ASSESSMENT OF GROWTH AND FEEDING PRACTICES IN CHILDREN WITH CLEFT LIP AND PALATE

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Abstract. Feeding difficulties in cleft lip and palate (CLP) infants is commonly observed and is the most traumatic experience the family has to face. These infants are undernourished and have compromised growth. The purpose of this study was to 1) assess general health and growth parameters in children with CLP and in normal children; and 2) investigate the feeding methods of CLP infants and normal infants. A total of 221 children from birth to six years of both sexes, with CLP (60 children) and normal (161 children) were selected. The CLP and normal children were divided into three subgroups by age. The practice of feeding the infants in subgroup I was assessed using standard piloted questionnaires. The assessment of growth was done at baseline and at six months in all the subgroups.The general well being of the children was assessed by noting the number of common infections. Results showed that a significantly higher percentage of mothers with normal babies ($p<0.01$) had a positive attitude towards breast feeding. When compared to normal children, CLP children were more susceptible to infections ($p<0.05$) and measured significantly lower on the height growth curve($p<0.05$). Hence, height can be used to monitor growth in CLP children.

INTRODUCTION

Cleft lip and palate (CLP) are some of the commonest congenital abnormalities. CLP is a gap involving the lip, upper maxilla and/or palate. The majority of CLP appear to be due to a combination of genetics and environmental factors. Epidemiological studies conducted on the incidence of CLP in Malaysian preschool children showed 1:1,304 for cleft lip and 1:1,594 for cleft palate (Dental Service Division, 1995), while international data showed craniofacial anomalies occur in approximately 1 in 500 live births (Lee, 1999).

Patients with CLP present with a number of problems. Feeding difficulties are commonly observed and are the most traumatic experience the family has to face. Children, especially those with a cleft palate, have an impaired sucking mechanism. Despite adequate sucking movements, they are unable to generate the negative pressure required (Chase *et al*, 1990; Davis, 1990). More air than normal is swallowed, feeding takes longer and the child may tire before completion of the feed (Chase *et al*, 1990). These children are prone to nutritional problems, since the healthiest and the safest source of nutrition for infants is breast milk. Recurrent infections, repeated operations and adverse psychosocial influences further aggravate the problem.

These infants are undernourished and have compromised growth in the early months after birth (Avedian and Ruberg, 1980; Bowers *et al*, 1987). The growth problems of children with CLP have largely been attributed to inadequate nutrition (Day, 1985). Studies have shown many children with CLP have impaired growth with no impairment in weight gain (Felix-Schotlaart *et al*, 1992). Assessment of growth in children with CLP is crucial, because abnormalities may be treatable in the early stages.

The purpose of this study was to 1) assess general health and growth parameters in children with CLP and in normal children and 2) to investigate the feeding methods of CLP infants and normal infants.

MATERIALS AND METHODS

This study was conducted at the School of Dental Sciences, Universiti Sains Malaysia.

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A total of 221 children from birth to six years of both sexes, with CLP and normal were selected. The distribution of the sample in relation to the age, sex, and ethnicity are shown in Table 1. The CLP and normal children were divided into three subgroups by age. They are, subgroup I: birth to 24 months; subgroup II: 25 to 47 months; and subgroup III: 48 to 72 months. Demographic information was obtained through interviews. The attitude and practice of feeding the infants in subgroup I was assessed using standard piloted questionnaires. Assessment of growth was done at baseline and at six months in all the subgroups. The general well being of the children was assessed by noting the number of common infections.

The total number of children in the study was 221. In-group I, the CLP group, there were 60 children. These were divided into subgroups as follows: in subgroup I, age from birth to 24 months, there were 20 children; in subgroup II, age 25 to 47 months, there were 20 children; and in subgroup III, age 48 to 72 months, there were 20 children. In-group II, the normal group, there were 161 children. These were divided into subgroups as follows: in subgroup I, from birth to 24 months, there were 62 children; and in subgroup II, age 25 to 47 months, there were 48 children; and in subgroup III, age 48-72 months, there were 51 children.

Criteria for selection

The inclusion criteria for the study were as follows: CLP patients and normal children without other systemic or congenital abnormalities; new CLP patients who present to the Hospital Universiti Sains Malaysia; children who were operated on for CLP at the Hospital Universiti Sains Malaysia; and healthy children age from birth to 6 years.

Exclusion criteria

The exclusion criteria for the experimental group were: CLP patients and normal children with systemic or congenital abnormalities; children more than 6 years of age; and incomplete repair of CLP. The normal healthy children were selected from nurseries, kindergartens and primary schools by a random sampling method.

Table 1
Descriptive statistics of the study sample.

Variable	Normal n=161	Cleft lip and palate n=60
Age		
Birth-24 months	62 (38.5%)	20 (33.3%)
Mean age (SD)	8.55 (8.2)	15.25 (7.1)
25-47 months	48 (29.8%)	20 (33.3%)
Mean age (SD)	39.85 (7.1)	37.05 (5.9)
48-72 months	51 (31.7%)	20 (33.3%)
Mean age (SD)	64.16 (7.9)	56.75 (9.9)
Sex		
Male	85 (52.8%)	30 (50%)
Female	76 (47.2%)	30 (50%)
Ethnicity		
Malay	161 (100%)	57 (95%)
Others	0	3 (5%)
Father's age		
Mean age (SD)	36.2 (5.8) (n=151)	38.9 (8.2) (n=59)
Mother's age		
Mean age (SD)	33.5 (5.2) (n=152)	34.3 (6.6) (n=60)

RESULTS

The composition of the sample by age, sex, and ethnicity is given in Table 1. The results show that in terms of income, 71.7% of the parents of the CLP children had a family income of less than RM 1,000.00. Parents of CLP children had lower education levels than parents of normal children ($p<0.001$). Among the CLP children, 31.7% of them came from a family size of 9-12 people (Table 2).

The practice of feeding from birth to 24 months in normal and in CLP infants was investigated. Regarding mothers' attitudes towards breast-feeding, 100% of those with normal babies had a positive attitude, while only 76.5% of mothers with CLP babies had a positive attitude ($p<0.001$). Although 88.2% of mothers with CLP babies tried to breast feed, only 40% of them were successful (Table 3). Among the CLP infants, 76.5% were bottle-fed and 69.2% were spoon-fed compared with normal infants, where 49.2% were bottle-fed and 1.7% was spoon-fed ($p<0.05$). More of the parents used formula milk instead of bovine or human

milk (Table 3).

CLP children from birth to 24 months were more susceptible to infection as evidenced by fever ($p<0.05$) and diarrhea ($p<0.05$), compared to normal children (Table 4). At the 6-month growth measurement, the height of the CLP children was significantly lower ($p<0.05$) than the normal children (Table 5).

Table 2
Sociodemographic indicators.

Variable	Frequency (%)	
	Normal n=161	CLP n=60
Father's education		
Primary school	4 (2.5)	10 (16.7)
Lower secondary	8 (5.0)	15 (25.0)
Upper secondory	70 (43.4)	34 (56.6)
Higher education	79 (49.1)	1 (1.7)
Mother's education		
Primary school	2 (1.2)	4 (6.7)
Lower secondary	10 (6.3)	14 (23.3)
Upper secondory	72 (44.7)	39 (65.0)
Higher education	77 (47.8)	3 (5.0)
Family income		
<RM 1,000	18 (11.2)	43 (71.7)
RM 1,000-2,000	28 (17.4)	10 (16.7)
> RM 2,000	115 (71.4)	7 (11.6)
Household size		
<4 people	57 (35.4)	11 (18.3)
5-8 people	92 (57.2)	30 (50.0)
9-12 people	11 (6.8)	19 (31.7)
>12 people	1 (0.6)	0 (0)

DISCUSSION

The normal and CLP children were divided by age. The mean age of the normal children from birth to 24 months was 8.55 months and the CLP child was 15.25 months. The difference in the mean ages can be attributed to a larger percentage of normal infants below 6 months. This sample had almost equal numbers of male and female subjects. The majority of the sample came from the Malay race. This may be due to the predominance of this race in the state of Kelantan in Malaysia where the study was conducted.

The mean age of the fathers was 36.17 years and the mothers was 33.54 years for the parents of the normal children, compared to mean age of parents with CLP infants, where the mean age of the fathers was 38.88 years and mothers was 34.28 years (Table 1). The maternal ages at risk for children with CLP are ages less than 15 years or greater than 35 years (Sipek *et al*, 2002).

We noted that the parents of the normal children had higher education levels than the parents of the CLP children. In terms of family income, 71.7% of the family's with CLP infants had a total income less than RM 1,000 and 31.7% of the CLP infants lived in houses with 9-12 people (Table 2). Therefore, a larger pro-

Table 3
Feeding practices from birth to 24 months in normal and CLP children.

Variable	N		Normal	CLP	p-value
	Normal	CLP	Freq (%)	Freq (%)	
Attitude towards breast feeding	60	17	60 (100)	13 (76.5)	0.002[b]
Tried breast feeding	60	17	60 (100)	15 (88.2)	0.046[b]
Successful feeding	60	15	54 (90)	6 (40.0)	0.000[b]
Bottle feeding	59	17	29 (49.2)	13 (76.5)	0.046
Milk used in bottle	29	13			0.141[b]
Human and bovine milk			6 (20.7)	6 (46.1)	
Formula milk			23 (79.3)	7 (53.9)	
Spoon for feeding	58	13	1 (1.7)	9 (69.2)	0.000[b]
Milk used in spoon	1	9			1.000[b]
Human and bovine milk			0 (0)	4 (44.4)	
Formula milk			1 (100)	5 (55.6)	

Fisher extract test = b; Freq = Frequency

portion of CLP infants come from lower levels of society.

In analyzing feeding practices in infants from birth to 24 months of age, it was observed that 100% of the mothers with normal children were willing to breast feed their infants, when given a preference, whereas only 76.5% of the mothers with CLP infants wanted to breast feed. Previous studies have reported that prior to birth, the majority of mothers with CLP infants intended to breast feed their child, however, after birth, the majority of infants were bottle fed. The majority of the mothers felt that they had been a part of the decision to change the method (Oliver and Jones, 1997). In this study, although 88.2% of the mothers with CLP infants tried to breastfeed, only 40% were successful (Table 3). It has been reported (Trenouth and Campbell, 1996) that 12 of the 25 mothers with CLP infants tried to breastfeed, but none of them was successful. The reasons the mothers could not breast feed their infants were attributed to the anatomical defect in the lip and palate and the inability of the mothers to position the nipple properly in the infant's mouth. In our study, the use of bottles and spoons for feeding the CLP infants was more common when compared to normal infants. This practice can be attributed to the inability of the mothers to successfully breast feed their infants. Most of the mothers who used bottles or spoons to feed their infants preferred formula milk to human or bovine milk, which can be attributed to the easy availability of the formula milk.

Table 4
Risk for common infections in children below two years of age.

Variable	N		Normal	CLP	p-value
	Normal	CLP	N (%)	N (%)	
Fever	56	17	22 (39.28)	12 (70.5)	0.023
Diarrhea	56	17	3 (5.4)	5 (29.4)	0.015[b]
Ear infection	55	17	6 (10.9)	0 (0)	0.325[b]

Fisher extract test = b

It was observed that CLP infants from birth to 24 months were at risk for common manifestations of infection, such as fever and diarrhea, when compared to normal infants (Table 4). This may be attributed to the use of bottles or spoons for feeding the CLP children, which could be contaminated, resulting in recurrent infections in these CLP children. Normal breast feed infants were less susceptible to common infections. A previous study (Danner, 1992) has reported that breast-feeding provides protection against upper respiratory infections, particularly otitis media.

At 6 months, the CLP infants measured lower on the height growth curve than normal infants, but there was no difference in the other growth parameters. The rate of growth in height is faster than the other parameters so we were able to note a difference between the two groups by 6 months. Few previous studies had similar findings. Lee *et al* (1997) reported that CLP children age 0-4 months grew relatively poorly in early infancy, but subsequently recovered, attaining both expected weight and height by follow up at age 25.5 months. Lipman *et al* (1999) reported that children 3 to 12 years old with nonsyndromic orofacial clefts had significantly more growth failure than the general population. Studies of white children birth to 10 years with isolated CL,CP, or CLP, demonstrated a

Table 5
Comparison at baseline and at 6 months of different growth parameters in normal and CLP children.

Variable	N		Normal	CLP	p-value
	Normal	CLP			
Weight (median, IQR)	102	49	1 (0.50-1.97)	1 (0.50-1.50)[a]	0.709[b]
Height (median, IQR)	102	49	4.6 (3.1-6.7)	1 (1.0-2.0)[a]	0.035[b]
Arm circumference Mean (SD)	101	49	0.64 (1.03)	0.63 (0.79)	0.96[c]
Head circumference (median, IQR)	102	49	0.7 (0.4-1.4)	1 (1.0-2.0)[a]	0.096[b]
Chest circumference Mean (SD)	102	49	2.14 (3.62)	1.46 (1.50)	0.103[c]

IQR=Interquartile range; b=Man–Whitney test; c='t' test equal variances

mean height below the population mean (Cunningham *et al*,1997). While another study reported that CLP children are neither consistently shorter nor taller than normal (Ranalli and Mazaheri, 1975). An early lag period occurred, but by three years CLP children caught up to the normal growth, confirming the concept of catch-up growth. A study by Seth and Mc Williams (1988) assessed the weight from birth to 2 years in 77 babies with CLP and in normal infants, and reported that the mean birth weight was not significantly different between the two groups.

Height can be used as one tool to assess growth in CLP infants. Growth assessment must be included in primary and specialty care of children with CLP. If growth failure is demonstrated, these children should be referred for evaluation of the etiology of their short stature.

In conclusion, the rate of growth in height in CLP children. In our study, was slower than in normal children. Only 40% of the mothers with CLP infants were successful in breast feeding their infants, but 90% of the mothers with normal infants were successful. When compared to normal children, CLP children were more susceptible to infection. Height can be used to monitor growth in CLP children.

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