BODY WEIGHT OF PAKISTANI INFANTS REARED ON DIFFERENT FEEDING REGIMES

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SUMMARY

A longitudinal study during the first year of life was conducted in Pakistani infants, to investigate the effect of feeding regimes on body weight.

On an average, breast-fed infants showed better weight gain in the first six months. In the last six months of their first year, however, bottle-fed infants grew better. Breast-fed infants doubled their birth weight earlier than bottle- or combined-fed infants.

INTRODUCTION

In our earlier communications we have discussed the effect of socio-economic status on various anthropometric indicators of infant growth and their feeding pattern (1-4). It has been a matter of controversy as to what type of feeding will result in their optimal growth. On the other hand, it is not likely that the same feeding regime will yield reproducible results in different ecological and environmental conditions. Breast feeding has been considered better than bottle- or combined (breast feeding accompanied by supplementary bottle feeding)– feeding by many workers (5, 6). At the same time, a good deal of research has reached the conclusion that the type of feeding does not affect infant growth (7-9). Nevertheless, the superiority of bottle feeding has also been recognized (10, 11).

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In this country no attempt has been made in the past to evaluate in a longitudinal fashion the effect of various feeding regimes on the body weight of infants. The study herein reported was designed to investigate the effect of breast, bottle and combined feeding, on the body weight of Pakistani infants for the entire period of infancy.

MATERIAL AND METHODS

A total of 916 infants born in various hospitals of Faisalabad, Pakistan, with no congenital abnormalities were randomly selected for our study. Body weight and type of feeding (i.e. breast, bottle and combined) were recorded within 24 hours of birth and every 30 ± 2 days, thereafter in a longitudinal fashion, throughout the first year of life. After birth all the observations were recorded by visiting the families in their own homes. Weight was obtained applying the method recommended by Jelliffe (12) and the type of feeding was recorded by interviewing the mothers. At the end of the study the entire data were classed sexwise for each month of the first year of life into three feeding regimes, as follows:

Breast-feeding regime:	Infants who were exclusively breast fed for the entire period of infancy.
Bottle-feeding regime:	Infants who were exclusively bottle fed either from birth or shifted to bottle feeding from breast feeding.
Combined-feeding regime:	Infants who received supplementary bottle feeding along with breast feeding.

The number of infants included in each feeding regime is given in Table 1. Analysis of variance (13) and Duncan's multiple range test (14) were used to determine the significant difference.

RESULTS AND DISCUSSION

The average monthly body weight of infants on the different feeding regimes and mean weight gain at various intervals during the first year, are also detailed in Tables 1 and 2, respectively.

Average weight gain of infants of either sex pertaining to the different feeding regimes remained inferior to the Harvard standards[2] as well as local standards[3] at all ages. Bottle-fed infants gained significantly ($p < 0.01$) less weight than those of the other feeding regimes during first six months. However, the situation was reversed in last six months and weight gain during this period was significantly ($p < 0.01$) higher. The overall performance of bottle-fed infants in terms of weight gain for the

2 Stuart and Stevenson, 1959.

3 Nagra *et al, J. Trop. Pediatr.,30:* 217-221, 1984.

TABLE 1

AVERAGE MONTHLY BODY WEIGHT OF INFANTS PLACED ON DIFFERENT FEEDING REGIMES
(kg)

Age	Breast		Bottle		Combined	
	Male	Female	Male	Female	Male	Female
At birth	3.11 ± 0.53(445)	3.02 ± 0.52(366)	3.34 ± 0.64(25)	3.02 ± 0.40(18)	3.14 ± 0.40(18)	3.32 ± 0.46(4)
1	3.78 ± 0.59(266)	3.61 ± 0.57(194)	3.64 ± 0.74(32)	3.24 ± 0.54(34)	3.77 ± 0.63(81)	3.66 ± 0.51(56)
2	4.70 ± 0.69(200)	4.40 ± 0.71(131)	4.30 ± 0.79(38)	3.98 ± 0.71(38)	4.50 ± 0.74(117)	4.42 ± 0.55(74)
3	5.42 ± 0.79(168)	4.96 ± 0.80(102)	4.79 ± 0.68(36)	4.66 ± 0.89(55)	5.37 ± 0.79(118)	5.09 ± 0.65(81)
4	5.95 ± 0.82(119)	5.64 ± 0.83(74)	5.74 ± 1.09(37)	5.29 ± 0.96(54)	5.98 ± 0.79(122)	5.62 ± 0.80(82)
5	6.53 ± 0.96(94)	6.07 ± 0.90(70)	6.42 ± 1.25(46)	5.79 ± 1.10(65)	6.44 ± 0.81(139)	6.21 ± 0.77(85)
6	6.84 ± 0.87(72)	6.38 ± 0.89(52)	6.56 ± 1.13(57)	6.41 ± 1.26(60)	6.85 ± 0.94(126)	6.69 ± 0.86(90)
7	7.31 ± 0.82(75)	6.79 ± 0.85(57)	6.99 ± 1.33(60)	6.70 ± 1.25(63)	7.21 ± 0.92(129)	6.83 ± 0.75(85)
8	7.50 ± 1.00(73)	6.96 ± 1.04(46)	7.47 ± 1.29(72)	7.12 ± 1.22(72)	7.50 ± 0.96(111)	7.25 ± 0.77(70)
9	7.51 ± 0.98(67)	6.98 ± 1.05(40)	7.81 ± 1.27(82)	7.50 ± 1.11(82)	7.70 ± 0.87(106)	7.34 ± 0.88(79)
10	7.82 ± 0.84(60)	7.36 ± 1.00(49)	8.11 ± 1.10(100)	7.66 ± 1.19(117)	7.98 ± 0.91(116)	7.63 ± 0.84(65)
11	7.97 ± 0.88(68)	7.49 ± 1.00(43)	8.43 ± 1.21(107)	7.95 ± 1.12(112)	8.14 ± 0.85(105)	7.70 ± 1.23(70)
12	8.10 ± 0.85(68)	7.76 ± 0.79(43)	8.58 ± 1.25(119)	8.13 ± 1.12(114)	8.29 ± 1.07(109)	8.03 ± 1.12(72)

Figures in parenthesis are the number of samples.

TABLE 2

MEAN GAIN IN BODY WEIGHT OF INFANTS REARED ON DIFFERENT FEEDING REGIMES
(kg)

Period (months)	Harvard standard	Local standard		Breast		Bottle		Combined	
		Male	Female	Male	Female	Male	Female	Male	Female
Birth to 6	4.00	4.22	3.92	3.73	3.36	3.22	3.39	3.71	3.37
6 to 12	2.50	1.77	1.46	1.26	1.38	2.02	1.72	1.44	1.34
Birth to 12	6.50	5.99	5.38	4.99	4.74	5.24	5.11	5.15	4.71

period of infancy was significantly ($p < 0.01$) better than that of children assigned to the other two feeding regimes.

Breast-fed infants gained more weight during the first six months as compared to those in the other two feeding regimes (12). Nevertheless, in the last six months, they started to decline in weight, probably because the quantity of breast milk fed to the infant during the first half of his first year of life is relatively satisfactory, even though the mothers' diet may be inadequate (13). Unlike many substitute foods, breast milk is easily digested, readily available and requires no kind of preparation which may lead to bacterial contamination because of unhygienic handling (14).

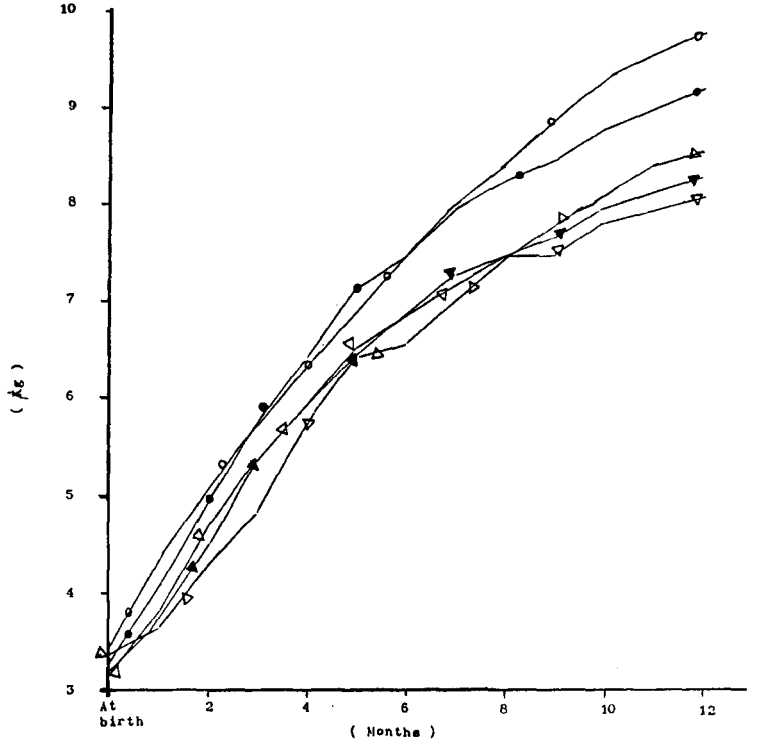

FIGURE 1

Weight for age of male infants reared on different feeding regimes. Within the graph symbols ——o——, ——●——, ——▽——, ——△—— and ——▼——represent Harvard standard, Local standard, breast-fed, bottle-fed and combined-fed infants, respectively

Low weight gain of bottle-fed infants during the first six months may be attributed to the comparatively higher incidence of diarrhea and vomiting in these infants (15, 16). After six months of age, when the most intensive infantile growth period was over, whole milk was usually given instead of much diluted milk, and solids were introduced in the infants' diet, facts which led to the better weight gain attained during the second half of the first year. Weight gain of combined-fed infants remained in between the breast- and bottle-fed infants (Figures 1 and 2).

Birth-weight doubling time appeared to be influenced by the feeding regime. Breast-fed infants doubled their birth weight earlier than bottle-

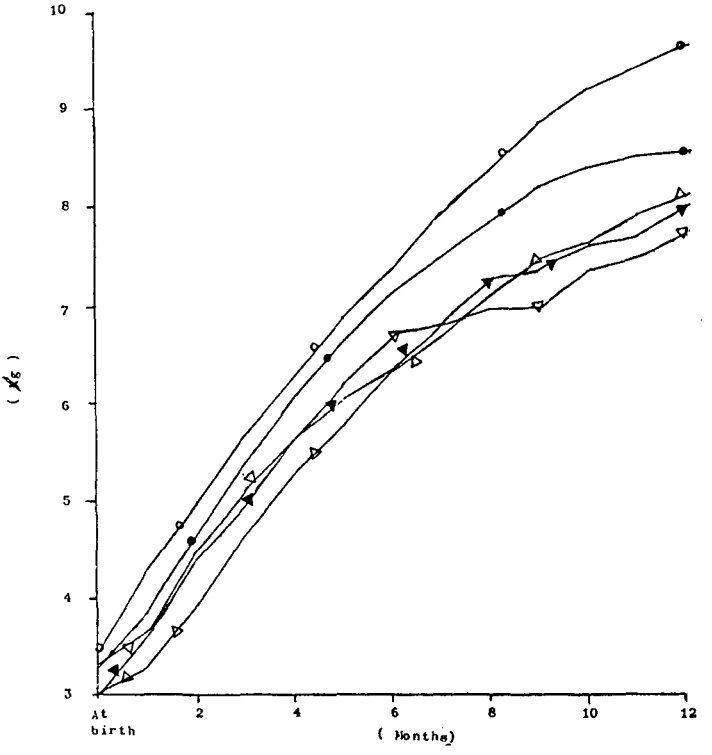

FIGURE 2

Weight gain of female infants reared on different feeding regimes. Within the graph symbols——o——,——•——,——▽——,——△——and——▼——represent Harvard standard, Local standard, breast-fed, bottle-fed and combined-fed infants, respectively

fed infants (4-5 months as compared with 6-7 for male and 5-6 months for female infants). These findings are in variance with those of Newman and Alpaugh (17) who reported that bottle-fed infants double their birth weight earlier than breast-fed infants. This discrepancy may be due to improper local bottle-feeding practices.

From the data discussed, it can be concluded that in the local environmental conditions, infants should be reared on breast feeding at least for 4-5 months, and that supplementary food must be introduced beyond this age (18).

RESUMEN

PESO CORPORAL DE LACTANTES PAQUISTANIS CRIADOS CON DIFERENTES REGIMENES ALIMENTICIOS

Se llevó a cabo un estudio longitudinal durante el primer año de vida, en infantes de ese país, con miras a investigar el efecto de los regímenes alimenticios en su peso corporal.

Como promedio, se encontró que los bebés alimentados al seno materno acusaban mejor ganancia ponderal en los primeros seis meses. En los últimos seis meses de su primer año de vida, sin embargo, los infantes alimentados con biberón crecieron mejor. Los lactantes amamantados duplicaron su peso al nacer antes de los que recibieron biberón o alimentación combinada.

BIBLIOGRAPHY

1. Nagra, S. A., A. H. Gilani, M. D. Ahmad & E. Haq. A longitudinal study in body weight of Pakistani infants as influenced by socioeconomic status. **J. Trop. Pediatr., 30**: 217-221, 1984.
2. Nagra, S. A. & A. H. Gilani. Longitudinal study on head circumference of Pakistani infants in different socioeconomic groups. **Arch. Latinoamer. Nutr., 34**: 308-319, 1984.
3. Nagra, S. A. & A. H. Gilani. Effect of socioeconomic status on body length of Pakistani infants during first year of life. **J. Trop. Pediatr., 32**: 13-16, 1986.
4. Nagra, S. A. & A. H. Gilani. Variations in infant feeding practices in Pakistan with socioeconomic stratification. **J. Trop. Pediatr., 33**: 79-82, 1987.
5. Bravo, I. L., C. Cobial, S. Areuch, E. Rivera & S. Varigas. Breast feeding, weight gain, diarrhea and malnutrition in the first year of life. **Boi. Ofic. Sanit. Panamer., 18**: 151-163, 1984.
6. Owen, G. M., P. J. Carry & E. M. Hooper. Feeding and growth of infants. **Nutr. Res., 4**: 727-731, 1984.
7. Morse, J. M. Breast and bottle feeding: The effect on infant weight in the Fiji Indian infants. **Ecol. Food Nutr., 15**: 109-114, 1984.
8. Jung, E. & D. M. Czajka-Narins. Birth weight doubling and tripling times: An updated look at the effects of birth weight, sex, race and type of feeding. **Am. J. Clin. Nutr., 42**: 182-189, 1985.
9. Renqvist, U. H., J. A. Kusin & A. A. J. Jansen. Feeding pattern, supplementary foods and growth of low birth-weight and normal birth-weight infants in Machakos, Kenya. **East African Med. J., 62**: 299-308, 1985.

10. Grutte, F. K., I. Stiegert & C. Sandhop. Comparative studies on the body mass development of newborn infants in relation to nutrition. **Kinderarztliche Praxis, 52**: 418-428, 1984 **(Vide Nutr. Abst. Revs., 55**(2): 1085, 1985).
11. Hendrickse, W. A., S. A. Spencer, D. M. Roberton & D. Hull. The caloric intake and weight gain of low birth-weight infants fed on fresh breast milk or a special formula milk. **European J. Pediatr., 43**: 49-53, 1982.
12. Jelliffe, D. B. **The Assessment of the Nutritional Status of the Community.** Geneva, World Health Organization, 1966 (WHO Monograph Series No. 53).
13. Trifan, E. Growth study of newborn infants in Emilia. **Minerva Pediatr., 21**: 191-196, 1969.
14. Nagra, S. A. Longitudinal study in biochemical composition of human milk during first year of lactation. **J. Trop. Pediatr.** (In press).
15. Berg, A. D. **The Nutrition Factor; Its Role in National Development.** A study sponsored jointly by the Foundation for Child Development and the Brookings Institution. Washington, D. C., The Brookings Institution, 1973.
16. Welboum, H. F. Bottle feeding: A problem of modern civilization. **J. Trop. Pediatr., 3**: 157-166, 1958.
17. Neuman, C. G. & M. Alpaugh. Birth weight doubling time: A fresh look. **Pediatrics, 57**: 469-473, 1976.
18. Bhandari, N. R. & G. P. Patel. Dietary and feeding habits of infants in various socioeconomic groups. **Indian Pediatr., 10**: 233-238, 1973.