



## Caries experience and oral health behavior in Chinese children with cleft lip and/or palate

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### Abstract

**Purpose:** The aims of this study were to investigate whether there were different caries levels in 3- to 6-year-old Chinese children who had a cleft lip compared to those with a cleft lip/palate. The goal also was to evaluate parental attitudes toward the feeding habits and oral health care for their children.

**Methods:** A cross-sectional study was carried out through a dental examination of a sample of children and a questionnaire to their parents. A sample of 104 3- to 6-year-old children (66 boys and 38 girls) with cleft lip, cleft palate or both were selected from those receiving pre-surgical treatment. Each child was examined and a short questionnaire was given to parents of the children. The form included questions about infant feeding practices, frequency consumption of specific drinks and, children's toothbrushing frequency.

**Results:** One hundred and four children were examined. Seventy-five percent had some caries experience and rampant caries was present in 26%. Children with cleft palate had a higher prevalence of rampant caries (30%) compared to those with cleft lip (12%). A multivariate analysis yielded feeding practices and mother's education as the variables significantly associated with caries and rampant caries.

**Conclusions:** The results of this study show that:

1. Children with a cleft lip/palate have higher levels of dental caries compared to those with a cleft lip alone;
2. The two most important factors for dental caries were:
  - a. whether the child had been bottle-fed and;
  - b. the educational attainment level of the mother.

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Facial clefts rank among the most common congenital malformations. In China, the prevalence is nearly one in 1,000 live births. Children who have a cleft lip and palate often experience feeding, speech and swallowing problems as well as poorer dental health.<sup>1-3</sup>

A number of dental caries epidemiological studies of children with cleft lip and cleft palate do not incorporate control groups.<sup>4-6</sup> The few studies that do have control groups show that dental caries levels are higher in children with clefts<sup>7-9</sup> (Table 1).

John and Dixon (1984)<sup>8</sup> reported on a group of American children with clefts who ranged in age from 18 months to 4 years. Carious lesions in the incisors occurred significantly more often than they did in children with other craniofacial defects. In Scandinavia, Dahllof et al (1989)<sup>9</sup> similarly reported a significantly greater number of decayed and filled surfaces at the age of 5.5 years in 49 children with clefts compared to a control group of 49 children without clefts.

Children with clefts are usually to be treated surgically at an early age to improve appearance and functions and to maintain space for the developing dentition.<sup>10,11</sup> In China, parents may have to pay all or part of the cost and many children do not receive treatment because of the expensive fees. In 1999, The Smile Train, an international children's charity and medial education organization, announced a Sino-U.S. strategy to help provide care for children with cleft lips and palates whose parents could not afford the costs of treatment. The scheme makes it possible for children with clefts who have a deprived background to receive treatment free of charge in their community by Chinese surgeons. Treatment is aimed at improving both function and aesthetics. However, the program is focused on surgical care for patients with clefts and includes less emphasis on more general oral health care. However, outcome or success of treatment, especially orthodontic treatment, may depend on good dental health.

No data are currently available on the prevalence of dental caries in the primary dentition in children with clefts in Mainland China (Table 1). In general, there is also relatively little information on the experience of dental caries in preschool children per se, but in the few published studies the caries prevalence estimates range from 64% to 79%, with mean dmft values between 3.2 and 4.6 for 3- to 6-year-old Chinese preschool children.<sup>12-14</sup>

The aims of this study were: 1. to investigate whether there were different caries levels in 3- to 6-year-old Chinese children who had a cleft lip compared to those with a cleft lip/palate; and 2. to evaluate parental attitudes toward feeding habits and oral health care for children.

**Table 1. Studies of the Caries Experience of Children with Cleft Lip and Palate**

Author	Location	Study group n	Age (years) Prevalence dmft/DMFT	Control group n	Age (years) Prevalence dmft/DMFT
Lausterstein et al (1964) <sup>15</sup>	USA	285	8.5±2.1	300	9±2
Stephen et al (1979) <sup>16</sup>	UK	57	5.1±1.6	34	4.7±0.1
Johnsen et al (1984) <sup>9</sup>	USA	41	1.5-4.0	23	1.5-4.0
Dahllof et al (1989) <sup>8</sup>	Sweden	49	5-6 78.0% 7.00±8.5	49	5-6 61% 3.90±5.1
Bokhout et al (1997) <sup>10</sup>	Holland	81	2.5 19.0% 0.59±1.4	77	2.5 6.5% 0.11±0.54
Paul et al (1998) <sup>6</sup>	UK	114	3-18 46.5% 2.30±5.1	—	—
Turner et al (1998) <sup>5</sup>	Russia	89	5-9 94.0% 7.31±1.7	—	—
Lin et al (1999) <sup>4</sup>	Taiwan, China	123	2 15.4% 0.67±1.7	—	—
Du et al (2000) – present study	China	104	3-6 75.0% 3.70±3.3	—	—

**Table 2. Caries Experience According to Cleft Types**

Type	n	Prevalence %	Rampant caries %	dt	mt	ft	dmft
Cleft lip	25	68%	12%	2.6	0.1	0.0	2.7 ±2.5
Cleft palate	79	77%	30%	3.7	0.1	0.3	4.1 ±3.8 *
All	104	75%	26%	3.4	0.1	0.2	3.7 ±3.3

Student t-test \* p<0.05

**Table 3. Number and Percentage of Children with Caries Experience and Patterns of Diseases in Relation to Feeding Practices, Oral Hygiene Habits and Education of Mothers**

Variable	n	With caries n%	With rampant caries n%
<b>Age (years)</b>			
3-4	51	37 73%	10 20%
5-6	53	41 77%	17 32%
<b>Gender</b>			
Male	66	48 73%	16 24.2%
Female	38	30 79%	11 29%
<b>Method of feeding</b>			
Breast	36	22 61%*	4 11%**
Bottle	68	56 79%	23 34%
<b>Beverages, juices with sugar</b>			
< 2 times / day	46	36 78%	12 26%
= 2 times/day	58	42 72%	15 26%
<b>Frequency of brushing</b>			
None/ occasionally	49	35 78%	13 27%
= 1 daily	55	43 71%	14 26%
<b>Education of mothers</b>			
Low	80	55 69%*	17 21%
High	24	20 83%	10 42%

X<sup>2</sup> test \*\* P<0.01 \* P<0.05

## Methods

The cross-sectional study was carried out through a dental examination of a sample of children and a questionnaire to their parents.

### The sample

All 3- to 6-year-old children were referred to a specialist unit, the department of Oral Maxillofacial Surgery, College and Hospital of Stomatology, at Wuhan University,

from the Smile Train initiative. A sample of 104 3- to 6-year-old children (66 boys and 38 girls) with cleft lip, cleft palate or both participated in the study, with no family refusing to participate. All those included had cleft lip, cleft palate or both without any other systemic complications. All were undergoing pre-surgical treatment. Each child was examined while seated in a dental chair with optimum illumination. Clefts were categorized into one of the following two types: 1) cleft lip alone (CL); 2) cleft palate, with or without cleft lip (CP). The number of cleft palate without lip involvement was too small for analysis.

### Questionnaire

A short questionnaire was given to parents of the children. The form included questions about infant feeding practices, frequency consumption of specific drinks and, children's toothbrushing frequency. The level of educational attainment by the mother was used as a proxy measure for socio-economic status.

### Dental examinations

All teeth were examined for dental caries using WHO criteria (1997). Rampant caries was defined as two or more carious labial or palatal surfaces of the upper primary incisors. There were two calibrated examiners (MD and HJ). Cohen's kappa values for agreement between examiners was 0.84. Children were examined in the department clinic using dental lights, plane mirror and explorers. No dental radiographs were taken.

The data were recorded on data collection forms, and then transferred to SPSS software for analysis. Chi-square and student t-test was applied to compare frequencies and dmft data,

**Table 4. Logistic Regression: P Values, Odds Ratios and 95% Confidence Intervals for the Association Between Caries Experience and Patterns of Disease with Variables**

Variables	With caries P OR (95%CI)	With rampant caries P OR (95%CI)
<b>Feeding practice</b>		
0=bottle	0.008 3.77	0.009 7.43
1=breast	(1.42 - 10.04)	(1.47 - 16.38)
<b>Education of the mother</b>		
0=low	0.02 3.52	0.03 3.34
1= high	(1.63 - 9.76)	(1.17 - 9.58)
<b>Beverages, juices with sugar</b>		
0= less 2 times / day	0.68 1.23	0.88 0.93
1= 2 times/day or more	(0.44 - 3.47)	(0.35 - 2.43)
<b>Frequency of toothbrushing</b>		
0= none/ occasionally	0.16 0.48	0.55 0.74
1= 1 daily	(0.17 - 1.33)	(0.28 - 1.98)
<b>Types of clefts</b>		
0=CL	0.56 0.72	0.15 0.36
1=CP	(0.23 - 2.23)	(0.09 - 1.43)

respectively. Logistic regression was undertaken for the multivariate analysis between caries prevalence and variables were used, the level of at significance was tested by Wald tests in logistic regression. The level of statistical significance for all tests was set by  $p < 0.05$ .

## Results

Results are summarised in Table 2, 3 and 4. The sample of 104 children ages ranged from 3 to 6 years old and, included 66 boys and 38 girls. Of the total, 25 children had a cleft lip, and 79 had a cleft palate with or without cleft lip.

Caries experience is summarised in Table 2. Of the total, 75% had some caries experience and 68% of the 25 with a cleft lip and 77% of the 79 cleft palate did as well. Rampant caries was seen in 26% of all the children, but children with cleft palate had a higher prevalence of rampant caries (30%) compared to those with cleft lip (12%). On average, 3.7 teeth per child were affected by caries. Those with cleft lip (2.7) had a lower average compared to cleft palate (4.1) (Table 1). More than 90% of the dmft score was made up of decayed teeth (dt), only 7% of which were filled teeth (ft) and 3% of which were missing teeth (mt). Boys and girls had a similar mean dmft score (dmft = 3.6). However, only dmft reached statistical significance at the 5% level between cleft lip children compared to cleft palate children (Table 2).

Experience of caries and rampant caries is shown in Table 3 in relation to age and gender. It is also considered in relation to feeding practices, frequency of beverages and toothbrushing and education of the mother. There was little difference in either caries experience or rampant caries in relation to age or gender.

Of the 104 questionnaires completed, 66 children (65%) were reported to have been bottle-fed, while the remaining 36 (35%) children had been breast-fed. Rampant caries was found in 23 children, with a prevalence of 34% in bottle-fed children

with clefts, compared with 4 breast-fed children (11%). The comparison between groups was statistically significant ( $P < 0.01$ ) (Table 3).

Fifty-three percent of the children were reported to have brushed at least once a day. The frequency of brushing did not show differences in the caries experience that were statistically significant when tested (Table 3). The relationship between the frequency of beverages and juices with sugar was not statistically significant.

Mothers of 80 (77%) of the children examined had received 8 or less years of education (primary and secondary school education); 24 (33%) had spent more than 8 years in education (high school or university education). The study showed that the mothers who had achieved a higher level of educational attainment were more likely to bottle-feed.

The following variables were entered into multiple logistic regression analysis: age, gender, feeding practices, mother's education, frequency of beverages, juices with sugar and toothbrushing and types of clefts, with presence of caries and of rampant caries as dependent variables (results are shown in Table 4). Stepwise multiple logistic regression showed that, when other factors were taken into account, feeding practices and mother's education were significant in relation to caries and rampant caries.

## Discussion

There is surprisingly little information on the oral health status of children with oral clefts. Although many clinicians are aware of the differences between the oral health and feeding problems between children with a cleft involving the palate, as to one limited to the lip, the evidence base for these observations is lacking.

The oral health provision in China varies considerably, and the clinical management for oral facial anomalies can involve considerable resources. Therefore, the availability of a well-funded program such as the Smile Train is to be welcomed. The program was aimed at families in poverty, but since the care needed is difficult to obtain, it is believed that the majority of families in the region who had a child with an oral cleft would have used the service. Therefore, with such relatively expensive service it is important that an integrated approach to dental care provision is implemented.

In the study, children with cleft lip and palate who attended this program were more likely to come from low socio-economic families. This is perhaps due to the fact that more affluent parents would be seeking care elsewhere. However, in this area of China this is unlikely. Also, differences in dental caries between the two social groups may possibly be explained, in general, by parents with higher educational attainment being more likely to comply with general nutritional recommendations and, consequently, restrict consumption of sucrose-rich foods. However, in this study, children with oral clefts did not differ significantly in frequency of beverages, fruits of sugar more than 2 times a day or less.

It is also known from parents that the priority of dental care for children with clefts may be low because of the parents' focus on the numerous medical procedures required to correct the birth defect during their first year of life. Therefore, the need to identify high-risk groups and to facilitate the integration of oral hygiene and dental preventive regimens into the treatment protocol is important.<sup>15-16</sup>

## Conclusions

The results from the present study show that:

1. Those children with a cleft lip/palate have higher levels of dental caries compared to those with a cleft lip alone;
2. The two most important factors for dental caries were:
  - a. whether the child had been bottle-fed and;
  - b. the educational attainment level of the mother.

It is not possible to be certain whether mothers of children with cleft palate are more likely to bottle feed or to know whether the possible feeding difficulties (real or perceived) experienced by mothers with children who have a cleft palate account for the tendency to bottle feed. This area of research requires further investigation.

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