Original Article

PHYSICAL GROWTH OF LOW BIRTH WEIGHT BABIES IN FIRST SIX MONTHS OF LIFE: A LONGITUDINAL STUDY IN A RURAL BLOCK OF ASSAM

Madhur Borah[1], Rupali Baruah[2]

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Author's Affiliation:
[1]Senior Resident, Dept of Community Medicine, NEIGRIHMS, Shillong; [2]Professor, Department of Community Medicine, Gauhati Medical College, Guwahati

Correspondence:
Dr. Madhur Borah
E-mail: borahmadhur8@gmail.com

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ABSTRACT

Introduction: A longitudinal study was carried out in a rural block of Assam to assess the physical growth pattern of Low Birth Weight babies during their first six months of life and to compare the growth pattern with Normal Birth Weight counterparts.

Methods: Total 30 LBW babies (0 -2 months) and equal numbers of NBW babies were randomly selected under five sub centres. They were followed up in monthly intervals till 6 months of age.

Results: During the study period LBW infants had lower mean weight, length, head circumference compared to NBW infants. But LBW infants had higher rate of weight gain, increase in length and head circumference than the NBW infants. By 6 months of age 20% LBW babies caught up in weight and 30% in head circumference with NBW infants. 77% LBW infants remained underweight at 6 months of age (RR = 3.74).

Conclusion: LBW babies had higher rate of weight gain during the first 6 months of age but still remained significantly lighter than the NBW infants.

Key words: LBW, physical growth, Catch up growth, under nutrition, longitudinal study

INTRODUCTION

Growth in the first year of life is crucial not just for the time being but it has a lifelong implication for LBW infant because it gets an opportunity to recover its growth deficit of intra uterine life in this period and to catch up with its normal birth weight siblings. In LBW babies, especially preterm babies and those without congenital anomalies, the growth is very fast in first year of life. But The LBW Small for Gestational Age infants show less catch up growth than that seen in Appropriate for Gestational Age infants.[1] Such LBW survivors demonstrate significant growth retardation as reflected by body weight, height, chest circumference, in comparison to normal weight peers. [2] These children with poor growth have high rate of mortality and morbidity and they suffer from motor and developmental delay.[3] Various longitudinal studies have revealed that LBW infants demonstrate retardation in motor, adaptive, personal, and social and language development in first five years of life. [4] Longitudinal studies are useful to observe the growth pattern of LBW babies over time. This type of studies reveals the velocity of growth of LBW babies in comparison to growth of NBW babies. Importance of such studies lies on the fact that different interventions for LBW babies can be initiated according to growth potentials of these babies. In rural areas incidence of LBW babies are more.[5] These babies grow with many added

disadvantages which hamper their growth and development in the most crucial years of life. But there are few longitudinal studies involving rural LBW infants in our country especially in this region. Therefore this longitudinal study was carried out in rural areas of Assam to assess the physical growth pattern of LBW babies during their first six months of life and to compare the growth pattern with NBW counterparts.

METHODS

A community based prospective longitudinal study was undertaken in Boko-Bongaon Development Block, Kamrup Assam. Which was also the rural field practice area of Dept of Community Medicine, Gauhati Medical College, Guwahati. Total 30 LBW babies (0 -2 months) and equal numbers of NBW babies were randomly selected (through SC registers) under five sub centres of Boko BPHC. They were followed up in monthly intervals till 6 months of age. Anthropometric measurements and WHO growth charts were used for growth assessment.

Sample size calculation: We randomly selected 5 Sub centres under the block PHC. For convenience from each sub centre we randomly selected six LBW babies (0 – 2 months) and equal number of NBW babies through SC records. Then we located those infants and followed up till six months of age

All singleton infants, whose parents were permanent residents of the study area and whose parents gave informed consent to be part of the study and who were available for follow up for six months were included in the study. Multiple births, those infants whose birth weight was not known, infants with major congenital malformations, severe birth asphyxia and chromosomal anomalies were excluded from the study. Ethical clearance was obtained from Gauhati Medical College ethics committee.

Statistics: The Data were entered in MS Excel 2007 software and statistical analysis was done in Statistical Package for the Social Science (SPSS 17.0) software. Percentage and proportion were used and calculation of Relative risk and Students t test were done. $P < 0.05$ was considered statistically significant.

Definitions:

LBW: Low birth weight is defined as the weight at birth of less than 2,500 gm (up to and including 2,499 gm) irrespective of gestational age.[6]

Catch up growth: Catch up growth is defined as reaching a height and weight within the normal range, that is achieving a weight and height above -2 Standard Deviation (>-2SD) of WHO growth standards.[7]

RESULTS

The LBW babies of age 0 to 2 months had a mean birth weight of 2.14 kg and the NBW babies of same age had a mean birth weight of 2.74 kg.

In the table 1 we can see that among LBW group mean weight gain is more than the comparison group. It was observed that mean length of the LBW infants was lower (53.1 cm) than that of NBW infants (55.5 cm) at first follow up visit and this difference was retained up to six months of age. However mean increase in length during first six months of age among the LBW was higher as compared to that of NBW infants. Similarly the mean Chest Circumference (CC) of LBW infants remained lower than that of NBW infants during first six months of age. The study also found that in the LBW group the mean increase in HC was more compared to NBW infants.

Table 1: Distribution of study subjects according to mean growth in follow up period

Variable	LBW babies			NBW babies		
	2 months	4 months	6 months	2 months	4 months	6 months
Mean Weight (kg)	3.6	5.2	6.3	4.1	5.8	6.8
Weight gain (kg)	1.46	1.6	1.1	1.36	1.7	1
Mean length (cm)	53.1	58.7	63.2	55.5	61.0	65
Increase in length (cm)	-	5.6	4.5	-	5.5	4
Mean CC (cm)	37.8	39.5	41.6	38.6	41	42.5
Increase in CC (cm)	-	1.7	2.1	-	2.4	1.5
Mean HC (cm)	35.8	38.5	40.1	38.3	40.7	42.2
Increase in HC (cm)	-	2.7	1.6	-	2.4	1.5

Table 2: Distribution LBW infants according to catch up growth during the follow up period N=30.

Category	2 months (%)	4 months (%)	6 months (%)
Weight	1 (3.3)	3 (10)	6 (20)
Height	1 (3.3)	2 (6.7)	5 (16.7)
Head Circum-ference	2 (6.7)	5 (16.7)	9 (30)

Table 3: Distribution of LBW and NBW infants according to their nutritional status at six month of age:

Nutritional status	LBW	NBW	Total
Underweight	24 (77.4)	7 (22.6)	31(100)
Normal	6 (20.6)	23(79.4)	29(100)
Total	30	30	60

RR= 3.74 95 % CI= 1.78 to 7.82

*figures in the paranthesis indicate percentage

Table 4: Distribution of LBW infants according to nutritional status and feeding pattern:

Nutritional status	Under-weight (%)	Normal (%)	Total(%)
Exclusive Breast Feeding	19 (79.2)	6 (20.8)	25 (100)
Not Exclusive Breast feeding	5 (100)	0	5 (100)
Total	24	6	30

Table 5: Distribution of LBW babies according to mean weight gain at six months and sex of the infants:

Sex	Number (%)	Weight gain in kg (Mean± SD)
Male	16 (53.6)	4.52±0.35
Female	14 (46.4)	3.47±0.46

t=7.08 DF=28 P<0.001

We observed that highest numbers of LBW infants (30%) could achieved catch up growth in head circumference during the follow up period. While 20% and 16.7% of LBW babies could achieve catch up growth in weight and length parameters during the same period (table 2).

Table 3 showed LBW and NBW infants according to their nutrition status at six months of age. Among the underweight infants 77.4% were LBW and only 22.6% were NBW infants. On calculating Relative risk (RR) for under nutrition among the LBW infants the calculated RR found to be 3.74.

Table 4 showed the LBW babies according to their breast feeding pattern and nutritional status. Percentage of under weight infants was 79.2% among exclusively breast fed infants but in not exclusively breast feeding infants 100% were found to be underweight at six months of age. Table 5 showed that difference in weight gain pattern in first six months of age was statistically significant between the males and the female LBW babies.

DISCUSSION

Table 1 revealed that LBW infants had higher weight gain as compared to NBW infants in the first six months of life. Similarly Bavdekar A R et al (1994) in their study observed that LBW infants demonstrate rapid growth in the first six months of life followed by generally parallel trends with NBW infants. [7] Ashworth A et al also reported improved weight for age Z score in more than 90% of LBW babies during first 12 months of age with substantial and progressive catch up growth.[8]

The present study observed that mean length of the LBW infants (53.1cm) of LBW infants was lower than that of NBW infants (55.5cm) at first follow up visit and this difference was retained up to six months of age. However mean increase in length during first six months of age among the LBW was higher as compared to that of NBW infants. Paul B et al also reported similar findings in their study. [9] Baburaj S et al also reported significant mean length gain during the follow up period among the preterm and LBW inafants.[10]

The present study revealed that with increase in age more numbers of LBW infants under study caught up with the normal growth standards. Highest percentage of LBW infants under study achieved catch up growth in Head Circumference (30%) followed by weight and length by 6 months of age. Karim E et al also observed catch up growth at 6 months among LBW babies of urban areas of Bangladesh.[11] Similarly Westerberg AC et al reported that Very low birth weight infants showed catch up growth during the first year, but their weight and length remained less than full term peers.[12] Modi M et al also reported that VLBW infants had catch up growth later during infancy but comparison to NBW infants; they continue to lag in their physical growth at 1 year of corrected age.[13]

In our study on calculating Relative risk (RR) for under nutrition among the LBW infants the cal-

culated RR was found to be 3.74. That indicated that the LBW infants were 4 times increased risk of suffering from under nutrition than the NBW infants during the first 6 months of age. Motta MEFA et al also found that Low birth weight was an important risk factor of nutritional risk at the end of the first year of life.[14]

Our study revealed that the mean weight gain of male LBW babies (4.52 kg) were more than that of the female LBW babies (3.47 kg) during the first six months of age. This difference in weight gain between males and female LBW infants was found to be statistically significant in the present study. Similarly Guo S S et al in their study of growth pattern of 867 preterm LBW infants during first 3 years of life, found that among the LBW infants, boys had larger weight, height and HC increment as compared to girls ($p<0.05$) [15]Kattula D et al also reported that The average monthly height and weight gain in girls was less than the boys.[16]

CONCLUSION

The present study found that low birth weight infants able to achieve catch up growth during first six months of age and they had higher rate of weight gain, increase in length and increase in head circumference than the NBW infants. But birth weight remained a significant risk factor for development of malnutrition among LBW babies at six months of age.

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