

# Association of Proximal Caries and Pulp Therapies in Primary Maxillary Anteriors

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## Abstract

The aim of this study is to assess the association between proximal caries and pulp therapies done in primary maxillary anteriors. The importance of management of anterior teeth is due to their aesthetic concerns. The extent of caries and pulpal involvement determines the treatment to be done. Pulp therapy procedures help in the preservation of the tooth and prevent tooth extraction. A total of 80,000 case sheets were collected and reviewed among which patients between the ages of 3-7 years who have undergone pulp therapy procedure due to proximal caries involving the pulp have been selected. The results were statistically analysed and graphs were tabulated. Among a total number of patients, the most predominant surface affected by caries was found to be the mesial surface with a percentage of 51% and 61% of the cases were found to be done in maxillary central incisors. Maxillary central incisors were found to be the most commonly affected teeth with proximal caries.

**Keywords:** Primary maxillary central incisors; Primary tooth; Proximal caries; Pulp therapies.

## Introduction

Maxillary anteriors are of great importance due to their role in aesthetics. The maxillary anterior teeth are important in achieving pleasing dental aesthetics as it is a primary consideration for patients.<sup>[1]</sup>

The most common problem affecting primary maxillary anteriors is early childhood caries. Early Childhood Caries (ECC) is a relatively new term that describes rampant caries in infants. It is initiated and exacerbated by inappropriate feeding with a nursing bottle. The condition, when associated with the bottle habit, has been found to be first affecting the primary maxillary anterior teeth, followed by involvement of the primary molars. Children with caries in the primary maxillary anterior teeth, independent of their age, generally are regarded as having nursing bottle caries. However, other causes of caries affecting the anterior teeth cannot be ruled out. Children who are 4 and 5 years of age, by which time bottle use generally has been discontinued, may develop caries in the maxillary anterior teeth as well. This late involvement of the maxillary anterior teeth is characterized by lesions on the central incisors that are more on the mesial aspect than when ECC is diagnosed at a younger age.<sup>[1,2]</sup> The children's diet and lifestyle habits were closely related to dental caries. Deciduous tooth caries may cause apical periodontitis and pulpitis, which may damage the permanent tooth buds that affects the development of permanent teeth or may cause the premature loss of deciduous teeth, resulting in the crowding of permanent teeth or increasing the risk of caries in the permanent dentition.<sup>[3,4]</sup> Therefore management of caries of affecting the deciduous dentition at early stages is important.

The main objective of pulp therapy in the primary dentition is to retain every primary tooth as a fully functional component in the dental arch to allow for proper mastication, phonation, swallowing, preservation of the space required for eruption of

permanent teeth and prevention of detrimental psychological effects due to tooth loss. Loss of the maxillary anteriors also accounts to loss of aesthetics. To fulfil this goal, vital pulp therapy through pulpotomy, partial or total pulpectomy is indicated to remove the irreversibly inflamed and necrosed pulp.<sup>[5]</sup>

Pulpectomy is a conservative treatment approach in preventing the premature loss of primary teeth.<sup>[6]</sup> In addition, pulpectomy is advantageous for retained primary teeth.<sup>[7,8]</sup> If not severed with a progressive root resorption or aligned in intra occlusion, the retained tooth can be a functional component in the dental arch for many years.<sup>[9-11]</sup> Thus, an appropriate pulpectomy of primary teeth rather than extraction is a reasonable treatment option to ensure normal shedding or eruption of successor or a long term survival in instances of retention.<sup>[12]</sup> The primary objective of pulp treatment is to maintain the integrity and health of the oral tissues. Although a tooth can remain functional without a pulp, it is desirable to attempt to maintain the vitality of the pulp.<sup>[13]</sup>

Indirect pulp capping is the procedure in which a small amount of carious dentin is retained in deep areas of cavity preparation to avoid an exposure of the pulp. A medicament is then placed over the carious dentin to stimulate and encourage pulp recovery. Indirect pulp therapy performed in primary and permanent teeth of young patients may result in a high 3-year survival rate. Direct pulp capping is defined as the placement of a medicament on a pulp that has been exposed during excavation of deep dental caries. The rationale behind

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this treatment is to encourage young healthy pulps to initiate a dentin bridge. Pulpotomy is the removal of the infected coronal pulp to preserve the normal radicular pulp tissues to encourage continued physiologic development and formation of the root end. [14] Previously our team has a rich experience in working on various research projects across multiple disciplines. [15-29] Now the growing trend in this area motivated us to pursue this project.

### Aim of the study

The aim of this study was to assess the association between proximal caries and pulp therapy done in primary maxillary anteriors in children aged between 3-7 years.

### Methodology

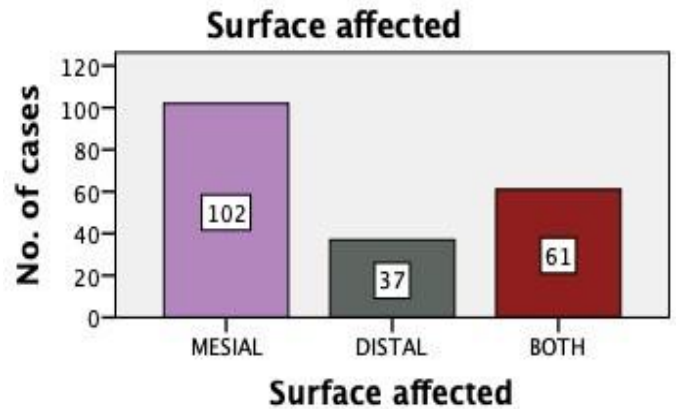
A retrospective study was carried out in patients between the age of 3-7 years who visited University in Chennai with proximal caries and underwent pulp therapy in primary maxillary anteriors. Data of 80,000 patients were reviewed from 1<sup>st</sup> June 2019 to 30<sup>th</sup> March 2020 was collected from patient records, from which 2557 patients who had undergone pulp therapy were selected. The data contains details of patients, intraoral photographs and treatment being done.

Inclusion criteria are patients between the age of 3-7 years, both male and female and patients with proximal caries on the maxillary anteriors. An exclusion criterion is teeth with caries on surfaces other than the proximal surface.

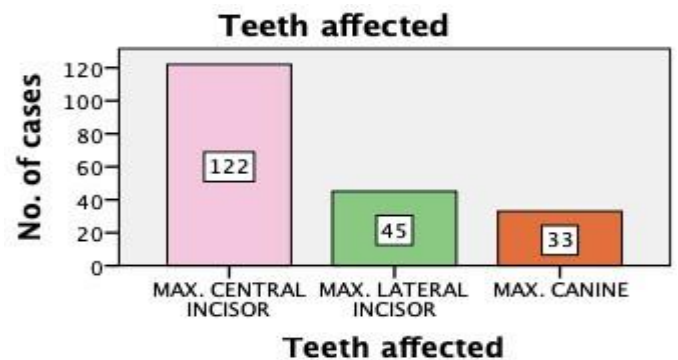
From the total 2557 patients, sample size (N=200) of total number of patients who visited University in Chennai with proximal caries on primary maxillary anteriors and underwent pulp therapy were selected for analysis. Their distribution according to age, gender, teeth number and surface affected were recorded. Ethical clearance was obtained from the institutional ethical committee and Scientific Review Board (SRB) of University in Chennai. The data collected was entered in an Excel sheet and subjected to statistical analysis using SPSS software. Descriptive statistics were done *i.e.*, frequency and cross tabulation. A chi square test was done between age and tooth affected. Independent variables are age and gender, while dependent variables are teeth number and surface affected. The level of significance was  $p < 0.05$ .

### Results and Discussion

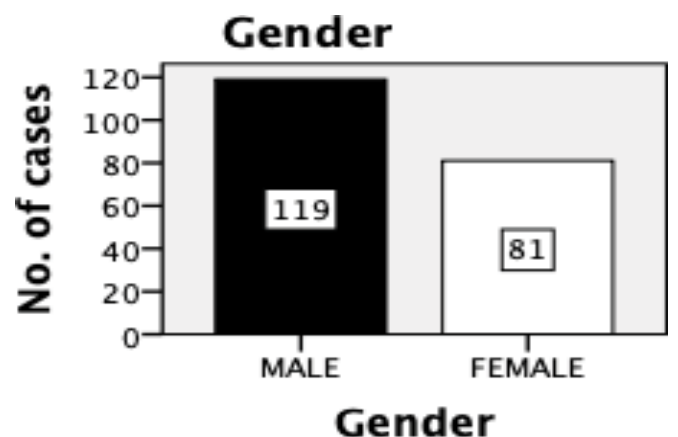
A total of 200 patients were seen during the study period. The most predominant surface affected by caries was found to be the mesial surface with a percentage of 51%. Distal caries on the other hand was only found to be 18.5%. It was also found that both the surfaces were affected in 30.5% of the cases [Figure 1]. It was found that the most commonly affected and treated teeth were the primary maxillary central incisors 61% and the lateral incisors were about 22.5%. Canines were the least common with a percentage of 16.5% [Figure 2]. It was found the male distribution to be predominant with a percentage of 59.5% whereas females were about 40.5% [Figure 3]. The statistical analysis Chi-square test shows p-value (0.000) less than the limit of significance  $p < 0.05$ , a positive correlation between the age of the patients and the tooth affected as depicted in [Figure 4].



**Figure 1:** Shows the frequency distribution of the surface affected among the study population. X axis corresponds to the surface affected and Y axis corresponds to the number of patients. From the graph it is evident that mesial (dark pink bar) was found to be higher, in 102 cases than teeth affected by both mesial and distal surfaces (brown bar) in 61 cases, followed by distal surface (dark grey bar) in 37 cases.

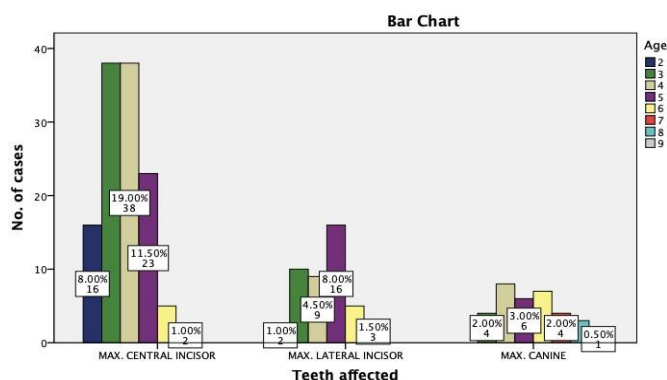


**Figure 2:** Shows the frequency distribution of the teeth affected among the study population. X axis corresponds to the tooth affected and Y axis corresponds to the number of patients. Maxillary central incisors (light pink bar) was affected in 122 patients, Maxillary lateral incisors (light green bar) in 45 patients and Maxillary canines (orange bar) in 33 patients.



**Figure 3:** Shows the Gender distribution of the study population. X axis corresponds to the gender and Y axis corresponds to the number of patients. Male distribution (black bar) was higher which was seen in 119 cases, and females (white bar) in 81 patients.

This study was done to find the association between proximal caries and pulp therapies in maxillary anteriors. [Figure 1] shows



**Figure 4:** Bar graph shows association between teeth affected and age group of the study population where the colour dark blue denotes 2 years, light green 3 years, beige 4 years, purple 5 years, yellow 6 years, red 7 years, light blue 8 years and light grey 9 years of age. X axis corresponds to the tooth affected and Y axis corresponds to the age of the patients who have undergone pulp therapy. From the graph it is evident that maxillary central incisors were more affected among 3-4 years of age, maxillary lateral incisors among 5 years of age and maxillary canines among 4 years of age. The association between teeth affected and age group of the study participants was found to be statistically significant (Pearson chi-square test; p-value=0.000-statistically significant).

the surface affected and was found that in 51% of the cases, the mesial surface was affected. [Figure 2] shows the distribution of pulp therapy among the different maxillary anterior teeth. In 61% of the cases, the maxillary central incisor was affected. [Figure 3] shows the gender distribution of the study population with a male predominance of 59.5%. Figure 4 shows the graph for the association between tooth affected and the age of the patients and it was seen that maxillary central incisors were most affected among 3-4 years of age, maxillary lateral incisors among 5 years of age and maxillary canines among 4-6 years of age. Pulpotomy procedures provide reasonable treatment options for primary teeth with irreversible pulpitis. [5] Dentists should manage the disease dental caries and control activity of existing cavities lesions to preserve hard tissue and retain teeth for long term. [30] In a study by Aquideimal et al. shows that 53% of the dentists recommended pulpotomy followed by definitive restoration and 39% recommended removal of caries and restoration without pulp therapy for management of deep proximal caries. [31] A study by Asgard et al. states that in deep caries management the 4 vital pulp therapy procedures were associated with comparable clinical and radiographic outcomes. The pulpal and periapical status as well as pulpal exposure type or location had no effect on the treatment outcomes. [32] Considerable research has been conducted in the field of pedodontics with relevance to the current population under study. [33-34] institution is passionate about high quality evidence based research and has excelled in various fields. [35-39] We hope this study adds to this rich legacy.

This study helps to identify the association between proximal caries and pulp therapies in maxillary anteriors among the study population. Further studies with a larger population and considering the extent of caries is advised.

## Conclusion

Maxillary central incisors were found to be the most commonly

affected teeth with proximal caries and the most common surface affected was mesial surface. The future scope of the study can be to find the long term outcomes and recurrence of the disease among the patients.

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