10.5005/jp-journals-10015-1455

ORIGINAL RESEARCH

Dental Caries and Dental Anomalies in Children with Cleft Lip and Cleft Palate in Bengaluru City, India

[1]Seema Kamble, [2]Shivalinga S Hiremath, [3]Manjunath P Puranik, [4]Rahul Gaikwad, [5]Ashwini Biradar
[6]Amol R Gadbail, [7]Sachin C Sarode [8]Gargi S Sarode, [9]Shankargouda Patil

ABSTRACT

Aim: The aim of this study was to assess the association of dental caries and dental anomalies among 5- to 15-year-old children with cleft lip and cleft palate.

Materials and methods: A cross-sectional study was conducted among 500 children with cleft lip and/or cleft palate and 500 children without cleft of the age group 5 to 15 years. The clinical examination was carried out using decayed, missing, and filled teeth (DMFT) by Klein Plamer and Knutson, and dmft by Grubbel and 1997 World Health Organization (WHO) pro forma.

Results: The results showed a statistically significant increase in the prevalence of dental caries in children with cleft lip and/or cleft palate. The mean DMFT was found to be significantly higher in operated children than in the children who were not operated. Other dental abnormalities included an increased frequency of enamel hypoplasia ($p < 0.001$), hyperdontia ($p < 0.014$), anterior, unilateral and bilateral cross-bite ($p < 0.001$), and open bite ($p < 0.001$).

Conclusion: The results of this study show that children with cleft have higher prevalence of dental anomalies than the normal children. With increased occurrence of hypoplasia in children with cleft, reduced access for cleaning upper anterior teeth after surgical repair leads to poor oral hygiene status, leading to increased risk to dental caries.

Clinical significance: Given the high caries experience among the children with cleft lip and cleft palate, it is necessary to advocate a more rigorous approach to the prevention of dental disease in these high-risk children. They should therefore, be subjected to regular checkups, oral hygiene advice, diet advice, appropriate fluoride supplementation, and, when required, appropriate referral for secondary care.

Keywords: Cleft lip, Cleft palate, Dental anomalies, Dental caries.

How to cite this article: Kamble S, Hiremath SS, Puranik MP, Gaikwad R, Biradar A, Gadbail AR, Sarode SC, Sarode GS, Patil S. Dental Caries and Dental Anomalies in Children with Cleft Lip and Cleft Palate in Bengaluru City, India. World J Dent 2017;8(4):304-308.

Source of support: Nil

Conflict of interest: None

[1]Department of Public Health Dentistry, Nair Hospital Dental College, Mumbai, Maharashtra, India

[2]Department of Public Health Dentistry, The Oxford Dental College & Hospital, Bengaluru, Karnataka, India

[3]Department of Public Health Dentistry, Government Dental College and Research Institute, Bengaluru, Karnataka, India

[4]Department of Community Dentistry and Oral Epidemiology College of Dentistry, Qassim University, Buraydah, Kingdom of Saudi Arabia

[5]Department of Public Health Dentistry, SB Patil Dental College and Hospital, Bidar, Karnataka, India

[6]Department of Dentistry, Indira Gandhi Government Medical College & Hospital, Nagpur, Maharashtra, India

[7,8]Department of Oral Pathology and Microbiology, Dr. D. Y. Patil Dental College & Hospital, Dr. D. Y. Patil Vidyapeeth, Pune Maharashtra, India

[9]Department of Oral and Maxillofacial Surgery, Division of Oral Pathology, College of Dentistry, Jazan University, Jazan Kingdom of Saudi Arabia

Corresponding Author: Sachin C Sarode, Department of Oral Pathology and Microbiology, Dr. D. Y. Patil Dental College & Hospital, Dr. D. Y. Patil Vidyapeeth, Pune, Maharashtra, India Phone: +919922491465, e-mail: drsachinsarode@gmail.com/sachin.sarode@dpu.edu.in

INTRODUCTION

Cleft lip and cleft palate are one of the most common congenital craniofacial anomalies. In India, these birth defects affect approximately 1:500 or 1:800 live births. The presence of cleft lip or palate has been associated with developmental anomalies. Numerous surgeries are required to repair oral clefts, and the timing for these surgeries depends on the child's stage of development. For this reason, there has been a great interest in the dental development and the possible differences in the development in the cleft population.[1]

Children with an oral cleft require extra care for their oral health and dentition status.[2] They often need complex and extensive treatment, usually provided by an interdisciplinary team of orthodontists, plastic surgeons, pedodontists, maxillofacial surgeons, speech therapist, and others. Following surgical repair of the cleft, the long-term oral health management of patient revolves around dental caries, malocclusion, and hypoplasia.[3]

Dental caries is still a global public health problem that constitutes the main threat to the children's oral health today.[4] With the presence of cleft in the oral cavity, the maintenance of good oral hygiene is difficult, and the children are more at risk of developing dental caries. Hence, this study was carried out to assess the prevalence

of dental caries and dental anomalies in cleft lip and cleft palate patients.

MATERIALS AND METHODS

A study was conducted among children 5 to 15 years of age in Bengaluru, Karnataka, India. Cases consisted of operated and nonoperated cleft lip and/or palate patients from the three major hospitals in Bengaluru city. Age- and socioeconomic status-matched controls consisting of noncleft individuals were taken from two schools in Bengaluru city.

Ethical clearance was obtained from the Institutional Ethical Committee of Government Dental College and Research Institute, Bengaluru. Before conducting the study, necessary permission was obtained from the respective institutions. Informed consent was obtained from parents of participants or attendants, which was designed in local languages.

In total, 500 cases of children with cleft lip and/or palate were examined. Children aged between 5 and 15 years without cleft lip and/or palate matched with the cases for certain pertinent variables, such as age, sex, and socioeconomic status were selected as controls. Children with treated cleft lip and/or palate were also included in the study. The general information regarding the patient's demographic profile, dietary habits, and oral hygiene practices was obtained. Maternal history regarding age of pregnancy, exposure to infections, smoking, or alcohol consumption during pregnancy was recorded. Information on consanguineous marriages was also noted. This information was collected from the parents through an interview. Clinical examination was done using WHO 1997 pro forma to assess oral health status and treatment needs. Caries experience was assessed by using dmft/dmf surface (dmfs) by Grubell, and DMFT and DMFS index by Klein, Plamer, and Knutson. Dental anomalies were assessed based on the presence or absence of hypodontia, hyperdontia, crowding, incompetent lip closure, unilateral cross-bite, bilateral cross-bite, and open bite. Examinations of cases were carried out on a wooden chair in a well-ventilated room and under favorable lighting conditions.

STATISTICAL ANALYSIS

Data were analyzed using Statistical Package for the Social Sciences software version 17, and p-value was assessed at 0.05. Student's t-test (two-tailed, independent) was used to find the significance of study parameters on continuous scale between two groups. Mann–Whitney U-test was used to find the significance between two groups for parameters on noninterval scale. Chi-square/Fisher's exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

Table 1: Distribution of the study groups according to gender

Gender	*Cleft lip with/without cleft palate, n (%)*	*Normal children, n (%)*
Male	306 (61.2)	295 (59)
Female	194 (38.8)	205 (41)

RESULTS

The number and percentage of children in both groups are shown in Table 1.

Dental Caries

Caries was present in 62.62% of deciduous teeth and 74.21% of permanent teeth in the children with cleft as compared with 44.96% of deciduous teeth and 24.76% of permanent teeth in normal children. The difference was found to be statistically significant ($p < 0.001$). The mean dmft in children with cleft was 1.5 ± 2.7, which was significantly more than the mean 0.7 ± 1.5 dmft of normal children (Table 2). Furthermore, there was a significant difference in the mean DMFT in the children with cleft (1.3 ± 1.8) as compared with the children without cleft (0.4 ± 0.8) (Table 3).

Table 2: Distribution of the study groups according to dmft in deciduous teeth

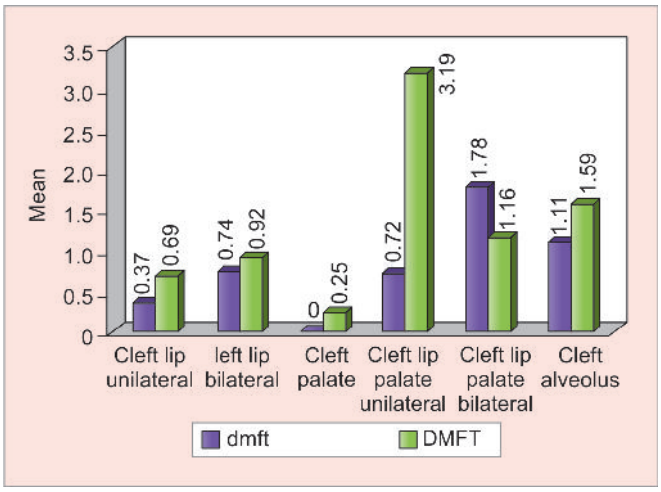
Caries experience	*Cleft lip with/without cleft palate*	*Normal children*	*p-value*
d	1.3 ± 2.4	0.6 ± 1.1	<0.001**
m	0.1 ± 0.7	0.1 ± 0.7	0.655
f	0 ± 0.1	0	<0.001**
dmft	1.5 ± 2.7	0.7 ± 1.5	<0.001**
ds	1.8 ± 5.5	0.7 ± 1.6	<0.001**
ms	0.6 ± 2.9	0.5 ± 2.3	0.603
fs	0 ± 0.1	0	<0.001**
dmfs	2.3 ± 7.2	1.3 ± 3	<0.004**

**Highly significant

Table 3: Distribution of the study groups according to mean caries experience in permanent teeth

Mean caries experience	*Cleft lip with/without cleft palate*	*Normal children*	*p-value*
D	1.3 ± 1.8	0.4 ± 0.8	<0.001**
M	0 ± 0.1	0 ± 0.1	0.316
F	0 ± 0.2	0	<0.001**
DMFT	1.3 ± 1.8	0.4 ± 0.8	<0.001**
DS	1.6 ± 2.6	0.5 ± 1.4	<0.001**
MS	0 ± 0.3	0 ± 0.3	0.762
FS	0.1 ± 0.3	0	<0.001**
DMFS	1.7 ± 2.7	0.6 ± 1.5	<0.001**

**Highly significant



Graph 1: Distribution of mean dmft and DMFT score according to the types of cleft

Table 4: Distribution of the study groups according to dental anomalies

	Cleft lip with/ without cleft palate	*Normal children*	
Dental anomalies	*n (%)*	*n (%)*	*p-value*
Enamel hypoplasia	214 (42.8)	29 (5.8)	<0.001**
Hypodontia	370 (74.0)	4 (0.8)	<0.001**
Hyperdontia	6 (1.2)	0 (0.0)	0.014*
Incompetent lip closure	398 (79.6)	60 (12.0)	<0.001**
Anterior cross-bite	255 (51.0)	10 (2.0)	<0.001**
Posterior cross-bite			
• Unilateral	23 (4.6)	0 (0.0)	<0.001**
• Bilateral	223 (44.6)	0 (0.0)	
Open bite	164 (32.8)	6 (1.2)	<0.001**

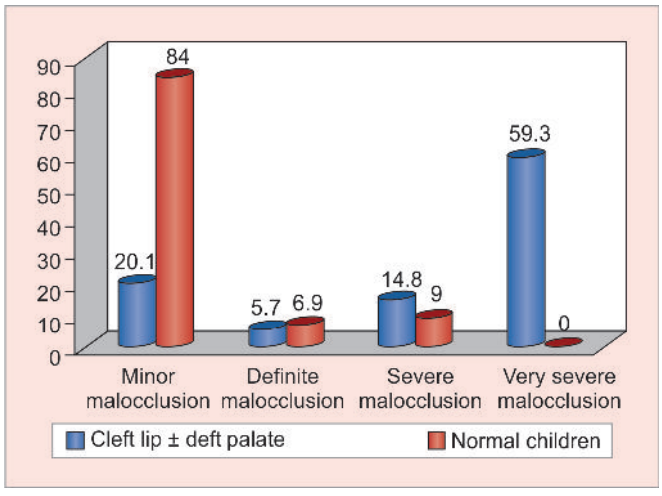
*Significant; **Highly significant

The mean caries experience according to the type of cleft is shown in Graph 1. Combining the unilateral and bilateral cleft lip with palate based on their morphological similarity, a statistically significant difference was found between dmfs and DMFS of these children as compared with the children with unilateral and bilateral cleft lip only, indicating that with severity of cleft, the dental caries experience also increases.

Dental Anomalies

Enamel hypoplasia was found to be significantly more often in children with clefts as compared with the children with no clefts. Hypodontia was found in 74% of children with clefts as compared with 4% in normal children ($p < 0.001$). No significant difference was found concerning supernumerary teeth. Crowding in the anterior segment was seen in 66% children with cleft as compared with 21.9% children without cleft. Incomplete lip closure was seen in 79.6% of children with cleft as compared with 2% of normal children. Furthermore, anterior cross-bite, posterior cross-bite, and open bite were statistically more in children with cleft as compared with normal children (Table 4).

Malocclusion was assessed through dental esthetic index, 59.3% of children had very severe malocclusion, and 31% had severe malocclusion (Graph 2).



Graph 2: Distribution of the study groups according to severity of malocclusion

DISCUSSION

The results of this study show that the children with cleft have more caries experience as compared with children without cleft. In deciduous teeth, 37.37% children with clefts were caries free and 55.03% normal children were caries free, which is similar to the study done by Chapple and Nunn[3] but more than the study done by Dahllöf et al[5] and Turner et al.[6] In permanent teeth, 24.39% children with clefts were caries free; this is similar to the study done by Hewson et al[7] but less than the study done by Paul and Brandt[8] in which 53.5% of children were caries free.

The mean dmft and dmfs were significantly more in children with clefts as compared with children without clefts, which is similar to the studies done by Chapple and Nunn,[3] Hewson et al,[7] and Paul and Brandt,[8] and more than the study done by Bokhout et al.[9] However, the mean caries experience in the present study was less than that in the other studies, which considered caries among children with cleft only, by Bian et al[10] (dmft, 3.7 ± 3.3), Bessling and Dubois[2] (dmft, 11.20 ± 6.45), and Turner et al[6] (dmft, 7.31 ± 1.7).

Furthermore, the mean DMFT and DMFS were found to be significantly higher in the children with cleft as compared with the children without cleft and were found to be similar to the studies done by Chapple and Nunn[3] and Turner et al,[6] more than the study done by Paul

and Brandt,[8] less than the study done by Besseling and Dubois.[2] However, in the study done by Hewson et al,[7] the difference between both groups was not statistically significant. The difference could be due to the difference in the population studied, different dietary experiences, and the frequency of fluoride exposure.

The mean caries experience (dmft and DMFT) increased with severity of the cleft, as the children with cleft lip and cleft palate both had more caries as compared with the children with only cleft lip. This might be because as the severity of cleft increases the deformity also increases.

This is similar to the study done by Chapple and Nunn,[3] in which the children with both cleft lip and palate had mean dmft double that of the children with only cleft lip, whereas in the study done by Kirchberg et al,[11] the difference was not found to be significant between the various types of clefts. In the study done by Besseling and Dubois,[2] the mean dmft was less for children with cleft lip as compared with the children with cleft lip and palate, but for mean DMFT, there was no significant difference among the various types of clefts.

The mean DMFT (1.62 ± 1.99) and DMFS (1.07 ± 1.65) of the children who had undergone operation were found to be significantly higher than the mean DMFT (2.15 ± 3.20) and DMFS (1.36 ± 2.184) of the children who were not operated.

Concerning the variations in the number of teeth, more number of children with cleft (74.0%) had hypodontia as compared with the normal children (0.8%), and the difference was found to be statistically significant. This is more than the study done by Ranta et al[12] in which 38.4% of the children with cleft exhibited hypodontia. This is not in line with the study done by Dahllöf et al.[5] No significant difference was found in children with cleft and normal children with regard to hypodontia. There is a delay noted in the children with cleft as compared with the controls, and it increases according to the severity of cleft. This retardation is caused by genetic factors or indirect effects of clefts on the postnatal development. In the present study, no follow-up was done to assess this and also no radiographs were taken to assess whether the tooth was really absent or it was a case of delayed eruption.

However, there was no significant difference concerning hyperdontia among both the groups, which is in contrast to the study done by Dahllöf et al,[5] in which significant difference was found in children with cleft and normal children concerning hyperdontia.

Incomplete lip closure was found to be significantly higher in children with clefts (79.6%) as compared with the children without clefts (12%). This is similar to the study done by Dahllöf et al[5] in which significant difference was found in children with cleft and normal children concerning incompetent lip closure.

Significantly more number of children with cleft had anterior cross-bite, posterior cross-bite as well as open bite as compared with children without cleft. This is in line with the study done by Turner et al[6] in which 48% children with cleft had anterior cross-bite, which is also similar to the study done by Dahllöf et al[5] in which significant difference was found between both the groups concerning unilateral cross-bite and open bite, but was not statistically significant concerning bilateral cross-bite.

There was a significant difference regarding the presence of enamel hypoplasia among the two groups, with 42.8 children with cleft having enamel hypoplasia as compared with only 5.8% of children without cleft. This is higher as compared with a study done by Dahllöf et al[5] in which enamel hypoplasia was seen in 18% of the children, and Chapple and Nunn[3] in which 24% of the children with cleft exhibited enamel hypoplasia. This might be due to differences in diagnostic criteria.

Even after surgical repair, malposed, malformed, and missing teeth appear more frequently in the cleft lip and cleft palate children than in noncleft children. Food entrapment and its prolonged retention upon the surface of the malposed teeth are generally considered a predisposing cause for tooth decay. This assessment will not only provide a baseline data on oral health status in young people with clefts but will also underline the need for a more aggressive approach for the management of oral diseases among these patients to optimize overall functions of the oral cavity.

CONCLUSION

This study shows that children with cleft have higher prevalence of dental anomalies than normal children. With increased occurrence of hypoplasia in children with cleft, reduced access for cleaning upper anterior teeth after surgical repair leads to poor oral hygiene status, leading to increased risk to dental caries. Given the high caries experience among the children with cleft lip and cleft palate, it is necessary to advocate a more rigorous approach to the prevention of dental disease in these high-risk children. It is essential that the patient with a cleft is monitored closely with regular dental care and maintained at all the times. Education about oral health needs to be given repeatedly and kept simple. Application of fluoride varnish is a valuable preventive measure, particularly in the cleft region, around the hypoplastic teeth. Fissure sealants are important considerations of these patients and should be carried out as soon as teeth erupt into the cavity.

REFERENCES

1. Borodkin AF, Feigal RJ, Beiraghi S, Moller KT, Hodges JS. Permanent tooth development in children with cleft lip and palate. Pediatr Dent 2008 Sep-Oct;30(5):408-413.
2. Besseling S, Dubois L. The prevalence of caries in children with cleft lip and or palate in South Vietnam. Cleft Palate Craniofac J 2004 Nov;41(6):629-632.
3. Chapple JR, Nunn JH. The oral health of children with clefts of the lip, palate, or both. Cleft Palate Craniofac J 2001 Sep;38(5):525-528.
4. Hasslöf P, Twetman S. Caries prevalence in children with cleft lip and palate—a systematic review of case-control studies. Int J Paediatr Dent 2007 Sep;17(5):313-319.
5. Dahllöf G, Ussisoo-Joandi R, Ideberg M, Modeer T. Caries, gingivitis, and dental abnormalities in preschool children with cleft lip and/or palate. Cleft Palate J 1989 Jul;26(3): 233-237.
6. Turner C, Zagirova AF, Frolova LE, Courts FJ, Williams WN. Oral health status of Russian children with unilateral cleft lip and palate. Cleft Palate Craniofac J 1998 Nov;35(6): 489-494.
7. Hewson AR, McNamara CM, Foley TF, Sandy JR. Dental experience of cleft affected children in the west of Ireland. Int Dent J 2001 Apr;51(2):73-76.
8. Paul T, Brandt RS. Oral and dental health status of children with cleft lip and/or palate. Cleft Palate Craniofac J 1998 Jul;35(4):329-332.
9. Bokhout B, Hofman FX, van Limbeek J, Kramer GJ, Prahl-Andersen B. Increased caries prevalence in 2.5-year-old children with cleft lip and/or palate. Eur J Oral Sci 1996 Oct-Dec;104(5-6):518-522.
10. Bian Z, Du M, Bedi R, Holt R, Jin H, Fan M. Caries experience and oral health behaviour in Chinese children with cleft lip and/or palate. Pediatr Dent 2001 Sep-Oct;23(5):431-434.
11. Kirchberg A, Treide A, Hemprich A. Investigation of caries prevalence in children with cleft lip, alveolus, and palate. J Craniomaxillofac Surg 2004 Aug;32(4):216-219.
12. Ranta R. A review of tooth formation in children with cleft lip/palate. Am J Orthod Dentofacial Orthop 1986 Jul;90(1):11-18.