



## Gingival Health Status in Children with And Without Cleft Palate: A Case Control Study

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### ABSTRACT

Orofacial cleft malformations requires multidisciplinary care. Maintenance of oral hygiene for such individuals is a difficult task for the patients because of oroantral communication. Hence, a study was conducted to analyse the periodontal health status of children with cleft palate. Retrospective data collected from 89,000 case records from June 2019 to March 2020 were taken for the study. Based on the inclusion and exclusion criteria, the present study consisted of 58 children divided into two groups: children with cleft palate and children without cleft palate. In both groups, Oral Hygiene - Simplified Index and Plaque Index were recorded and tabulated. The data was subjected to Mann-Whitney test using SPSS software. There was no difference in the gingival health status of children with cleft palate and children without cleft palate. This was not statistically significant. In this study, gingival health status in children without cleft palate was similar to children with cleft palate.

### ARTICLE HISTORY

Received October 10, 2020

Accepted November 03, 2020

Published December 09, 2020

### KEYWORDS

Cleft palate, Oral hygiene, Periodontal health.

### INTRODUCTION

Orofacial cleft (OFC) malformations are common congenital malformations occurring in humans [1] [2]. The estimated prevalence is 1.7 in 1000 live births in India. Incidence of cleft lip and palate (CLP) ranges between 0.25 and 2.29 per 1000 births in India [3]. The causative factors varies from genetic origin, smoking, x-ray exposure, alcohol consumption, and antibiotics [4]. Their consequences include difficulty in suckling, speech difficulties, deafness, facial deformity, malocclusion, psychological problems, and stress [5] [6] [7].

Dental complications include oligodontia, neonatal teeth, ectopic eruption of teeth, anomalies in shape and size of tooth, fused teeth, enamel hypoplasia, cross bite, crowding and spacing [8]. Children and adults with a cleft lip and palate (CLP) are at increased risk for developing periodontal diseases and carious lesions. The scar tissues which are observed after the defect closure leads to plaque accumulation and retentive appliances used also hinder the plaque control [9]. The persisting soft tissue folds before closure, would serve as a pathogenic habitat enhancing the risk of periodontal infections [4]. Teeth present adjacent to the cleft showed periodontal destruction [10].

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Cheng LL [11] reported that patients with orofacial clefts have poor oral health which may lead to poor quality of life. Deformity in the cleft and scar produced after surgery can make it difficult to control the plaque accumulation.

Cleft palate patients have difficulty in maintaining oral hygiene which eventually leads to periodontal disease. Assessing the gingival status of children with cleft defects can give an idea on concentrating more oral hygiene maintenance in them. However studies conducted in the South Indians were limited. Previously we have focused our research on various invitro and invivo studies [12-27] We have currently shifted our focus to this retrospective analysis. So this study was conducted with the aim to assess the gingival health status in children with and without cleft palate.

## MATERIALS AND METHODS

This is a retrospective study. This study was carried out in a hospital based university setting. Institutional ethical review committee approved the study protocol. Retrospective data collected from 89,000 case records from June 2019 to March 2020. Informed consent was obtained from the parents or guardian before starting the treatment were children with cleft palate. Inclusion criteria were children with cleft palate, children aged from 3 years to 18 years, children with at least one or two erupted teeth, children with at least one or two erupted teeth, complete photographic and written records regarding the complete intra-oral examination of the patient. Age and gender matched controls i.e. children without cleft lip, were taken according to the relevant cases obtained from the inclusion criteria. The exclusion criteria were incomplete and censored dental records, children below the age of 3 years and improper photographs. Total cases acquired for this study was 58 patients which includes 29 children with cleft palate and 29 children without cleft palate (age,gender matched controls). OHI-S score was collected for patients with and without cleft palate. OHI-S index includes both Debris Index and Calculus Index. For OHI-S index, we divided each arch into three segments and measured the calculus and plaque on the buccal and lingual surfaces of each segment of both arches. The segment was represented by the tooth that showed the highest scoring. The values were added and divided by the total number of tooth surfaces to obtain the Plaque index score. Similarly calculus index was obtained and both were added to obtain the final score. If the OHI-S score is 0.1-1.2 oral hygiene is good, if the OHI-S score is 1.3-3.0 oral hygiene is fair and if the OHI-S score is 3.1-6.0 oral hygiene is poor. The Plaque Index was given by Silness and Loe in 1964. Scoring criteria for Plaque index as follows. Score 0 represents no plaque. Score 1 represents a film of plaque adhering to the

free gingival margins and adjacent area of tooth. Score 2 represents moderate accumulation of soft deposits within the gingival pocket or tooth and gingival margin which can be seen with naked eye. Score 3 represents abundance of soft matter within the gingival pocket and or the tooth and gingival margin. Plaque Index were also collected for the children with and without cleft palate. If the plaque index score is 0.1-0.9 oral hygiene is excellent, if the plaque index score is 1.0-1.9 oral hygiene is fair and if the plaque index score is 2.0-3.0 oral hygiene is poor.

Selected case and control group were examined by three people; one reviewer, one guide and one researcher. Patient's case sheets were reviewed thoroughly. Cross checking of the data including digital entry and intraoral photographs was done by an additional reviewer, and as a measure to minimise sampling bias, samples for the group were picked by the simple random sampling method. Digital entry of clinical examination and intraoral photographs were assessed. Then OHI-S score and plaque score was entered into Microsoft excel (MS Excel) and then transferred into Statistical Package for the Social Sciences (SPSS) software for statistical results. A correlation test (Mann - Whitney test) was done between the children with cleft palate (case group) and children without cleft palate (control group). The difference was considered statistically significant when the p-value was less than 0.05.

## RESULTS AND DISCUSSION

The final study sample size included a total of 58 patients with 29 patients with cleft palate (case group) and 29 patients without cleft palate (control group).[Graph-1] In this study, the control group was matched based on age and gender as similar to the case group. [Graph-2]. Mean Plaque index score for children with cleft palate (0.27) was similar to the mean Plaque index for children without cleft palate (0.31).[Graph-3]. Majority of children with cleft palate had excellent Plaque index scores while the children without cleft palate fell under excellent and fair scores. Mann Whitney U test showed that this difference was not statistically significant (p-value = 0.125).[Graph 4] Mean OHI-S index of children with cleft palate (0.12) was similar to the mean OHI-S index of children without cleft palate (0.15).[Graph-5] Majority of children with cleft palate and all the children without cleft palate had good OHI-S scores. Comparing with Mann - Whitney U test, the result was not statistically significant (p-value = 0.088). [Graph -6].

According to Ramjford [28], Lindhe [29], and Silness [30], a healthy periodontium is needed for proper functioning of the stomatognathic system. For maintaining periodontal health in cleft patients, adequate plaque control should be there. In

patients with congenital malformations, anatomic deviation would hamper the plaque control. [31]. The current study results showed that there were no gross differences in the mean score of children with and without cleft palate. Majority of children with and without cleft palate had good OHI-S score. These variations in the results may be due to geographic limitation, oral hygiene awareness and unicentric type of study. This was contradictory to the study conducted by Nagappan and John in 2015 reported that the mean OHI-S score for their study was found to be 1.7 [32]. Similar results were observed in a study conducted by Idown et al in 2011 and Bloor et al in Nigerian and Indian population [33] [34]. Other studies [35],[33] failed to show a poor periodontal status in cleft patients. Parents and children should work together to maintain good oral hygiene. Good attitude of parents reflects as a good oral health in children and vice versa [36],[37]. Prophylactic programs should be implanted for cleft lip/palate patients and multidisciplinary team approach for the treatment of all aspects and also regular recall system for the patients [38]. Preservation of primary teeth in the dental arch is important to guide the eruption of the permanent teeth in the optimal position. Grossly decayed primary teeth which are extracted before exfoliation causes space in the dental arch which causes malocclusion if space maintainer was not given [39] [40]. Bacteria play a vital role in the initiation and progression of pulpal and periodontal disease [41]. Dental caries would eventually lead to pulpitis and periapical periodontitis which is treated by means of root canal procedure [42] [43] [44] [45]. Fluoridated toothpaste should be used which removes dental plaque effectively thereby decreasing the incidence of oral disease [46] [47] [48] [49] [50] [51]. Thus intensive oral hygiene measures have to be taken along with early interdisciplinary treatment for the cleft palate patients.

Advantages of this study were that this was a case control study with age and gender matched controls to provide best results with high internal validity, reasonable data, Disadvantage of the study was that this was a unicentric study with geographic limitations, limited sample size and has lower external validity. The dietary factors, feeding and oral hygiene factors were not taken into consideration while interpreting the results. Future scope for this study includes larger sample size which is not confined to a particular geographic area and to assess the plaque index and OHI-S index by clinically examining the cleft palate patients.

## CONCLUSION

Within the limitations of the present study, gingival health status in children with cleft palate was similar to the gingival health status in children

without cleft palate. Hence, awareness of oral hygiene instructions should be of prime importance which could influence oral health.

## AUTHOR CONTRIBUTIONS

- Design - P.Kuzhalvaimozhi, Vignesh Ravindran
- Intellectual content - Vignesh Ravindran
- Data collection - P.Kuzhalvaimozhi
- Data analysis - Vignesh Ravindran, Subhashini.V.C
- Manuscript writing - P.Kuzhalvaimozhi.
- Manuscript editing - Vignesh Ravindran,Subhashini.V.C

## CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest.

## FUNDING

Self.

## ETHICAL CLEARANCE

It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number-SDC/SIHEC/2020/DIASDATA/0619-0320)

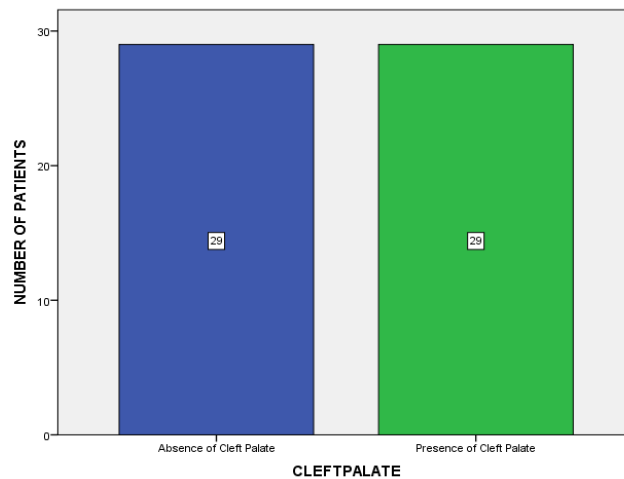
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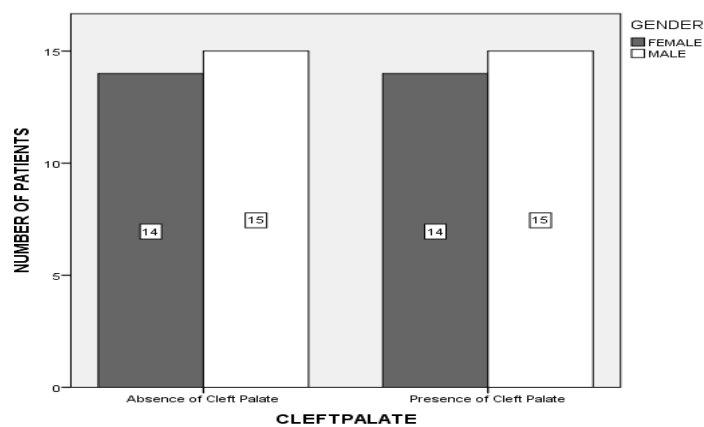
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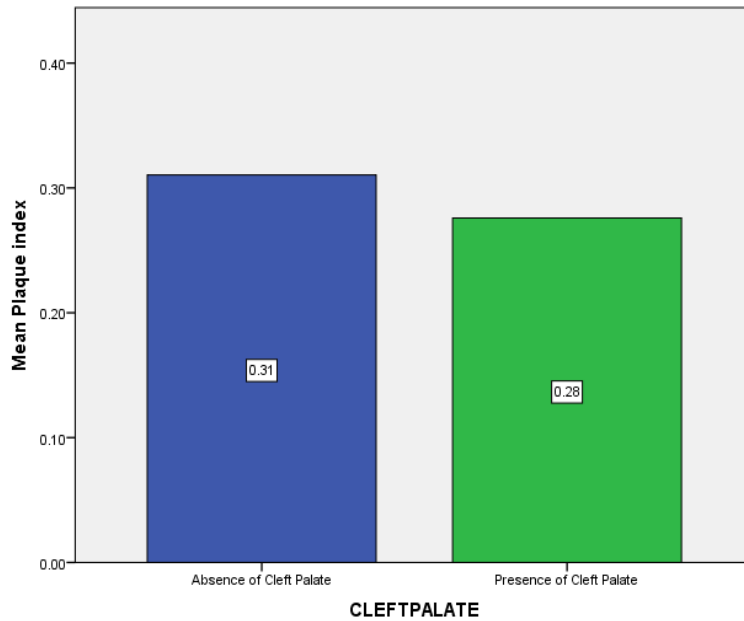
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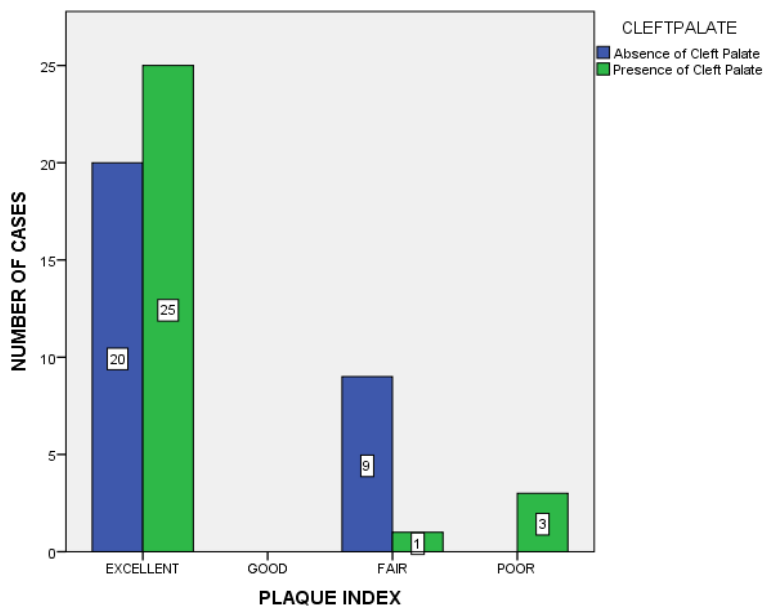
**Graph 1: Bar graph represents the number of subjects in case (children with cleft palate) and control group (children without cleft palate). (Y-axis represents number of patients; X-axis represents presence or absence of cleft palate) Note the equal distribution of cases in both the groups.**



**Graph 2: Bar graph represents the gender distribution of cases in case (children with cleft palate) and control group (children without cleft palate). (Y-axis represents the number of patients ; X-axis represents presence or absence of cleft palate; grey represents females ; white represents males) Note the equal distribution of cases in both the groups.**

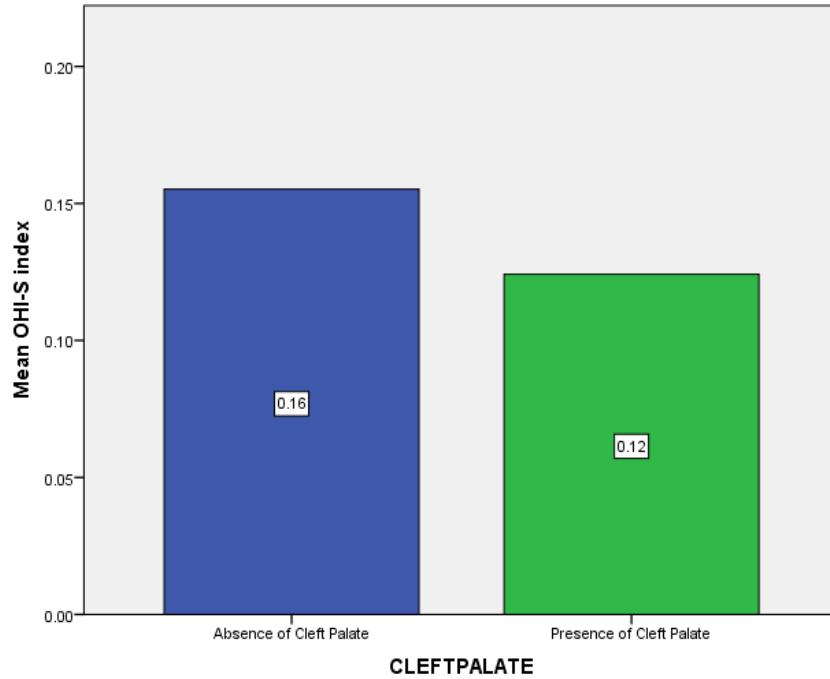


**Graph 3:** Bar graph represents the Mean Plaque Index in case (children with cleft palate) and control group (children without cleft palate). (Y-axis represents the presence or absence of cleft palate; X-axis represents mean Plaque Index scores; blue represents absence of cleft palate; green represents presence of cleft palate). Mean Plaque index score for children with cleft palate (0.27) was similar to the mean Plaque index score for children without cleft palate (0.31).

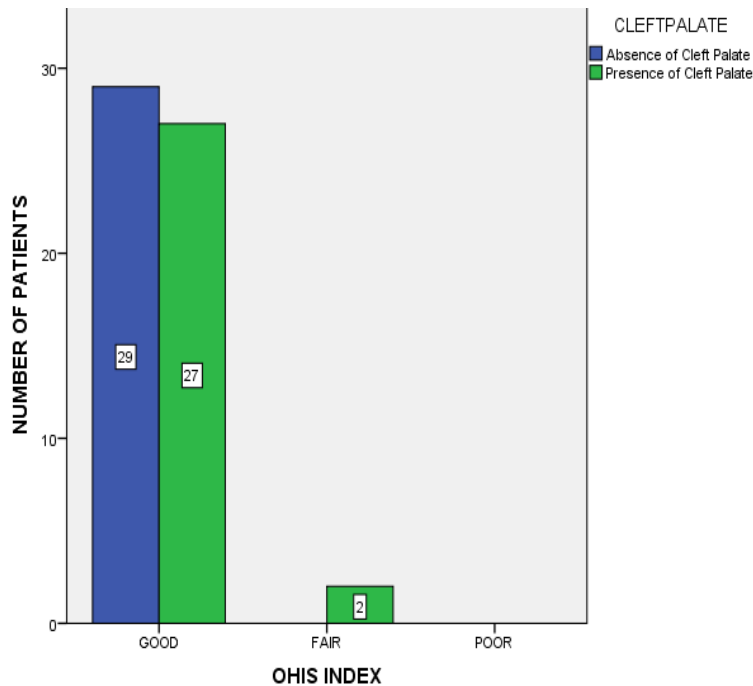


**Graph 4:** Bar graph represents the comparison of Plaque index scores among the children with and without cleft palate. (X-axis represents the different plaque index scores; Y-axis represents the number of cases; blue represents absence of cleft palate; green represents presence of cleft palate). Majority of children with cleft palate had excellent Plaque index score while the children without cleft palate fell under excellent and fair scores. This difference was not statistically significant. (Mann Whitney U test, p-value - 0.125 - not statistically significant)





**Graph 5:** Bar graph represents the Mean OHI-S index scores in case (children with cleft palate) and control group (Y-axis represents the presence or absence of cleft palate; X-axis represents mean OHI-S index scores; blue represents absence of cleft palate; green represents presence of cleft palate). Mean OHI-S index of children with cleft palate (0.12) was similar to the mean OHI-S index of children without cleft palate (0.15).



**Graph 6:** Bar graph represents the comparison of OHI-S index scores among the children with and without cleft palate. (X-axis represents the different OHI-S index scores; Y-axis represents the number of cases; blue represents absence of cleft palate; green represents presence of cleft palate). Majority of children with cleft palate and all the children without cleft palate had good OHI-S scores, which did not show any statistical significance (Mann - Whitney U test, p-value - 0.088 - not significant).