

# COMPARISON OF INCIDENCE OF MISSING TEETH IN UCLP PATIENTS COMPARED TO NON CLEFT ORTHODONTIC PATIENTS

**Type of study:** Original Research

**Running Title:** Comparison of incidence of missing teeth in UCLP patients compared to non cleft orthodontic patients

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## Abstract

**Introduction:** The most prevalent serial congenital defects affecting the orofacial region are cleft lip and palate. It can occur alone, in various combinations, and/or in conjunction with other congenital malformations, such as congenital heart disease. To achieve functional and aesthetic well-being, patients with oro-facial cleft deformity must be treated at the appropriate time and at the appropriate age. Congenitally missing teeth were discovered 1.5 times more frequently bilaterally than unilaterally, whereas in second premolar teeth, bilateral absence was detected 1.5 times more frequently than unilateral absence. It was claimed that the absence of several teeth in cleft patients was interdependent, but it is unknown how many affected individuals are missing these teeth at the same time. The aim of this study is to compare the incidence of missing teeth in patients affected by unilateral cleft lip and palate with non cleft orthodontic patients.

**Materials and method:** In this retrospective study, the data was collected from the hospital database and further analysis was done and the results were tabulated. A statistical analysis of the collected data regarding the variance of edentulism among unilateral cleft lip or palate patients and non-cleft orthodontic patients.

**Results:** The total patient count for Unilateral cleft lip and palate aged between 6-30 years was found to be 41. Hence, 41 non-cleft orthodontic patients aged 6-30 years were selected based on simple random sampling. In Unilateral cleft lip or palate patients, 41.46% were missing 1 tooth, 34.15% were missing 2 teeth, 7.32% were missing 3 teeth, 9.76% were missing 4 teeth, 4.88% were missing 5 teeth and 2.44% were missing 6 teeth.

**Discussion:** The number of missing teeth plays a significant influence in orthodontic treatment planning and management. The amount of lost teeth is larger in CLP patients, which complicates treatment planning further. The lateral incisors were observed to be the most common missing teeth in the cleft region in both deciduous and permanent dentition, while the upper second premolars were reported to be more commonly deficient than the normal population in children with clefts.

**Conclusion:** It can thus be concluded that patients with unilateral cleft lip or palate had increased edentulism when compared to non cleft orthodontic patients. It can also be said that the edentulism is a result of the cleft defect.

**Key words:** UCLP, Cleft lip and palate, Edentulism, Innovative technology, Edentulism in cleft lip or palate.

## INTRODUCTION:

The most prevalent serial congenital defects affecting the orofacial region are cleft lip and palate. It can occur alone, in various combinations, and/or in conjunction with other congenital malformations, such as congenital heart disease(1). To achieve functional and aesthetic well-being, patients with oro-facial cleft deformity must be treated at the appropriate time and at the appropriate age. Oral/maxillofacial surgery, otolaryngology, genetics/dysmorphology, speech/language pathology, orthodontics, prosthodontics, and other specialties must all work together to provide coordinated treatment for a child born with a cleft lip and palate(2). Cleft lip and palate (CLP) is a congenital development abnormality, most commonly observed in the maxilla. It is characterised by improper fusion of the nasal and labial processes. Approximately 65 percent of all congenital craniofacial defects are cleft lip and/or palate. In the rest of the globe, the prevalence of this congenital defect was 1/700 to 1000, while in Turkey, it is 1/800. The anomaly is most prevalent (1:500) among Asian people, somewhat common (1:750) in white people, and extremely rare (1:1000 or fewer) in black people. When speech and hearing abnormalities are combined to the child's physical differences, the child appears to have serious psychological issues(3).

With the severity of the cleft, occlusion problems and dental malformations become more common. CLP demands a comprehensive approach to treatment. The most significant members of this team are the plastic surgeon, orthodontist, and speech therapist, especially paediatricians, geneticists, ENT doctors, child psychiatrists, pedodontists, and dentists. Individuals with CLP typically have dental abnormalities. The severity of the cleft also influences the direction and size of tooth and occlusion development. Both deciduous and permanent dentitions are impacted in general, but permanent dentition has a higher rate of abnormalities(4).

The most commonly observed dental anomalies include:

1. Natal or neonatal teeth: In clefts, the presence of neonatal teeth does not appear to affect the primary or secondary dentition. Unlike non-cleft neonates, most natal teeth in cleft neonates are situated on the lateral margin of the premaxillary and maxillary segments.
2. Microdontia: Clinically small teeth are usually observed in patients with cleft lip and/or palate.
3. Taurodontism: Characterised by bull like rectangular shaped teeth, larger pulp chambers with obliteration of pulp horns, obliteration of the radicular bifurcation, etc
4. Ectopic eruption: Clefts can also cause ectopic eruption of primary lateral incisors, which can erupt palatally adjacent to or within the cleft, and permanent canines on the side of alveolar clefts can likewise erupt palatally. There may be a delay in the eruption of permanent incisors.
5. Enamel hypoplasia: Hypoplasia is more commonly seen affecting maxillary central incisors in cleft patients.
6. Delayed tooth maturation: Several growth factors are important for craniofacial development, and when a cleft defect arises, these factors may be overexpressed or underexpressed. This improper expression has the potential to alter odontogenesis and produce dental lamina abnormalities(4).

Upper lateral incisors were observed to be the most usually missing teeth in the cleft region in both deciduous and permanent dentition in children with CLP, while upper second

premolars were reported to be more frequently deficient than in the general population(5).

Congenitally missing teeth were discovered 1.5 times more frequently bilaterally than unilaterally, whereas in second premolar teeth, bilateral absence was detected 1.5 times more frequently than unilateral absence. Congenitally missing teeth affect 0.027 percent to 10.1 percent of the general population. This varies by race and geographical area. Some authors claim that the maxillary lateral incisors are the most commonly missing teeth in the general population, while others claim that the mandibular second premolars are the most commonly missing teeth with 3.4 percent frequency, followed by the maxillary lateral incisors with 2.2 percent frequency. Individuals with CLP have much more dental abnormalities, including outside the cleft area, than those who do not have clefts in varying degrees(6).

Orofacial clefts are caused by abnormal embryonic development in the area of the secondary definitive oral cavity, and can be caused by insufficient mesenchyme proliferation between the medial-nasal and maxillary prominences, as well as a failure or insufficient fusion of the palatal shelves, resulting in the oral and nasal cavities not being separated from one another, depending on the type of cleft. It was claimed that the absence of several teeth in cleft patients was interdependent, but it is unknown how many affected individuals are missing these teeth at the same time, and probable associations of missing teeth in cleft patients have only been mentioned infrequently in the literature. Only a few studies have looked at the relationship between missing teeth in and outside the cleft area, as well as the relationships between specific tooth kinds, sidedness, and laterality in the upper and lower jaws(7).

Our team has extensive knowledge and research experience that has translate into high quality publications (8),(9),(10),(11),(12),(13),(14),(15),(16),(17),(18),(19) ,(20–24) (25),(26),(27)

The aim of this study is to compare the incidence of missing teeth in patients affected by unilateral cleft lip and palate with non cleft orthodontic patients.

## MATERIALS AND METHODS:

This retrospective study examined the records of patients from 01 June 2019 to 31st March 2021 who visited Saveetha Dental College and Hospitals. Ethical approval was taken from the institutional review board. The study population included cleft patients aged between 6-30 years. The study sample included both male and female gender, predominantly south indians. The necessary data such as age, gender, type of cleft deformity, dental status etc was recorded. Incomplete patient data was excluded. Data was recorded in Microsoft Excel and exported to the statistical package of social science for Windows (SPSS) and subjected to statistical analysis. Chi Square test was used for comparison of groups.

## RESULTS:

The total patient count for Unilateral cleft lip and palate aged between 6-30 years was found to be 41. Hence, 41 non-cleft orthodontic patients aged 6-30 years were selected based on simple random sampling. In Unilateral cleft lip or palate patients, 41.46% were missing 1 tooth, 34.15% were missing 2 teeth, 7.32% were missing 3 teeth, 9.76% were missing 4 teeth, 4.88% were missing 5 teeth and 2.44% were missing 6 teeth. [Fig. 1]. In Non-cleft orthodontic patients, 29.27% had no missing teeth, 43.9% were missing 1 tooth, 14.63% were missing 2 teeth, 7.32% were missing 3 teeth and 4.88% were

missing 4 teeth. [Fig. 2]. The edentulism was not associated with Age [Fig. 3] or Gender [Fig. 4].

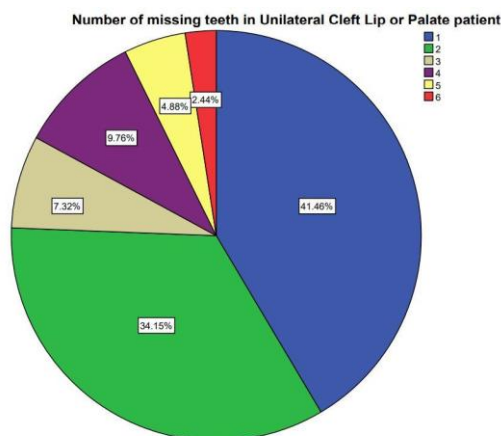


Fig. 1: Pie chart depicting the Number of missing teeth in unilateral cleft lip or palate patient. 41.46% were missing 1 tooth (Blue), 34.15% were missing 2 teeth (Green), 7.32% were missing 3 teeth (Beige), 9.76% were missing 4 teeth (Purple), 4.88% were missing 5 teeth (Yellow) and 2.44% were missing 6 teeth (Red).

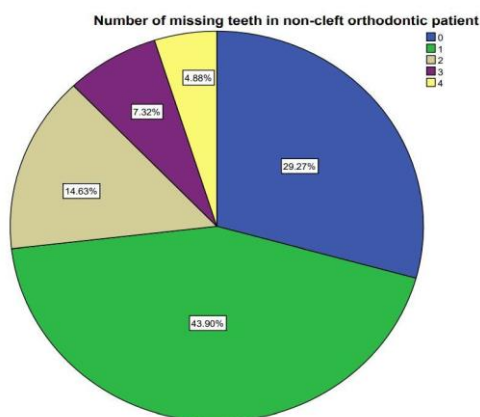


Fig. 2: Pie chart depicting the Number of missing teeth in non-cleft orthodontic patients. 29.27% had no missing teeth (Blue), 43.9% were missing 1 tooth (Green), 14.63% were missing 2 teeth (Beige), 7.32% were missing 3 teeth (Purple) and 4.88% were missing 4 teeth (Yellow).

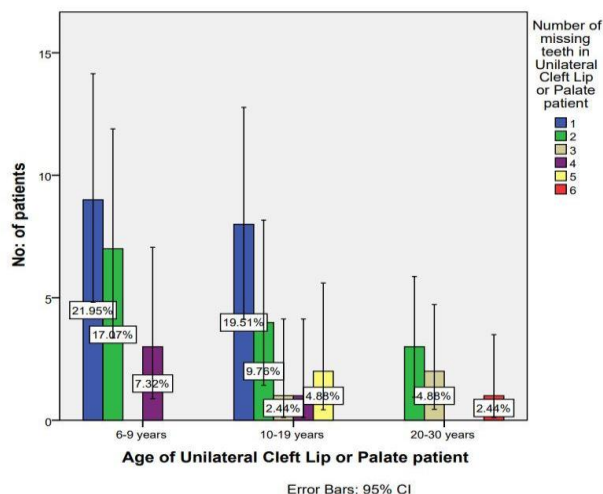


Fig. 3: Bar chart depicting the association between Age and Number of missing teeth in unilateral cleft or palate patients. X axis represents Age, and the Y axis represents No. of patients. Chi square test was done and the association was not found to be statistically significant. Pearson's Chi value: 11.742, df: 12, p-value= 0.467 ( $p > 0.05$ ).

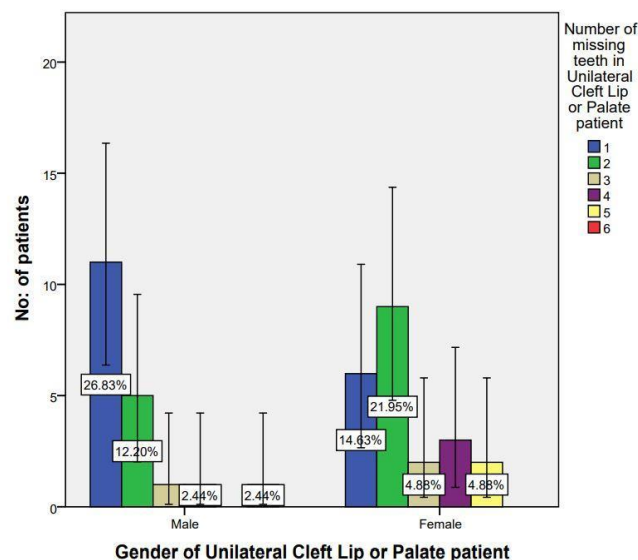


Fig. 4: Bar chart depicting the association between Gender and the No. of missing teeth in Unilateral cleft lip or palate patients. X axis represents Gender, and Y axis represents the No. of patients. Chi square test was done and the association was not found to be statistically significant. Pearson's Chi value: 5.562, df: 4, p-value= 0.234 ( $p > 0.05$ ).

## DISCUSSION:

The number of missing teeth plays a significant influence in orthodontic treatment planning and management. The amount of lost teeth is larger in CLP patients, which complicates treatment planning further. The lateral incisors were observed to be the most common missing teeth in the cleft region in both deciduous and permanent dentition, while the upper second premolars were reported to be more commonly deficient than the normal population in children with clefts(28).

Previous studies conducted by Dogan et al compared the congenital tooth deficiencies seen in permanent teeth in individuals with unilateral cleft lip and palate to those without cleft lip and palate, and observed that the cleft side's lateral incisors are more commonly congenitally deficient than the upper second premolar teeth, and this should be taken into account in treatment planning from an early age(29). Another study conducted by Royko et al concluded that Hypodontia is observed in the cleft sided lateral incisor region (104 patients, or 69 percent), with a total of 235 missing teeth, followed by upper and lower jaw second premolars. The upper and lower second premolars in the cleft area showed a strong connection with congenital missing teeth in left-sided clefts. In patients with CLP, a congenital defect of the lateral tooth can result in canine tooth abnormalities(29,30).

The eruption of the upper permanent canine teeth in a sample of 77 children with CLP was studied by Vichi and Franchi. They found that in congenital deficiency of the permanent lateral, the canines were positioned mesially, but that in the presence of

supernumerary teeth, the canines were positioned distally(31). In their investigation, Rullo et al. discovered that 40 percent of CLP patients had congenitally missing lateral incisors, and 30 percent of their samples had supernumerary teeth in the incisor region(32). Using radiographs of 278 kids aged 5 to 18 years old who had CLP, Shapira Y et al. investigated the frequency of missing teeth in clefts, both on the cleft side and on the non-cleft side. The maxillary permanent lateral incisors (259 teeth) were the most often missing teeth on the cleft side, followed by the maxillary (47 teeth) and mandibular (23 teeth) second premolars. The maxillary second premolars (12 teeth) were the most commonly missing teeth on the non-cleft side, followed by the maxillary lateral incisors (10 teeth) and mandibular second premolars (12 teeth) (6 teeth)(33). Specific surgical treatments, like early periosteoplasty or neonatal closure of the hard palate, may impact the greater occurrence of tooth agenesis in CLP patients, according to some of the researchers. As a result, according to several other studies, surgical procedures have no influence on tooth agenesis. During embryological development, there may be insufficient tissue in the medial nasal and/or maxillary processes, resulting in the absence of lateral incisors mesially and/or distally. The high occurrence of agenesis outside of the cleft area, on the other hand, suggests that hypodontia and clefts share a shared genetic foundation(34).

#### CONCLUSION:

It can thus be concluded that patients with unilateral cleft lip or palate had increased edentulism when compared to non cleft orthodontic patients. It can also be said that the edentulism is a result of the cleft defect.

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#### AUTHOR CONTRIBUTIONS:

Santhosh Bala contributed to data collection, analysis and interpretation and drafting of the article. Aravind Sivakumar contributed to the critical revision of the article.

#### CONFLICT OF INTEREST:

No potential conflict of interest relevant to this article was reported.

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