



Growth and Infant Feeding: A Community Based Study of District Varanasi, Uttar Pradesh, India

Upadhyay Garima¹ and Chakravarty Archana²

¹Dept. of Home Science (Food and Nutrition), Vasant Kanya Mahavidyalaya, Kamachha Varanasi-221010, Uttar Pradesh, INDIA

²Department of Home Science (Food and Nutrition), Mahila Mahavidyalaya, Banaras Hindu University Varanasi-221005, Uttar Pradesh, INDIA

Available online at: www.isca.in, www.isca.me

Received 15th May 2014, revised 30th June 2014, accepted 20th July 2014

Abstract

Growth is an essential biological characteristic of childhood and the growth process is a complicated one. Growth is a sensitive indicator of a child's state of health, nutrition and genetic background. Studies on growth of children in community provide important information on the nutritional status of the community, which in true is largely governed by feeding practices followed in the community. So, the study was conducted in Varanasi to study growth of infants in relation to their feeding practices. The study was conducted in the urban areas of Varanasi district, Uttar Pradesh. Varanasi city is divided into ten wards, according to Municipal corporation, Varanasi. By consultation with the statistician two wards Bhelupur and Dashashwamedh were selected for the study. A pretested schedule was developed (according to the guidelines proposed by ICMR 1989) and was used to collect information regarding feeding practices. 253 infants were selected purposively through domiciliary visits. Growth was assessed by Nutritional anthropometric measurements as suggested by Jelliffe and Jelliffe. For the sake of study infants were divided into seven feeding groups and four age groups (0-3, 3-6, 6-9 and 9-12 months.) months.

Keywords: Growth, nutritional status, anthropometric measurements, exclusive breast feeding, artificial feeding, weaning.

Introduction

Growth is an essential biological characteristic of childhood and the growth process is a complicated one. Growth is a sensitive indicator of a child's state of health, nutrition and genetic background. Studies on growth of children in community provide important information on the nutritional status of the community, which in true is largely governed by feeding practices followed in the community¹. Since, an altered infant feeding and food consumption practice is one of the main features of urbanization. So, the study was conducted in Varanasi to study growth of infants in relation to their feeding practices. Growth faltering in an infant starts between the ages of 3 months to 12 months. Detection and early intervention at this crucial age has been shown to produce dramatic results in correcting the nutritional deficiencies². The recommended feeding practices for infants include initiation of breast feeding immediately after childbirth without squeezing out the "First milk" (colostrums), breastfeeding children exclusively from birth to four months, supplementing breast milk after age 6 months with adequate and appropriate complementary foods and continuing breastfeeding through the second year of life or beyond³.

Material and Methods

The study was conducted in the urban areas of Varanasi district, Uttar Pradesh. Varanasi city is divided into ten wards, according to Municipal corporation, Varanasi. By consultation with the

statistician two wards Bhelupur and Dashashwamedh were selected for the study. A pretested schedule was developed and was used to collect information regarding feeding practices^{3,4}. The sample consisted of 253 infants of urban area of Varanasi. The number of infants to be covered in the sample was decided in consultation with the statistician on the basis of anthropometric measurements using the formula:

$$n = \frac{(1.96)^2 \sigma^2}{(\bar{X} - \mu)^2}$$

1.96 – level of significance at 5%, \bar{X} – Mean weight of malnourished infant (1.75 kg), μ – Mean weight of normal infant (2.5 kg), σ – Standard Deviation (2.185), Power of test – 90%. 253 infants were selected purposively through domiciliary visits. Growth was assessed by Nutritional anthropometric measurements as suggested by Jelliffe and Jelliffe⁵. In order to avoid intra observer error each reading was taken thrice and then mean was calculated, which is taken as actual measurement.

Weight: Weight (kg) of the infant was taken on a baby weight machine (Make – Libra Private Limited).

Precautions: Weight of the child was taken with minimal clothing while the child was restful. Weight of the child was taken at least one hour after the meal. The weighing machine was corrected for zero error and actuated with known weights from time to time. Least count of weighing machine was 10 gm.

Table-1
Distribution of infants according to feeding pattern in different age groups

Feeding pattern	Age group (months)									
	0-3		3-6		6-9		9-12		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
BF	28	41.8	17	32.1	06	9.8	03	4.2	54	21.3
BF + BT	32	47.8	24	45.3	09	14.8	03	4.2	68	26.9
BT	7	10.4	08	15.1	05	8.2	--	--	20	7.9
BF+ SF	--	--	--	--	03	4.9	06	8.3	09	3.6
BT + SF	--	--	--	--	13	21.3	36	50.0	49	19.4
BF+ BT+ SF	--	--	04	7.5	25	41.0	24	33.3	53	20.9
SF	--	--	--	--	--	--	--	--	--	--
Total	67	100.0	53	100.0	61	100.0	72	100.0	253	100.0

Length: Length (cm) was measured in the supine position on the flat board of infantometer. Both the legs were stretched by applying firm pressure by the hand on the knees of infant and feet were fixed at right angles to the legs. The upright sliding foot piece was moved to get firm contact with the heels. The head was positioned firmly against the fixed head board, with eyes facing vertically. Least count of infantometer was calculated, 1 cm for length.

Precautions: While measuring all efforts were made to keep the infant in restful condition. Further the infantometer was placed on a smooth and hard surface. For the sake of study infants were divided into seven feeding groups and four age groups (0-3, 3-6, 6-9 and 9-12 months.)

Results and Discussion

In the age group 0-3 months and 3-6 months maximum infants 32 (47.8%) and 24 (45.3%) respectively were breastfed plus bottle-fed. Maximum 25 (41%) infants were breast fed + bottle fed+ solid fed in 6-9 months age group whereas minimum 3 (4.9%) were breast fed+ solid fed. Majority of infants 36 (50%) were bottle-fed + solid fed in the age group 9-12 months. No infant was exclusively bottle-fed in this age group.

Table 2 shows the mean \pm SD age of infants in different feeding groups. Mean age for exclusive breast-feeding was 3.51 ± 2.84 months. Bottle-feeding was initiated in 3.4 ± 2.37 months of age. The mean age for solid feeding was 8.61 ± 2.09 months.

Table 3 shows the distribution of infants according to time interval after delivery for breast-feeding. Maximum 103 (40.7%) infants were breast fed within 24 hours of delivery. Only 2 (0.8%) infants were breast fed after fourth day or more.

Distribution of infants according to reasons for giving colostrum is shown in table-4. Out of 122 (48.2%) infants who were given colostrum, maximum 62 (50.8%) mothers stated that the infant was given colostrum because of doctor’s advice. Minimum 2 (1.6%) infants were given colostrum due to custom.

Breastfeeding: Majority of infants 40.7% were breastfed within 24 hours after delivery and 48% were given colostrums due to doctors’ advice, knowledge of mother regarding importance of colostrum, custom and early experience of mother.

Table-2
Distribution of infants according to mean age in different feeding groups

Feeding groups	No.	Age (months) Mean \pm SD
Exclusively breast fed	54	3.51 ± 2.84
Breast fed+ bottle fed	68	3.40 ± 2.37
Bottle fed	20	3.99 ± 2.0
Breast fed + solid fed	09	9.73 ± 2.03
Bottle fed + solid fed	49	10.17 ± 1.68
Breast + bottle + solid fed	53	8.61 ± 2.09
Total	253	100.0
F-value	85.428	

Table-3
Distribution of infants according to time interval after delivery for breast-feeding

Time interval	Frequency	%
Immediately after birth	31	12.3
Within 24 hrs.	103	40.7
After 2 days	85	33.6
After third day	26	10.3
Fourth day onwards	02	0.8
Never breast fed	06	2.4
Total	253	100.0

Table-4
Distribution of infants according reasons for giving colostrum

Reason	Frequency	%
Doctor’s advice	62	50.8
Mother knew importance	21	17.2
No idea	30	24.6
Custom	02	1.6
Early experience	07	5.7
Total	122	100.0

Table- 5
Distribution of infants according to reasons for artificial feeding

Reasons	Frequency	Percentage
Inadequate secretion of milk	134	53.0
Illness of the child	06	2.4
Illness of the mother	12	4.7
Others*	38	15.0
Total	190	75.1

*Other reasons include: baby was not satisfied with breast milk, baby not accepted breast milk, diarrhoea by breast milk, nipple engorgement, to develop

Table-6
Distribution of infants according to age of weaning

Age of weaning (months)	Frequency	Percentage
<4	02	0.8
4 – 6	81	32.0
6 – 8	17	6.7
8 – 10	06	2.4
Total	106	41.9
Not weaned	147	58.1
Total	253	100.0

Kaur *et al.*⁷ and Crasy and Resnik⁸ reported that in many parts of India colostrum is routinely discarded and lactation is not initiated until the third day and there is a long standing tradition of giving prelacteal feeds during the first 24-74 hours. Whereas according to Devdas *et al.*⁹ depriving the infants of breast milk during first 8 to 24 hours was a common practice. Quite a large number of mothers gave prelacteal feeds with the belief that foods like jaggery, honey and sugar act as laxatives while in the present study 30.8% of infants were given dilute milk as prelacteal feeds, as due to the custom of rejecting colostrum (22%). Similar findings were also reported by Sethi *et al.*, etc.¹⁰⁻¹³, Kapil U *et al.*¹⁴, Ray and Reddy (1988), Kalra *et al.* (1982).

Artificial Feeding: Artificial feeding was initiated mostly (56%) in the age group 0-3 months while Aneja B *et al.* (2001)

observed that about 68% children started receiving top milk when they were less than 6 months of. The reasons stated by mothers for artificial feeding were inadequate secretion of milk (53%) and this was the primary cause for starting other milk in the first month. This finding is in accordance with Haider *et al.*¹⁵. The most common mode of feeding top milk to infants was feeding bottle 118 (42%) followed by spoons in 64 (33.68%) and tumbler in 8 (3.2%) infant. NC De¹⁶ reported that the bottle was used by 73.3% in urban area, whereas in rural area the percentage was much lower. Kapil *et al.*¹⁷ found it to be only 9%. Thus though not bottle fed, a large number of infants consumed supplementary feeding with the help of katori/spoon or some other vehicle. The study brings about another very important fact regarding the type of milk for artificial feeding and results revealed that in urban areas also infants received diluted top milk. Out of these, (20.2%) children received top milk diluted with water in the ratio of 2:1 followed by 3:1 (15.0%) and 4:1 by (10.7%) subjects. These dilutions are very closer to study of Aneja *et al.*¹⁴. Majority of infants were offered cow's milk.

Weaning: It was observed that majority of infants 81 (32%) were consuming semi-solids at 4-6 months of age. Almost similar finding was reported by Tripathi *et al.*¹⁸ where weaning foods were introduced at 5 months of age in 76% of infants and at 7th month in the rest 24% of infants whereas only 47% of the mothers initiated semi solids and 55% of the mothers were giving solids by the age of six months as reported by Aneja *et al.*¹⁴.

According to the contents of table 7 weight of exclusively breastfed infants decreased after 6 months may be due to reason that milk output decreases after 6 months. Contrary to this, as reported by WHO Working Group on Infant Growth breast-fed infants begin to falter in growth by the third month. At the age of 9 months weight increased probably due to reason that weaning was started in present study approximately at 9 months in breast-fed infants. Weight of bottle fed infants at age of 3 months was less than exclusively breastfed infants and breast-fed plus bottle-fed infants.

Table-7
Weight (kg) of infants in different feeding groups

Age group (mths)	BF		BF + BT		BT		BF + SF		BT + SF		BF+ BT + SF		Stat. values
	No.	Mean ±SD	No.	Mean ±SD	No.	Mean ±SD	No.	Mean ±SD	No.	Mean ±SD	No.	Mean ±SD	
0-3	28	4.11 ±1.25	32	3.74 ±1.02	7	3.74 ±0.96	---	---	---	---	---	---	F=0.93 NS
3-6	17	6.15 ±0.62	24	5.23 ±1.25	8	4.86 ±0.70	---	---	---	---	4	5.94 ±0.66	F=4.48 p<0.05
6-9	6	4.77 ±1.62	9	5.06 ±2.07	5	5.40 ±1.48	3	7.13 ±0.71	13	7.65 ±1.36	25	6.94 ±1.51	F=8.52 p<0.001
9-12	3	7.07 ± 3.14	3	7.43 ±0.81	--	---	6	8.96 ±1.16	36	8.48 ±1.16	24	8.09 ±1.65	F=1.44 NS

Table-8
Length (cm) of infants in different feeding groups

Age group (mths)	BF		BF + BT		BT		BF + SF		BT + SF		BF+ BT + SF		Stat. values
	No.	Mean ±SD	No.	Mean ±SD	No.	Mean ±SD	No.	Mean ±SD	No.	Mean ±SD	No.	Mean ±SD	
0-3	28	51.33 ±3.97	32	52.32 ±4.72	7	51.53 ±3.33	---	---	---	---	---	---	F=1.59 NS
3-6	17	61.36 ±1.50	24	59.28 ±3.94	8	59.68 ±3.41	---	---	---	---	4	60.93 ±2.10	F=1.52 NS
6-9	6	54.80 ±7.92	9	58.06 ±2.07	5	58.54 ±7.05	3	65.70 ±0.72	13	67.79 ±3.97	25	65.31 ±4.48	F=10.70 p<0.001
9-12	3	64.10 ±10.74	3	67.07 ±2.00	--	---	6	72.07 ±2.57	36	71.12 ±3.60	24	69.16 ±4.90	F=2.84 NS

The reason can be stated to be improper dilution of milk or lack of knowledge of mothers as they had the misconception that undiluted milk can cause diarrhoea. But, the study conducted by Aarts, Kylberg *et al*⁶ revealed that in an affluent society truly exclusive breast fed infants seemingly has the same growth during the first half year of life as non-exclusively breast fed infants with a high breast feeding rate. In breast-fed plus bottle fed infants weight slightly declined after 6 months and regained after 9 months, whereas in other feeding groups weight increased with age. No significant difference was found in weight of infants in different feeding groups in the age group 0-3 months and 9-12 months but in the age group 3-6 and 6-9 months significant difference was found for weight in different feeding groups p<0.05 and p<0.01 respectively. The mean length of exclusively breast-fed infants declined in the age group 6-9 months age group. The length for exclusively breast fed, Breast-fed plus bottle fed and exclusively bottle fed infants followed a similar trend, i.e. increased till 6 months then decreased till 12 months of age. In 6-9 months age group maximum length was found in bottle-fed plus solid fed infants whereas in 9-12 months length was observed to be the highest in breast-fed plus solid fed infants. In the age group 6-9 months significant difference in the length of infants was observed for different feeding groups (p<0.001).

Conclusion

Study of infants in different feeding groups revealed that in exclusively breastfed infants weight decreased after 6 months probably due to decreased milk output after 6 months. After that gain in weight may be due to initiation of weaning. Whereas in breastfed plus bottle-fed and exclusively bottle-fed infants weight increased satisfactorily with age. Regarding feeding practices, the mean age of exclusive breastfeeding was 3.51 months. Artificial feeding was initiated mostly in 0-3 months age group, reason being mainly due to inadequate secretion of milk. However, several other reasons were also cited like illness of the child, illness of mother, baby not accepted, diarrhea, nipple engorgement, for developing habit, to supply extra nutrients to baby and due to working mother.

References

1. Gupte S., The Short Textbook of Pediatrics, New Delhi: Jaypee Brothers, 106-8 (1993)
2. Singh B., Anthropometric profile of school going children (6-15 years) of block Ganderbat, a rural area of Kashmir, *Indian Journal of Community Medicine*, **37**, 62-71 (1985)
3. National Family Health Survey (NFHS-2) India 1998-99. Key findings, International Institute for Population Sciences, Govandi Station Road, Deonar, Mumbai (1999)
4. Cuthbertson W.J.F., Evolution of Infant Nutrition, *British Journal of Nutrition*, **81**, 359-71 (1999)
5. Jelliffe D.B., The assessment of nutritional status of the community, WHO, Geneva: 50-77 (1966)
6. Aarts C., Kylberg E. Hofvander, Y Gebre-Medhin, M Growth under privileged conditions of healthy Swedish infants exclusively breastfed from birth to 4-6 months: a longitudinal prospective study based on daily records of feeding, *Acta Paediatr*, **92**, 145-51 (2003)
7. Kaur Y.R. Kumar, V. Sehgal, S. and Boora, P Infant Feeding practices in an urban area, *Indian Journal of Nutrition and Dietetics*, 305-9 (1999)
8. Crasy R.K. and Resnik R., Maternal fetal medicine principles and practice w.b. Saunders Co. 174 (1984)
9. Devdas R.P., Purushothaman V. and Paul M., Trends in Breast Feeding Practices, *The Indian Journal of Nutrition and Dietetics*, **36**(1), 1-11 (1999)
10. Sethi V., Kashyap S. and Seth V., Infant Feeding Practices in a Relocated Slum – A pilot study, *Indian Paediatr*, **40**(6), 579 (2003)
11. Kapil U., Tandon M., Pathak P. and Nayar D., Nutrient intake and Consumption of Supplementary Nutrition by Severely Malnourished Children in two ICDS Projects in Rajasthan State, *Indian Paediatr*, **36**(8), 800 (1999)
12. Ray G. and Reddy D.C.S., Some aspects of feeding and weaning practices in an urban slum community, *Indian J Pub Health*, **32**, 207-8 (1988)

13. Kalra A., Kalra K. and Dayal R.S.. Breastfeeding practices in different residential, economic and educational groups, *Indian Pediatr*, **19**, 419-25 (1982)
14. Aneja B., Singh P. and Tandon M., Etiological factors of Malnutrition among infants in two urban slums of Delhi, *Indian Pediatr*, **38**, 160-4 (2001)
15. Haider R., Islam A., Kabir I. and Habte D., Early complementary feeding is associated with low nutritional status of young infants recovering from diarrhea, *J Trop Pediatr*, **42**, 170-2 (1996)
16. De N.C., Breastfeeding among Urban women of low-socio economic status, *Indian Pediatr*, **35(8)**, (1998)
17. Kapil U., Verma D. and Narula S., Study of breastfeeding practices in schedule caste communities in Haryana state, *Indian Pediatr*, **31**, 1227-32 (1994)
18. Tripathy R., Das R.B., Das M.M. and Parija A.C., Growth in the first year in children following IAP policy on infant Feeding, *Indian Pediatr*, **37(10)**, 1051-9 (2000).