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Original Article

The caries prevalence of oral clefts in eastern China

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Abstract: Little information is available concerning the prevalence of caries among patients with oral clefts in Eastern China. Consecutive patients aged 6-18 with oral clefts were recruited. Patients were stratified into 2 groups according to their ages, namely Group I with aged 6-12 and Group II with aged 13-18. For each age group, the children were further divided into three subgroups according to the types of oral clefts they had: cleft lip/cleft lip and alveolus (CL), cleft palate only (CP), and cleft lip and palate (CLP). Dental caries were examined by using the decayed, missing, and filled index for primary teeth (dmft) and Decay, Missing and Filled index for Permanent teeth (DMFT) according to criteria of the World Health Organization. 268 eligible patients with oral clefts were included in the study. The mean DMFT for Group I was 1.77 (SD2.58) while that for Group II was 6.96 (SD4.35). The mean DMFT was statistically significant different between the age group I and age group II ($t=12.21$, $P<0.05$). In Group I, the dmft scores was 4.68 (SD3.67) for CL group, while that for the CP group was 7.36 (SD3.93), and that for the CLP group was 5.72 (SD 3.87). The mean dmft was no statistically significant different among cleft types ($F=3.13$, $P>0.05$). Also in Group I, the mean DMFT was 1.56 (SD2.18) for CL group, while that for the CP group was 1.24 (SD 1.81) and that for the CLP group was 2.08 (SD2.96). There were no statistically significant different in mean DMFT among different cleft types ($F=1.09$, $P>0.05$). In Group II, the mean DMFT was 6.06 (SD3.97) for CL group while that for the CP group was 7.71 (SD 4.94) and that for the CLP group was 7.05 (SD4.32). No significant difference was shown in the mean DMFT among different cleft groups (CL, CP, and CLP) ($F=0.55$, $P>0.05$). During assess the prevalence of dental caries among Eastern Chinese with oral clefts; the study confirmed that the prevalence of caries was increased with increasing age for oral clefts patients. It was also demonstrated that there was no significant difference in the mean dmft/DMFT scores among different cleft types.

Keywords: Dental caries, oral clefts, epidemiology

Introduction

Oral clefts are one of the most common congenital malformations of orofacial structures and constitute approximately 65% of the anomalies affecting the head and neck [1]. Oral clefts are the most common major congenital orofacial abnormalities and occur in approximately 1:700 to 4:1000 live births with significant racial and geographic variation [2, 3]. The prevalence rate varies with different ethnic backgrounds and countries. In China, the prevalence of oral clefts was reported to be 1.8% [4]. Of these patients with oral clefts, they often requires complex and individualized treatment spanning from birth to adulthood, thus warranting an interdisciplinary care provided by orthodontists, plastic surgeons, pediatric dentists, maxillofacial surgeons, speech pathologists, psychologists, social workers and so on.

Apart from the obvious orofacial gaps, these cleft patients have some other oral diseases such as dental & arch segment irregularities, together with postoperative scar problems, resulting in higher incidence of dental caries. In fact, even in modernized societies, dental caries is still a global public health problem causing a major threat to oral health of these cleft patients. Although the prevalence of dental caries in different countries around the world is reducing [5], patients with oral clefts remain at high risk for dental caries [6, 7]. Bian et al. [8] examined 3- to 5-year-old patients with cleft lip, cleft palate or both cleft lip and palate in Central China. He found that seventy-five percent of them had rampant caries. Zhu et al. [9] examined 3- to 25-year-old patients with clefts in Western China and revealed that the caries prevalence was significantly higher in patients with cleft palate. However, little information is

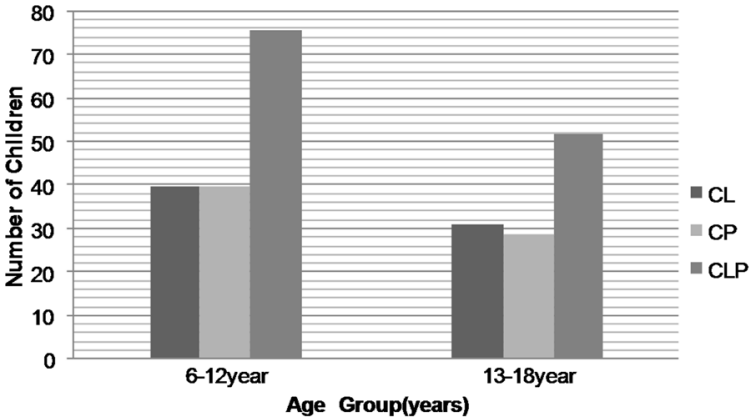

Figure 1. The number of children among different classification of the cleft types in the two age groups.

available concerning the prevalence of caries among patients with oral clefts in Eastern China.

Numerous studies have investigated caries prevalence in the oral clefts patients. Up till now, there is conflicting evidence. Many investigations revealed that more caries teeth were found in patients with oral clefts [6, 9-12]. Whereas some other studies on the contrary showed that patients with oral clefts have a low mean caries [13, 14].

Dental caries is considered an infectious and transmissible disease of multifactorial origin. Dental anomalies in terms of the shape, structure, number and position varied with different cleft types will likely influence the caries prevalence. However, that is controversial. Several studies found cleft types were an important factor for influencing caries prevalence in oral clefts patients [8-10, 14, 15]. The others studies showed caries prevalence wasn't significantly different between cleft types [12, 16, 17].

The purpose of this article was to investigate the prevalence of caries among different oral cleft types and to describe whether cleft patients belonged to different age groups would have different caries levels in Eastern China.

Materials and methods

The evaluations were conducted prospectively between March and August 2010. All patients with cleft lip &/or palate whom have been operated at our institution were included. Participants met the following criteria: Lack of systemic and genetic disorders; diagnosis of non-syndromic coral clefts; for those with other congenital malformation or having received orthodontic treatment were excluded. All participants provided written informed consent. The Ethics Committee of the Affiliated Hospital of Qingdao University approved all protocols.

Subjects

There were a total of 268 patients, including 142 boys and 126 girls (M:F=5.5:4.7), with cleft lip and/or cleft palate were recruited. The mean age was 11.40 (SD3.25), ranging from 6 to 18 years old.

Patients were divided into two different age groups: Group 1 with aged 6-12 (n=156) and Group 2 with aged 13-18 (n=112). For each age group, the patients were further divided into three subgroups according to the types of oral clefts they had: cleft lip/cleft lip and alveolus (CL), cleft palate only (CP), and cleft lip and palate (CLP).

Dental examinations

Dental caries was examined according to the modified criteria of the World Health Organization (World Health Organization. Oral Health Surveys. Basic Methods 4th ed., Geneva, WHO 1997). The examinations were conducted in dental clinics with good artificial light, using dental mirror and explored by a single experienced dentist. Measurements were repeated 3 times on different days with no reference to the original data. The average of the 3 measurements was used as the final data. Dentition status was recorded on all subjects. The caries were examined from all erupted teeth using the decay (cavitated/noncavitated carious lesion), missing, and filled teeth in the mix dentition and permanent dentition (dmft/DMFT). A noncavitated carious lesion was defined as distinct chalky white enamel structure or macroscopic break in the enamel surface [18].

Statistical analysis

All analyses were carried out using SPSS (SPSS17.0, SPSS Software Company, U.S.). The Chi-Square and student t-test for independent samples were applied to compare DMFT/dmft

Table 1. Mean caries indices for children with oral clefts by age groups*

Variable	6- to 12-year-old (DMFT)	13- to 18-year-old (DMFT)
Number	156	112
Prevalence	49%	96%
DT	1.73±2.55	6.55±4.40
MT	0.01±0.09	0.19±0.58
FT	0.04±0.19	0.21±0.66
DMFT	1.77±2.58	6.96±4.35

*DT=decay teeth (permanent); MT=missing teeth (permanent); FT=filled teeth (permanent); DMFT=decay, missing, filled teeth index (permanent).

Table 2. Mean caries experience in the primary teeth by cleft types (group 1)*

Variable	6- to 12-year-old (dmft)		
Cleft Types	CL	CP	CLP
Number	40	40	76
Prevalence	84%	96%	92%
Dt	4.40±3.38	6.80±3.48	4.85±3.27
Mt	0.28±0.74	0.48±1.08	0.87±1.37
Ft	0.00±0.00	0.08±0.28	0.07±0.40
Dmft	4.68±3.67	7.36±3.93	5.72±3.87

*dt=decay teeth (primary); mt=missing teeth (primary); ft=filled Teeth (primary); dmft=decayed, missing, filled teeth index (primary); CL=cleft lip/cleft lip and alveolus; CP=cleft palate only; CLP=cleft lip and palate.

Table 3. Mean caries experience in the permanent teeth by cleft types (group 1)*

Variable	6- to 12-year-old (DMFT)		
Cleft Types	CL	CP	CLP
Number	40	40	76
Prevalence	44%	40%	54%
DT	1.52±2.08	1.24±1.81	2.02±2.94
MT	0.00±0.00	0.00±0.00	0.02±0.13
FT	0.04±0.20	0.00±0.00	0.05±0.22
DMFT	1.56±2.18	1.24±1.81	2.08±2.96

*DT=decay teeth (permanent); MT=missing teeth (permanent); FT=filled teeth (permanent); DMFT=decay, missing, filled teeth index (permanent). CL=cleft lip/cleft lip and alveolus; CP=cleft palate only; CLP=cleft lip and palate.

data, respectively. A *P*-value<0.05 was considered statistically significant.

Results

In this study, the different classification of the cleft types in age groups was shown in **Figure 1**. Study results were given in table 1 to 4.

Table 4. Mean caries experience in the permanent teeth by cleft types (group 2)*

Variable	13- to 18-year-old (DMFT)		
Cleft Types	CL	CP	CLP
Number	31	29	52
Prevalence	94%	100%	95%
DT	5.94±4.14	7.21±5.04	6.57±4.34
MT	0.00±0.00	0.07±0.27	0.32±0.75
FT	0.13±0.50	0.43±1.09	0.16±0.50
DMFT	6.06±3.97	7.71±4.94	7.05±4.32

*DT=decay teeth (permanent); MT=missing teeth (permanent); FT=filled teeth (permanent); DMFT=decay, missing, filled teeth index (permanent). CL=cleft lip/cleft lip and alveolus; CP=cleft palate only; CLP=cleft lip and palate.

The number of examined patients was 40 for CL, 40 for CP and 76 for CLP in 6-to 12-year-old group; The number of examined patients was 31 for CL, 29 for CP, 52 for CLP in 13-to 18-year-old group.

The mean DMFT for 6- to 12-year-old was 1.77 (SD2.58) while that for the 13- to 18-year-old was 6.96 (SD4.35). The mean caries of 6- to 12-year-old group was lower than that of 13- to 18-year old group for permanent teeth. The mean DMFT was statistically significant different between the age group I and age group II (t=12.21, *P*<0.05) (**Table 1**).

The mean dmft in 6- to 12-year-old group of different cleft types was given in **Table 2**. The dmft scores was 4.68 (SD3.67) for CL group, while that for the CP group was 7.36 (SD3.93), and that for the CLP group was 5.72 (SD 3.87). The mean dmft was no statistically significant different among cleft types (F [2, 153]=3.13, *P*>0.05).

The mean DMFT in 6- to 12-year-old group of different cleft types was given in **Table 3**. The mean DMFT was 1.56 (SD2.18) for CL group, while that for the CP group was 1.24 (SD 1.81) and that for the CLP group was 2.08 (SD2.96). There were no statistically significant different in mean DMFT among different cleft types (F [2, 153]=1.09, P>0.05).

The mean DMFT in 13- to 18-year-old group of different cleft types was shown in **Table 4**. The mean DMFT was 6.06 (SD3.97) for CL group while that for the CP group was 7.71 (SD 4.94) and that for the CLP group was 7.05 (SD4.32). No significant difference was shown in the mean DMFT among different cleft groups (CL, CP, and CLP) (F [2, 109]=0.55, P>0.05).

Discussion

Currently, more and more clinicians realize the significance of evaluation of the dental caries occurring in the oral clefts patients. Surprisingly, there is little related information for Chinese patients. We are the first Chinese group to investigate the prevalence of the dental caries scientifically according to the classification of age and cleft types in these patients in Eastern China.

Dental caries is a multifactorial nature of the disease and caries prevalence is increasing with age in normal patients. In our studies, caries prevalence of oral clefts patients in different age groups was investigated. Through the analysis of different DMFT measuring value, the following results were found that caries prevalence was increasing with age in permanent teeth. The caries prevalence was significantly lower in 6-to 12-year-old patients than that of 13- to 18-year-old patients (1.77±2.58 versus 6.96±4.35; $P<0.05$) (**Table 2**). A Vietnam author examined 154 patients with cleft lip and/or palate and found that the mean number of teeth affected by dental caries was 9.95 for 4- to 6-year-old group, 2.97 for group 11- to 13-year-old group and 4.93 for 14- to 16-year-old group. The mean DMFT scores were increasing with age in permanent teeth (2.79 versus 4.93) [15]. In United Kingdom, one author reported that 3- to 18-year-old patients with cleft lip and/or palate, the mean dmfts for the 3- to 5-year-old was 1.9 (SD6.5), while that for the 6- to 12-year-old was 2.8 (SD3.7); the mean DMFT for the 6-to 12-year-old was 0.4 (SD0.9) and that for the 13- to 18-year-old was 1.9 (SD2.2) [14]. Another United Kingdom author also similarly reported that 4, 8, 12-year-old patients with cleft lip and/or palate, the mean dental caries experience in both the primary and permanent dentition increased with increasing age [19]. In Jordan, an author examined 10- to 28-year-old patients with cleft lip & palate and found that the mean DMFT was higher in 16- to 28-year-old group than those in 10- to 15-year-old group (5.42±5.94 versus 4.76±5.11) [11]. Our results concurred with these studies. But some others studies were not consistent with the above study. Zhu et al. [9] reported that dental caries prevalence of oral clefts patients was irregular variations with different age groups. A German author studied patients aged 6- to 16-year-old with cleft lip, alveolus and palate, and found that the caries prevalence was different with the growing of age in primary teeth and permanent teeth. For primary teeth, the caries prevalence is decreased with increasing age. For permanent teeth, the caries prevalence did not quite follow a tendency of continuous increase or decrease with increasing age [20]. Although, the past studies have demonstrated a relationship between the severity of caries and ages for oral clefts patients [11, 14, 15, 19].

Our studies found the caries prevalence of permanent teeth was different in patients with oral clefts among different countries. The patients with oral clefts in Eastern China had higher DMFT score than those of United Kingdom [14, 19], but DMFT score was lower than those of Vietnam [15] and Jordan [11]. One possibility was that public stomatological health care was different among different countries. Another possible explanation was different criteria was used for the assessment of dental caries.

The dmft scores was 4.68 (SD3.67) for CL group, 7.36 (SD3.93) for CP group and 5.72 (SD3.87) for CLP group in 6- to 12-old-year-old group (Group I). The CP group had a higher dmft scores than CL and CLP groups. However, the mean dmft scores were not statistically significantly different among different cleft types. In Sweden, the authors examined 49 patients with oral clefts aged 5 or 6 years old, found cleft types did not influence the caries prevalence [16]. Thailand authors reported that no statistically significant difference in Early Childhood Caries (ECC) was found in oral clefts patients among different cleft types [12]. However, Zhu et al. [9] reported that the dmft/dmfs scores of the CL group were lower than in the CP group in 3- to 5-year-old patients, but there was no statistical significance. It was reported that patients with CLP had higher levels of dental caries compared to those with CL in 3- to 6-year-old patients [8]. Our results showed that the dmft scores were higher in CP group (7.36±3.93) than that of CLP group (5.72±3.87) and CL group (4.86±3.67), but there were no statistical significance among three cleft types. Paul and Broudt [14] reported the mean dmfs scores of CP group were 3.6 and it was higher than that of CL group (1.7) and CLP group (1.4). Their results were similar to our results for mean dmfs scores. Then CL and CLP groups were combined according to

their morphological similarity in that study and results showed the mean caries experience of primary dentition in CP group was significantly different than that of combination group. At the same time, caries prevalence of oral clefts patients among different races was compared, and authors found the race was an influencing factor for caries prevalence. In this study, there were more patients belonged to Indian race in CP group than the combination group, and these patients of Indian origin had a higher prevalence of caries than that of Caucasian patients. Therefore, the above researching result could be applied to explain why Paul and Broudt's statistical result was different from our study [14]. A Vietnam author reported that the dmft was lower for the CL/CLA (cleft lip or cleft lip and alveolar) group when compared with the UCLP (unilateral cleft lip and palate) and BCLP (bilateral cleft lip and palate) group. The author also found CP patients had higher dt and dmft compared with the patients of the CL/CLA group. However, there were no statistically significant results obtained among different groups [15]. Another author examined the dental caries prevalence in oral clefts patients and found the mean dmft of CLP patients (1.73) was double that of c CL patients (0.86) [19].

The mean DMFT of CP group was higher than that of CL and CLP group in both 6- to 12-year-old group and 13- to 18-years-old group. However, the mean DMFT among different cleft types was not significantly different in two age groups. Kirchberg et al. [20] found that the severity of clefts and oral health status was no statistical correlation. Pual and broudt [14] reported that there was no statistically significant difference in DMFSs among different cleft types and cleft side. Al-wahadni et al. [11] examined 10- to 28-year-old patients with oral clefts and found that no significant difference in caries prevalence between UCLP and BCLP. Zhu et al. [9] examined Western Chinese patients with oral clefts and found that higher DMFT or DMFS scores in CP±A (cleft palate with or without cleft alveolus)/CLP patients than those of the CL±A (cleft lip with or without cleft alveolus) patients aged 6- to 25-year-old. However, their results carried no statistical significance. According to another study, the mean DMFT is 0.71 for CL group, 0.98 for CP group and 0.96 for CLP group respectively. But the results still did not appear significantly different among different cleft types, too [19].

This study confirmed that the prevalence of caries was increased with increasing age for oral clefts patients. It was demonstrated that there was no significant difference in the mean dmft/DMFT scores among different cleft types. It was very important to prevent dental caries for maintaining excellent oral health and hygiene. We would advocate many measures to the prevention of dental caries. For oral clefts patients, having appropriate dental care-regular checkups, oral hygiene advice, diet advice and adequate fluoride supplementation were also important. It was hope that this study could add value to the database for the dental caries prevalence of oral clefts, especially for those patients in oriental countries like China.

Disclosure of conflict of interest

None.

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