# Growth Patterns of Low-birth-weight Infants : 2-year Longitudinal Study

SOMCHIT JARURATANASIRIKUL, M.D.*, PRASIN CHANVITAN, M.D.*,
WARICHA JANJINDAMAI, M.D.*, SKULRAT RITSMITCHAI, M.D.**

**Abstract**

A 2 year longitudinal study of the growth of 147 low birthweight (LBW) < 2,500 g infants who had no known factors disturbing growth was conducted. The infants were divided into 6 groups according to birthweight and maturity : group 1 - appropriate for gestational age (AGA) with birthweight < 1,500 g (n = 18); group 2 - AGA 1,500-1,999 g (n = 41); group 3 - AGA 2,000-2,499 g (n = 26); group 4 - small for gestational age (SGA) < 1,500 g (n = 5); group 5 - SGA 1,500-1,999 g (n = 20); group 6 - SGA 2,000-2,499 g (n = 37). The control group consisted of 149 normal birthweight (> 2,500 g) infants. Weight, height, and head circumference were measured at birth, 2, 4, 6, 9, 12, 18, and 24 months postnatally and recorded in standard deviation score (SDS). All groups showed catch-up growth in the first 6 months. At 2 years old, all infants were above -2 SDS. However, the SGA infants with birthweight < 1,500 g were significantly lighter (-0.9 SDS, p = 0.003), shorter (-0.6 SDS, p = 0.001) and had smaller head size (-0.65 SDS, p = 0.027) whereas, the other groups were not different compared to the control group. We also compared those LBW infants who, at 2 years of age, weighed below -1 SDS to those who weighed above -1 SDS and found no significant difference in familial income, parental education, nursing care or parental height. We concluded that with adequate nutritional intake and nursing care, LBW infants have the potential for good catch-up growth. For the SGA infants with birthweight < 1,500 g, although they showed good catch-up growth, they still remained smaller than their peers at 2 years of age.

**Key word** : Growth, Intrauterine Growth Retardation, Low Birthweight Infants, Prematurity, Small for Gestational Age

* Department of Pediatrics,
** Epidemiology Unit, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90112, Thailand.

It is known that low birthweight (LBW) infants are at higher risk for neonatal morbidity and mortality[1]. During the last decade, with an improvement in neonatal intensive care, the number of surviving LBW infants has increased. The postnatal growth of these infants is of great concern to their parents and pediatricians. In Western countries, the patterns of growth in LBW infants have been extensively studied and reported that the majority of these infants can catch-up growth to normal by 6-12 months[2-14]. In Thailand, information concerning this subject is limited. We, therefore, performed a cohort study about the physical growth of LBW infants from birth to 2 years in order to assess how well they can grow compared to normal birthweight (NBW) infants. We also collected data about social and environmental factors that may influence physical growth in these infants.

## PATIENTS AND METHOD

### Patients

A cohort of LBW newborns delivered at or transferred to Songklanagarind Hospital between January 1993 and January 1995 were studied. The inclusion criteria was a birthweight < 2,500 g. For the purpose of this study, newborns with conditions known to disturb physical growth were excluded, e.g. congenital dysmorphic features, congenital heart diseases (including the unclosed ductus arteriosus), congenital gastrointestinal defects (including bowel resection for necrotizing enterocolitis), intrauterine infections, bronchopulmonary dysplasia, cerebral palsy, and neurological sequalae. A total of 181 newborns met these criteria and, upon informed consent, 147 of them were enrolled in the study. Gestational age at birth was determined from the date of last menstrual period and confirmed by the method of Ballard et al[15]. If there was a discrepancy of more than 2 weeks between the estimated age based on the last menstrual period and the Ballard score, then the latter was used. Demographic, neonatal and infancy risk factors were collected for their potential relationship to growth. These factors consisted of initial birth data, delivery mode, Apgar score, neonatal complications, parental data (age, education, occupation, income, parental height and weight), and nursing care.

To compare the growth patterns of LBW newborns, we first classified the patients according to maturity : appropriate for gestational age (AGA) or small for gestational age (SGA). Newborns with birthweight lower than the 10th centile of the Lubchenco growth chart[16] were considered as SGA and those between the 10th and 90th centiles were AGA. We then divided the newborns into 6 groups according to birthweight : group 1 - AGA < 1,500 g (n = 18); group 2 - AGA 1,500-1,999 g (n = 41); group 3 - AGA 2,000-2,499 g (n = 26); group 4 - SGA < 1,500 g (n = 5); group 5 - SGA 1,500-1,999 g (n = 20); group 6 - SGA 2,000-2,499 g (n = 37). Newborns with normal birthweight > 2,500 g (NBW) born during the same period were randomly selected and invited to participate and served as a control group. Of the total 181, thirty-two infants were lost to follow-up, leaving 149 NBW who completed the study protocol.

The characteristics of the patients in each group and the controls are shown in Table 1. For SGA infants, the patients in group 4-5 were all asymmetrical. In group 6, twenty-five infants were asymmetrical and twelve infants were symmetrical. In our study, type of feeding was not included as one of the variables since the majority of patients in group 1-5 were formula-fed while the majority of the controls were together breast and formula-fed.

### Method

The children's weight, height, and head circumference were measured at birth, then at 2, 4, 6, 9, 12, 18, and 24 months postnatally by skilled personnel. The children were weighed undressed on a calibrated infant balance scale. Height was measured in supine position with straight back and knee on standardized infantometer. Head circumference was measured with a standard measuring tape taken across occipito-frontal line. The units of measurement were 10 g for weight, 0.1 cm for height and head circumference. A complete physical examination and all measurements were assessed at each visit. Weight, height, and head circumference were interpreted as standard deviation score (SDS) based on the standard growth chart for Thai children designed by Chavalittamrong and Tantiwongse[17]. The SDS was calculated by using the actual body weight - mean body weight and divided by standard deviation. The benefit of using SDS is that it represents the degree of deviation from the mean of any individual measurement and also adjusts for sex. The SDS of all growth parameters were plotted using postnatal age, not the corrected gestational age in order to demonstrate the real postnatal growth patterns of LBW infants. Body mass index (BMI) was calculated by body weight

**Table 1. Characteristics of LBW infants in each group and NBW infants.**

| | Group 1 (n = 18) | Group 2 (n = 41) | Group 3 (n = 26) | Group 4 (n = 5) | Group 5 (n = 20) | Group 6 (n = 37) | NBW (n = 149) | p value |
|---|---|---|---|---|---|---|---|---|
| Boys : girls | 9 : 9 | 24 : 17 | 15 : 11 | 2 : 3 | 9 : 11 | 19 : 18 | 75 : 74 | - |
| GA* (wk) | 30.6 ± 2.8 | 33.0 ± 1.7 | 35.0 ± 1.6 | 32.6 ± 2.3 | 37.8 ± 1.8 | 38.5 ± 1.3 | 39.2 ± 1.0 | - |
| BW* (g) | 1,247 ± 165 | 1,770 ± 161 | 2,181 ± 114 | 1,097 ± 248 | 1,806 ± 100 | 2,258 ± 109 | 3,133 ± 336 | - |
| BL* (cm) | 38.0 ± 3.2 | 42.5 ± 2.0 | 44.9 ± 1.8 | 39.6 ± 3.6 | 42.9 ± 1.5 | 45.9 ± 1.7 | 49.2 ± 1.8 | - |
| HC* (cm) | 26.9 ± 1.6 | 29.8 ± 1.3 | 30.9 ± 1.3 | 27.6 ± 3.9 | 30.6 ± 1.4 | 31.8 ± 1.1 | 34.6 ± 1.0 | - |
| Delivery | | | | | | | | |
| Normal | 10 (55.6) | 23 (56.1) | 16 (61.5) | 3 (60) | 7 (35) | 15 (40.6) | 80 (53.7) | NS |
| Caesarean | 6 (33.3) | 14 (34.1) | 6 (23.1) | 2 (40) | 8 (40) | 17 (45.9) | 35 (23.5) | NS |
| Hospitalization (days)* | 49 ± 16** | 18 ± 7** | 11 ± 6 | 45 ± 10** | 8 ± 5 | 5 ± 3 | 4 ± 2 | **< 0.001 |
| Maternal age* | 28 ± 6 | 27 ± 4 | 28 ± 4 | 25 ± 4 | 29 ± 4 | 28 ± 5 | 28 ± 6 | NS |
| Paternal age* | 32 ± 7 | 31 ± 4 | 32 ± 4 | 31 ± 3 | 33 ± 5 | 31 ± 6 | 32 ± 5 | NS |
| Income < 20,000 baht | 5 (27.8) | 13 (31.7) | 7 (26.9) | 3 (60) | 5 (25) | 11 (29.7) | 75 (50.3) | NS |
| Education+ | | | | | | | | |
| Maternal | 6 (33.3) | 18 (43.9) | 9 (34.6) | 1 (20) | 12 (60) | 14 (37.8) | 33 (22.1) | NS |
| Paternal | 7 (39) | 24 (58.5) | 14 (53.8) | 2 (40) | 12 (60) | 19 (51.4) | 66 (44.3) | NS |
| Midparental height*(SDS) | 0.23 ± 0.72 | 0.35 ± 0.81 | 0.36 ± 0.8 | 0.18 ± 0.87 | 0.40 ± 0.7 | 0.32 ± 0.8 | 0.3 ± 0.8 | NS |
| Nursing provider | | | | | | | | |
| Mother | 9 (50) | 27 (65.9) | 20 (76.9) | 4 (80) | 11 (55) | 16 (43.2) | 88 (59) | NS |
| Grandparents | 9 (50) | 14 (34.1) | 6 (23.1) | 1 (20) | 9 (45) | 19 (51.4) | 49 (32.9) | NS |
| Nursery | - | - | - | - | - | 2 (5.4) | 12 (8.1) | - |

Note * expressed in mean ± standard deviation, the rest is expressed in number (%)
GA = gestational age; BW = birthweight
BL = birthlength; HC = head circumference
Education+ = education < primary school

in kg divided by the square meters of body height. The data were analysed by a computer using the STATA program. Analysis of variance (ANOVA) was used to compare the groups.

## RESULTS

The patterns of growth in weight, height, and head circumference, expressed in SDS (mean ± standard deviation) in each group are shown in Fig. 1-6. All AGA and SGA infants showed accelerated growth in the first 6 months and continued at a slower rate until the age of 1 year, when they parelleled the growth curve of NBW infants. Compared to the same birthweight groups, growth patterns of SGA infants were not different from the AGA infants, except for the SGA < 1,500 g that grew significantly less than the AGA < 1,500 g. At 1 year, only the SGA < 1,500 g had all growth parameters significantly lower than the other groups and the control group. The significant difference in growth of SGA < 1,500 g infants persisted till 2 years of age shown by weight at - 0.9 SDS ($p = 0.003$), height - 0.6 SDS ($p = 0.001$), and head circumference - 0.65 SDS ($p = 0.027$). The BMI (Table 2) was also significantly less than the other groups and the control group ($p = 0.016$).

Although none of our LBW infants had 2 years-growth parameters below - 2 SDS, some of them were unable to catch up completely particularly the SGA < 1,500 g infants. To delineate whether factors other than birthweight and dysmaturity influenced the complete catch-up growth in LBW infants, we compared the social and parental factors of children with a 2 year-body weight above - 1 SDS to those below - 1 SDS. We chose - 1 SDS as a cut-off point for complete catch up growth because it corresponded to the 15th centile. Body weight below this point is although normal, but relatively in the low normal range and can be classified as underweight. Height and head circum-

ference were not used for comparison because few children were below - 1 SDS and no comparison could be made. Using the 2 year-body weight, there were 23 children who were below - 1 SDS (6 AGA, 6 SGA, and 11 NBW). By multivariate analysis, we found no significant difference between children whose body weight was above (n = 273) and below - 1 SDS (n = 23) in familial income, maternal education, paternal education, nursing care, and parental height (Table 3).

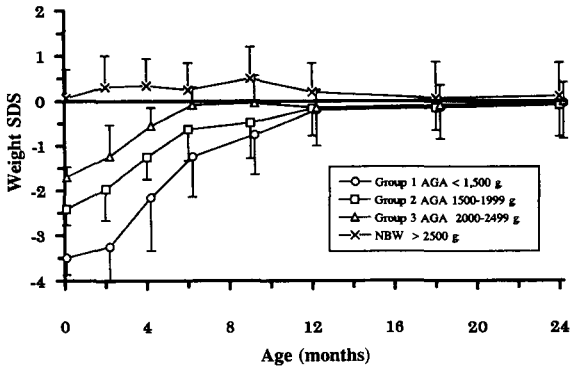


Fig. 1. Weight SDS of the AGA infants.

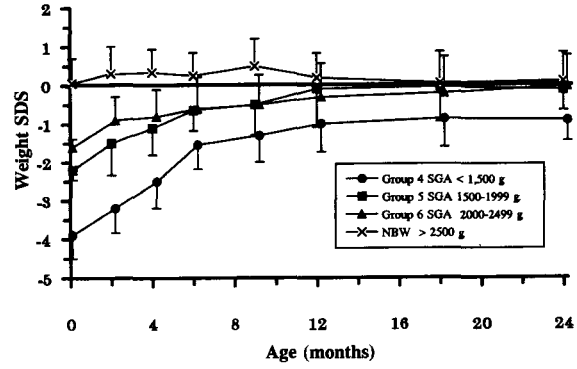


Fig. 2. Weight SDS of the SGA infants.

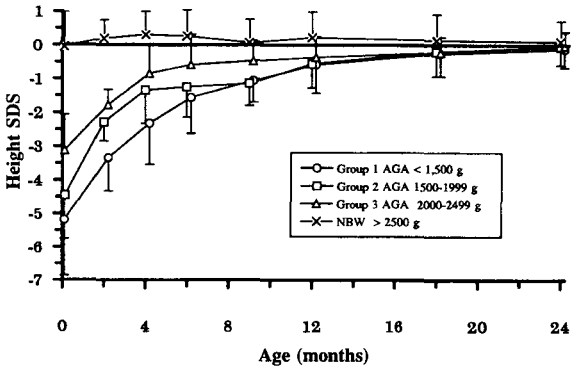


Fig. 3. Height SDS of the AGA infants.

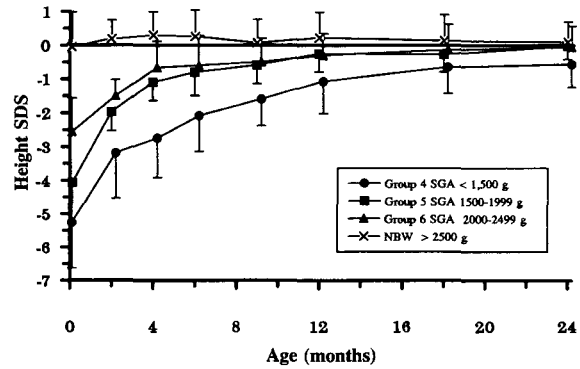


Fig. 4. Height SDS of the SGA infants.

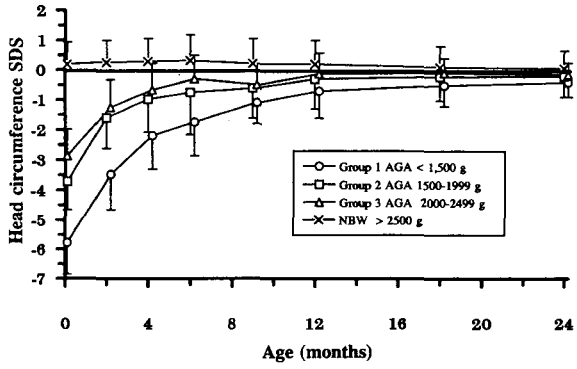


Fig. 5. Head circumference SDS of the AGA infants.

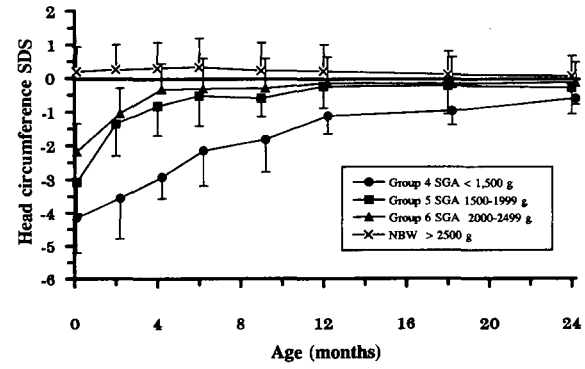


Fig. 6. Head circumference SDS of the SGA infants.

**Table 2. Growth data at 2 years old.**

| | Group 1 (n = 18) | Group 2 (n = 41) | Group 3 (n = 26) | Group 4 (n = 5) | Group 5 (n = 20) | Group 6 (n = 37) | NBW (n = 149) | p value |
|---|---|---|---|---|---|---|---|---|
| Weight SDS* | -0.04 ± 0.8 | -0.09 ± 0.7 | -0.01 ± 0.42 | -0.9 ± 0.54** | 0.11 ± 0.5 | 0.02 ± 0.8 | 0.11 ± 0.74 | ** 0.003 |
| Length SDS* | -0.12 ± 0.55 | -0.05 ± 0.55 | -0.02 ± 0.4 | -0.60 ± 0.68++ | -0.01 ± 0.4 | -0.05 ± 0.62 | 0.1 ± 0.6 | ++ 0.001 |
| HC SDS* | -0.3 ± 0.5 | -0.2 ± 0.7 | -0.15 ± 0.4 | -0.65 ± 0.18# | -0.29 ± 0.77 | -0.13 ± 0.6 | 0.06 ± 0.6 | # 0.027 |
| BMI* | 16.3 ± 1.6 | 16.3 ± 1.2 | 16.2 ± 1.1 | 14.8 ± 1.4## | 16.5 ± 1.2 | 16.3 ± 1.4 | 16.3 ± 1.3 | ## 0.016 |
| Weight < -1 SDS+ | 2 (11.1) | 4 (9.8) | - | 3 (60)B | - | 3 (8.1) | 11 (7.4) | B < 0.05 |

Note * expressed in mean ± standard deviation
+ expressed in number (%)
HC = head circumference
BMI = body mass index

**Table 3. Multivariate analysis of factors in LBW children at 2 years of age who were average (n = 273) and underweight (n = 23).**

| | Odds ratio | p value |
|---|---|---|
| Familial income | 0.46 | 0.39 |
| Maternal education | 0.45 | 0.14 |
| Paternal education | 0.63 | 0.36 |
| Nursing by mother | 0.97 | 0.53 |
| Midparental height | 0.57 | 0.12 |

## DISCUSSION

The results of our study clearly demonstrated that LBW infants, both AGA and SGA, had the potential for good catch-up growth. All groups showed the same patterns of catch-up growth : markedly accelerated in the first 6 months, continued at a slower rate in the later 6 months, and paralleled to the NBW infants in the second year. At 2 years, all LBW children were well above - 2 SDS. The good catch-up growth of our LBW infants was probably due to our exclusion from the study of infants who had conditions disturbing growth. Secondly, all our LBW infants were cared for by their own mothers or grandparents who were concerned about their growth. Thirdly, they were closely followed and interventions were done in children who were cared for inadequately or inappropriately. However, the SGA infants with birthweight < 1,500 g were significantly lighter, shorter and had smaller head size than all other groups, even when compared with the compatible birthweight AGA infants. These findings indicated that intrauterine growth disturbance occurring earlier than 32 weeks in utero had a later effect on postnatal physical growth. In contrast, the appropriate size premature infants born even earlier than 32 weeks of gestation had the potential for complete catch-up growth. Intrauterine growth retardation occurring later than 32 weeks of gestation had no effect on postnatal catch-up growth. All this evidence supported the importance of the critical intrauterine period to long term growth potential.

The mechanism controlling catch-up growth in LBW infants is not fully understood. As already known, postnatal growth depends very much on adequate nursing care, nutritional intake, parental interest, and familial socioeconomic status. In our study, although all LBW infants were well above - 2 SDS at 2 years of age, some of them remained smaller than their peers. To determine whether factors other than birthweight and dysmaturity influence physical growth, we compared other genetic and socioeconomic factors in children who showed complete catch-up growth (> - 1 SDS) and those who did not (< - 1 SDS). Such factors included familial income, maternal education, paternal education, nursing provider, and midparental height. Nursing provider was included in our analysis because we thought it is an important factor affecting growth. In this decade, lifestyle and Thai culture has changed. The number of double income homes is increasing, therefore, children are spending more time in day care. In our study, children taken to a nursery were relatively few and found only in the NBW group. This is because the majority of our participants were middle-class families who lived with their grandparents. For the LBW children, the parents and grandparents intended to take care of the child themselves. Using multivariate analysis, we failed to demonstrate the relationship between

underweight children and familial income, parental education, nursing care (only between mothers and grandparents), and midparental height. These results suggested that full catch-up growth in the first 2 years of life was not dependent on socio-economic factors. Adequate nursing care, adequate nutritional intake, and parental interest had a marked impact on the children growth.

One of the long term effects of intra-uterine growth retardation (IUGR) is short adult stature[18,19]. Several studies have demonstrated that intrauterine growth retardation leads to a reduction in adult height compared to the target height[19]. The study by Albertsson-Wikland and Karlberg showed that children born with IUGR who were short at 2 years of age reached a final height below their genetic potential and that height at 2 years can be used for prediction of the final height outcome[20]. Based on the evidence of previous studies, it is predicted that our SGA infants with birthweight < 1,500 g will remain shorter as adults.

In summary, our study demonstrated that LBW, both AGA and SGA, newborns without obvious factors disturbing growth were able to catch-up to within normal by 6 months postnatally. For the SGA infants with birthweight < 1,500 g, although catch-up growth occurred, they tended to remain in the low normal range. Our results suggested that healthy LBW infants who show no catch-up growth or who remain below -2 SDS at 2 years of age need careful investigation to exclude growth affecting disorders such as chromosomal abnormalities, hypothyroidism, and also growth hormone deficiency.

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## REFERENCES


1. McCormick MC. The contribution of low birth weight to infant mortality and childhood morbidity. N Engl J Med 1985;312:82-90.
2. Vohr BR, Oh W. Growth and development in preterm infants small for gestational age. J Pediatr 1983;103:941-5.
3. Brandt I. Growth dynamics of low-birth-weight infants. Acta Paediatr Scand 1985; Suppl 319:38-47.
4. Gill A, Yu VYH, Bajuk B, Astbury J. Postnatal growth in infants born before 30 weeks' gestation. Arch Dis Child 1986;61:549-53.
5. Sann L, Darre E, Lasne Y, Bourgeois J, Bethenod M. Effects of prematurity and dysmaturity on growth at age 5 years. J Pediatr 1986;109:681-6.
6. Tenovuo A, Kero P, Piekkala P, Korvenranta H, Sillanpaa M, Erkkola R. Growth of 519 small for gestational age infants during the first two years of life. Acta Paediatr Scand 1987;76:636-46.
7. Greisen G, Petersen MB. Perinatal growth retardation in preterm infants. Acta Paediatr Scand 1989; 360:43-7.
8. Altigani M, Murphy JF, Newcombe RG, Gray OP. Catch up growth in preterm infants. Acta Paediatr Scand 1989; suppl 357:3-19.
9. Fitzhardinge PM, Inwood S. Long-term growth in small-for-date children. Acta Paediatr Scand 1989; suppl 349:27-33.
10. Casey PH, Kraemer HC, Bernbaum J, et al. Growth patternss of low birth weight preterm infants : A longitudinal analysis of a large, varied sample. J Pediatr 1990;117:289-307.
11. Casey PH, Kraemer HC, Bernbaum J, Yogman MW, Sells JC. Growth status and growth rates of a varied sample of low birth weight preterm infants : A longitudinal cohort from birth to three years of age. J Pediatr 1991;119:599-605.
12. Elliman A, Bryan E, Elliman A, Walker J, Harvey D. The growth of low-birth-weight children. Acta Paediatr 1992;81:311-4.
13. Kelleher KJ, Casey PH, Bradley RH, et al. Risk factors and outcomes for failure to thrive in low birth weight preterm infants. Pediatrics 1993;91: 941-8.
14. Albertsson-Wikland K, Wannergren G, Wannergren M, Vilbergsson G, Rosberg S. Longitudinal follow-up of growth in children born small for gestational age. Acta Paediatr 1993;82:438-43.
15. Ballard JL, Novak KK, Driver M. A simplified score for assessment of fetal maturation of newly born infants. J Pediatr 1979;95:769-74.
16. Lubchenco LO, Hansman C, Dressler M, Boyd E. Intrauterine growth as estimated from liveborn birthweight data at 24 to 42 weeks of gestation. Pediatrics 1963;32:793-8.
17. Chavalittamrong B, Tantiwongse P. Height and weight of Thai children : Update. J Med Assoc Thai 1987;70 suppl 1 : 1-40.
18. Paz I, Seidman DS, Danon YL, Laor A, Stevenson DK, Gale R. Are children born small for gesta-

tional age at increased risk of short stature? Am J Dis Child 1993;147:337-9.
19. Chaussain JL, Colle M, Ducret JP. Adult height in children with prepubertal short stature secondary to intrauterine growth retardation. Acta Paediatr 1994; suppl 399:72-3.
20 Albertsson-Wikland K, Karlberg J. Natural growth in children born small for gestational age with and without catch-up growth. Acta Paediatr 1994; suppl 399:64-72.

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*สมจิตร์ จารุรัตนศิริกุล, พ.บ.*, ประสิน จันทร์วิทัน, พ.บ.*,*
*วาริชา เจนจินดามัย, พ.บ.*, ศกุลรัตน์ ฤทธิสมิตชัย, วท.ม.***

ได้ทำการศึกษาโดยติดตามการเจริญเติบโตของทารกแรกเกิดน้ำหนักตัวน้อยกว่า 2,500 กรัมที่ไม่มีปัจจัยขัดขวางการเจริญเติบโต ในการศึกษานี้ได้แบ่งกลุ่มทารกออกเป็น 6 กลุ่มตามน้ำหนักแรกเกิดและขนาดเหมาะสมของน้ำหนักแรกเกิดกับอายุครรภ์ กลุ่มที่ 1–ทารกแรกเกิดน้ำหนัก <1,500 กรัม ขนาดเหมาะสมกับอายุครรภ์ (จำนวน 18 ราย) กลุ่มที่ 2–ทารกแรกเกิดน้ำหนัก 1,500–1,999 กรัม ขนาดเหมาะสมกับอายุครรภ์ (จำนวน 41 ราย) กลุ่มที่ 3–ทารกแรกเกิดน้ำหนัก 2,000–2,499 กรัม ขนาดเหมาะสมกับอายุครรภ์ (จำนวน 26 ราย) กลุ่มที่ 4–ทารกแรกเกิดน้ำหนัก <1,500 กรัม ขนาดเล็กกว่าอายุครรภ์ (จำนวน 5 ราย) กลุ่มที่ 5–ทารกแรกเกิดน้ำหนัก 1,500–1,999 กรัม ขนาดเล็กกว่าอายุครรภ์ (จำนวน 20 ราย) กลุ่มที่ 6–ทารกแรกเกิดน้ำหนัก 2,000–2,499 กรัม ขนาดเล็กกว่าอายุครรภ์ (จำนวน 37 ราย) และมีกลุ่มควบคุมซึ่งเป็นทารกแรกเกิดน้ำหนัก > 2,500 กรัม (จำนวน 149 ราย) ได้ติดตามทารกเหล่านี้โดยทำการชั่งน้ำหนักตัว วัดความยาวตัวและวัดขนาดรอบศีรษะที่อายุต่างๆ คือ เมื่อแรกเกิด และอายุ 2, 4, 6, 9, 12, 18 และ 24 เดือน และคำนวณค่าที่วัดได้เป็น standard deviation score (SDS) ผลการศึกษาพบว่าเมื่ออายุ 6 เดือน ทารกในทุกกลุ่มสามารถเจริญเติบโตในเกณฑ์ที่มากกว่าปกติ (catch–up growth) และเมื่ออายุ 2 ปี ทารกทุกคนมีน้ำหนักตัวมากกว่า –2 SDS อย่างไรก็ตาม ทารกแรกเกิดน้ำหนัก <1,500 กรัมที่มีขนาดเล็กกว่าอายุครรภ์จะมีน้ำหนักตัวน้อยกว่า (–0.9 SDS, $p = 0.003$) ความยาวตัวน้อยกว่า (–0.6 SDS, $p = 0.001$) และเส้นรอบศีรษะเล็กกว่า (–0.65 SDS, $p = 0.027$) ในขณะที่ทารกในกลุ่มอื่นมีการเจริญเติบโตในด้านต่างๆ ไม่แตกต่างจากกลุ่มควบคุม ได้ทำการศึกษาเปรียบเทียบทารกเหล่านี้เมื่ออายุ 2 ปีที่มีน้ำหนักตัวน้อยกว่า –1 SDS กับทารกที่มีน้ำหนักตัวมากกว่า –1 SDS พบว่าไม่มีความแตกต่างในเรื่องของรายได้ของครอบครัว การศึกษาของบิดา การศึกษาของมารดา ผู้ให้การเลี้ยงดู และความสูงของบิดามารดา จากการศึกษานี้สรุปได้ว่า การเลี้ยงดูและการได้รับอาหารที่เหมาะสม สามารถทำให้ทารกแรกเกิดน้ำหนักตัวน้อยเหล่านี้เจริญเติบโตได้มากกว่าปกติ จนเท่ากับทารกแรกเกิดน้ำหนักตัวปกติได้ อย่างไรก็ตาม ทารกแรกเกิดน้ำหนัก <1,500 กรัม ที่มีขนาดเล็กกว่าอายุครรภ์ แม้จะมีการเจริญเติบโตได้มากก็ตาม แต่ก็ยังไม่สามารถเติบโตขึ้นมาได้เท่ากับทารกในกลุ่มอื่นๆ

**คำสำคัญ** : การเจริญเติบโต, ทารกเกิดก่อนกำหนด, ทารกแรกเกิดน้ำหนักตัวน้อย

* ภาควิชากุมารเวชศาสตร์,
** หน่วยระบาดวิทยา, คณะแพทย์ศาสตร์ มหาวิทยาลัยสงขลานครินทร์, หาดใหญ่, สงขลา 90110