to 6 years is 8 (21.8%). In Figure 6, X-axis denotes the no. of affected anteriors and the Y-axis denotes the number of children in

each age group. Red represents age group 3, green represents age group 4, orange represents age group 5 and yellow represents age group 6. The Chi-square test reveals p=0.000 (p<0.05), which is statistically significant. In Figure 7, X-axis denotes the no. of affected anteriors and Y-axis denoted the no. of children in each gender. Pink represents females and blue represents males. The Chi-square test reveals p=0.000 (p<0.05), which is statistically significant. In Figure 8, the X-axis denotes the no. of missing teeth and the Y-axis denotes the no. of children in each age group. Red represents age group 3, green represents age group 4, orange represents age group 5 and yellow represents age group 6. The Chi-square test reveals p=0.000 (p<0.05), which is statistically significant. In Figure 9, the X-axis denotes the no. of missing teeth and the Y-axis denotes the no. of children in each gender. Pink represents females and blue represents males. The Chi-square test reveals p=0.000 (p<0.05), which is statistically significant.

CONCLUSION

From the study, we can conclude that Early Child Caries is common among the Children and mainly affects children of age 5. Boys seem to be more susceptible to Early Child Caries. Hence it necessitates the need to implement preventive and curative oral health programs for preschool children.

Conflict of Interest

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

Funding Support

The authors declare that they have no funding support for this study.

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