Infant Feeding Practice and its effect on the Growth and Development of babies

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Abstract

The present study was conducted among 150 healthy babies< 2 years of age attending the Paediatric OPD/ under-five clinic in JIPMER, a tertiary care hospital, with the aim of studying the feeding practice of babies and correlating it with their growth and development. Information about the feeding pattern and development were obtained from the mother/ the guardian using a graded questionnaire. The anthropometric parameters were measured and analysed with refined parameters like Z score of weight, Weight-for-Height percent etc using CDC2000 anthropometric charts as reference. Developmental progress was quantified using the Trivandrum Developmental Screening Chart (TDSC).

The mean duration of exclusive breast feeding was 6.26 months (range 0 – 22). Presence of malnutrition was quite high (42.3% by Z score and 40% by Weight-for-Height), though overnutrition was present to a lesser extent (7.3% by Weight-for-Height). Significant differences in the Z score of weight were observed between babies exclusively breast fed for 4-6 months and for> 6 months (P value = 0.001) while significant differences in development were seen between babies exclusively breast fed for <3 months and the others (P value = 0.003 & 0.032).

Though most of the babies were breast fed exclusively for 4-6 months, babies weaned after 6 months are likely to be malnourished, while babies exclusively breast fed for< 3 months are likely to have a delay in achieving milestones.

Introduction

Infant feeding pattern includes the types of food the baby is fed with starting right from its birth. The recommendations are to feed the baby first with colostrum followed by a period of exclusive breast feeding. This is followed by weaning foods which initially supplement breast milk and later become the principal diet of the baby. The WHO recommends exclusive breast feeding till 6 months of age and to start weaning not before 4 months (1).

Malnutrition (some prefer the term ‘undernutrition’) im-pairs the immunity and predisposes the baby to infections which hamper its growth further, setting up a vicious cycle. On the other hand, obesity predisposes the baby to non-communicable diseases like hypertension, diabetes, cardio-vascular morbidity etc in later life. Though there are a repertoire of factors that affect the growth and development of an infant, the feeding pattern of the infant is the most crucial of them all.

Materials & Methods

One hundred and fifty healthy babies (78 males and 72 females) were included. The mother/ the guardian was then interviewed with a graded questionnaire. A detailed history was obtained about the feeding pattern of the baby encompassing prelacteal feeds, colostrum, initiation and duration of breast feeding and initiation and types of weaning food viz commercial feeds, animal food, fruits, vegetables etc. A fair idea about a round-the-clock food intake of the baby was assessed by asking the mother to list the foods and their amounts given during the previous day (the 24 hour recall method). Then, the different ages of attainment of the various gross motor, fine motor, language and social milestones were recorded using the recall method.

Weight was measured with an infant weighing machine routinely used in our OPD. It has a sensitivity of 50g. Length was measured using an infantometer with a sensitivity of 1mm.

The anthropometric parameters were standardized using the corresponding mean expected values for that age and sex, given in the CDC 2000anthropometric charts.

The 'Z score' of the weight(wt) of each baby was calculated as,

$$\text{Z score of wt} = \frac{\text{Observed wt} - \text{Expected wt}}{\text{S. D. of weight for age}}$$

A Z score of i)< -2 was taken as malnourished, ii) -2 to 2 as normal and iii) > 2 as obese.

Weight-for-Height percentage was calculated for each baby using the formula,

$$\text{Weight-for-Height\%} = \frac{\text{Observed weight}}{\text{Expected wt for its height}} \times 100$$

As per the Waterlow classification, a Weight-for-Height percentage of i)>90% was taken as normal, ii) 80%-90% as mild malnutrition, iii) 70%-80% as moderate malnutrition and iv) <70% as severe malnutrition. We considered a Weight-for-Height percentage of > 110% as overweight.

The development of the baby was quantified using the Trivandrum Development Screening Chart (TDSC). A developmental score was given using the formula,

$$\text{Developmental Score} = \frac{\text{No. of milestones attained}}{\text{Expected no. of milestones}} \times 100$$

Based on the duration of exclusive breast feeding, the babies were divided into, i)early weaning </= 3 months of exclusive breast feeding), ii)appropriate weaning (4-6 months of exclusive breast feeding) and iii)late weaning (> 6 months of exclusive breast feeding) groups.

Comparisons between the 3 groups were done using 'One Way ANOVA' and 'Post Hoc tests' while between any 2 groups using 'Unpaired student's t test'. A two tailed P value< 0.05 was considered statistically significant. The software Statistical Package for Social Sciences (SPSS), Version 13.0 was used for statistical analysis.

Results

The feeding practice of the babies is presented in table 1. The mean duration of exclusive breast feeding was 6.26 months (range 0 – 22). The averageBMI was 15.74 (range 11.72 – 22.83). The average Z score of weight was -1.87 (range -6.28 – 1.96), the average Weight-for-Height percentage, 94.07 (range 69.36 – 137.36), the average developmental score 95.01 (range 50.0 – 116.67). Presence of malnutrition, based on CDC norms, was quite high (42.3% by Z score and 40% by Weight-for-Height), though overnutrition was present to a lesser extent (7.3% by

Weight-for-Height) as seen from table 2 and figures 1 and 2. The differences in the Z score of weight were statistically significant between the 'appropriate weaning' and 'late weaning' groups (P value = 0.001), though it was insignificant between the other groups. The difference in the developmental scores was significant between the 'early weaning' and the other two groups (P value = 0.003& 0.032), though the difference between the later two groups was insignificant. The differences in the Weight-for-Height percentage were statistically insignificant. The differences in the growth and development of the babies with other feeding habits were minor and statistically insignificant.

Discussion

Infant feeding practices regarding exclusive breast feeding duration are very well within the WHO recommendations (1), in contrast to previous studies (2,3). The percentage of mothers giving colostrum has also improved (4,5). The practice of giving prelacteal feeds has declined (6), but still exists. These improvements may be due to the fact that mothers who come to the hospital have a higher awareness about the WHO principles for infant health.

In line with the recent World Bank Health report (7), malnutrition is still highly prevalent in the community. It may be due to poverty, poor living environment etc still widely prevalent in India. Moreover, the values for normalcy given in CDC2000 charts (which are based on babies of the United States) may be high for Indian babies.

A significantly lower Z score of weight in the late weaning group, as compared to the appropriate weaning group, suggests that most of these children are malnourished, a finding consistent with previous studies (8 - 10). Exclusive breast feeding beyond 6 months of age may provide a diet, with calories and proteins, inadequate to meet the active growth needs of the infant thus leading to malnourishment.

Breast milk is crucial for nervous system development as studies show that breast feeding causes psychosocial improvement even in infants of psychologically impaired mothers (11). A significantly lower developmental score in the early weaning group, as compared to the other two groups, only highlights that exclusive breast feeding is essential in the first 6 months for optimal development of the nervous system.

A statistical insignificance in the differences in Weight-for-Height percentage among the three exclusive breast feeding groups may be due to insufficient numbers in the various nutritional categories. Recently, some authors even questioned the accuracy of the usage of Weight-for-Height percentage for nutritional assessment (12).

Table 1: The feeding practice of the babies coming to the Pediatric OPD/ underfive clinic, JIPMER

	Frequency	**Percent**
Prelacteal feeds		
Yes	21	14.0
No	129	86.0
Colostrum		
Yes	130	86.7
No	20	13.3
Exclusive breast feeding		
</=3m	14	9.3
4-6m	88	58.7
>6m	48	32.0

Commercial foods		
Yes	77	51.3
No	73	48.7
Animal foods		
Yes	76	50.7
No	74	49.3

Table 2: The nutritional status of babies graded by the Z-score of weight and the Weight-for-Height percentage

		Frequency	Percent
Z-score	MN	64	42.7
	Normal	86	57.3
Wt-for-ht %	Severe MN	1	0.7
	Moderate MN	14	9.3
	Mild MN	45	30.0
	Normal	79	52.7
	Overweight	11	7.3

Note: In the tables, an exclusive breast feeding period 0f</= 3m signifies 'early weaning', 4-6m signifies 'appropriate weaning and > 6m 'late weaning'. MN- malnutrition, Wt-for-ht %- Weight-for Height percentage

In contrast to previous studies (4, 5), differences in the growth parameters of the babies with other feeding habits were statistically insignificant. The reasons may be that the influence on growth of these factors is not as primary as some of the factors stated above, especially when all these factors co-exist.

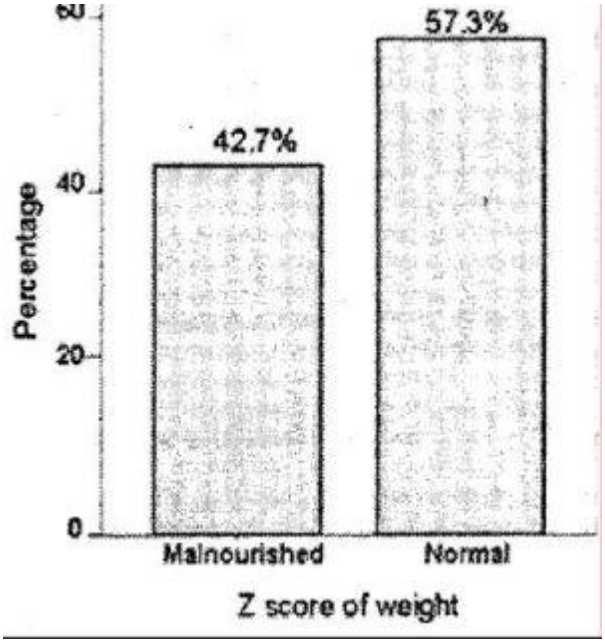

Fig. 1: The nutritional status of babies graded by the Z-score of weight.

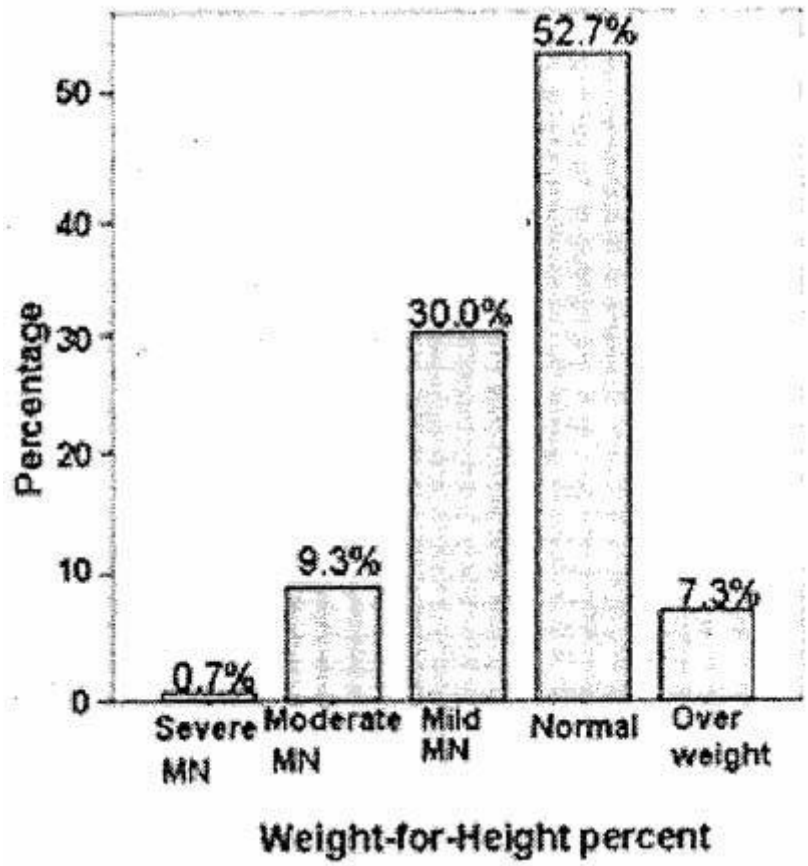

Fig. 2: The nutritional status of babies Graded by the Weight-for-Height percent (Waterlow system). (MN-malnutrition)

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