



STUDY OF GROWTH PATTERN IN LOW BIRTH WEIGHT NEONATE - ON EXCLUSIVE BREAST FEEDING

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ABSTRACT

Background: Human milk is the ideal source of nutrition for neonates. But various practical difficulties present to feed breast milk exclusively in preterm and low birth babies. This study was undertaken to evaluate the growth of both preterm and term small for gestational age infants nursed on exclusive breast milk from birth to six months of age.

Methods: This was a prospective, longitudinal study carried out in RMMCH, a recognized baby-friendly hospital where exclusive breast-feeding is practiced in all neonates. All consecutive low birth weight neonates irrespective of gestational age, born during the study period were included in the study. Assessment of growth parameters included recording of weight (daily when in the hospital and later weekly), length (weekly) and head circumference (weekly) till the age of six months.

Result: Low birth weight infants, both the preterm and the term small for gestational age, on being exclusively breastfed by their own mothers, gained weight and had an increase in their head circumference and length to the levels almost comparable to the standard fetal-infant growth norms.

Conclusion: Exclusive breast-feeding results in adequate growth in low birth weight babies including preterm.

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INTRODUCTION

Low birth weight (LBW) babies are defined as babies with birth weight of less than 2500g. These could be either term small for gestational age (term SGA) or preterm babies. LBW is a common problem in our country with an incidence of 30-40% (term SGA 20-30% and preterm 10-20%)¹. A neonate may be LBW either due to being born prematurely or being intrauterine growth retarded (birth weight less than 10th centile for gestational age-SGA). The problems that these babies encounter are largely dependent on the cause of LBW. Various maternal risk factors contribute commonly to premature delivery and SGA neonates. The common causes of preterm includes Pre-eclampsia, Drug abuse, Premature rupture of membranes, Polyhydramnios, Iatrogenic, Placental dysfunction, Placenta previa, Abruptio placentae, Incompetent cervix, Uterine malformation, Multiple gestation & Malformations. Common causes for SGA includes Maternal Anemia, Hypertension, Renal disease, Addictions (alcohol and narcotics), Chromosomal disorders, intrauterine infections (TORCH) & Congenital anomalies.

The human milk-fed premature infant may experience improved health (such as lower rates of infection and necrotizing enterocolitis, improved gastro intestinal function and better neurodevelopment). None of the substitute feeds can match the qualitative properties of human milk. Nature has modified the breast milk of the mother of a preterm baby so as to make it the ideal and best option for the LBW neonates³. The nutritional, immunologic, developmental, psychological, social, economic and environmental advantages of breastfeeding have been well documented. Because of this notion, pediatric societies in various countries recommend breastfeeding. In addition, the World Health Organization (WHO), in collaboration with the United Nations Children's Fund (UNICEF), have established ten steps for promoting and supporting breastfeeding. For low birth weight (LBW) infants, the benefits of breastfeeding are thought to be more distinct. Several investigators reported that the use of breast milk in LBW infants decreased the risk of serious infections and necrotizing enterocolitis¹⁰ and improved motor or mental development. However, LBW infants have an immature capability of directly sucking from the breast. In addition, isolation of LBW

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infants from their mothers in the neonatal intensive care unit (NICU) is an obstacle to providing the infants with a constant and sufficient supply of breast milk. Therefore, pediatricians and NICU caregivers try to implement strategies for promoting breastfeeding to mothers both during NICU hospitalization and after NICU discharge.

IAP recommends Exclusive Breastfeeding for the First Six Months as breast milk contains all the necessary nutrients which are sufficient to sustain appropriate growth and development of a healthy term infant for the first 6 months of life. There is sufficient evidence that a significant number of under-five-month deaths in resource poor countries could be prevented through achievement of 90% coverage with exclusive breastfeeding for 6 months. Any supplementation during the first 6 months will expose infant to infections and also decrease breast milk output.

This study was under taken to evaluate the growth of both preterm and term SGA infants nursed on exclusive breast milk from birth to six months of age. Exclusive breastfeeding defined as giving a baby no other food or drink, including water, in addition to breastfeeding with the exception of syrup/drops of vitamins, minerals and medicines (expressed breast milk is also permitted)

MATERIAL AND METHODS

This is a prospective, longitudinal study done in RMMCH, Annamalai University, and a well-recognized baby-friendly hospital where exclusive breast-feeding is practiced in all neonates. All low birth weight neonates irrespective of their gestational age, born during the study period of one year are included in the study. The inclusion criteria for low birth weight neonates is defined as those babies with birth weight of below 2500g. Exclusion criteria includes babies with congenital anomalies, neonates on parenteral nutrition or on intravenous fluids for more than seven days.

The babies are started on feeds once their respiratory condition stabilizes and there is no contraindication to orogastric feeds and no other signs of any systemic illness that would result in cardio-respiratory instability. Feeding schedule consisted of starting small volume gavage feeds with step-wise increase based on baby's tolerance of feeds. Babies were breast fed if they had a good suck and were able to co-ordinate sucking, swallowing, and breathing as observed by the pattern of feeding. While on gavage feeds the daily feed volumes did not exceed 150-200 ml/kg/day. Vitamin D supplementation added to all newborn in this study. Other supplements (Multivitamin, Vitamin E, Calcium) added to required neonates.

Assessment of growth parameters included recording of weight (daily when in the hospital and later weekly), length (weekly) and head circumference (weekly). Babies were weighed naked on an electronic weighing scale with an accuracy of measurement of ± 1 gm. Infantometer was used to measure the length of the infants. For measurement of head circumference, a flexible plastic non stretch measuring tape was used to encircle the head at the level of occipital protuberance posteriorly and supra orbital ridges anteriorly and measurement was taken to the nearest millimeter. All the measurements were made by

the same observer to avoid inter- observer variability. Following discharge, the infants were followed up and growth parameters recorded in High-Risk Neonate Clinic every week till the first four weeks (postnatal age), and then every month till six months. All recordings were charted on the selected extrauterine growth graphs (Fenton's updated Babson and Benda's growth chart) of varying gestational ages⁵.

RESULTS

From a study population of 254 low birth weight infants, 142 low birth weight infants were included in the study based on the selection criteria. A total of 34 infants were excluded due to non-compliance of exclusive breast-feeding, irregular follow-ups or lost to follow-up. Out of these 108 LBW infants, 52 (48%) were males and 56 (52%) females. 44 (41%) of the total cases were preterm babies with a mean gestational age of 34 ± 2 weeks.

Weight

The mean birth weight of preterm infants was 1876.4 ± 276 gm (median 1906 gm). 42 preterm babies were appropriate for their gestational age (AGA) and two baby was small for the gestational age (SGA). 64 (59%) babies were term SGA babies with a mean gestational age of 38 ± 2 week. The mean birth weight of the term SGA infants was 2012 ± 187 gm (median 2080 gm). Results of weight gain displayed in table 1.

Table 1 Weight gain in Preterm & Term SGA infants

Age	PRE TERM		TERM	
	Mean weight (gm)	Rate (gm/day)	Mean (gm)	Rate (gm/day)
Birth weight	1876.4		2012.8	
Week 1	1798.4	-11.1	1888.3	-17.8
Week 2	1902.7	14.9	2006.5	16.7
Week 3	2108.6	29.4	2202.4	28.0
Week 4	2289.2	25.8	2396.8	27.8
Month 2	3004.6	23.8	3184.7	26.3
Month 3	3866.0	28.7	4001.0	27.2
Month 4	4678.5	27.1	4785.2	26.1
Month 5	5432.2	25.1	5567.1	26.1
Month 6	6200.0	25.6	6349.9	26.1

Length

The mean length of the preterm babies at birth was 44.00 ± 2.41 cm. The net increment was 19.8 cm at the end of six months. The mean length of the term SGA babies at birth was 47.1 ± 1.77 cm. The net increment was 18.4 cm at the end of six months. The lengths of babies in both the groups grew by parallel increments. The differences in the gains at all the intervals of the recording were insignificant (Table 2).

Head Circumference

The mean head circumference of the preterm infants at birth was 30.4 ± 2.3 cm. The mean head circumference of the term SGA infants was 32.1 ± 1.2 cm at birth. The head circumference of babies in both the gestational age groups grew in parallel increments as recorded in Table 3.

Table 2 Length gain: Preterm & Term SGA infants

Age	PRE TERM		TERM	
	Mean length (cm)	Growth rate (cm/month)	Mean length (cm)	Growth rate (cm/month)
At Birth	44.0		47.1	
Week 1	44.5		47.8	
Week 2	45.1	3.1	48.7	3.1
Week 3	46.0		49.4	
Week 4	47.1		50.2	
Month 2	50.2		53.0	
Month 3	53.9	3.7	56.2	3.2
Month 4	57.5	3.6	59.5	3.3
Month 5	60.4	2.9	62.3	2.8
Month 6	63.8	3.4	65.5	3.2

Table 3 Head circumference gain in Preterm & Term SGA infants

Age	PRE TERM		TERM	
	Mean HC (cm)	Growth rate (cm/month)	Mean HC (cm)	Growth rate (cm/month)
At Birth	30.4		32.1	
Week 1	30.9		32.6	
Week 2	31.4	2.2	33.2	2.3
Week 3	32.0		33.9	
Week 4	32.6		34.4	
Month 2	34.7		36.5	
Month 3	36.9	2.2	38.5	2.0
Month 4	38.4	1.5	39.9	1.4
Month 5	39.8	1.4	41.6	1.7
Month 6	41.3	1.5	43.4	1.8

DISCUSSION

Low birth weight is a common problem in our country with an incidence of 30-40%¹. Given the economic advantages, metabolic efficiency, immunological benefits and demonstration of higher mineral content in the milk produced by mothers of preterm infants, breast-feeding from their own mothers appears to be the best option for these infants⁶. Growth monitoring is a simple and objective way of assessing the adequacy of breast milk as a nutritional source in such infants.

Our study yielded the results of Low birth weight infants, both the preterm and the term small for gestational age, on being exclusively breastfed by their own mothers, gained weight and had an increase in their head circumference and length to the levels almost comparable to the standard fetal-infant growth norms.

Jarvenappa et al⁷ reported a weight gain of 28.5 gm/day in very low birth weight (VLBW) infants who received pooled, expressed milk, partly supplemented with their own mother's expressed milk. Gross et al⁸ recorded the rate of weight gain as 23.7±1.1gm/day in VLBW infants fed with preterm milk. In his study, he also observed that infants fed with term milk had a lower rate of weight gain (15.8±0.8gm/day). This shows that breast-feeding by their own mothers is the best way of feeding preterm babies.

There are also studies which suggest results to the contrary. Cooper et al⁹, compared growth of a group of VLBW infants fed a formula specifically developed for such infants with another group fed expressed breast milk. Weight gain was faster in the formula-fed infants after a caloric intake of 100kcal/kg/day was achieved. Increments in head circumference and skin fold thickness were also greater in the formula-fed group. In another study by the

same authors, VLBW infants fed premature formula had significantly greater weight increments and length increments than those on own mother's milk¹⁰. Hendrickse et al¹¹, observed that preterm infants fed with preterm formula had better weight gain as compared to those fed with preterm milk. But even in their studies preterm infants who were fed with preterm milk had weight gain that approximated to intrauterine standards, whereas infants fed with formula had weight gain that crossed the intrauterine growth standards.

In a Meta- analysis of data from five trials demonstrated a statistically significantly higher incidence of necrotizing enterocolitis in the formula fed group. In a separate meta-analysis published in Cochrane database by the authors of same group, they have commented that maternal breast milk remains the default choice of enteral nutrition because observational studies and meta-analyses of trials comparing feeding with formula milk versus donor breast milk, suggest that feeding with breast milk has major non-nutrient advantages for preterm or low birth weight infants.

Breast-feeding is the generally accepted feeding for term SGA infants and that is the best way to feed them. High protein formula did not increase the growth rate in these infants. Breast-fed term SGA infants showed catch up growth with normal birth weight infants between 4-5 months postnatally in some studies. In our study controls of normal birth weight infants were absent. So, comparisons could not be made. Awasthi et al reported weight gain of 22.99gm/ day in breast- fed term SGA infants. The rate of weight gain in term SGA infants was higher in our study.

The growth velocities of weight, head circumference and length were almost similar for both the preterm and the term SGA babies. The growth curves run parallel to each other till the end of the study period. In short, the growth parameters of exclusively breast- fed LBW infants of this study follow the fetal-infant growth standards without any abnormal or significant deviations. The growth rates in this study were comparable with those of similar studies. These findings may have a useful bearing on the choices for affordable and effective strategies for feeding LBW infants of vary in gestational periods. The source of nutrition that is selected to feed these babies should be cheap, natural yet adequate. Human breast milk when supplemented with appropriate vitamins and minerals, rates favorably on adequacy in supporting optimal growth patterns not only in the normal birth weight infants but also in the preterm and the term LBW babies. In a developing country like ours, the additional evidence from this study would further encourage baby friendly policies like breast-feeding.

CONCLUSION

Exclusive breast-feeding results in adequate growth in low birth weight babies. Hence exclusive breast feeding can be adopted to all LBW babies (Preterm and Term) to get optimal growth along with other benefits of breast feeding.

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