

# Growth of Breast-fed and Formula-fed Infants Compared with National Growth References of Thai Children

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**Objective:** To compare the growth patterns of breast-fed (BF) and formula-fed (FF) infants with national growth references of Thai children and to determine whether the Thai growth references can be used to assess growth of BF infants who were fed according to Thai guidelines of infant feeding.

**Design:** Cohort study

**Material and Method:** One hundred and fifty six term infants (78 BF and 78 FF infants) were followed prospectively for 12 months. Milk was the only food source during the first 4 months and solid foods were introduced after 4 months of age. Body weight, length and head circumference were measured at the age of 1, 2, 4, 6, 9 and 12 months.

**Results:** Of the 156 infants, 140 completed the study (71 BF and 69 FF infants). BF and FF infants had similar mean weight and length from 0 to 6 months, thereafter BF infants had lower weight and length than FF infants with significant difference at 9-12 months in male infants and at 12 months in female infants ( $p < 0.05$ ). Compared with national growth references of Thai children, mean weight and length of BF and FF infants in the study were significantly lower than the mean values of Thai infants from 0 to 1 months, thereafter mean weight and length of BF infants were close to the Thai references but those of FF infants were higher than the Thai references after 6 months with significant difference in weight from 9 to 12 months and length at 12 months. The incidence of malnutrition and obesity at 1 year of age was not different between the two feeding groups. Inadequate complementary food was the risk factor of infant malnutrition (adjusted RR 4.7, 95%CI 1.1-21.9,  $p 0.04$ ).

**Conclusion:** BF and FF infants had similar weight and length from birth to 6 months, thereafter, FF infants had higher weight and length than BF infants and Thai growth references. Growth of BF infants correlated well with the national growth references of Thai children, so the Thai growth references can be used to assess growth of BF infants who were fed according to Thai guidelines of infant feeding.

**Keywords:** Breastfeeding, Formula feeding, Growth, Infant

**J Med Assoc Thai 2005; 88(2): 168-75**

**Full text. e-Journal:** <http://www.medassocthai.org/journal>

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Human milk is the preferred feeding for all infants with rare exceptions<sup>(1)</sup> because of its benefit on nutrition, immunity and development<sup>(1-3)</sup>. The World Health Organization (WHO) recommends that normal infants should be exclusively breast-fed for 6 months and continue breastfeeding with nutritionally adequate complementary food up to 2 years of age<sup>(4)</sup>. Guidelines of infant feeding in Thailand are exclusive breastfeeding for the first 4 months and continue breastfeeding

with complementary food for 2 years<sup>(5)</sup>. However, several studies reported that breast-fed (BF) infants had lower weight and length at 4-12 months than formula-fed (FF) infants, and the growth of BF infants was negatively deviated from the National Center for Health Statistics (NCHS)/WHO growth references<sup>(6-10)</sup>. The decline in growth of BF infants from standard references led some mothers to conclude that human milk was inadequate and stopped breastfeeding or prematurely introduced complementary food. A comprehensive review of the use of NCHS growth references concluded that the NCHS references which were derived from predominantly FF infants were not

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appropriate to assess growth of BF infants<sup>(11,12)</sup>. The national growth references for Thai children had been developed by the Minister of Public Health from infants and children in urban areas of 17 provinces and most infants were mixed breast and formula-fed or predominantly formula-fed<sup>(13)</sup>. There is no data that compared the growth of BF infants who were fed according to Thai guidelines of infant feeding with the current Thai growth references.

The objectives of the present study were 1) to compare the growth patterns of BF and FF infants with national growth references of Thai children and 2) to determine whether the Thai growth references can be used to assess the growth of BF infants who were fed according to Thai guidelines of infant feeding.

### Material and Method

The present cohort study was conducted at the nutrition clinic and well baby clinic, BMA Medical College and Vajira Hospital from February 2002 to November 2003. This study protocol was approved by the Ethical Committee of the Bangkok Metropolitan Administration. All infants born at BMA Medical College and Vajira Hospital from February to October 2002 who met the inclusion criteria and had no exclusion criteria were recruited to the study.

Inclusion criteria were:

1. Healthy infants born at 37-42 weeks of gestation.
2. Birth weight  $\geq 2,500$  grams
3. Five-minute apgar score  $\geq 7$
4. Mothers planned to feed their infants either breast milk or iron-fortified formula for 1 year.
5. Parental informed consents

Exclusion criterias were:

1. Multiple pregnancies
2. Infants with congenital anomalies
3. Infants or mothers who had chronic illness or needed some medication on a regular basis.

Sample size of 156 (78 in each feeding group) were calculated for a 0.57 kilogram difference in body weight at the age of 12 months, a standard deviation of 1.16, a power of 80%, level of significance of 0.05 with 20% added for loss follow up<sup>(7)</sup>.

Mothers of the 156 infants were randoms, 78 were BF and 78 were FF. Type of milk feeding was the mother's decision. The investigator discussed the details of the study protocol to the parents of all participating infants before obtaining the written informed consents. Instructions for infant feeding conformed to the current Thai guidelines of infant feeding provided by the Royal College of Pediatrics

of Thailand and the Pediatric Society of Thailand<sup>(6)</sup>. Milk was the only food source during the first 4 months and solid foods were introduced after 4 months of age. BF infants were fed only breast milk or breast milk with infant formula less than 4 oz/day and FF infants were fed only infant formula or initially breast milk but were weaned off breastfeeding before 2 months of age.

All infants were followed at the age of 1, 2, 4, 6, 9 and 12 months. At each visit, the parents were asked about type and amount of milk and complementary food using 24 hour recall and the infants were measured for body weight, length and head circumference. All measurements were performed by two trained personnel according to standardized techniques with regular standardization of equipment during the study. The recorded values were means of the measurements from two personnel which were not significantly different (interobserver variation). Weight was measured to the nearest 10 grams with an electronic scale (Seca model 727), length was measured in a supine position to the nearest 0.1 cm with an infant measuring board and head circumference used a measuring tape to the nearest 0.1 cm.

Adequate complementary food was defined as: 1) consumed a variety of food from various food groups (rice and grains, fruits, vegetables, milk, meat, eggs and fat) and 2) had adequate amounts of nutrients and energy compared with Thai Recommended Dietary Allowances (Thai RDA)<sup>(14)</sup>. Malnutrition was defined as a weight for age (W/A), length for age (L/A), or weight for height (W/H)  $<$  mean - 2 standard deviation (SD) of the Thai references and obesity if a W/H  $>$  mean + 2SD of the Thai references<sup>(13)</sup>.

### Statistics

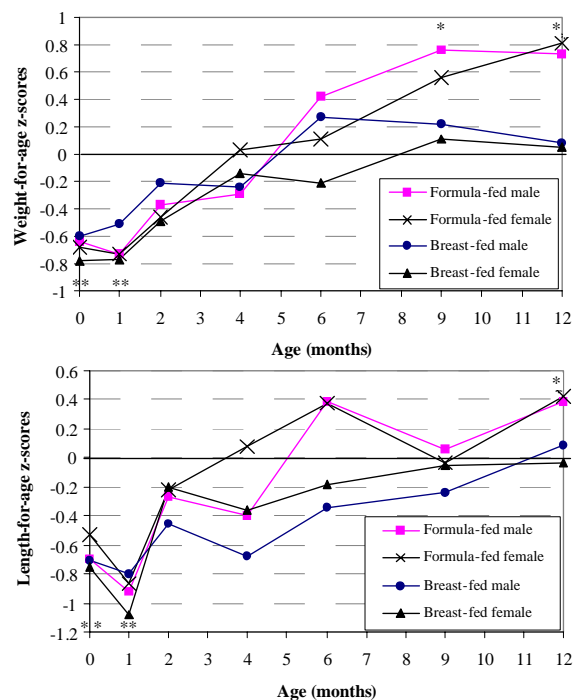
Statistical analyses were performed by Stata version 7.0. Categorical datas were expressed as percent and comparison between the two groups by Chi-square test or Fisher's Exact test. Continuous datas were expressed as mean  $\pm$  SD and comparison between the two groups by student's t-test. The mean z-scores of W/A and L/A were used to compare the growth of BF and FF infants with national growth references of Thai children. The relative risk (RR) and 95% confidence interval (95%CI) were used to compare the incidence of malnutrition and obesity between the two feeding groups and multiple logistic regression (poisson regression) was used to evaluate the factors associated with malnutrition and obesity. A p-value  $<$  0.05 was considered statistically significant.

## Results

Of the 156 infants, 16 were excluded before the end of the present study (7 BF and 9 FF infants). The reasons for exclusion were stopped breast milk or fed with infant formula > 4 oz/day (5 BF), received solid foods before 4 months (2 BF, 5 FF), and moved to other provinces or lost to follow up (4 FF). Table 1 shows the baseline characteristics of 140 infants who completed the study. Baseline characteristics of both groups of infants were similar except for maternal occupation; BF mothers were housewives or worked at home more than FF mothers ( $p < 0.001$ ).

Table 2 shows body weight and length of BF and FF infants from 0-12 months. BF and FF infants had similar weight and length at the first six months, thereafter, BF infants had lower weight and length than FF infants. The growth differences were statistically significant from 9 to 12 months in male and at 12 months in female infants ( $p < 0.05$ ). The head circumferences were not different between the groups. All infants were healthy and had normal development.

Growth of BF and FF infants compared with national growth references of Thai children are shown in Fig.1. The BF and FF infants in the present study had mean weight and length at 0-1 month lower than Thai infants, thereafter mean weight and length of



**Fig. 1** Weight for age and length for age z-scores of breast-fed and formula-fed infants compared with national growth references of Thai children<sup>(13)</sup>

\*  $p < 0.05$ , FF infants vs Thai growth references, same sex  
 \*\*  $p < 0.05$ , BF and FF infants vs Thai growth references, same sex

**Table 1.** Characteristics of 140 studied infants

	Total n = 140	Breast-fed infants n = 71	Formula-fed infants n = 69	p
Maternal age, yr <sup>+</sup>	26.4±6.2	26.6±6.3	26.2±6.0	0.67
Maternal education (%)				0.76
: primary school	57 (40.7)	30 (42.3)	27 (39.1)	
: secondary school	73 (52.2)	37 (52.1)	36 (52.2)	
: graduate	10 (7.1)	4 (5.6)	6 (8.7)	
Maternal occupation (%)				<0.001*
: housewife or work at home	118 (84.3)	68 (95.7)	50 (72.5)	
: work outside	22 (15.7)	3 (4.3)	19 (27.5)	
Household income, baht/month (%)				0.89
: ≤ 10,000	86 (61.4)	44 (62.0)	42 (60.9)	
: > 10,000	54 (38.6)	27 (38.0)	27 (39.1)	
Parity (%)				0.94
: primiparous	97 (69.3)	49 (69.0)	48 (69.6)	
: multiparous	43 (30.7)	22 (31.0)	21 (30.4)	
Infant sex (%)				0.87
: male	70 (50.0)	35 (49.3)	35 (50.7)	
: female	70 (50.0)	36 (50.7)	34 (49.3)	
Gestational age, week <sup>+</sup>	38.6±1.3	38.7±1.3	38.5±1.2	0.43
Birth weight, kg <sup>+</sup>	3.1±0.4	3.0±0.4	3.1±0.5	0.69
Birth length, cm <sup>+</sup>	49.6±2.6	49.4±2.5	49.7±2.7	0.47
Head circumference at birth, cm <sup>+</sup>	33.1±1.4	33.1±1.5	33.0±1.4	0.82

<sup>+</sup> mean ± SD :  $p$ -value > 0.05 by student t-test

\*  $p < 0.05$  by Fisher's Exact test

**Table 2.** Weight and length of breast-fed and formula-fed infants from 0-12 months

Age (months)	Male infants						Female infants					
	Breast-fed		Formula-fed		p		Breast-fed		Formula-fed		p	
	BW (kg)	Lt (cm)	BW (kg)	Lt (cm)	BW	Lt	BW (kg)	Lt (cm)	BW (kg)	Lt (cm)	BW	Lt
0	3.05 (0.39)	49.54 (1.99)	3.00 (0.34)	49.57 (2.93)	0.60	0.96	3.05 (0.41)	49.37 (2.94)	3.13 (0.54)	49.83 (2.46)	0.45	0.48
1	4.05 (0.46)	51.50 (2.38)	3.87 (0.43)	51.12 (3.22)	0.26	0.72	3.84 (0.47)	51.18 (2.41)	3.87 (0.45)	51.64 (2.53)	0.86	0.60
2	5.49 (0.58)	56.29 (3.39)	5.33 (0.60)	56.89 (2.96)	0.26	0.43	4.94 (0.58)	56.54 (2.81)	4.96 (0.68)	56.49 (2.74)	0.87	0.93
4	6.82 (0.70)	62.14 (2.60)	6.78 (0.68)	62.71 (2.82)	0.85	0.38	6.18 (0.71)	60.84 (2.77)	6.30 (0.91)	61.80 (2.61)	0.53	0.14
6	7.69 (0.73)	65.23 (2.70)	7.84 (0.85)	66.94 (2.91)	0.45	0.06	6.88 (0.82)	64.34 (3.24)	7.26 (1.04)	65.66 (2.79)	0.10	0.07
9	8.50 (0.86)	69.86 (2.21)	8.98 (0.96)	71.80 (2.61)	0.03*	0.001*	7.79 (0.96)	69.19 (2.45)	8.23 (1.53)	69.29 (2.91)	0.15	0.93
12	9.33 (0.89)	74.74 (2.38)	10.09 (1.06)	76.46 (2.34)	0.002*	0.003*	8.63 (0.91)	73.26 (2.33)	9.46 (1.28)	74.89 (2.60)	0.002*	0.007*

BW and length present as mean(SD)

\*  $p < 0.05$ , breast-fed VS formula-fed, same sex

BF infants were close to the mean of Thai infants throughout the first year but those of FF infants were higher than the Thai references after 6 months with significant difference in weight from 9 to 12 months and length at 12 months ( $p < 0.05$ ). The nutritional status at 1 year of age was not statistically different between the two feeding groups ( $p > 0.05$ ). The nutritional status was normal in 65 BF (91.6%) and 59 FF (85.5%), malnourished in 5 BF (7.0%) and 2 FF (2.9%) and obese in 1 BF (1.4%) and 8 FF (11.6%).

Table 3 shows that the incidence of malnutrition was not affected by type of milk feeding, maternal education and occupation, household income, parity and sex of the infants but complementary food was the risk factor of infant malnutrition. Infants who had inadequate complementary food had 5.4 times higher risk of malnutrition than those with adequate complementary food (RR 5.4, 95% CI:1.2-24.4,  $p < 0.01$ ). Complementary food remained the risk factor of malnutrition after adjustment for type of milk feeding (adjusted RR 4.7, 95% CI 1.1-21.9,  $p < 0.04$ ). Table 4 shows that factors associated with obesity in univariate analysis were household income and maternal occupation but after adjustment for confounding variables, these factors were not associated with infant obesity.

## Discussion

The present study indicated that BF and FF infants had similar weight and length during the first 6 months but BF infants gained less weight and

length than FF infants from 6 to 12 months. The results confirmed the findings of other studies that BF infants had different growth patterns from FF infants<sup>(6-8)</sup>. The finding that BF infants had lower growth rate than FF infants has raised questions regarding the adequacy of human milk intake but growth differences were most evident between 6-12 months (the time when solid foods were added to milk). If poor growth resulted from inadequate human milk, the BF infants could compensate by consuming more food, so the growth differences should be the cause of poor complementary food or infant self regulation rather than inadequate human milk. Studies by de Bruin et al<sup>(15)</sup> and Heinig et al<sup>(16)</sup> demonstrated that human milk intake was determined by infant demand. BF infants self regulate their energy intake at a lower level than FF infants and the growth differences were related to energy intake<sup>(16)</sup>. Fawzi et al<sup>(17)</sup> reported that undernutrition in BF children resulted from poor complementary feeding among BF children and stressed the importance of adequate complementary food in the second half of infancy. The Euro-Growth study which was a longitudinal, multicenter study that compared growth of infants fed by different feeding modes with the Euro-Growth references showed that the influence of feeding mode on infant growth was transient and much weaker than mid-parental height, demonstrated the importance of genetics on growth of young children<sup>(8)</sup>. The growth differences of BF and FF infants were seen only at 3 to 12 months

**Table 3.** Univariate analysis of factors associated with malnutrition

Variable	No. of infants	No. of infants with malnutrition (%)	Rate/100 person-year (95% CI)	Relative risk (95% CI)	p
Type of milk feeding					0.24
: breast milk	71	5 (7.0)	7.6 (3.2-18.3)	1	
: infant formula	69	2 (2.9)	3.0 (0.7-11.9)	0.4 (0.1-2.0)	
Maternal education					0.09
: primary school	57	5 (8.8)	9.5 (3.9-22.7)	1	
: secondary school or higher	83	2 (2.4)	2.5 (0.6-10.0)	0.3 (0.1-1.4)	
Maternal occupation					-
: housewife or work at home	118	7 (5.9)	7.0 (3.5-15.4)	-	
: work outside	22	0 (0)	-	-	
Household income, baht/month					0.56
: ≤ 10,000	86	5 (5.8)	6.2 (2.6-14.9)	1	
: > 10,000	54	2 (3.7)	3.8 (1.0-15.4)	0.6 (0.1-3.2)	
Parity					0.12
: primiparous	97	3 (3.1)	3.2 (1.0-10.1)	1	
: multiparous	43	4 (9.3)	10.0 (3.7-26.6)	3.1 (0.7-13.8)	
Sex of infant					0.66
: female	70	4 (5.7)	6.2 (2.3-16.4)	1	
: male	70	3 (4.3)	4.4 (1.4-13.7)	0.7 (0.2-3.2)	
Complementary food					0.01*
: adequate	110	3 (2.7)	2.8 (0.9-8.7)	1	
: inadequate	30	4 (13.3)	15.2 (5.7-40.6)	5.4 (1.2-24.4)	

\* p &lt; 0.05

**Table 4.** Multivariate analysis of factors associated with obesity (Poisson regression)

Variable	No. of infants	No. of infants with obesity (%)	Crude relative risk (95% CI)	Adjusted relative risk <sup>1</sup> (95% CI)	p <sup>1</sup>
Type of milk feeding					0.13
: breast milk	71	1 (1.4)	1	1	
: infant formula	69	8 (11.6)	7.8 (0.9-62.5)	5.4 (0.6-48.6)	
Household income, baht/month					0.12
: ≤ 10,000	86	2 (2.3)	1	1	
: > 10,000	54	7 (13.0)	5.4 (1.1-26.1)	3.8 (0.7-20.9)	
Maternal occupation					0.29
: housewife or work at home	118	4 (3.4)	1	1	
: outside work	22	5 (22.7)	6.6 (1.8-24.7)	2.2 (0.5-10.0)	

<sup>1</sup> Adjusted for type of formula, household income and maternal occupation

of age and did not persist beyond the second year of life<sup>(18,19)</sup>. Despite less growth, BF infants were healthy and had less morbidity than FF infants<sup>(2)</sup>.

In comparison to the national growth references of Thai children, the infants in the present study had mean weight and length from 0-1 months lower than mean of Thai infants, thereafter mean weight and length of BF infants almost corresponded to those of Thai infants but FF infants had weight and length at 6-12 months higher than the Thai infants. These findings were different from previous studies

that reported the negative growth from 4 to 12 months of BF infants compared with the NCHS references<sup>(8-10)</sup>. The NCHS references were based on growth of predominantly FF infants in a single community in the United States<sup>(11)</sup>. The differences in genetic factor and mode of infant feeding made the NCHS references inappropriate for growth assessment of BF Thai infants<sup>(9)</sup>. The national growth references for Thai children had been developed by the cross-sectional study of Thai children aged 0-19 years in urban areas of 17 provinces<sup>(13)</sup>. Data of infants were derived from

healthy, term, single birth infants who had full growth potential and most infants were mixed breast and formula-fed or predominantly FF. It is of concern that the Thai growth references can be used for BF infants. The present study showed that growth of BF infants correlated well with the current Thai growth references (except from 0-1 month of age), indicating that the current Thai growth references can be used to assess growth of BF infants who were fed according to Thai guidelines of infant feeding. Mean weight and length at 0 and 1 month of the studied infants were lower than those of Thai infants may explained by the rather low socioeconomic status and poor antenatal care in the studied infants; but after enrollment to the study and appropriate nutritional advice, growth of these infants from 2 to 12 months was close to or above the Thai growth references.

Previous studies reported that prolonged breastfeeding may be a risk factor for malnutrition<sup>(20,21)</sup>. However, recent studies showed that the inverse association was not causal and may be explained by poor complementary feeding among BF children<sup>(17,22)</sup>. The present study indicated that the incidence of malnutrition was not different between BF and FF infants but malnutrition was more prevalent in infants who had inadequate complementary food. The present study was a longitudinal study which followed the growth of infants since birth and was controlled for socioeconomic status, birth weight and age of introduction of complementary food, so it may be concluded that inadequate complementary food, not breastfeeding, was the risk factor of infant malnutrition. Although FF infants had a mean weight and length from 6 to 12 months higher than BF infants, the incidence of obesity was not statistically different between the two feeding groups. A review of the effect of breastfeeding on obesity concluded that the association between breastfeeding and obesity remained controversial and the effect of breastfeeding, if any, was weaker than genetic and other environmental factors<sup>(23)</sup>.

The limitation of the present study was most infants had a relatively low to middle socioeconomic status. The presented results may not be applicable to other groups of population. Further studies in infants fed by different feeding modes from various population groups and a longer period of growth assessment should be concerned.

The present study indicated that the national growth references of Thai children can be used to assess growth of BF infants who were fed according to Thai guidelines of infant feeding. If the infants

had declined growth from the growth references, the physicians should inform the parents to provide adequate complementary food or look for the illness that causes growth retardation.

### Conclusion

BF and FF infants had similar weight and length from 0 to 6 months, thereafter, FF infants had higher weight and length than BF infants and Thai growth references. Growth of BF infants correlated well with national growth references of Thai children, so the Thai growth references can be used to assess growth of BF infants. Inadequate complementary food, not breast feeding, was the cause of infant malnutrition. Exclusive breastfeeding for 4 months and appropriate complementary food should be encouraged for all infants to achieve normal nutritional status.

### Acknowledgements

The author wishes to thank Dr. Budsaba Wiriyasirivaj for the statistical analyses and the nursing staff at the pediatric outpatient department for their cooperation in the present study.

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## การเจริญเติบโตของทารกที่ได้รับนมแม่และนมดัดแปลงสำหรับทารกเปรียบเทียบกับเกณฑ์อ้างอิง การเจริญเติบโตของเด็กไทย

สุภาพรณ ตันตราชีวะธร

**วัตถุประสงค์:** เพื่อเปรียบเทียบการเจริญเติบโตของทารกที่ได้รับนมแม่และนมดัดแปลงสำหรับทารก กับเกณฑ์อ้างอิงการเจริญเติบโตของเด็กไทย และประเมินการใช้เกณฑ์ดังกล่าวในการติดตามการเจริญเติบโตของทารกกลุ่มนมแม่ที่ได้รับอาหารตามข้อแนะนำการให้อาหารสำหรับทารกของไทย

**รูปแบบการวิจัย:** การศึกษาแบบ cohort

**วัตถุประสงค์และวิธีการ:** ติดตามทารกคลอดครบกำหนด 156 ราย (กลุ่มนมแม่และนมดัดแปลงสำหรับทารก กลุ่มละ 78 ราย) เป็นเวลา 12 เดือน ทารกทุกรายได้รับนมเพียงอย่างเดียวใน 4 เดือนแรก และเริ่มอาหารเสริมหลังอายุ 4 เดือน ติดตามการเจริญเติบโตของทารกโดยชั่งน้ำหนัก วัดความยาวและเส้นรอบศีรษะ ที่อายุ 1, 2, 4, 6, 9 และ 12 เดือน

**ผลการศึกษา:** จากทารกที่เริ่มต้นการศึกษา 156 ราย มีทารกที่ติดตามจนจบการศึกษา 140 ราย เป็นทารกที่ได้รับนมแม่ 71 ราย และนมดัดแปลงสำหรับทารก 69 ราย ทารกทั้ง 2 กลุ่มมีค่าเฉลี่ยของน้ำหนักตัวและความยาวตั้งแต่แรกเกิดถึงอายุ 6 เดือนใกล้เคียงกัน หลังจากนั้นทารกที่ได้รับนมแม่น้ำหนักตัวและความยาวน้อยกว่าทารกที่ได้รับนมดัดแปลงสำหรับทารก โดยแตกต่างกันอย่างมีนัยสำคัญทางสถิติที่อายุ 9 และ 12 เดือนในทารกเพศชาย และที่อายุ 12 เดือนในทารกเพศหญิง ทารกกกลุ่มนมแม่และนมดัดแปลงสำหรับทารกในการศึกษานี้มีค่าเฉลี่ยของน้ำหนักตัวและความยาวที่อายุ 0-1 เดือนน้อยกว่าค่าเฉลี่ยตามเกณฑ์อ้างอิงการเจริญเติบโตของเด็กไทย หลังจากนั้นทารกกลุ่มนมแม่น้ำหนักตัวและความยาวเฉลี่ยใกล้เคียงกับค่าเฉลี่ยของเด็กไทย แต่ทารกกลุ่มนมดัดแปลงสำหรับทารกมีน้ำหนักตัวและความยาวหลังอายุ 6 เดือนมากกว่าเกณฑ์อ้างอิงของเด็กไทย โดยน้ำหนักตัวแตกต่างกันอย่างมีนัยสำคัญทางสถิติที่อายุ 9-12 เดือน และความยาวที่อายุ 12 เดือน อุบัติการณ์ของภาวะทุโภชนาการและภาวะอ้วนที่อายุ 1 ปีของทารกทั้ง 2 กลุ่มไม่แตกต่างกัน การได้รับอาหารเสริมที่ไม่เพียงพอเป็นปัจจัยเสี่ยงของภาวะทุโภชนาการในทารก (adjusted RR 4.7, 95% CI 1.1-21.9, p 0.04)

**สรุป:** ทารกที่ได้รับนมแม่และนมดัดแปลงสำหรับทารกมีน้ำหนักตัวและความยาวตั้งแต่แรกเกิดถึงอายุ 6 เดือนใกล้เคียงกัน หลังจากนั้นทารกกลุ่มนมดัดแปลงสำหรับทารกมีน้ำหนักตัวและความยาวมากกว่าทารกกลุ่มนมแม่ และค่าเฉลี่ยของเด็กไทย ส่วนทารกกลุ่มนมแม่มีการเจริญเติบโตใกล้เคียงกับเกณฑ์อ้างอิงของเด็กไทย เกณฑ์อ้างอิงการเจริญเติบโตของเด็กไทยสามารถใช้ประเมินการเจริญเติบโตของทารกกลุ่มนมแม่ที่ได้รับอาหารตามข้อแนะนำการให้อาหารสำหรับทารกของไทยได้

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