

INFANT GROWTH IN RELATION TO FEEDING PRACTICES IN LOW INCOME FAMILIES

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ABSTRACT

A survey of feeding practices and measurements of weight, length and chest circumference of infants upto the age of 12 months and belonging to low income families of some selected villages at Pantnagar was carried out during 1987-88. The study revealed that as many as 83% of infants were exclusively breast fed upto the age of 6 months. In addition to being breast fed, 77% of infants between 9 and 12 months were also receiving semi-solids. Very small quantities of cereals, pulses, biscuits and fruits were reported to be the supplementary foods fed to infants. Animal milk diluted to varying degrees was fed as a supplement by some mothers and as a substitute by a few. Growth patterns of various feed types in terms of the anthropometric measurements were not found significantly different in different feeding practices. With reference to International standards (NCHS), it was seen that weight of only 25% of male and 55% of female infants fell in the normal range at the age of 3 months and this percentage declined from 3rd month to 12th month of age. Though the percentage falling in normal range was higher for length, the pattern of decline with the advancement in age was similar. This unsatisfactory growth performance of even those who received other foods alongwith breast milk is indicative of the fact that the quantity/quality of supplementary foods (along with other factors) were not sufficient to promote normal growth.

Key words: Growth, Breast feeding, Supplementary foods;

Malnutrition, combined with infection is the most widespread and serious problem affecting young children(1). While the effects of infant feeding practices are reflected in the growth and physical development of infants, the determinants of these practices are largely socio-economic. Unfortunately, majority of our children live under such social, economic and environmental conditions that hamper their growth and development. Inappropriate feeding practices lead to infant malnutrition, morbidity and mortality. From the nutrition standpoint, infants constitute a vulnerable group. Studies on growth of infants are important as they provide valuable data in assessing the growth pattern of infants in relation to a variety of factors which may influence them. It is important because they can be used to study the difference between the growth of infants living under satisfactory and unsatisfactory conditions. Such comparisons can be used to study the effect of specific conditions which would retard the growth of an infant. A pre-requisite for this is a thorough understanding of the feeding practices and growth and physical development of infants living under varying community conditions. The present longitudinal study was carried out to study the prevailing feeding practices and their role on the physical growth of infants.

Material and Methods

Infants upto the age of 12 months formed the subjects of the present study.

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Infants from village of Shantipuri and from Pantnagar areas were selected for the purpose of study. These localities in the vicinity of Govind Ballabh Pant University of Agriculture and Technology, Pantnagar are inhabited by the vulnerable groups. The collection of data extended from May, 1987 to June, 1988. The infants thus selected were divided in two groups. The first group (Group A) included 28 infants upto the age of six months, while the second group (Group B) included another 30 infants between the ages of 6 to 12 months.

A detailed interview schedule was prepared to collect the relevant information. A record or routine measurements of length, weight and chest circumference was maintained. In order to assess the overall socio-economic status of the families, parents' education, their occupation, and monthly income of the household were recorded. Using a 24 hour dietary recall method, feeding practices of infants were recorded. A record of illness like gastrointestinal disorders and respiratory tract infections suffered by the infants were also kept.

All the infants belonging to both groups were studied according to six different types of feeding practices (FP): FP I: Breast milk only; FP II: Animal milk only; FP III: Breast milk and animal milk; FP IV: Breast milk and semi-solids; FP V: Breast milk, animal milk and semi-solids; and FP VI: Animal milk and semi-solids. The impact of feeding practices on physical growth was assessed through statistical test of significance namely t-test.

Results

Socio Economic Status

The study revealed that all the families lived in poor housing and unhygienic conditions. With regard to education, 74%

fathers were literate, 59% had education upto middle school level and the remaining 15% upto the level of high school and above. Ninety four per cent of the mothers were illiterate. Regarding occupational status, 70% of the earners were agricultural labourers. Almost 87% households had a per-capita monthly income upto Rs. 200 only. Of these, 41% households had a per capita income of Rs. 107 per month which was the minimum income for estimating poverty level for rural areas at 1984-85 prices as reported by Gandhi(2). The monthly per capita income of Rs. 107 at 1984-85 prices when adjusted for the increase in the Consumer Price Index for Agricultural Labourers'(3) between 1984-85 and 1987-88 works out at Rs. 129 at 1987-88 prices. Considering the adjusted income, 70% of the selected households were thus below the poverty line during the period of study.

Feeding Habits

Pre-lacteal feed was administered by 90% mothers. Colostrum was fed only in 46% cases. All the mothers breast fed their babies, the exception being 5% mothers due to failure of lactation performance. About 59% were breast-fed in combination with other supplements. Diluted artificial milk, cereals, commercial cereals, pulses, fruits and biscuits were supplements of choice. It was observed that 95% infants suffered from one illness or the other, 41% suffered recurrently.

High percentage of gastro-intestinal and respiratory tract infections indicated that percentage of infants suffering were almost similar for the exclusively breast fed group and for groups fed other foods also. The average rate of increase in length observed was found more during the first six

TABLE I—Weight Increment (g) of Infants in Relation to Feeding Practices and Age

Age (mo)	Total numbers of sample	Type of Feeding											
		FP-I		FP-II		FP-III		FP-IV		FP-V		FP-VI	
		No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
Group A (1 to 6 months)													
Gain over previous month (g)													
2	28	25	650			3	0						
3	28	25	920			3	830						
4	28	24	200			3	40	1					
5	28	23	400			3	960	2	320				
6	28	18	480			3	670	6	390	1			
Mean			530				625		355				
Group B (6 to 12 months)													
Gain over previous month (g)													
7	14	6	85	1				2		3		2	
8	18	3	90	1	500	1		6	500	5	110	2	0
9	20	3	750			1	250	8	130*	6	-70	2	-250
10	29	3	-250			3	250	14	350	7	430	2	500
11	30	3	160	1		3	330	14	440	7	440	2	0
12	30	3	670	1	500	3	330	14	350	7	600	2	750
Mean			251		500		290		354		302		200

No. : Number of infants; FP I: Breast milk only; FP II: Animal milk only; FP III: Breast milk + Animal milk; FP IV: Breast milk + Semi-solids; FP V: Breast milk + Animal milk + Semi-solids; FP VI: Animal milk + Semi-solids.

months of infancy compared to the later half of infancy.

Variations in weight (Table I, Fig. 1) were rapid particularly during early infancy. In exclusive breast fed infants there was a steady weight gain upto 3rd months after which there was a gradual gain at a lower rate. The weight gain during later half of infancy worked out to be lower in comparison to infants upto 6th month. By

and large, exclusive breast feeding was superior type of feeding practice upto 3rd month.

Only when it was supplemented with semi-solids from 4th month that the weight declined during infancy. Exclusive breast feeding did not confer any benefit with regard to higher weight gain by the end of 12th month. The supplementation of breast milk with artificial milk or semi-solids or

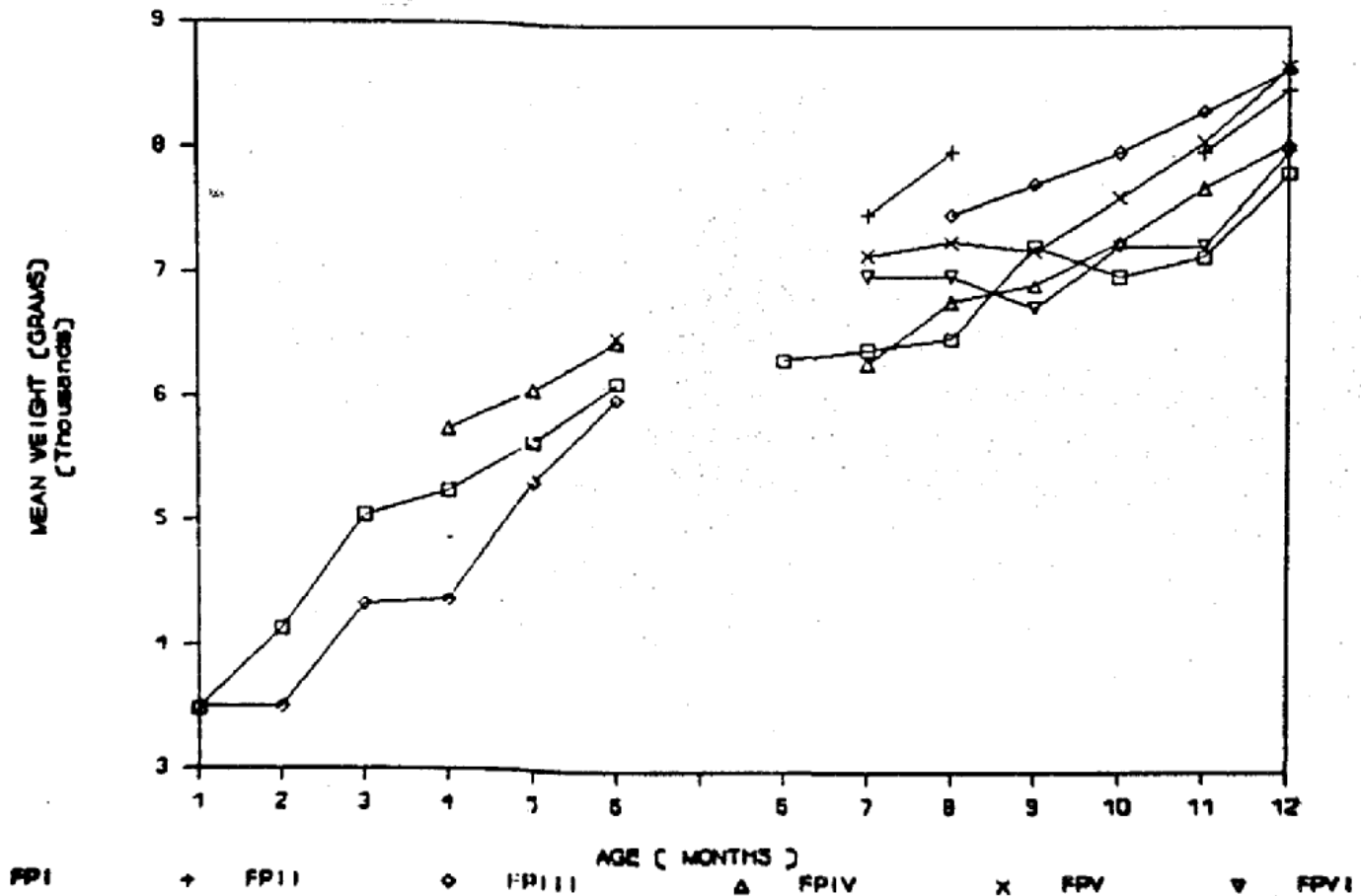


Fig. 1. Mean Weight (g) of Infants by Age and Types of Feeding Practices. FP I: Breast milk only; FP II: Animal milk only; FP III: Breast milk + Animal milk; FP IV: Breast milk + Semi-solids; FP V: Breast milk + Animal milk + Semi-solids; and FP VI: Animal milk + Semi-solids.

both resulted in higher weight increment in the later half of infancy. The test of significance (t test) revealed that the difference in gain with regard to mean weight (Table I, Fig. 1), length (Table II, Fig. 2) and chest circumference (Table III, Fig. 3) between various types of feeding practices were statistically non-significant.

Comparison of weight, length and chest circumference of infants with the corresponding data of Indian Council of Medical Research (1956-65) indicated that the mean values by and large depicted a positive secular trend(4). In comparison to values of Ghosh *et al.*(5) the mean values were between 84 and 100% of the refer-

ence. The values when compared to the standard values of NCHS (1973)(6), it was found that with advancement in age, the percentages of infants falling within the normal range (between 25th and 75th percentiles) kept on declining in terms of both weight and length.

Discussion

Where environment is highly unhygienic, all infants exclusively on breast milk or receiving any type of supplements are heavily prone to infections(7). Indian infants even of poor communities are least exposed to infections in the first six months

TABLE II—Length Increment (cm) of Infants in Relation to Feeding Practices and Age

Age (mo)	Total numbers of sample	Type of Feeding											
		FP-I		FP-II		FP-III		FP-IV		FP-V		FP-VI	
		No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
Group A (1 to 6 months)													
Gain over previous month (cm)													
2	28	25	2.7			3	2.8						
3	28	25	3.7			3	1.8						
4	28	24	1.4			3	2.3	1					
5	28	23	1.9			3	1.5	2	1.7				
6	28	18	1.7			3	2.3	6	2.7	1			
Mean			2.3				2.0		2.2				
Group B (6 to 12 months)													
Gain over previous month (cm)													
7	14	6	0.2	1				2		3		2	
8	18	3	0.9	1	0.4	1		6	1.5	5	1.5	2	2.0
9	20	3	1.8			1	0.5	8	1.3	6	1.2	2	0.1
10	29	3	0.6			3	2.2	14	1.2	7	1.4	2	1.5
11	30	3	1.6	1		3	1.3	14	1.4	7	2.0	2	1.0
12	30	3	2.4	1	0.7	3	2.7	14	1.9	7	0.9	2	3.2
Mean			1.3		0.7		1.7		1.5		1.4		1.6

No. : Number of infants; FP I: Breast milk only; FP II: Animal milk only; FP III: Breast milk + Animal milk; FP IV: Breast milk + Semi-solids; FP V: Breast milk + Animal milk + Semi-solids; FP VI: Animal milk + Semi-solids.

as compared to later childhood(8). Cunningham *et al.* reported that lower morbidity was observed among infants of higher educated parents(9). Thus, physical growth of infants is bound to get affected adversely as suggested by Rowland *et al.* who also reported that there existed a negative relationship between gastro-intestinal disease and growth of both weight and length gain(10). According to Waterlow's

contention(11,12) milk is inadequate to maintain growth after 3 months, in developing countries.

Newmann *et al.* reported that the slowing down of weight gain in some infants during the first six months may be occasionally due to inadequate breast feeding(13). This can be attributed to the fact that rate of growth of infant in terms of weight and length is rapid during early

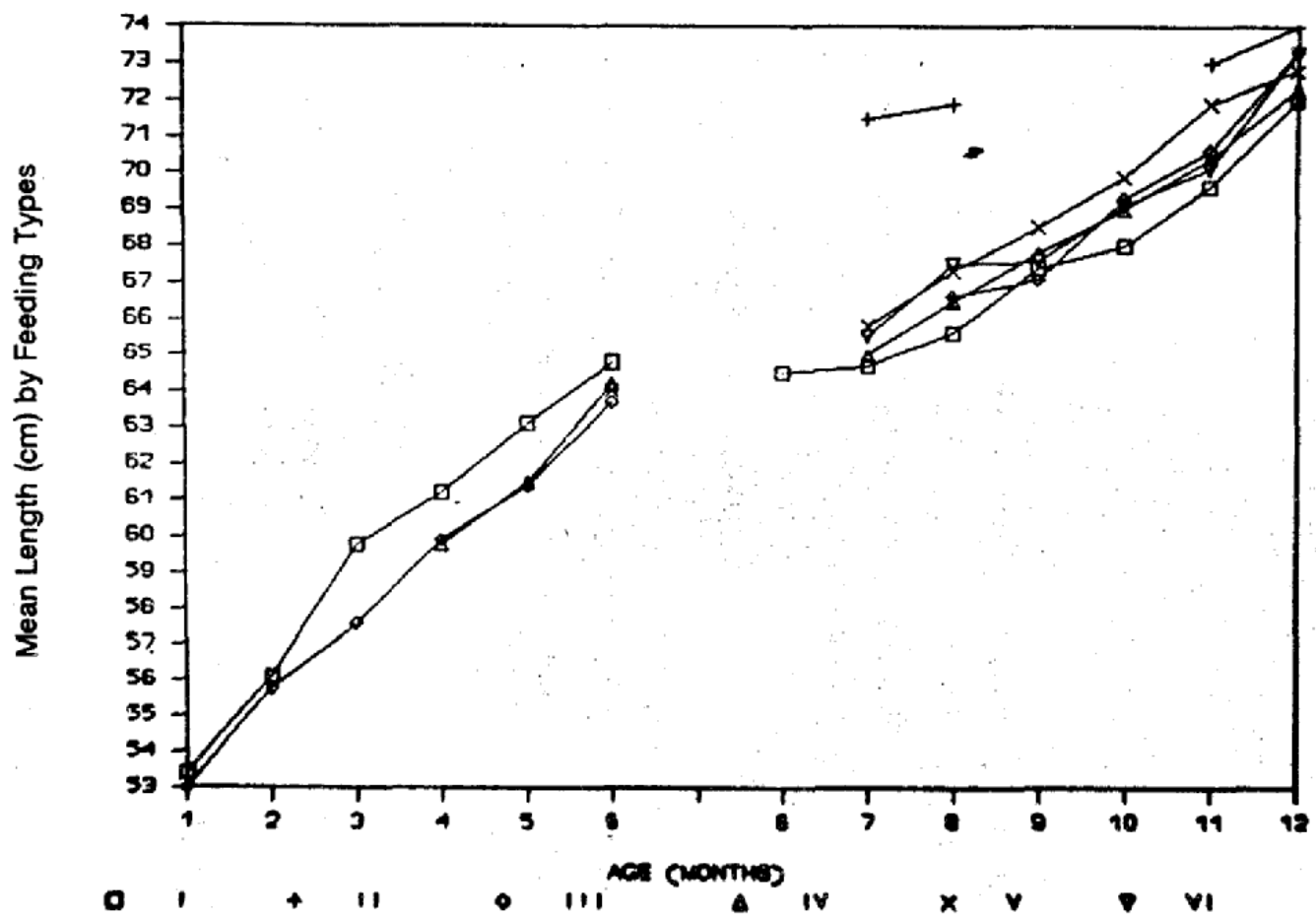


Fig. 2. Mean Length (cm) of Infants by Age and Types of Feeding Practices. FP I: Breast milk only; FP II: Animal milk only; FP III: Breast milk + Animal milk; FP IV: Breast milk + Semi-solids; FP V: Breast milk + Animal milk + Semi-solids; FP VI: Animal milk + Semi-solids.

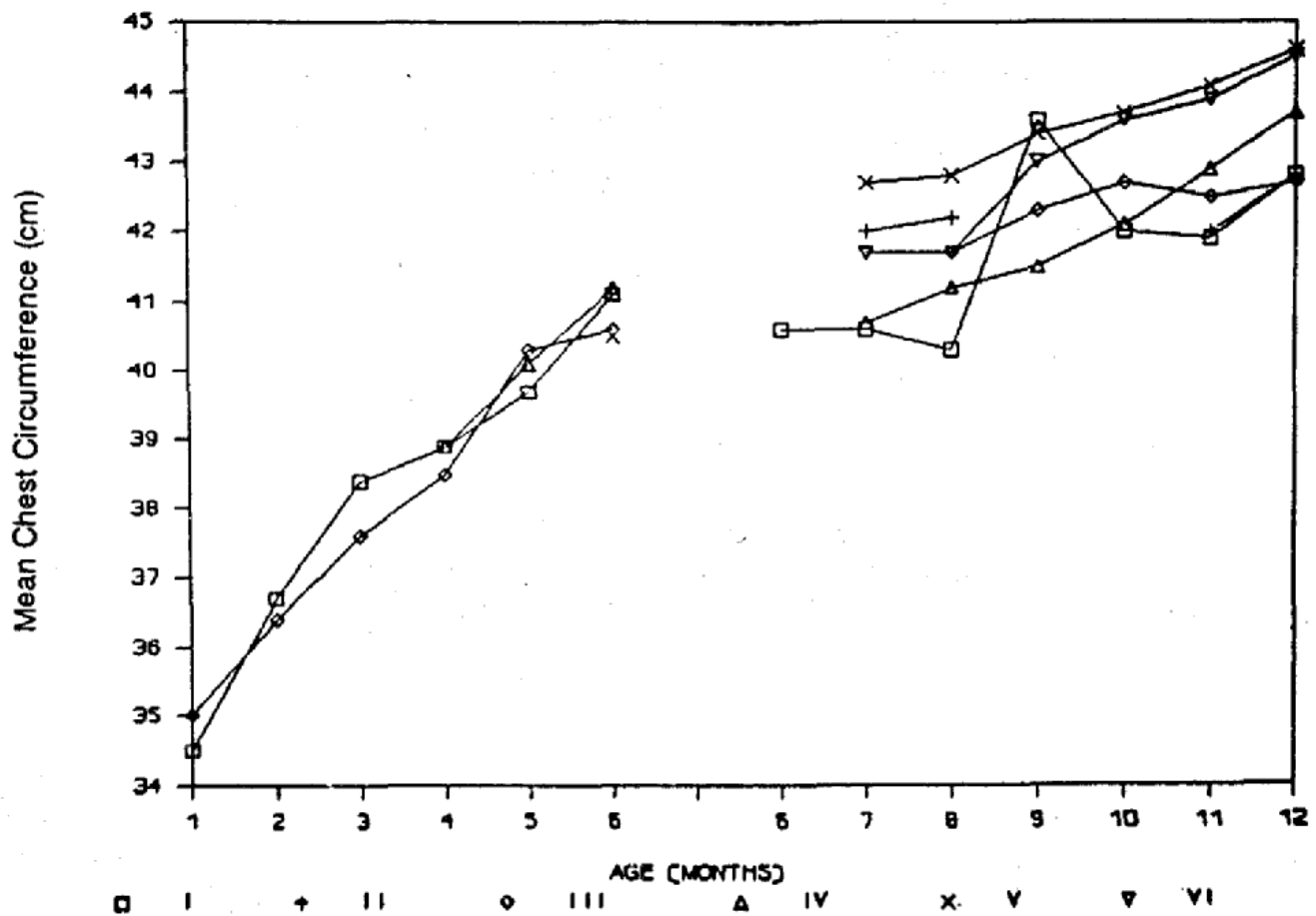


Fig. 3. Mean Chest Circumference (cm) of Infants by Age and Types of Feeding Practices. FP I: Breast milk only; FP II: Animal milk only; FP III: Breast milk + Animal milk; FP IV: Breast milk + Semi-solids; FP V: Breast milk + Animal milk + Semi-solids; FP VI: Animal milk + Semi-solids.

TABLE III—Chest-Circumference Increment (cm) of Infants in Relation to Feeding Practices and Age

Age (mo)	Total numbers of sample	Type of Feeding											
		FP-I		FP-II		FP-III		FP-IV		FP-V		FP-VI	
		No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
Group A (1 to 6 months)													
Gain over previous month (cm)													
2	28	25	2.2			3	1.4						
3	28	25	1.7			3	1.2						
4	28	24	0.5			3	0.9	1					
5	28	23	0.8			3	1.8	2	1.2				
6	28	18	1.4			3	0.3	6	1.1	1			
Mean			1.3				1.1		1.2				
Group B (6 to 12 months)													
Gain over previous month (cm)													
7	14	6	0.0	1				2		3		2	
8	18	3	-0.3	1	0.2	1		6	0.5	5	0.1	2	0.0
9	20	3	3.3			1	0.6	8	0.3	6	0.6	2	1.3
10	29	3	-1.6			3	0.4	14	0.6	7	0.3	2	0.6
11	30	3	-0.1	1		3	-0.2	14	0.8	7	0.4	2	0.3
12	30	3	0.9	1	0.8	3	0.2	14	0.8	7	0.5	2	0.6
Mean			0.4		0.5		0.3		0.6		0.4		0.8

No. : Number of infants; FP I: Breast milk only; FP II: Animal milk only; FP III: Breast milk + Animal milk; FP IV: Breast milk + Semi-solids; FP V: Breast milk + Animal milk + Semi-solids; FP VI: Animal milk + Semi-solids.

infancy period and the rate of growth somewhat declined during the later half(1). However, the effect of various feeding practices on the rate of length gain did not differ significantly. Similar results were obtained by Puri *et al.*(14).

Different types of feeding practices had no significant effect on the increments in weight, length and chest circumference of infants. It is possible that the variation with respect to socio-economic status and living

conditions of the homogenous poor group were not large enough to reflect the impact of various feeding practices on physical growth of infants. It was reported that the specific illnesses, inadequate diet and changes in feeding had adverse effects on the growth performance of infants(15).

The reason for these infants lagging very much behind the well-to-do group in growth is obvious that these underprivileged children are constantly exposed to

nutritional, social and environmental conditions as revealed in several studies conducted in our country(16,17). A well developed nutrition and health education programmes directed towards improving the home dietaries may be beneficial in improving the physical growth of our infants.

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