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Dental Anomalies in Children with Unilateral and Bilateral Cleft Lip and Palate

Ajmal Khan,[1] Nadia Mansoor,[2] Imtiaz Ali,[1] Noman Khan,[3] Waleed Ali,[4] Asif Shah[1]

1. Saidu College of Dentistry, Saidu Sharif Swat, KP Pakistan.
2. Bacha Khan Dental College, Mardan, KP Pakistan.
3. Sharif Medical & Dental College, Lahore, Pakistan.
4. AERO Hospital, Hassan Abdal, Pakistan.

ABSTRACT

Background: Dental anomalies is common feature of cleft lip and palate cases. Clefting is not an isolated condition but rather part of a broader spectrum of malformations involving both facial structures and tooth development
Objective: To determine and compare the frequency of dental anomalies among children with unilateral and bilateral cleft palate
Materials and Methods: This cross-sectional descriptive study was conducted at the outpatient department of Bacha Khan Dental College, Mardan, involving 82 participants aged 4 to 20 years. Patient history, clinical examination, and panoramic radiographs were employed to identify common dental anomalies, like lateral incisor agenesis, supernumerary teeth, peg-shaped lateral incisor, lateral incisor microdontia, agenesis of the maxillary second premolar, and enamel hypoplasia. The Chi-square test was used to compare dental anomalies between unilateral and bilateral cleft palate cases, with the significance level set at $p < 0.05$.
Results: The age was 12.12 ± 5.21 years, with a gender distribution of 28 (34.15%) females and 54 (65.85%) males. Unilateral cleft palate (n=56, 68.29%) was more common than bilateral (n=26, 31.71%). The frequency of dental anomalies included 37.80% exhibiting lateral incisor agenesis, 21.95% supernumerary teeth, 17.07% peg-shaped lateral incisor, 17.07% lateral incisor microdontia, 20.73% agenesis of the second premolar, and 9.76% clinical enamel hypoplasia. No statistical significant difference was found for all dental anomalies between unilateral and bilateral cleft palate ($p>0.05$).
Conclusion: Dental anomalies are quite prevalent in both unilateral cleft lip and palate (UCLP) and bilateral cleft lip and palate (BCLP) patients. Importantly, no statistically significant differences were observed between these two groups.
Keywords: Bilateral, Cleft lip and palate, Dental anomalies, Unilateral.

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INTRODUCTION

Cleft lip and palate are relatively common conditions, occurring in approximately 1 in 500 cases.[1] The development of the lip and palate takes place between the 4th and 10th weeks of embryogenesis, coinciding with the period of tooth development. Any aberration in this developmental process can lead to dental malformations. Dental anomalies can manifest in various ways, encompassing both numerical variations and structural irregularities.[2] Numerical anomalies may involve the presence of extra teeth, known as supernumerary teeth, or a reduction in the number of teeth, referred to as hypodontia (lack of one or a few teeth) or oligodontia (absence of several teeth).[3] On the other hand, structural anomalies pertain to alterations in tooth size, which can range from smaller-than-average teeth, termed microdontia, to larger-than-average teeth, known as macrodontia.[4]

Research consistently shows that children with isolated cleft lip and/or palate, or both unilateral and bilateral cleft lip and palate have a higher prevalence of dental anomalies compared to the general population.[5-7] This suggests that clefting is not an isolated condition but rather part of a broader spectrum of malformations involving both facial structures and tooth development.[7]

Correspondence: Dr. Nadia Mansoor
Assistant Professor,
Bacha Khan Dental College, Mardan, KP Pakistan.
Email: nadiamansoordr@gmail.com

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These disturbances lead to various dental anomalies, highlighting the complex relationship between facial development and oral health.[8]

Studying dental anomalies in children with cleft lip and unilateral or bilateral cleft lip and palate is essential for understanding and managing oral health in this population. Cleft conditions often involve a higher incidence of dental issues, including tooth agenesis and malocclusions. This research provides insights into specific oral health challenges, guiding healthcare providers in developing tailored treatment plans. Comparing dental anomalies in unilateral and bilateral cases aids in refining treatment approaches, and early identification supports timely interventions to minimize the impact on oral health. Additionally, the study contributes to the knowledge of craniofacial anomalies, informing evidence-based practices for optimal oral healthcare in these children.

MATERIALS AND METHODS

The cross-sectional descriptive study was conducted at the outpatient department of Bacha Khan Dental College, Mardan, on 82 patients with cleft lip and palate from 23rd June 2023 to 10th February 2024, using a non-probability sampling technique. Ethical approval was obtained from the Institutional Review Board (No. 043/BKCD dated 22/05/23). Informed consent was obtained from all participants or their legal guardians before inclusion in the study. The sample size of 82 was estimated through OpenEpi software, using a 5.6% prevalence of microdont lateral incisor from a previous study[9] at a 95% confidence level and 5% absolute precision.

The inclusion criteria were unilateral and/or cleft lip and palate cases with ages between 4 and 20 years, Pakistani nationals (based on parent NIC), of both genders, and willing to participate in the study.

A comprehensive patient history was obtained to determine eligibility based on inclusion criteria, such as age and gender. Subsequently, a clinical examination was conducted to record the location of anomalies and the type of cleft using a disposable mouth mirror under the light illumination of the dental chair. Panoramic radiographs were recommended to further assess the dental condition. The examination revealed by oral and maxillofacial specialist having FCPS qualification various dental anomalies, including agenesis of the lateral incisor, supernumerary teeth in the anterior region, peg-shaped lateral incisor, microdontia of the lateral incisor, agenesis of the second premolar, and enamel hypoplasia.

Data analysis was conducted using R software version 4.1.3. Categorical data were presented as frequencies and percentages, while age was expressed as mean and standard deviation (SD). The Chi-square test was employed to compare dental anomalies between unilateral and bilateral cleft palate cases. The significance level was set at $p < 0.05$.

RESULTS

The mean age was 12.12±5.21 years. Females were 28(34.15%). Majority of participants (60.98%) fell within the 11-20 years range, comprising 50 individuals. (Table 01) Unilateral cleft palate (n=56, 68.29%) was more common than bilateral (n=26, 31.71%) in the maxilla. (Fig 01)

Of the 82 individuals with cleft palate, 31 (37.8%) had lateral incisor agenesis, 18 (21.95%) had supernumerary teeth, 14 (17.07%) had peg-shaped lateral incisors, and 14 (17.07%) had lateral incisor microdontia. Agenesis of the second premolar was observed in 17 (20.73%), while enamel hypoplasia was noted in 8 (9.76%). (Table 02)

Table 03 compares dental anomalies between individuals with bilateral and unilateral cleft palate (CP) in the maxilla. Lateral incisor agenesis was observed in 8 (30.77%) of bilateral CP and 23 (41.07%) of unilateral CP cases, with no significant difference ($p = 0.52$). Supernumerary teeth were present in 6 (23.08%) of bilateral CP and 12 (21.43%) of unilateral CP cases, with no significant difference ($p > 0.99$). Peg-shaped lateral incisors were found in 3 (11.54%) of bilateral CP and 11 (19.64%) of unilateral CP cases, with no significant difference ($p = 0.55$). Lateral incisor microdontia occurred in 3 (11.54%) of bilateral CP and 11 (19.64%) of unilateral CP cases, with no significant difference ($p = 0.55$). Agenesis of the second premolar was noted in 4 (15.38%) of bilateral CP and 13 (23.21%) of unilateral CP cases, with no significant difference ($p = 0.6$). Enamel hypoplasia was observed in 8 (14.29%) of unilateral CP cases but not in bilateral CP cases.

Table 01. Distribution of age and gender of the participants

Characteristic	N = 82
Age(years), Mean ± SD	12.12 ± 5.21
gender, n (%)	
female	28 (34.15)
male	54 (65.85)
Age groups (years), n (%)	
11-20	50 (60.98)
4-10	32 (39.02)

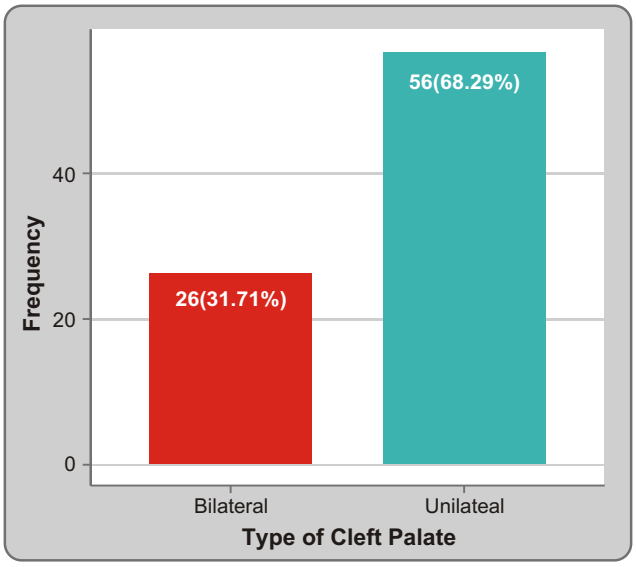


Fig 01. Distribution of Type of cleft palate in the maxilla

Table 02. Distribution of various dental anomalies in cleft palate cases in the maxilla

Characteristic	n(%)
Lateral Incisor Agenesis	
No	51 (62.20)
Yes	31 (37.80)
Supernumerary Teeth	
No	64 (78.05)
Yes	18 (21.95)
Peg Shaped Lateral Incisor	
No	68 (82.93)
Yes	14 (17.07)
Lateral Incisor Microdontia	
No	68 (82.93)
Yes	14 (17.07)
2nd Premolar Agenesis	
No	65 (79.27)
Yes	17 (20.73)
Enamel Hypoplasia	
No	74 (90.24)
Yes	8 (9.76)

Table 03. Comparison of dental anomalies between bilateral and unilateral cleft palate in the maxilla

Characteristic	Bilateral CP, N-26(%)	Unilateral CP, N-56(%)	P-value*
Lateral Incisor Agenesis			0.52
No	18 (69.23)	33 (58.93)	
Yes	8 (30.77)	23 (41.07)	
Supernumerary teeth			>0.99
No	20 (76.92)	44 (78.57)	
Yes	6 (23.08)	12 (21.43)	
Peg Shaped Lateral Incisor			0.55
No	23 (88.46)	45 (80.36)	
Yes	3 (11.54)	11 (19.64)	
Lateral Incisor Microdontia			0.55
No	23 (88.46)	45 (80.36)	
Yes	3 (11.54)	11 (19.64)	
2nd Premolar Agenesis			0.6
No	22 (84.62)	43 (76.79)	
Yes	4 (15.38)	13 (23.21)	
Enamel Hypoplasia			0.1
No	26 (100.00)	48 (85.71)	
Yes	0 (0.00)	8 (14.29)	

*Chi-square/fisher exact test

DISCUSSION

This study provides important information into the prevalence of dental anomalies among children with unilateral and bilateral cleft lip and palate (CLP), as these anomalies have impact on treatment planning and aesthetic outcomes. Dental anomalies, such as lateral incisor agenesis, supernumerary teeth, and enamel hypoplasia can complicate treatment strategies and contribute to aesthetic concerns.

The prevalence of dental anomalies is higher in individuals with cleft palate compared to those without this condition. Prominent among these anomalies are tooth agenesis and supernumerary teeth. The noticeable absence of the lateral incisor, often associated with a significant deficiency in mesenchymal mass, insufficient blood supply, or previous surgical interventions, highlights the intricate nature of these anomalies.[10] The occurrence of supernumerary teeth is correlated with less severe deficiencies. In individuals with cleft palate, the regulation of tooth agenesis is complex, influenced by homeobox Msx-1 genes, resulting in a frequency nearly four times higher than that observed in the general population.[11]

Our study reveals a missing lateral incisor in 37.80% was found. In comparison, the prevalence of hypodontia in the permanent dentition of individuals with cleft lip and/or palate (CL/P) was found to be notably frequent at 52.7%, aligning with rates reported in previous studies: 47.5% by Slayton et al.[12], 51.1% by Watanabe et al.[13], and 56.9% by Kadono et al.[14] It is crucial to note that our observed prevalence is relatively lower than that reported in some earlier investigations, ranging from 63% to 77%, highlighting the variability in hypodontia prevalence in CL/P individuals.[15]This underscores the significance of considering a range of factors, including genetic and environmental influences, along with potential variations in study populations and methodologies, when interpreting and comparing prevalence rates.

Our findings found no statistical difference in pattern dental anomalies between bilateral and unilateral cleft. Similar results were found in another study.[16] A study in United States aimed to compare dental anomalies in unilateral (UCLP) and bilateral (BCLP) cleft lip patients. From 102 clinical records, 67 UCLP and 29 BCLP cases were analyzed. High prevalence of dental anomalies was found. Significant differences ($P < 0.05$) were observed in anodontia of a single tooth, multiple anodontia, and anterior malocclusion.[17]

CONCLUSION

Based on our findings, it can be concluded that dental anomalies are quite prevalent in both unilateral cleft lip and palate (UCLP) and bilateral cleft lip and palate (BCLP) patients. Importantly, no statistically significant differences were observed between these two groups, highlighting the similarity in the occurrence of dental anomalies.

Ethical consideration

This study was approved by Institutional Review Board Bacha Khan Dental College, Mardan, Pakistan.

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Conflict of Interest

Authors declared no conflict of interest.

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DATA SHARING STATEMENT: The data that support the findings of this study are available on request from the corresponding author. The data is not publicly available due to privacy or ethical restrictions.

AUTHORS' CONTRIBUTION

The following authors fullfill authorship criteria as per ICMJE guidelines;

Khan A, Mansoor N:	Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.
Ali I, Khan N:	Substantial contribution to conception and design, data acquisition, drafting the manuscript, final approval, agreed to be accountable for all the work.
Ali W:	Analysis and interpretation of data, drafting the manuscript, final approval, agreed to be accountable for all the work.
Shah A:	Analysis and interpretation of data, critical revision,final approval, agreed to be accountable for all the work.

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