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Assessment of Linear Growth in Infants with Orofacial Cleft on Different Feeding Techniques

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Abstract: ***Background:*** ***Orofacial cleft poses feeding problems in infants and their linear growth is affected. No single best feeding technique to be used has been identified. Hence the study aimed to compare the impact of the feeding techniques commonly used in our setup in improving the length, of infants with orofacial cleft.*** ***Materials and Method:*** ***A total sample of 150 infants at the age of two months with cleft of both lip and palate were recruited in a cohort prospective study and followed bi monthly until their first birthday to assess the pattern of gain in their length. The infants were categorized into three groups based on their habitual feeding techniques such as Group I Paladai fed, Group II Bottle fed and Group III Spoon fed with 50 subjects in each group. The three groups were counseled on nutritional aspects, correct infant positioning and hygienic practices.*** ***Results and Discussion:*** ***The mean height of the group I infants was observed to be higher than the other two groups at every visit and was also found to be statistically significant at p < 0.001. Over all comparison proved that the mean gain in length of the infants belonging to group I was found to be 18.21 ±1.24cm, group II 15.24 ± 0.94cm and that of group III was 15.44 ± 1.14cm and it was found to be statistically significant at p< 0.001 level.*** ***Conclusion:*** ***Though, monitoring, motivation and counseling both on feeding techniques and nutrition were common for infants across the three groups, it was observed that group I seemed to have had a better linear growth and the most important influence would have been the feeding technique adopted indicating paladai as a better feeding device in this group of infants with orofacial cleft. .***

Keywords: Orofacial cleft, feeding problems, feeding techniques, length, Z score.

1. Background

One of the most frequently encountered congenital craniofacial birth defects is orofacial cleft [1]. Clefting has been reported widely to be more frequently among Asians (1 to 2 in 1000) [2, 3&4]. Dual burden is the challenge: in addition to the existing feeding problems prevalence of malnutrition is documented in these children [5]. Cleft lip and palate represent some of the more common anatomic defects that interfere with sucking and swallowing [6].It is essential to address the feeding problems of children with orofacial cleft as it has been extensively studied and reported. Masarel (2007) demonstrated that the sucking pattern of infants with non syndromic complete unilateral cleft lip and palate or a cleft of the soft and hard palate differed from normal infants [7]. Researchers have evolved many methods to meet this challenge. Evidence that breast feeding was better than spoon feeding following surgery was weak and it was suggested that squeezable bottles may be better manageable than rigid ones [8]. According to Gopinath and Muda (2005), among subjects with cleft lip and palate a majority of them were bottle-fed [9]. Goyal, et al., (2012) reported that the most common feeding method practiced by the parents of subjects with orofacial cleft was spoon feeding [10]. Traditionally used feeding device in India is the paladai. Spoon feeding, bottle-feeding with or without 'X' shaped slits have been tried for children with orofacial cleft. However, no single technique has been recommended as the best method to be adopted. Hence, the study aims at comparing the various feeding techniques used in our set up for infants with orofacial cleft in order to understand their impact on pattern of linear growth.

2. Materials and Method

A cohort, prospective study was used to recruit 150 infants aged two months having cleft of both lip and palate and categorized them with an equal distribution in each of the three feeding technique groups based on their habitual way of feeding [Group I receiving paladai feeding, Group II bottle feeding and Group III spoon feeding]. They were followed bimonthly until their first birthday. Infants excluded were those with other congenital deformities/ syndromes, intra - uterine growth retardation (SGA), birth weight less than 2.5kg, identifiable chronic systemic illness and preterm infants.

Demographic data, age, gender, family history, medical history, feeding methods and practices were collected using an interview schedule. Illness like chronic diarrhea and respiratory distress that affects the growth was noted.

Length was measured using an infantometer at base line that was at second month and subsequently at bimonthly visits until one year of age. The infants were followed up and appropriately counseled on the various challenges faced during the study. The data obtained was analyzed to evaluate the pattern of gain in length using WHO standards. Nutritional status was assessed by length for age using Z score. Linear growth pattern of infants belonging to the three groups were compared to identify the presence of stunting.

One way Anova was used to find the statistical difference between patterns of gain in length among the three groups. The dependant variable (anthropometric data) was also compared between the three groups, that is, between group I

and II, group II and III, and group III and I by applying Tukey HSD.

Informed consent was obtained from the mothers of the subjects. Approval was obtained from both Institutional Ethical Committee before starting the study and Publication Oversight Committee before sending for publication.

3. Results and Discussion

Male infants were 29 in group I and 31 in each of Group II and III. Majority of infants in all the groups were of first birth order. Presence of recurrent infection or any illness leading to hindrance to feeding or food allergy was not found in the subjects. Ninety percent of the total subjects followed a mixed diet pattern and no supplements were given during the study period. Initiation of complementary feeding was at sixth month for 90, 88 and 84 percent of the subjects in group I, II and III respectively and for others it was started at 7th month. Illness like chronic diarrhea and respiratory distress that affects the growth was not seen in any subjects during the study period. There was no significant difference in the mean birth weight of the infants belonging to the three groups and all subjects were born at term with appropriate birth weight.

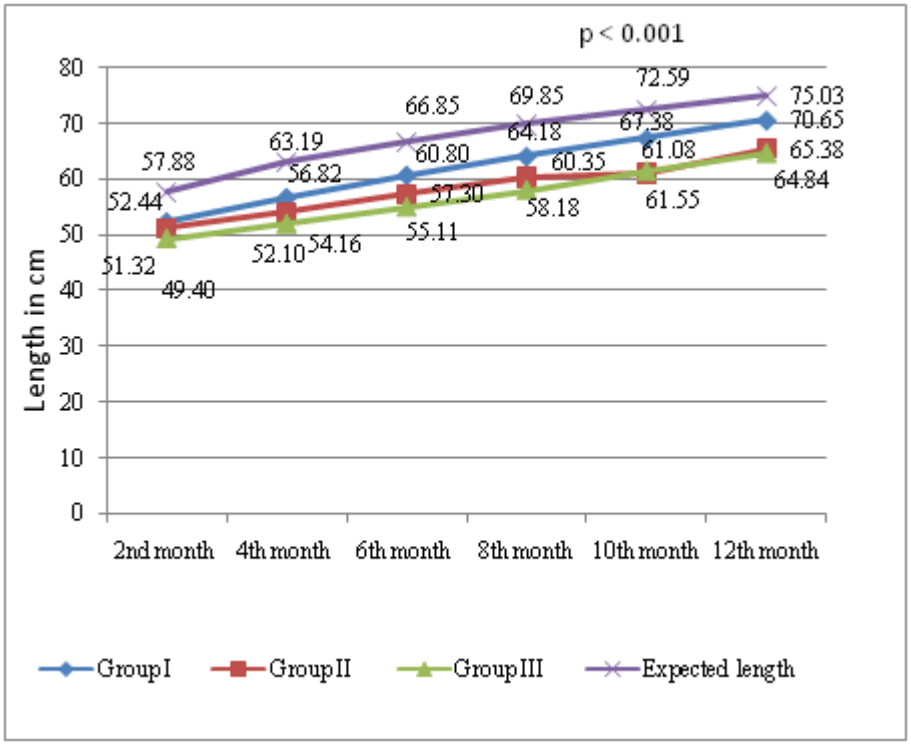

Figure 1: Comparison of the mean length (cm) at each visit between the three groups Vs WHO standards

Figure 1 compares the mean length of the infants belonging to the three groups at each visit. The difference in the mean length at every visit between the three groups was found to be statistically significant at p< 0.001. Length was less than the WHO standards for all groups at all visits when comparing with WHO growth chart, 2011 [11].

Comparing the dependant variable (length) by applying Tukey HSD, it was seen that between the three groups, at all visits, the difference in the mean length of group I was greater than II and group II was greater than III which was statistically significant at p < 0.001 level.The mean length of the group I infants was observed to be higher than the other two groups at every visit indicating that the feeding technique adopted by the mothers belonging to group I was better than the other two techniques.

The impairment in length was more severe in cleft lip and palate and isolated cleft palate subjects and may be attributed to feeding problems encountered compared to subjects with isolated cleft lip [12].

Table 1: Comparison of the mean gain in length (cm) at each visit between the three groups

Variables	*Group I M± SD(n=50)*	*Group II M± SD(n=50)*	*Group III M± SD (n=50)*	*p value*
1st&2nd Visit	4.37 a ± 0.79	2.84 b ± 0.32	2.70 b ± 0.47	0.000***
2nd&3rd Visit	3.02 a ± 0.29	2.70 b ± 0.47	3.01 b ± 0.37	0.000***
3rd&4th Visit	3.38 a ± 0.46	2.95 b ± 0.25	3.06 b ± 0.39	0.000***
4th&5th Visit	3.19 a ± 0.60	2.73 b ± 0.43	3.37 a ± 0.43	0.000***
5th&6th Visit	3.27 a ± 0.49	3.48 a ± 0.60	3.29 a ± 0.42	0.09NS

*** p<0.001, Tukey HSD a > b > c, NS- non significant

Table 1 compares the mean gain in length at each visit between the three groups. The mean gain observed in group I was significantly higher (p < 0.001) than the other two groups up to ten months of age and at one year the gain in length was almost similar in all the three groups. Similar findings were observed when applying Tukey HSD. Two contributory factors may have favoured these findings.

Complementary feeding was initiated from sixth month onward and majority of infants were able to take considerably a better quantity from eighth month. Secondly, cleft of the palate repair was completed for majority of infants in their tenth month of age.

The mean gain in length of the group I infants was observed to be higher than the other two groups at every visit and it can be stated that in respect to the gain in length of the infants the feeding technique adopted by the mothers belonging to group I was better than the other two methods.

Studies of subjects from birth to 10 years of life with isolated cleft lip, cleft palate, or cleft of lip and palate, demonstrated a mean height below the population mean [13]. Length can be used as a tool to assess growth in CLP subjects. Growth assessment must be mandatory in primary and specialty care of infants with CLP. If growth failure is observed, these children should be referred for evaluation of the aetiology of their short stature. Length for age indicates stunting and more number of children in group II and III were found to be stunted at all visits compared to group I. Technique followed by mothers of infants belonging to Group I is better than the technique followed by mothers of other two groups. Hence, it can be concluded that paladai fed infants were less likely to be stunted than bottle or spoon-fed infants.

WHO classifies the length for age based on SD from the median as normal nutrition, mild to moderate malnutrition and severe malnutrition [11]

Table 2: Comparison of Z score (Length for age) at each visit between the three groups

Age (months)	Interpretation	Group I (n=50)	Group II (n=50)	Group III (n=50)	Chi square P value
2nd	Normal				0.000***
	Mild to Moderate	40	18	2	
	Severe	10	32	48	
4th	Normal	6			0.000***
	Mild to Moderate	19	16		
	Severe	25	34	50	
6th	Normal	13			0.000***
	Mild to Moderate	19	14		
	Severe	18	36	50	
8th	Normal	17			0.000***
	Mild to Moderate	18	14		
	Severe	15	36	50	
10th	Normal	21	4		0.000***
	Mild to Moderate	23	25	1	
	Severe	6	21	49	
12th	Normal Nutrition	29	14		0.000***
	Mild to Moderate	20	28	20	
	Severe	1	8	30	

*** p< 0.001

Normal - Normal Nutrition, Mild to Moderate - Mild to moderate stunting &Severe - Severe stunting

Table 2 compares the Z score (length) at each visit between the three groups. At the second month of age it was found that out of the 150 infants, none of them were found to be normal for length for age, whereas from fourth month onwards a gradual shift was observed in group I and a steady improvement was noticed at each visit and about 60% of the subjects were in the category of normal length at the end of one year. In Group II and III, the improvement was noticed only after the tenth month and group III was still lagging back compared to Group II. All the findings were found to be statistically significant (p <0.001).

Child growth status, in terms of indices, is most commonly interpreted as Z-scores or SD-scores [14], indicating how a child's or population's measurements is related to a suitable reference population [15].

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 [16].
Lipman et.al.(1999) reported that children between 3 to 12 years of age with non-syndromic orofacial clefts had significantly more growth failure than the general population[17]. An early lag period was noted, but by three years, children with Orofacial cleft caught up to the normal growth, supporting the concept of catch-up growth [13].

Lack of knowledge and motivation are responsible for mothers under feeding their infants[18].Constant monitoring is essential to identify growth pattern in these children as correction is easier with early detection [19].Mothers of infants with orofacial cleft need to be educated and counseled periodically to achieve appropriate growth.

Table 3: Comparison of the difference in initial and final length between the three groups

Groups	*length (cm) M ± SD*	*f value*
Group I (n = 50)	18.21 [a] ±1.24	110.768***
Group II (n = 50)	15.24 [b] ± 0.94	
Group III (n = 50)	15.44[b] ± 1.14	

*** p , 0.001

Table 3 clearly indicates that overall gain in length of group I was much better than the other two groups**.** "Children with congenital malformations or genetic or clinical syndromes follow their own growth pattern, which might differ from that of normal children, and represent groups with their own disease-specific growth pattern" [13,17].

4. Conclusion

Length for age denotes stunting and there has been a clear indication that feeding difficulties encountered by the infants were more severe in groups fed other than paladai. Lip repair was performed by third to fourth month and complementary feeds were introduced by sixth month onwards. Palate repair was performed by ninth month onwards. Infants belonging to group I had both cleft and palate repair earlier than their counter parts in the study. Monitoring, and counseling both on feeding techniques and nutrition were common for infants across the three groups, but, it was observed that group I seemed to have had a better linear growth and the most important influence would have been the feeding technique adopted indicating paladai as a better feeding device in this group of infants with orofacial

cleft. Though the mean length of the infants were below the 50th percentile, it was noted that there was a steady gain in length in all the subjects but the gain in infants who were paladai fed was found to be significantly higher than the other two groups. Of the three feeding techniques adopted by the mothers' of infants with orofacial cleft, it was noted that paladai feeding was better than bottle or spoon-feeding.

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