

## A study of prevalence of caries and oral health behavior in Japanese children with cleft lip and palate

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**Abstract** The aims of this study were to investigate the condition of dental caries in 1–4 years old Japanese children with cleft lip and/or palate, and also to examine the relationships between age, location of the cleft, oral health behavior of cleft children and the incidence of dental caries. The study was carried out through a dental examination of a sample of children and a questionnaire to their parents which included questions about infant feeding practices, frequency of consumption of specific drinks and children's frequency of tooth brushing. A sample of 116, 1–4 years old Japanese children (58 boys and 58 girls) with oral clefts referred to the Department of Pediatric Dentistry Clinic, Showa University, after receiving surgical treatment, participated in this study. Results indicated that the prevalence of caries in cleft children was related to patient age, location of clefts and oral health behavior. A higher level of dental caries was recognized in children with cleft lip and alveolus/palate than in those with cleft lip alone. Incidence of caries increased with patient age. Children who had been fed in a determined time were less affected than those who had been fed at will. Incidence of caries was also high in the children who ingested drinks with sugar than in those who did not. The results of this study suggest that it is important to improve the oral health behavior of cleft children to minimize the risk of caries. Moreover, children with clefts and their parents should as early as possible undergo a preventive program to ensure preservation of primary dentition.

### Key words

Cleft lip and/or palate,  
Dental caries,  
Oral health behavior

### Introduction

Among the congenital anomalies in the orofacial region, clefts of the lip and palate are the most frequent, occurring once in every 600 to 700 births in the white population, less frequently among blacks (once in every 2,000), but more frequently in Japan, once in every 400 to 500 births<sup>1,2</sup>. Children with clefts experience many disturbances in life including those of cosmetics, speech, hearing and dental problems. Furthermore, they have a higher prevalence of dental abnormalities than children without clefts<sup>3</sup>. Common abnormalities include high prevalence and severity of malocclusion<sup>4-6</sup>,

higher frequency of caries<sup>7-9</sup>, congenitally missing, peg-shaped and fused teeth<sup>10</sup> and high incidence of enamel hypoplasia<sup>11</sup>. The prevalence of dental anomalies tend to increase with severity of the cleft<sup>3</sup>.

A number of epidemiological studies of dental caries in Japanese children with cleft lip and palate have been performed. These studies have indicated that they had higher prevalence of caries in the permanent dentition than children without clefts<sup>12</sup>, with the highest prevalence of caries recognized in children with medical problems and oral health behaviors such as bottle feeding, sucking habit, and high frequency of eating sweets between meals. Furthermore, prevalence of caries increase with age<sup>12,13</sup>.

In the present study, we examined whether relationships exist between origin/location of clefts

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Table 1 Distribution of clefts participated in the study

Cleft type and Location	n	Total (%)	
Lip only	{ Bilateral Unilateral	1 7	8 (6.9)
Lip and Alveolus	{ Bilateral Unilateral	2 31	33 (28.4)
Lip, Alveolus and Palate	{ Bilateral Unilateral	22 30	52 (44.8)
Palate only	{ Hard & Soft Soft	22 1	23 (19.8)

Table 2 Caries experience and average age on cleft type

Cleft type	n	Average	Number of children with caries (%)
Lip only	8	18.8 months	1 (12.5)
Lip and Alveolus	33	26.8 months	10 (30.3)
Lip, Alveolus and Palate	52	23.2 months	13 (25.0)
Palate only	23	22.6 months	6 (26.1)
Total	116		30 (25.9)

\*:  $P < 0.05$ 

or oral health behavior and the incidence of dental caries in infants.

## Subjects and methods

The subjects were children with clefts who were referred to our Department of Pediatric Dentistry, Showa University, after receiving their first surgical treatment and having total care from the SCPT (Showa University Cleft Palate Team), during the period from January, 2003 to December, 2003. A total of 116 children (58 boys and 58 girls) with clefts participated in the present study, whose ages ranged from 1 to 4 years.

A short questionnaire was given to parents. The form included questions about age (12–23 m, 24–35 m, 36–47 m, more than 48 m), infant feeding practices (breast only, breast and bottle, bottle only), feeding at determined times or at will, consumption of sugar through specific drinks (sugared/no sugared), sucking strength (weak/normal), children's frequency of tooth brushing (sometimes, at least once a day, twice or more) and brushing times (at night, at morning, both).

Each child was clinically examined on a dental

chair with optimum illumination. All teeth were examined for dental caries (present/absent/site), malformed teeth (present/absent/site) and rotated teeth (present/absent/site) according to the WHO criteria (1977). Children were examined using a plane mirror and explorer.

The data were recorded on data collection forms, and then transferred to software for analysis. Statistical analysis was performed by Chi-square and student *t*-test ( $P < 0.05$ ).

## Results

Results are summarized in Tables 1–4. Most of the children referred to our department were less than 3 years old, and 76% were in the 12–23 months group. Among the clefts in the 116 children, 8 were located in the lip only, 33 in the lip and alveolus, 52 in the lip, alveolus and palate, and 23 in the palate only (Table 1). Among the palatal clefts, 22 were located in both the hard and soft palate, and 1 in the soft palate only; no submucosal cleft palate in this study. A higher percentage of unilateral clefts was recognized, with most located on the left side.

Of the children examined, 86 (74.1%) were

Table 3 Rates of examinees by age, occurrence of carious teeth

Age group	n	Number of children with caries (%)	Number of teeth with caries	Teeth with caries per child
1	88	12 ( 13.6)	26	0.30
2	18	8 ( 44.4)	24	1.33
3	3	3 (100.0)	13	4.33
4	7	7 (100.0)	41	5.86

Age group 1: 12–23 m; 2: 24–35 m; 3: 36–47 m; 4: more than 48 m

Table 4 Number and percentage of children with caries experience in relation to oral health behavior

Variable	n	Number of children with caries (%)
Method of Feeding		
Breast only	8	1 (12.5%)
Breast and Bottle	76	19 (25.0%)
Bottle only	32	10 (31.3%)
Feeding at determined times		
at will	59	10 (16.9%)
	57	20 (35.1%)*
Taking drinks with sugar		
without sugar	39	15 (38.5%)
	77	15 (19.5%)*
Brushing frequency		
sometimes	8	4 (50.0%)
once a day	78	20 (25.6%)
twice or more	30	6 (20.0%)

\*:  $P < 0.05$

caries free at first visit. Caries was detected in 30 children (25.9%); Rate of caries prevalence was 12.5% in the cleft of lip group, 30.3% in the clefts of lip and alveolus group, 25.0% in the clefts of lip, alveolus and palate group, and 26.1% in the group with cleft palate only (Table 2). There was a significant difference in prevalence of caries between children with clefts involving the lip and those of the clefts of other regions, but the mean age of cleft lip group was lower than those of the other groups.

Table 3 shows rates of examinees by age, and occurrence teeth with caries. In respect to the age group, number of children with caries increased with age; 13.6% at 12–23 months, 44.4% at 24–35 months, and all children over 36 months of age had caries. Teeth with caries per child also increased with age.

The relationship between prevalence of caries and the oral health behavior is shown in Table 4. By method of feeding, bottle-fed children had a higher incidence of caries (31.3%) than the other two groups. Moreover, children fed at predetermined times (16.9%) were significantly less affected by caries than those who were fed at will (35.1%). In respect to sugar containment in the drinks, incidence of caries was higher among children who ingested much sugar (38.5%) than who did not (19.5%). As to the frequency of brushing, children who brushed their teeth only sometimes had a higher percentage of caries than who brushed at least once a day or more.

In relation to the abnormalities of tooth position, it was found that prevalence of caries was higher in children with malformed (37.0%) or rotated teeth (35.0%) than the total percentage of caries (25.9%).

Furthermore, 30 children with clefts had associated with medical history such as allergy and skin rash, heart disease, asthma, mental retardation, or Pierre Robin Syndrome, but there were no significant high caries incidence.

## Discussion

The purpose of the present study was to examine a relationships between age, origin/location, oral health behavior of cleft children, and incidence of dental caries. Since no control children were examined in this study, we compared our results with those of previous studies. A questionnaire for oral health behavior and dental examinations were used. Age of children ranged from 1 to 4 years, and the deciduous teeth had erupted in the oral cavity.

The present study revealed that the prevalence of caries in cleft children was related to the location of cleft, patient age, and oral health behavior. This confirms earlier findings of Schroder & Edwardsson<sup>14)</sup>, who found a positive correlation between poor oral hygiene and dental caries in 3 years old children. A lower prevalence of dental caries was found in children with a cleft of lip alone than in those with other types of clefts, consistent with findings of a previous study<sup>15)</sup>, though in this study children with cleft lip alone were very young. This may have affected to our findings.

In the present study, the number of children with caries increased with age; it was 13.6% at 12–23 months, 44.4% at 24–35 months, and all cleft children over 36 months of age had caries. These results confirmed those of a previous study in which prevalence of caries in cleft children became higher with the increase of the age<sup>12,13)</sup>. The number of teeth with caries per child also increased with age; it was 0.30, 1.33, 4.33, and 5.86 in the age group of 1, 2, 3 and 4, respectively. The prevalence of caries in children with clefts was higher in the present study than in children of the same age without clefts as reported in National Health Survey of Japan in 1999<sup>16)</sup>. This survey showed prevalence of caries and caries teeth per child at each age group; those were 1.2%, 0.02 at 1 year-old group, 21.5%, 0.78 at 2 year-old group and 36.4%, 2.08 at 3 year-old group.

As to oral health behaviors of cleft children, regularity of feeding, quantity of sugar-containing drinks ingested and frequency of brushing, were related to caries prevalence. Breast-fed children exhibited a low incidence of caries, as it was

thought that breast-fed children had slight disorders by oral clefts. The children who had been fed at a predetermined times were less affected than those who had been fed at will. In respect to sugar quantity in the drinks, incidence of caries was higher among the children who took much sugar than among those who did not. The above results suggest that dietary habits play a major role in the occurrence of dental caries, in addition to the presence of an oral cleft. Frequency of brushing was also related to incidence of caries; children who brushed their teeth only sometimes had a higher percentage of caries than who brushed at least once a day. Furthermore, brushing both in the morning and night was effective in reducing the incidence of caries. These findings were in agreement with those of a previous study, in which diagnosed gingival inflammation was more frequent in a group with clefts than in a control group, particularly in the maxillary anterior region<sup>17)</sup>. For both children with clefts and their parents, it is probably difficult to achieve optimal tooth cleaning technique in the cleft area.

The effects of abnormalities of tooth position such as malformed and rotated tooth on dental caries activity were also assessed in the present study. Prevalence of caries was higher in the children with malformed or rotated teeth than in those without abnormalities. It thus appears that abnormalities of tooth position further complicate the oral health condition of cleft children because of low self-cleaning activity in the mouth, and consequently increase the prevalence of caries.

These facts suggest that dental care is effective to decrease the risk of caries in cleft children, especially brushing frequency and brushing before bed are important<sup>18)</sup>.

## Conclusion

Children with clefts were found to high incidence of caries, which increased with age. To decrease the risk of caries, improvement of dietary habits and oral hygiene in cleft children seemed to be an evident goal. Children with cleft lip and/or palate and their parents should as early as possible undergo preventive program that aims at preserving a healthy primary dentition. Special attention should be paid to oral hygiene in the cleft area. It is necessary for children with clefts to acquire better dietary habits and oral hygiene.

## References

- 1) Brandt, S.: Drs S. Pruzansky and H. Aduss on cleft lip and palate: JCO/interview. *J Clin Orthod* **10**: 380, 1976.
- 2) Cooper, H.K.: Historical perspectives and philosophy of treatment. In: *Cleft Palate and Cleft Lip*. (Cooper, H.K., Harding, R.L., Krogman, W.M., Mazahari, M. and Millard, R.T. eds.) W.B. Saunders, Philadelphia, 1979, pp.2-3.
- 3) Ranta, R.A.: A review of tooth formation in children with cleft lip/palate. *Am J Orthod Dentofac* **90**: 11-18, 1986.
- 4) Hall, A.M.: Some orthodontic problems associated with cleft lip and palate. *Br J Orthod* **3**: 239-243, 1976.
- 5) Mazahari, M.: Changes in arch form and dimensions of cleft patients. *Am J Orthod* **60**: 19-32, 1971.
- 6) Bergland, O. and Shidu, S.: Occlusal changes from the deciduous to the early mixed dentition in unilateral complete clefts. *Cleft Palate J* **11**: 317-326, 1974.
- 7) Stephen, L.W. and MacFadyven, E.E.: Three years of clinical caries prevention for cleft palate patients. *Br Dent J* **143**: 111-116, 1977.
- 8) Johnsen, D.C. and Dixon, M.: Dental caries of primary incisors in children with cleft lip and palate. *Cleft Palate J* **21**: 104-109, 1984.
- 9) Shah, C.P. and Wong, D.: Management of children with cleft lip and palate. *Can Med Assoc J* **12**: 122(1): 19-24, 1980.
- 10) Poyry, M. and Ranta, R.: Anomalies in the deciduous dentition outside the cleft region in children with oral clefts. *Proc Finn Dent Soc* **81**: 91-97, 1985.
- 11) Dixon, D.A.: Defects of structure and formation of teeth in persons with cleft palate and the effect of reparative surgery on the dental tissues. *Oral Surg* **25**: 435-446, 1968.
- 12) Ishida, R., Yasufuku, Y., Miyamoto, A., Ooshima, T. and Sobue, S.: Clinical survey of caries incidence in the children with cleft lip and palate. *Jpn J Ped Dent* **27**: 716-724, 1989. (in Japanese, English abstract)
- 13) Chapple, J.R. and Nunn, J.H.: The Oral health of children with clefts of the lip, palate, or both. *Cleft Palate Craniofac J* **38**: 525-529, 2001.
- 14) Schroder, U. and Edwardsson, S.: Dietary habits, gingival status and occurrence of *Streptococcus mutans* and *Lactobacilli* as predictors of caries in 3-year-olds in Sweden. *Community Dent Oral Epidemiol* **15**: 320-324, 1987.
- 15) Bian, Z., Du, M., Bedi, R., Holt, R., Jin, H. and Fan, M.: Caries experience and oral health behavior in Chinese children with cleft lip and/or palate. *Am Ac Ped Dent* **6**: 431-434, 2000.
- 16) Health Policy Bureau, Ministry of Health and Welfare Japan: Report on the survey of dental diseases (1999). Japan, 1999, p.42, 68.
- 17) Dahllof, G., Ussisoo-Joandi, R., Ideberg, M. and Modeer, T.: Caries, gingivitis, and dental abnormalities in preschool children with cleft lip and/or palate. *Cleft Palate J* **26**: 233-237, 1989.
- 18) Lin, Y.J. and Tsai, C.: Caries prevalence and bottle-feeding practices in 2-year-old children with cleft lip, cleft palate, or both in Taiwan. *Cleft Palate Craniofac J* **36**: 522-526, 1999.