

The Effect of Weaning Practices on Linear Growth Retardation in Low-Income Households in Korea

Park, Haeryun · Gershoff, Stanley N
Moon, Hyun Kyung*

School of Nutrition, Tufts University
Korea Advanced Food Research Institute*

= ABSTRACT =

A retrospective cohort study of low-income households was carried out on 679 mother-infant pairs to see the effect of weaning practices on growth between March, 1987 and January, 1988 in one rural area, one small city, and one big city, by measuring weight and height of children and interviewing mothers.

The sample children showed a linear growth retardation from around 7 or 8 month based on WAZ and HAZ using the Korea Growth Standard. After adjusting both for birth-weight/length and morbidity effect, the ANCOVA test showed that: 1) infants who were given supplements were not greater than those of not given. 2) infants who were eating supplements more frequently did not show a larger WAZ or HAZ than those of not eating or sometimes eating them. 3) The caloric intake rates of those of higher food frequencies were not greater than those of lower food frequencies.

The context of nutrition education about weaning practices has to be changed stressing not only the early introduction of supplements but also the adequate amount of food intake to secure the rapid growth at this critical age.

KEY WORDS : weaning practices · linear growth retardation · nutrition education.

Introduction

It is well documented that breast feeding alone does not assure adequate nutrition for infants for the first full year, and usually not beyond the first six months, even under favorable circumstances. Many studies in developing countries show that infants of socio-economically disadvantaged households start to suffer growth faltering and to become vulnerable to common childhood di-

seases as early as three to four months¹⁻⁵⁾, or as late as five to six months in others⁶⁻⁸⁾ because appropriate supplementary feeding is not given when needed. These findings, stressing the importance of timely and appropriate weaning practices along with growth monitoring, have thus received much attention in the literature⁹⁻¹²⁾.

Previous research in Korea has reported that undernutrition problems in poor urban and rural areas still remain¹³⁾¹⁴⁾. They simply described the

inappropriate weaning practices¹⁵⁻²⁸) and stressed the importance of giving supplementary foods early and terminating breastfeeding early. However questions arise as to whether all infants who start to eat supplementary foods at the proper time will grow well, and educating poor mothers to terminate breastfeeding early will result in better growth. Moreover, neither could they successfully relate inappropriate weaning practices to child's growth, due to the limitations of their statistical approach and sampling techniques.

This study seeks to trace more closely the pattern of linear growth retardation of socio-economically disadvantaged children especially during the first two years after birth. It will pay greater attention to the differential impacts on child's growth of different feeding types and different food frequencies, and the sufficiency of daily caloric intakes of different food frequencies. Such a broader and more concrete conception of weaning practices will help us better design strategies for nutrition education and other policy intervention.

Subjects and Methods

A retrospective cohort study was carried out between March, 1987 and January, 1988 on 679 mother and infant pairs in three different regions in Korea; one rural area, Choonsung; one big city, Daejeon; and one small city, Chooncheon. All children were under 24 months of age and were chosen among infants who were attending peripheral community clinics in the three regions. In each project site about 200 mother-infant pairs, 679 pairs altogether, were chosen on a first-come-first-serve basis.

The test instruments consisted of three types: (1) child care information through interviews of mothers including 24-hour dietary recall, (2) gro-

with data through measurement of the body size of infants, and (3) collection of birthweight and birth length data from infants' records at each community clinic.

Statistical Analysis

All of the collected data were analyzed utilizing the Statistical Packages for the Social Science (SPSS). Z-scores for weight-for-age (WAZ), height-for-age (HAZ), and weight-for-height (WHZ) were calculated based on the Korea Child Growth Standard²⁹) and also on the NCHS standard³⁰) for better assessment of growth retardation of the selected children. But for reasons discussed in previously published article³¹), the Korea Child Growth Standard was used throughout the indepth analyses.

Since growth retardation as measured by WAZ started at 8 months of age (Fig. 1), all of the analyses for the relationships of z-scores to food frequencies and feeding types were carried out by dividing the sample into two age groups, one with children aged 4 to 8 months (N=274), and the other with children over 8 months of age (N=375). Thirty infants who were under 4 months of age were excluded from indepth analyses related to weaning practices because they were considered to eat breastmilk or formula only.

To test the existence of any differences in z-scores associated with different food frequencies or feeding types, oneway analysis of variance tests were carried out. In cases of existing differences, the Student-Newman-Keuls tests of multiple comparisons along with homogeneity-of-variance tests were then used to reveal significantly different groups. Analysis of covariance tests were performed to assess the main effects of variance on z-scores by different food frequencies or different feeding types after adjusting for morbidity as a

Infant Feeding Practices and Growth

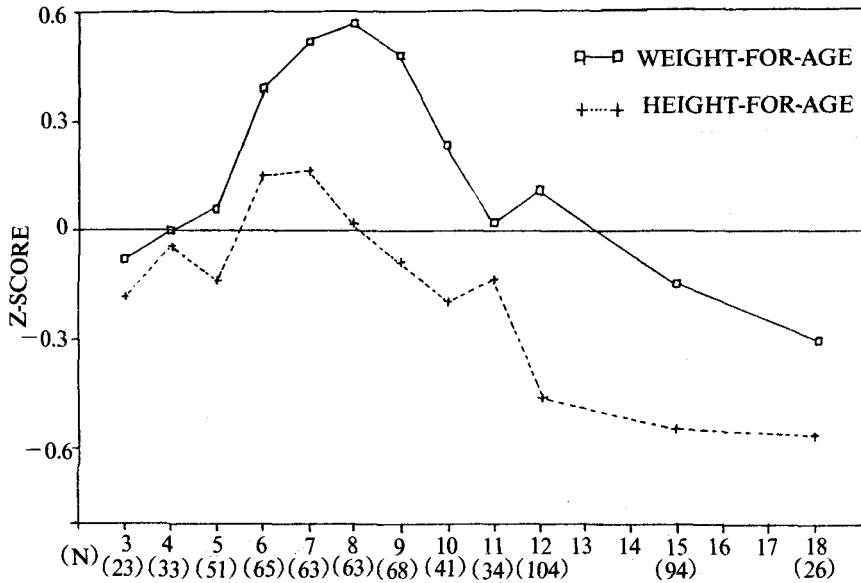


Fig. 1. Z-Score for sample children using the Korea growth standard.

covariate or for morbidity and birthweight/birth length together as covariates.

The amount of caloric intake from a 24-hour dietary recall was analyzed using the Korea Food Composition Table³². These values were then transformed to a percentage value of the FAO/WHO energy requirement. The 50th percentile value of the Korea Child Growth Standard were used as the ideal weights at each monthly age for calculating the FAO/WHO requirements.

Results

1. Sample characteristics

Most of the sample households(97%) were below the national average in monthly income. Among the 679 subjects the number of male infants was 382(56%) and that of female infants was 297(44%). The average household size was 4.4, with 55% of the subjects being only child. The number of single-parent households was only 3. The average number of years of schooling of the mothers was 10.3 years and that of the fathers

was 11.4 years. Fourteen percent of the mothers were working. The children of working mothers were mostly(82%) living with their grandparents in an extended family.

The average birthweight(excluding 36 cases of home delivery for which data not available) was 3.32kg for male infants and 3.25kg for female infants. Compared to 3.40kg and 3.24kg, the national average birthweights of males and females, respectively, these value shows the relative sound prenatal cares of the mothers. In contrast to birthweights, birth length records were not consistently kept and only 174 cases of birth length record were available.

2. Growth retardation of the sample children

The values of both WAZ and HAZ peaked at 8 and 7 months after birth and then declined afterward for both sexes(Fig. 1). Although the monthly mean values of WAZ and HAZ were well within the normal range, it is disturbing that the growth of these children of low-income households kept faltering after 7 or 8 months during the

weaning period, compared to the reference population.

3. Feeding patterns over time

The overall prevalence of ever breastfeeding including mixed feeding was 83%. Breastfeeding duration is presented in Fig 2 for the 186 subjects whose breastfeeding was terminated by the time

of the study. Among the 395 mothers who were using or had ever used formula feeding, 98% of the mothers used boiled water for preparing formula, showing excellent hygiene practices.

The subjects' current eating pattern was divided into three groups : a) breastmilk or formula only, b) milk and weaning food, and c) adult food.

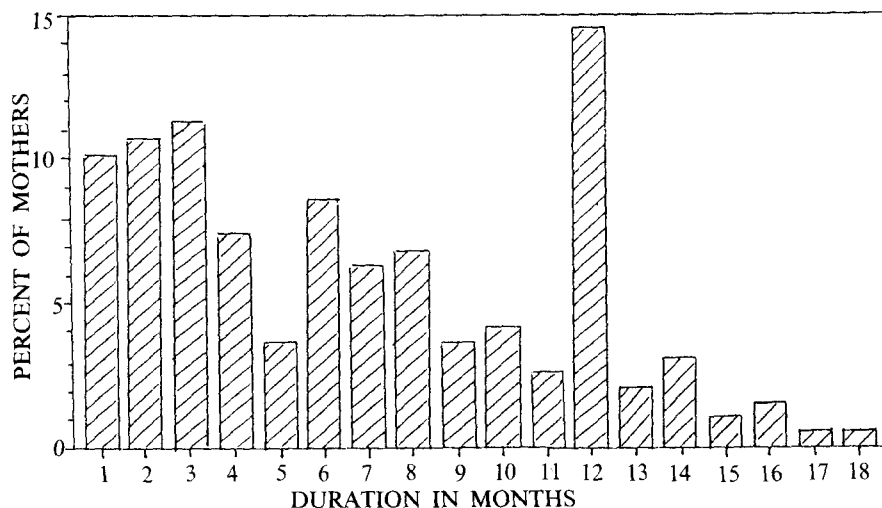


Fig. 2. Breastfeeding duration(N=186).

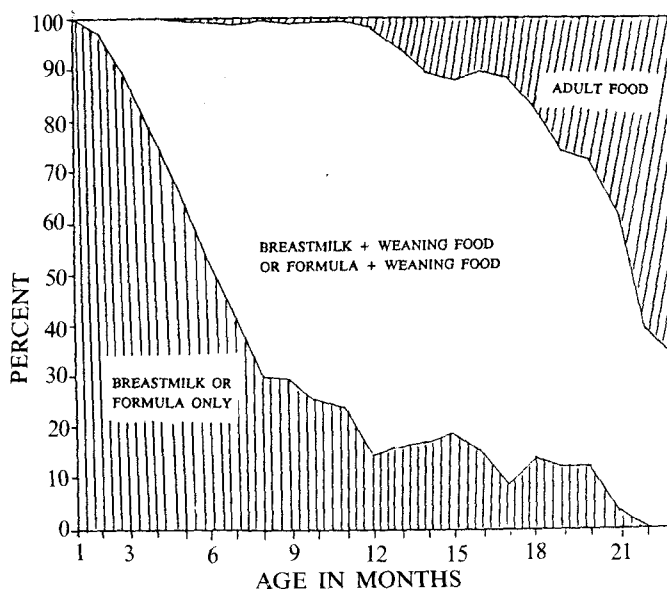


Fig. 3. Feeding type by age.

Fig 3 presents changes in feeding type with age found in this study. The eating pattern differed greatly from those recommended³³.

Introduction of supplementary food varied from 1 to 18 months of age. Timely introduction of supplementary food (4 to 6 months) occurred in 34% of the case, with about one third starting between the ages of 7 to 9 months, and the rest occurring later. Fig 4 shows the prevalence of frequently eating of five food groups by six-month age group, which is inappropriate, also.

4. Differences in z-scores by feeding types

To study differences in z-scores by feeding patterns, the 649 subjects of monthly age over 3 months were divided into three age groups : (a) 4 to 8 months (N=274), (b) 9 to 11 months (N=143), and (c) 12 to 23 months (N=232). These divisions were used because children should start to eat weaning food from 4 to 6 months of age and be eating adult food by around 12 months.

Among 649 infants, the ANCOVA test after adjusting both for morbidity and birthweight effects

or both for morbidity and birthlength effects were performed for the subjects whose birthweight/length were kept at clinic and whose mothers answered about the morbidity (Table 1). All of the WAZs and HAZs were not different except WAZs of age 4 to 8 months ($P < 0.05$). But the cases of infants who showed larger WAZ than other group were only 2.

The supplementary feedings given to children over 8 months did not result in growth greater than that seen in babies consuming only breast-milk or formula. These results suggest that these older aged children may eat supplements inappropriate frequency basis or eat too small amounts of them to affect their nutritional status. These data show that simply stressing timely introduction of supplementary foods would not necessarily improve the nutritional status for older infants.

5. Differences in z-scores by food frequency

Again, among 649 infants of age over 3 months, the ANCOVA test after adjusting for morbidity effect or morbidity and birthweight effect were per-

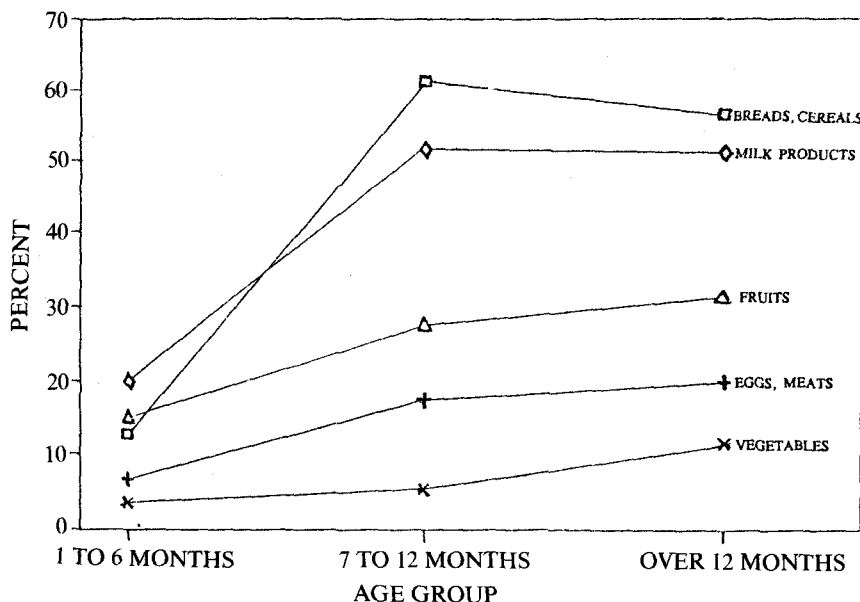


Fig. 4. Prevalence of frequently-eating foods in each age group.

Table 1. Difference in z-scores by feeding type after adjusting both for birthweight/birlength and morbidity

	WAZ	N	HAZ ⁺⁺	N
<u>4 to 8 Months</u>				
+Milk Only	.17	118	-.44	33
+Milk plus Weaning Food	.49*	123	.10	22
Adult Food	2.12*	2		0
	P=0.034		NS	
<u>9 to 11 Months</u>				
+Milk Only	.18	33	-.71	8
+Milk plus Weaning Food	.34	94	.11	11
Adult Food	.18	1		0
	NS		NS	
<u>12 to 24 Months</u>				
+Milk Only	+.07	32	-1.13	16
+Milk plus Weaning Food	-.03	147	-.59	44
Adult Food	-.16	21	-.80	9
	NS		NS	

Groups identified by symbol *are different by the Student-Newman-Keuls test.

+ The term, milk includes both of breastmilk and formula.

++ The cases of the HAZ analyses are smaller than those of WAZ because birth length data were not kept consistently at each clinic.

formed for the subjects whose birthweight records were kept and mothers answered about their morbidity and food frequency. Food frequencies for five kinds of food groups were categorized as 'rarely (less than once a week)', 'sometimes (at least once a week)', and 'frequently (almost every-day)' and scaled 0.1, and 2, respectively. The wean score was calculated by arithmetically adding each of the 5 food group frequencies. Therefore, a higher wean score means more frequent and more diverse food intake by the children.

Without considering the quantity of food provided, Table 2 shows that the frequencies of food intake alone appeared to be inappropriate for many of the infants. Judging from the wean scores, only about one third were eating various supplementary food frequently. Those who ate any of the food supplements daily or on an almost daily basis would be expected to grow larger than

those eating supplements less frequently. This was true for the younger age group. Among the children 4 to 8 months, those frequently eating supplementary food of any kind showed greater weights than those children not eating or only sometimes eating supplementary food. As a result, a higher wean score meant a higher WAZ.

On the contrary, among the children over 8 months, frequency of feeding supplementary food was generally not directly related to their nutritional status whether or not adjustments were made for morbidity effects or morbidity and birthweight effects. Infants frequently eating any food supplements were not significantly heavier than those less frequently eating them. These results may lead to a suspicion that infants frequently eating the supplements did not eat enough food to show a difference in their body size. Mothers may frequently give tiny amount of supplementary food

Infant Feeding Practices and Growth

without realizing that older infants need larger quantities of supplementary foods in addition to breastmilk or formula to support their full growth. The analyses of height-for-age also showed the

same results.

6. Caloric intake of the sample

Fig 5 shows the mean caloric intake intake of

Table 2. Difference in WAZ by food frequency after adjusting for morbidity or both for morbidity and birthweight

Food Frequencies	Morbidity Adjusted		Morbidity and Birth Wt Adjusted	
	Age (Month)		Age (Month)	
	4 to 8(N)	Over 8(N)	4 to 8(N)	Over 8(N)
Wean Score				
0 to 3	.21(141)	-.10(51)	.22(133)	-.05(47)
4 to 6	.44(76)	.10(165)	.46(75)	.09(156)
7 to 10	1.24(20)	.19(98)	1.13(19)	.19(94)
	p*	NS	p*	NS
Bread and Cereal Group				
0	.19(128)	-.15(31)	.18(121)	-.14(30)
1	.60(42)	.07(98)	.60(46)	-.06(90)
2	.58(72)	.20(213)	.59(69)	.19(203)
	p*	p*	NS	NS
Egg and Meat Group				
0	.18(151)	.15(83)	.17(144)	.14(82)
1	.64(76)	.06(188)	.63(73)	.05(185)
2	.85(22)	.07(72)	.85(22)	.06(22)
	p*	NS	p*	NS
Milk Product Group				
0	.21(132)	.01(76)	.21(124)	.03(71)
1	.66(39)	.05(78)	.59(38)	.04(76)
2	.59(71)	.10(179)	.61(70)	.09(169)
	p*	NS	NS	NS
Fruit Group				
0	-.02(76)	.08(31)	-.03(68)	.06(29)
1	.53(129)	.08(197)	.53(128)	.09(187)
2	.69(42)	.09(115)	.62(41)	.10(110)
	p*	NS	p*	NS
Vegetable Group				
0	.30(202)	.06(202)	.31(204)	.07(192)
1	.66(23)	.18(101)	.66(23)	.17(96)
2	1.29(8)	.21(26)	1.02(7)	.23(24)
	p*	NS	NS	NS

0.01 < p* < 0.05

0 ; rarely eat (less than once a week)

1 ; sometimes eat (at least once a week)

2 ; frequently eat (almost everyday)

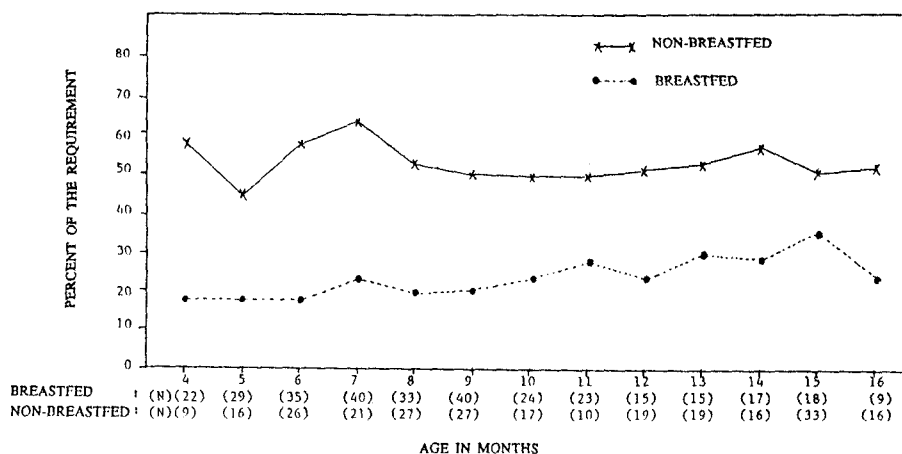


Fig. 5. Caloric intake rate compared with the FAO/WHO requirement(Excluding Breastmilk).

the sample, who were over 3 months and under 17 months of age, compared with the FAO/WHO energy requirement. The caloric intake rate of infants of age over 17 months were not included in this figure due to small cases. Since the quantity and quality of the breastmilk fed were not measured, these quantities do not include calories from breastmilk. The mean caloric intake rate by the non-breastfed sample remained below 60 % all the time and that of the breastfed sample from supplements did not increase a lot with age.

Table 3 reveals that the mean caloric intake rate by the non-breastfed subjects with higher food frequencies was not different from those with lower food frequencies for the older age group. On the contrary, younger age group infants shows a difference in caloric intake by different food frequency for both breastfed and non-breastfed subjects. These data suggest that the quantity of food fed infants after weaning age might not be sufficient to support adequate growth even though they ate a variety of foods frequently.

Discussion

Consistent with the earlier research conducted

in Korea¹³⁻²⁶⁾, the sample in this study showed complex weaning problems.

Children fed weaning food did not experience better growth than those fed only breastmilk for weaning aged subjects. Likewise, for the subjects over 12 months those fed adult food were not superior in growth to those with only breastmilk or formula (Table 1). Even those who were eating most foods frequently were not larger in weight than those not eating them or sometimes eating them in the older age group (Table 2). Mothers probably did not understand or realize the fact that infants need adequate amounts and kinds of food other than breastmilk or formula.

The analyses of 24-hour dietary recall data strongly support this revealed in the food frequency and feeding type data analyses (Fig. 5, Table 3). The mean caloric intake rate of children fed supplementary food frequently was not higher than those of less frequently fed for the older age group infants who were not breastfed. These results, again, confirm the fact that as the infants grew older, food quantities, despite high food frequencies, were inadequate. Growth faltering after 8 months in this study can be attributed to low energy intake from supplements, and to the prolo-

Infant Feeding Practices and Growth

nged duration of breastfeeding.

Under these circumstances, nutrition education could be a promising strategy for combating un-

dernutrition of weaning aged children as Zeitlin and Formacion insisted³⁴). Mo and her coworkers found that even a one-day nutrition education

Table 3. Difference in caloric intake rate by food frequency based on FAO/WHO recommendation by oneway ANOVA tests(excluding the amount from breastmilk)

Frequencies	4 to 8 month Age Group		Over 8 Month Age Group	
	Breastfed % (N)	Non-Breastfed % (N)	Breastfed % (N)	Non-Breastfed % (N)
<u>Wean Scores</u>				
0 - 3	17 (100)*	49 (50)* [^]	19 (29)*	53 (22)
4 - 6	25 (40)	16 (33) [^]	22 (78) [^]	52 (95)
7 - 10	37 (9)*	78 (8)*	41 (45)* [^]	56 (57)
	p=0.013	p=0.006	p<0.001	NS
<u>Bread and Cereal Group</u>				
Rarely Eat	19 (94)	51 (42)	30 (18)	57 (14)
Sometimes Eat	15 (21)	57 (25)	26 (45)	56 (57)
Frequently Eat	27 (38)	62 (30)	26 (106)	51 (120)
	NS	NS	NS	NS
<u>Egg and meat Group</u>				
Rarely Eat	18 (107)*	49 (51)	21 (51)*	48 (38)
Sometimes Eat	25 (39)	59 (37)	26 (91) [^]	52 (107)
Frequently Eat	35 (8)*	76 (11)*	38 (29)* [^]	59 (42)
	p=0.041	p=0.006	p=0.0011	NS
<u>Milk Product Group</u>				
Rarely Eat	18 (86)*	56 (54)	22 (38)	49 (42)
Sometimes Eat	16 (26)	42 (14)	24 (33)	53 (48)
Frequently Eat	28 (41)*	64 (26)	30 (92)	55 (94)
	p=0.02	NS	NS	NS
<u>Fruit Group</u>				
Rarely Eat	13 (53)* [^]	49 (28)*	15 (20)* [^]	46 (12)
Sometimes Eat	23 (80) [^]	56 (53) [^]	25 (93) [^]	52 (113)
Frequently Eat	27 (21)*	71 (17)* [^]	33 (57)* ⁺	55 (63)
	p=0.012	p=0.023	p=0.003	NS
<u>Vegetable Group</u>				
Rarely Eat	20 (134)	54 (86)	24 (110)*	51 (104)
Sometimes Eat	28 (12)	69 (9)	29 (44) [^]	55 (57)
Frequently Eat	22 (5)	94 (2)	46 (9)* [^]	54 (18)
	NS	p=0.031	p=0.0061	NS

Groups identified by symbols(* or + or [^]) are different by the Student-Knewman-Keuls Test.

Rarely eat ; Less than once a week

Sometimes eat ; Eat at least once a week

Frequently eat ; Eat every day or almost every day

program for rural mothers resulted in a significant difference in their knowledge of nutrition and increased their interest in information about child feeding practices³⁵⁾.

Home or community-based weaning food in areas where protein of animal origin is costly or in short supply could be promising³⁶⁻³⁸⁾. Nutrition surveillance project, assisted by a properly designed 'Korean Road to Health' card and conducted in association with other related programs such as nutrition education through the infrastructure of the peripheral clinics, could be recommended³⁹⁾.

Literature cited

- 1) Whitehead RG. The infant-food industry. *Lancet* ii : 1192-1194, 1976
- 2) Waterlow JC. Adequacy of breastfeeding. *Lancet* ii : 897-898, 1979
- 3) Waterlow JC, Thomson AM. Observations on the adequacy of breastfeeding. *Lancet* ii : 238-242, 1979
- 4) Whitehead RG. Infant feeding practices and the development of malnutrition in rural Gambia. *Food and Nutrition Bulletin* 1(4) : 36-41, 1979
- 5) Khan M. Infant feeding practices in rural Meheran Comuilla, Bangladesh. *Am J Clin Nutr* 33 : 2356-2364, 1980
- 6) Lauber E, Reinhardt M. Studies on the quality of breastmilk during 23 months of lactation in a rural community of the Ivory Coast. *Am J Clin Nutr* 32 : 1159-1173, 1979
- 7) Lee KY, Band S, Yun DJ. Dietary survey of weanling infants in South Korea. *J Amer Dietet Assoc* 43 : 457-461, 1963
- 8) Lebshtein AK, El Bahay AM. The extent of breast and bottle feeding of children in Cairo and its effect on their growth. *J Egypt Publ Hlth Assoc* LI : 246, 1976
- 9) Griffiths M. *Growth Monitoring*. Primary Health Care Issues Paper, American Public Health Association, International Health Programs Monograph Series I, No 3, 1981
- 10) Scrimshaw NS, Underwood BA. Timely and appropriate complementary feeding of the breastfed Infant-an overview. *Food and Nutrition Bulletin* 2(2) : 19-22, 1980
- 11) Whitehead RG. Nutrition aspects of human lactation. *Lancet* 22 : 167-169, 1983
- 12) Berggren GG. Questions and answers about weaning. *Food and Nutr Bulletin* 4(1) : 20-24, 1982
- 13) Jun SK. The problems of weaning practices and its counter policies for rural areas in Korea. *Food and Nutrition* 5(2) : 6-10, 1984
- 14) Joo JS. The nutritional status and problems of Korean infants. *Food and Nutrition* 2(1) : 10, 1981
- 15) Kim KS, Kim BJ. A study of infant nutritional status in rural area. *Korean Journal of Public Health* 5(2) : 78, 1968
- 16) Mo SM, Lee JS, Lee BK, Choi SH. The dietary behaviors of rural young children in Youngin-Gun, Kyunggi-Do. *The Journal of The Korean Public Health Association* 9(2) : 53-60, 1983
- 17) Mo SM, Lee BK, Lee JS. Development and pretest of maternal and child nutrition guide booklets for the rural Samaul Women's Club. *The Journal of The Korean Public Health Association* 8(2) : 11-24, 1982
- 18) Lee KJ, Yi BS, Mo SM. An ecological survey of early childhood nutrition in Whaseong-Gun, Kyunggi-Do. *Journal of The Korean Society of Food and Nutrition* 12(1) : 1983
- 19) Lee MS, Lee BS, Lee KJ, Mo SM. Pretest of integrated field family health manual for community women's programmes. *The Journal of The Korean Public Health Association* 7(2) : 1981
- 20) Lee BK, Lee JS, Mo SM. Change in infant feeding method and weaning practices of rural women by age groups. *The Journal of The Korean Public Health Association* 9(3) : 1983
- 21) Mo SM. A Study about improvement of child nutrition-in a sense of education. *The Korean Journal of Nutrition* 12(2) : 25-27, 1979
- 22) Park MY, Kim YM, Mo SM. Overall assessment of nutrition survey of rural young children. *The Journal of The Korean Public Health Association* 1 : 7(1) : 1981
- 23) Yoon D. The current situation of Korean children's health and nutritional status and its problem. *Korean J Nutr* 12(2) : 1-13, 1979

Infant Feeding Practices and Growth

- 24) Lee BS, Lee KJ, Lee MS, Mo SM, Park MY. A survey of maternal nutrition and family planning rural family health project area of Korea. *J Korean Publ Hlth Asso* 7(2) : 1981
- 25) Moon YY. The regional difference of national children's feeding. *The Collection of Learned Papers of Medical Department of Catholic University* 26 : 821, 1974
- 26) Bae KS, Moon SJ. Nutrition education for weaning infants-Review of weaning practices and supplementary foods-*The Korean Journal of Home Economics* 22(2) : 1984
- 27) Lee EW, Mo SM, Seo JS. An Ecological survey of early childhood nutrition in the Yowido apartment compound in Seoul. *J Korean Publ Hlth Asso* 8(2) : 1982
- 28) Lee EW. Physical development and dietary status of kindergarten children from a high socio-economic apartment compound in Seoul. M.S. Thesis, College of Home Economics, SNU. 1981
- 29) Korean Pediatricians' Association, Ministry of Health and Social Affairs. *Korean Child Growth Standard* 1985
- 30) World Health Organization. *Measuring Change in nutritional Status*, pp. 101, WHO, Geneva, 1983
- 31) Park HR, Moon HK, Chung HR, Song BH. A study of the growth pattern of children in low-income class and the selection of the growth reference in Korea. *J Korean Publ Hlth Assoc* 15(1) : 1989
- 32) Office of Rural Development. *The Korea Food Composition Table*, 1986
- 33) Berggren GG, Questions and answers about weaning. *Food and Nutr Bulletin* 4(1) : 20-24, 1982
- 34) Zeitlin MF, Formacion CS. *Study II : Nutrition Education*. Prepared for Office of Nutrition Development Support Bureau U.S. Agency for International Development, p4.
- 35) Mo Sm, Lee Bk, Lee JS. Development and pretest of maternal and child nutrition guide booklets for the Rural Saemaul Women's Club. *J Korean Publ Hlth Assoc* 8(2) : 1982
- 36) Tontisirin K, Moaleekoonpairroj B, Dhanamitta S, Valyasevi A. Formulation of supplementary infant foods at the home and village level in Thailand. *Food Nut Bull* 3(3) : 37-40, 1981
- 37) Heimdinger J, Zeitlin MF, Austin JE. *Nutrition Intervention in Developing Countries : Study IV Formulated Foods*. Cambridge, Ma : Oelgeschlaeger, Gunn and Hain, 1981
- 38) Berggren GG, Questions and answers about weaning. *Food and Nutr Bulletin* 4(1) : 20-24, 1982
- 39) Gibbons G, Griffiths, M. *Program Activities for Improving Weaning Practices*. Information for action issue paper, World Federation of Public health Associations, 1984, p26.

영유아 식이가 성장에 미치는 영향

박혜련 · Gershoff, S.N. · 문현경*

미국 Tufts 대학 영양대학원

* 한국 식품 연구소

= 국문 초록 =

저소득층 영유아의 식이형태가 linear growth에 미치는 영향에 대하여 연구하기 위하여 1987년 3월부터 1988년 1월까지 대전시, 춘천시, 그리고 춘성군 보건소에서 만 2세 미만의 영유아 679명과 그 어머니들을 대상으로 영양조사를 실시하였다. 조사방법은 어머니들을 대상으로 식이섭취를 중심으로한 설문조사를 실시하였고 대상아들의 체중과 키를 측정 하였으며 보건소 기록을 이용하여 대상아들의 출생시 체중의 키값을 구하였다.

대상아들은 한국 소아 발육표준치를 이용한 표준 편차점수(Z-score)로 볼 때 체중, 신장 모두 월령 7, 8개월부터 성장지체를 보였다. 출생체중/신장과 질병효과를 통계적으로 조정 하였을 때, 이유식을 먹는 대상아들이 모유나 우유만 먹는 경우보다 더 크지 않았으며 각종 보충식을 자주 먹는 대상아들이 가끔 먹거나 거의 안 먹는 경우보다 더 크지 않았다. 일일 열량섭취량 분석도 같은 결과를 보였다. 즉 식이 형태나 식품섭취 빈도가 열량섭취량으로 연결되지 않았다. 이같은 현상은 월령 8개월 이후의 대상아에게서 더 두드러지게 나타났다.

따라서 이유에 관한 영양교육 내용은 기존의 빠른 보충식 도입의 강조 차원 보다는 이 시기의 빠른 성장을 뒷받침할 만한 다양한 식품 및 충분한 열량섭취에 관한 보다 자세한 정보가 growth monitoring과 함께 어머니들에게 전달되도록 변화되어야 할 것으로 생각된다.