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Research Article

Caries Experience Varies in Egyptian Children with Different Combinations of Cleft Lip and Palate, and is Related to Carbohydrate Intake between Meals

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Abstract

Aim: Our aim was to assess the prevalence of dental caries in Egyptian children with cleft lip or cleft lip and palate (CLP), according to dietary habits, and to assess the level of dental care given to these patients.

Methods: Children aged 4-12 years (N=120) with CLP were recruited: 54 with primary dentition and 66 with mixed dentition. Personal data were gathered and parents completed a 5-day diet diary for the children. The prevalence of dental caries was determined with the dmft and DMFT indices, and debris and calculus were assessed with the simplified oral-hygiene index.

Results: 16.7% of children were caries-free. Caries experience was directly correlated with the intake of carbohydrate-containing items between meals, but not with intake at meal times. Oral-hygiene (debris) status did not differ significantly between the CLP groups. Calculus was found in 6.6% of the children. Only 8.3% of the study population had received oral-hygiene instructions from a health-care professional.

Conclusion: A direct correlation was found between caries experience and the intake of sugar-containing items in-between meals, indicating the importance of dietary advice into the comprehensive dental management of patients with CLP. Our sample had not received effective dental services.

Keywords: Caries; Cleft lip; Cleft palate; DMF; Diet

Introduction

Cleft lip and cleft lift and palate (CLP) are conditions that can influence oral health in affected children. The anatomy of the cleft area (including anomalies in dental shape, structure, number and position) and the presence of scar fibrosis secondary to lip surgery can impede proper oral hygiene and hence increase the risk of dental caries [1]. Evidence suggests that children with CLP also have elevated incidence of cavities and more untreated cavities, especially in the primary dentition, compared with children without CLP [2,3]. One possible contributing factor to these differences is that CLP results in elevation of oral clearance times, which is reflected in higher salivary levels of starch-derived saccharides, higher levels of caries-associated microorganisms and more caries than in children without CLP. Notably, children with CLP have been shown to have greater mean caries scores than children without CLP [4].

It has been suggested that one of the reasons that children with CLP have poor oral hygiene is that their parents have not been well educated with regard to diet (which has a very important role in preventive dental care) or how to brush the teeth of toddlers with CLP. Furthermore, the use of diets that are spontaneous and not well-regimented can lead to poor dietary habits, which may explain why poor oral hygiene is more common in economically deprived areas than in more affluent areas [5,6]. Many patients with CLP who undergo orthodontic treatment or who receive removable prostheses are likely to proceed to a soft-food diet from the first day, which enhance arguments about increased caries risk being related to diet [6,7]. Correlation of the prevalence of caries with the dietary practices of patients with CLP has yet to be fully determined. There is a lack of accurate knowledge regarding the oral health of patients with CLP in Egypt. Dentists and dental professionals, as effective contributors to health-care teams, have a major role in the care of these patients and must be technically and scientifically prepared to offer the most appropriate diagnosis and treatment as well as to provide information and advice to the parents of children with CLP on the possible disturbances that may affect their

children's dentition and who to manage [8]. Few studies have been undertaken to show the prevalence of dental caries in CLP patients in Egypt. In this study our aim was to compare the prevalence of dental caries among different groups of Egyptian children with CLP, with an emphasis on their dietary habits and on assessment of the level of dental care given to them.

Methods

Study population

This study was approved by the Research Ethical Committee of the Faculty of Dentistry Ain-Shams University. Children aged 4-12 years with CLP were considered for inclusion. Children with serious medical problems or other congenital malformations were excluded from the study. The study population consisted of 120 children (sample size estimation is calculated using Epicalc program version 1.02 assuming a power of 80 % and alpha=0.05)who were selected from those attending the Cleft Care Clinic affiliated with the Maxillofacial Department, Faculty of Dentistry Ain-Shams University, or by referral from the phonetics department, Faculty of Medicine Ain-Shams University or the ENT department, Faculty of Medicine Ain-shams University and Kobry El Kobba Military Medical Complex. The children and their parents were given all possible information about the research, and after granting permission for participation, the parents signed a free and clear consent form and children older than 8 years signed a free and clear assent form. The study population was separated into three main groups according to cleft type: the CL group comprised 40 children with a cleft lip with or without alveolar cleft; the UCLP group comprised 40 children with a unilateral complete cleft lip and palate; and the BCLP group comprised 40 children with a bilateral complete cleft lip and palate. These three groups were combined with two stages of dentition (primary and mixed), giving six subgroups, as shown in Table 1. Only two patients with an isolated cleft palate fulfilled the eligibility criteria, as other patients with isolated cleft palates had associated congenital malformations and were excluded. As it was not appropriate statistically to include these two patients in a separate group, they were not included in the study.

Histories of participants

Parents/caregivers provided information about the patients' personal data, type of deformities, associated malformations and procedures undertaken to repair the deformities, including the number of operations, stages of repair procedures and timings of the operations performed. Parents/caregivers were also asked whether they were referred by any medical professional for dental assessment or whether they had been given oral hygiene instructions by any dental-care professional. They were also interviewed to provide information on the patients' past dental visits and on previous and current prosthetic or orthodontic appliances for correction of developmental anomalies or their consequences.

Dietary analysis

Parents/caregivers completed 5-day diet diaries describing the patients' usual daily intake of food and drink in three main meals and in snacks consumed in-between. Each diary was analyzed, and food and drink was categorized into nine groups on the basis of carbohydrate content and physical characteristics:

A. Confectionery items, with high sugar content and high adhesivity (toffees, sugared candies, sugared chewing gums and chocolate without bread).

B. Sweetened baked goods and other foods with a mixture of non-raw starches and sugars with a wide range of starch–sugar ratios (bakery products, cakes, pastries, cookies, biscuits and bread with chocolate).

C. Honey and jam.

D. Artificial sweeteners, sugarless candies, sugarless chewing gums and sugar-free soft drinks.

E. Milk and dairy products with sugars.

F. Milk and dairy products without sugars.

G. Liquid foods with saccharose, fructose or both (soft drinks and fruit juices).

H. Solid fruit (bananas, grapes and apples).

I. Processed foods containing partially hydrolyzed starch without added sugars (potato chips and salted snacks).

For each food/drink category, it was determined from the diaries how many times in a 5-day period it was consumed at regular meal times, between meals or both, which enabled exposure to sugar-containing food/drink to be correlated with caries experience. This was defined as exposure to sugar-containing food/drink and was used to assess the correlation with caries experience as previously described by Gibson S et al. [9].

Assessment of caries experience

Patients were examined while seated in a dental chair under artificial light for illumination of the oral cavity, with the use of compressed air, water for rinsing, mirrors and a dental probe (to clear debris from an obscured surface). The prevalence of dental caries was determined with the dmft and DMFT indices for decayed, missing and filled teeth in the primary and permanent dentition, respectively, according to World Health Organization criteria [10]. When both primary and permanent teeth were present, the dmft and DMFT scores were recorded and summed separately.

The dmft index was calculated as follows:

A. dmft of each individual=sum of dt, mt and ft scores of the individual

B. Mean dmft of a group=(sum of dmft of all individuals)/(total number of individuals)

C. Where: dt=decayed primary tooth, mt=missing primary tooth as a result of caries, and ft=filled primary tooth as a result of caries.

Similarly, the DMFT index was calculated as:

A. DMFT of each individual=sum of DT, MT and FT scores of the individual

B. Mean DMFT of a group=(sum of DMFT of all individuals)/(total number of individuals)

C. Where: DT=decayed permanent tooth, MT=missing permanent tooth as a result of caries, and FT=filled permanent tooth as a result of caries.

Assessment of oral hygiene

The simplified oral hygiene index (OHI-S) was used [11]. The index consists of two components, the simplified debris index (DI-S) and the simplified calculus index (CI-S). Debris and calculus were evaluated at six tooth surfaces: the buccal surfaces of the upper first permanent molars on both sides, the labial surfaces of the upper right and lower left permanent central incisors, and the lingual surfaces of both lower permanent first molars. If any of these teeth was missing, an adjacent tooth was substituted. Only fully erupted teeth were scored. In younger patients, if any of the index teeth was not present, its predecessor was examined instead. Plaque and calculus were detected visually and by using an explorer that was passed from the mesial to the distal aspects of the index teeth. The mean scores of the six examined surfaces were calculated for DI-S and CI-S separately, and the DI-S and CI-S scores were summed to give the OHI-S of the individual.

Results

Table 1: Number of patients in each study subgroup and mean ages in the main groups.

Dental Development Stage	Main Groups (No of Cases)		
	UCLP	BCLP	CL
Primary dentition	20	18	16
Mixed dentition	20	22	24
Mean age (years)	8.4	7	6.9

BCLP: Bilateral Complete Cleft Lip and Palate; CL: Cleft Lip With or Without Alveolar Cleft; UCLP: Unilateral Complete Cleft Lip and Palate

Table 2: Comparison of caries experience, dmft and DMFT indicate numbers of decayed, missing and filled primary or permanent teeth, respectively, resulting from caries. Mean caries scores were compared by the Kruskal-Wallis test.

Index	UCLP		BCLP		CL		P-Value
	Mean	SD	Mean	SD	Mean	SD	
Primary dentition dmft	6.0±4.2		3.4±2.3		5.4±3.3		0.574
Mixed dentition DMFT+dmft	6.0±0.0		1.2±0.4		1.4±2.5		<0.001*

*indicates a significant probability that the means are not drawn from the same distribution (p≤0.05).

BCLP: Bilateral Complete Cleft Lip and Palate; CL: Cleft Lip With or Without Alveolar Cleft; UCLP: Unilateral Complete Cleft Lip and Palate.

The distribution of patients in the three CLP groups and according to primary or mixed dentition is shown in Table 1. Within this population, oral-hygiene instructions had been given by dental/medical professionals to the parents/caregivers of only 10 patients (8.3%). Active caries and/or a history of caries were present in 100 patients (83.3%), whereas 20 patients (16.7%) were caries-free. The results of caries scoring in the three CLP groups and according to primary or mixed dentition are shown in Table 2. A significant difference was observed between mean caries scores in the three CLP groups in patients with mixed dentition (Kruskal–Wallis test, P<0.001), but there was no difference in patients with primary dentition (*P*=0.574). Responses to the study questionnaire indicated that 63.3% (n=38) of the participants had previously received dental-treatment services; all dental visits were self-referrals to a general dentist and not part of a comprehensive program involving surgical, dental, orthodontic and prosthodontic services. Dental services for these patients were either restorative treatments or extractions to palliate pain or improve esthetics. Only two patients in the primary dentition stage who had experienced premature extractions in posterior arch segments had space maintainers. No further orthodontic assessments or preventive measures had been advocated for the treated patients.

Table 3: Consumption in a 5-day period of different sugar-containing foods and drinks in-between meals.

Food/Drink Groups	Number of Servings per Child (Mean±SD)
Confectionery items Group 1	4.48±1.7
Sweetened baked goods Group 2	4.33±2
Honey and jam Group 3	0.27±0.7
Artificial sweeteners Group 4	0.05±0.1
Milk and dairy products with sugar Group 5	2.48±0.9
Milk and dairy products without sugars Group 6	4.29±2.3
Soft drinks and fruit juices Group 7	6.2±1.6
Solid fruit Group 8	1.32±1.1
Partially hydrolyzed starch goods Group 9	6.23±3.4

Table 4: Consumption in a 5-day period of different sugar-containing foods and drinks at meal-time.

Food Groups	Number of Servings per Child (Mean,SD)
Confectionary items Group 1	Not consumed at meal times
Sweetened baked goods Group 2	1±1.4
Honey and jam Group 3	0.32±0.7
Artificial sweeteners Group 4	Not consumed at meal times
Milk and dairy products with sugar Group 5	0.48±0.5
Milk and dairy products without sugars Group 6	5.3±2.4
Soft drinks and fruit juices Group 7	3.83±2
Solid fruit Group 8	0.35±1.8
Partially hydrolyzed starch goods Group 9	0.65±1.8

The overall mean 5-day levels of consumption in-between and at meals of different categories of food and drink items (number of servings of items in each category per child) are shown in Table 3 & 4. Caries experience showed direct (positive) correlation (0.663) with the intake of carbohydrates in between meals with P-value<0.001, but no direct correlation was indicated between the caries experience (correlation coefficient=0.248) and the intake of carbohydrates at meal times with P-value 0.178. In terms of oral hygiene, calculus was present in eight patients (6.7%). The presence of debris on teeth of patients in the three CLP groups and according to primary or mixed dentition is shown in Table 5. No significant difference was observed between the DI-S means in patients with primary or mixed dentition. However, the mean DI-S was significantly higher in upper-arch segments (1.74±0.8) than in lower-arch segments (1.27±0.6; paired t-test P <0.001).

Table 5: Comparison of debris-index scores, mean simplified debris index (DI-S) scores were compared by the Kruskal–Wallis test.

Dentition	UCLP		BCLP		CL		P-Value
	Mean	SD	Mean	SD	Mean	SD	
Primary dentition	1.4	1	1.4	0.7	1	0.4	0.732
Mixed dentition	1.5	1.2	1.2	0.6	1.5	1	0.581

BCLP: Bilateral Complete Cleft Lip and Palate; CL: Cleft Lip With or Without Alveolar Cleft; UCLP: Unilateral Complete Cleft Lip and Palate

Discussion

In this descriptive, cross-sectional study we compared the prevalence of dental caries among different groups of Egyptian children with CLP, in relation to their dietary habits, and particularly to the intake of carbohydrates between meals. We also assessed dental hygiene and the level of dental care given to these patients. We found that 16.7% of children in this study were caries-free. Lower levels of caries prevalence have previously been reported by researchers in Germany [12] and the UK [13], where the very low prevalence was thought to be the result of water fluoridation and the use of fluoride supplements. In the UK study, the mean DMFT value in children aged 12 was 1.8 [12,13]. The relatively high caries prevalence that we observed was similar to that previously found in a Syrian population, in which 85% of patients with CLP had moderate or high dental caries scores, compared with 45.3% of their siblings without CLP [14]. We found no difference in caries experience among the three CLP groups in the primary dentition stage, suggesting that cleft type does not significantly affect a child's predisposition to dental caries, as has also been demonstrated previously [12,13].

Despite of that the UCLP group in the mixed dentition stage recorded a statistically significant higher mean (DMFT+dmft), a result that conflicted that obtained by Johnsen & Dixon [15] that the children with bilateral clefts had greater percentage of carious teeth than did those with unilateral clefts. In our population, caries experience in individuals had a direct (positive) correlation with the total count of servings of carbohydrate-containing food and drink items in-between meals, but no correlation was found between caries experience and the intake of carbohydrate-containing items at meal times. This difference might be related to the flushing effect of increased salivary flow caused by active chewing of meal components, or to the presence of protective elements in dietary components, such as calcium, phosphates, fats, proteins and fluorides. A similar association between caries experience and weekly consumption of sweet snacks and soft drinks in-between main meals has been reported previously for a study conducted in Spain [16].

With regard to oral hygiene, no significant difference in debris-index scores was observed among the CLP groups in patients with either primary or mixed dentition. Calculus was found in only 6.7% (n=8) of the cohort, which is a smaller proportion than was observed in a study conducted in India that showed that all subjects had calculus in the mandibular anterior teeth, but subjects with cleft lip, alveolus and palate had a higher incidence of calculus formation in the maxillary incisor regions. [17]. Although proper

dental care is very important for the rehabilitation of children with CLP, and the development and maintenance of healthy dentition is a prerequisite to subsequent orthodontic, prosthodontic and surgical treatment, our results demonstrated a lack of proper dental care in this population. Only a small number (8.3%, n=10) of the participants (or their parents/caregivers) had received oral-hygiene instructions from a health-care professional, even though comprehensive and periodic oral-hygiene instructions are required to improve oral self-care behavior and to prevent progression of dental disease in such patients, who are considered at particular risk for caries and periodontal disease [2].

Poor dental care in our patient population was suggested by the fact that over one-third of the patients had not previously received dental-treatment services, possibly because of a lack of available dental services for these patients or because of a lack of awareness among parents and caregivers of the availability and importance of these services. In addition, in all of their interactions with medical and dental staff, only 8.3% of the parents and caregivers had received oral-hygiene instructions indicating the importance of dental care that should accompany surgical procedures. Another possible reason for the inadequate provision of dental care to these patients is the absence of the multidisciplinary team approach for treatment of patients with CLP in Egypt, even though this approach is now the accepted practice in other countries. Through the team approach, professionals from various fields are able to convene to assess the needs of children and to assist parents in understanding the requirements inherent to their situations [4]. Our study had some potential limitations, including a small sample size, the lack of a suitable cleft-palate group for inclusion in the study sample and a limited age range in the study population.

Conclusion

Our sample of Egyptian children with CLP had not received effective dental services, possibly because of the lack of a multidisciplinary team approach, lack of availability of dental services, absence of reliable referral systems between different medical and dental specialties, and insufficient public awareness of dental-health implications of CLP. The higher caries prevalence in our population compared with reports from previous studies might reflect socioeconomic differences, social and cultural practices, and/or variation in the uptake of dental services, including regular check-ups and preventive measures. A direct positive correlation was found between caries experience and the intake of sugar-containing foods and drinks in-between meals, but not at meal times, indicating the importance of incorporating dietary advice into the comprehensive dental management of patients with CLP.

References

1. Cassiano PE, Garbo EP, Simone S, Thais M, Ana L, et al. (2013) A critical review of dental caries in individuals with cleft lip. World j of dentistry 4(4): 272-275.
2. Wahdani A, Alhaija EB (2005) Oral disease status of a sample of Jordanian people ages 10 to 28 with cleft lip and palate. Cleft Palate Craniofac J 42(3): 304-308.
3. Kirchberg A, Treide A, Hemprich A (2004) Investigation of caries prevalence in children with cleft lip, alveolus, and palate. J Craniomaxillofac Surg 32(4): 216-219.
4. Cassolato SF, Ross B, Daskalogiannakis J (2009) Treatment of dental anomalies in children with complete unilateral cleft lip and palate at sick kids hospital, Toronto. Cleft Palate Craniofac J 46(2): 166-172.
5. Sarri G, Marcenes W (2012) Child dental neglect: Is it a neglected area in the UK? British Br Dent J 213(3): 103-104.
6. Hasslof P, Twetman S (2007) Caries prevalence in children with cleft lip and palate: A systematic review of case-control studies. Int J Paediatr Dent 17(5): 313-319.
7. Cheng LL, Stephen LM, Chistopher TTH (2007) Predisposing factors to dental caries in children with cleft lip and palate: a review and strategies for early prevention. The Cleft Palate-Craniofacial J 44(1): 67-72.
8. King NM, Reid J, Hall RK (2008) Management of cleft lip and palate. In: Cameron AC, Widmer RC (Eds.), Handbook of Pediatric Dentistry, (3rdedn), Elsevier Health Sciences, UK, pp. 379-399.
9. Gibson S, Williams S (1999) Dental caries in pre-school children: Associations with social class, tooth brushing habit and consumption of sugars and sugar-containing foods. Caries Res 33: 101-113.
10. World Health Organization (1997) Oral health surveys: Basic methods. Dentition status and criteria for diagnosis and coding (caries), Geneva, Switzerland, pp. 39-44.
11. Green JC, Vermillion JR (1964) The simplified oral hygiene index. J Am Dent Assoc 68: 7-13.
12. Zschieschack B, Grabowski R (1999) The influence of caries of the deciduous teeth upon development of the dentition in patients with cleft lip, jaw and palate. J Orofac Orthoped 60(3): 215-224.
13. Chapple JR, Nunn JH (2001) The oral health of children with clefts of the lip, palate, or both. Cleft Palate-Craniofac J 38(5): 525-528.
14. Al-Dajani M (2009) Comparison of dental caries prevalence in patients with cleft lip and/or palate and their sibling controls. Cleft Palate Craniofac J 46(5): 529-531.
15. Johnsen DC, Dixon M (1984) Dental caries of primary incisors in children with cleft lip and palate. Cleft Palate J 21(2): 104-109.
16. Llena C, Forner L (2008) Dietary habits in a child population in relation to caries experience. Caries Res 42(5): 387-393.
17. Boloor V, Biju T (2010) Comparison of periodontal status among patients with cleft lip, cleft palate, and cleft lip along with a cleft in palate and alveolus. J Indian Soc Periodontol 14(3): 168-172.