

Research Article

Growth Parameters and Follow up of Low-Birth-Weight Healthy Newborn Discharged from Post Natal Ward of Dr. BRAMH Raipur till 4 Month of Age

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Abstract

Introduction: LBW is known to be associated with subsequent health issues such as poor anthropometric growth in childhood. Late catch-up growth of preterm infants throughout childhood linked to an adverse health outcome. The aim of this study is to study the growth parameters of healthy low birth weight neonates discharged from post-natal ward.

Material and methods: This was a hospital based prospective cross-sectional study conducted in year of 2022 in the department of pediatrics at Pt JNMCH, Raipur. Vitrally stable LBW neonates were recruited in the study. The sample size calculated was 140. At the time of birth anthropometric measurement i.e. head circumference, length, weight was taken. Follow up was done again at 1.5 month, 2.5 month and 3.5 month. Informed consent was taken from care takers prior to inclusion in the study.

Results: In present study 140 newborns were followed up for their growth. The mean difference between birth weight at birth and at 1.5 months was 1.150 kg ($p < 0.01$), at 1.5 months and weight at 2.5 months was 1.129 kg ($p < 0.01$) and at 2.5 months and weight at 3.5 months was 1.436 kg ($p < 0.01$). Type of feed wise mean weight gain at 1.5 months was highest on those on formula feed, mother milk and those on mixed feed. Male had higher mean weight gain than female.

Conclusion: The present study concluded that postnatal lactation counseling leads to higher weight gain in infants as compared to those on formula feed.

Keywords: Low birth weight; Growth pattern; Follow up; Counseling; Weight gain

Introduction

Growth pattern of Low Birth Weight (LBW) infants after discharge is a good measure of physical, neurologic, and environmental well-being [1]. Low birth weight is one of the main determinants of neonatal and postnatal morbidity. According to World Health Organization (WHO) statistics, the rate of LBW is 17% in the entire world [2]. LBW classification is determined at birth and based on the absolute weight of the baby at birth regardless of gestational age and can be caused by preterm delivery [3,4]. LBW is known to be associated with subsequent health issues such as poor anthropometric growth in childhood and higher incidence of non-communicable disease in adulthood [5-7]. Growth and nutrition in preterm infants have long-term implications for neuro developmental and cardio metabolic outcomes [8].

A significant number of discharged LBW infants have their growth parameters below the normal range. In particular, Very Low Birth Weight (VLBW) infants and Small for Gestational Age (SGA)

preterm infants have a higher risk of growth deviations [9]. Several studies have shown an association between impaired extra uterine growth and poor long-term performance [10].

The catch-up growth patterns of preterm infants have been a matter of debate. Approximately 80% of preterm infants after initial postnatal growth failure show catch-up growth, and often achieving targets within the first two years of life [11]. However, late catch-up growth of preterm infants throughout childhood and even in adolescence has also been described. Catch-up growth is linked to an adverse health outcome, while rapid catch-up increases the risk of metabolic disease later in life [12].

The aim of this study was to study the growth parameters of healthy low birth weight neonates discharged from post-natal ward of Dr. BRAM Hospital Raipur. The study was based on follow-up work conducted in a tertiary-level public teaching hospital.

Aims and Objectives

Aim

To study the growth parameters of Healthy Low birth weight neonates discharged from post-natal ward of Dr. BRAM Hospital Raipur.

Objective

- To study the growth parameter at one and half month, two and half month, and three- and half-month intervals of healthy low birth weight neonate discharged from post-natal ward.
- To study the weight gain in low-birth-weight neonate discharged from post-natal ward of Dr. BRAMH Hospital Raipur according to feeding practices.

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Material and Methods

This was a hospital based prospective cross-sectional study conducted from January 2022 to December 2022. The study was conducted in post-natal ward of Dr. BRAMH Raipur Department of pediatrics after getting permission from ethical committee. All the low-birth-weight neonates (1.8 kg to 2.5 kg) discharged from post-natal ward was taken as study subjects.

Sample size for one sample proportion was calculated in the present study using the formula: $N = z_{1-\alpha/2}^2 \cdot p(1-p) / d^2$, where $z_{1-\alpha/2} = 1.96$ at 95% CI, $P =$ proportion of low-birth-weight infants improved in weight for age = 90.2%, $d =$ margin, error rate = 0.05. Thus, the sample size was $N = 140$. Newborn having congenital anomaly, admitted in NICU from Postnatal ward and those lost to follow up were excluded from the sample.

Neonates born in the Dr. Bhim Rao Ambedkar hospital Raipur weighing 1.8 kg to 2.5 kg and those vitally stable were recruited in the study. At the time of birth anthropometric measurement i.e., head circumference, length, weight was taken. Along with this detailed history including demographic details, gestational age, mother detail, and socioeconomic status was taken. After discharge infants were followed up between one month to one and half month, in the follow up again weight, length, and head circumference were measured. If infants were not gaining weight adequately, their mothers were counseled about the proper feeding positioning, to avoid bottle feeding, benefit of exclusive breast feeding, and to maintain hygiene to prevent illness.

Follow up was done again on between two to two and half month and again mothers were counseled about positioning and type of feed and about breast feeding practices. The third follow up which was done at the age between 3 and 3 and a half month, weight, head circumference and length were noted and compared with the birth, first and second visit measurement and statistical analysis was done, and result was prepared.

Data was entered in Microsoft excel using specified format and analysis was done using SPSS-20 version. Frequency and percentages were calculated whenever require. Data was presented in mean and standard deviations. Independent sample t test, paired t test and ANOVA tests were applied to measure the difference in weight gain of infant's and statistical significance was taken P value < 0.05 . Informed/written consent was taken from care takers prior to inclusion in the study.

Results

In present study 140 newborns were followed up for their growth. Table 1 show that the mean birth weight of newborns at the time of birth was 2.01 kg, head circumference was 32.05 cm and birth length was 47.97 cm. Whereas the mean birth weight of newborns at the age of 1.5 months was 3.16 kg, head circumference was 34.01 cm and birth length were 52 cm.

The mean difference between birth weight at birth and at 1.5 months was 1.150 kg ($p < 0.01$). The mean difference between birth length at birth and at 1.5 months was 4.029 cm ($p < 0.01$). The mean difference b/w birth HC at birth and at 1.5 months was 1.957 cm ($p < 0.01$).

Table 2 shows that the mean birth weight of newborns at the age of 2.5 months was 4.29 kg; head circumference was 34.83 cm and birth length were 54.92 cm. The mean difference between birth weight

at 1.5 months and weight at 2.5 months was 1.129 kg ($p < 0.01$). The mean difference between birth length at 1.5 months and length at 2.5 months was 2.929 cm ($p < 0.01$). The mean difference b/w birth HC at 1.5 months and HC at 2.5 months was 0.829 cm ($p < 0.01$).

Table 3 shows that the mean birth weight of newborns at the age of 3.5 months was 5.61 kg, head circumference was 36.02 cm and birth length was 61.86 cm. The mean difference between birth weight at 2.5 months and weight at 3.5 months was 1.436 kg ($p < 0.01$). The mean difference between birth length at 2.5 months and length at 3.5 months was 6.936 cm ($p < 0.01$). The mean difference between HC at 2.5 months and HC at 3.5 months was 1.186 cm ($p < 0.01$).

Table 4 shows the type of feed wise mean weight gain at 1.5 months was 3.27 kg in those on formula feed and 3.16 kg among those on mother milk and 3.08 kg among those on mixed feed. The mean weight gain at 2.5 months was 4 kg in those on formula feed and 4.29 kg among in those on mother milk and 4.23 kg among in those on mixed feed. The mean weight gain at 3.5 months was 5.72 kg in those on mother milk and 5.75 kg in those on mixed feed. Difference between weight at different interval was tested using one way ANOVA test and it was statistically significant ($p < 0.05$) (Table 5).

At 1.5-month 28.57% newborn does not gain adequate weight, again follow up was done at 2.5 month and 14.29% infants did not gain adequate weight. At 3.5 month to 4 month 2.86% infants did not gain adequate weight.

Discussion

In present study after post-natal counseling the mean difference between birth weight and weight at 1.5 months was 1.150 kg. The mean difference between birth length and length at 1.5 months was 4.029 cm. The mean difference between birth Head Circumference and Head Circumference at 1.5 months was 1.975 cm. The difference between the growth parameters at age of 1.5 months from the birth parameters were statistically significant ($p < 0.01$). Hilaire et al. [13] (2011) did a similar study and reported that in LBW babies gained a mean birth weight of 0.71 kg at 1.5 months and the difference was statistically significant. Good friend MS (2004) reported that mean birth weight of 0.951 kg was gained in LBW babies [14].

In present study the mean difference between weight at 1.5 months and weight at 2.5 months was 1.129 kg. The mean difference between length at 1.5 month and length at 2.5 months was 2.929 cm. The mean difference between Head Circumference at 1.5 month and Head Circumference at 2.5 months was 0.829 cm. The difference between the growth parameters at age of 2.5 months from the 1.5 months parameters were statistically significant ($p < 0.01$). Martins-Celini et al. [15] (2018) did a similar study and reported that in LBW babies gained a mean birth weight of 1.21 kg at 2.5 months and the difference was statistically significant. Freitas M et al. [16] (2004) reported that the mean difference between weight at 1.5 months and weight at 2.5 months was 1.238 kg and difference between length at 1.5 months and length at 2.5 months was 3.121 cm. The mean difference Head Circumference at 2.5 months was 0.901 cm [16].

In present study the mean difference between weight at 2.5 months and weight at 3.5 months was 1.436 kg. The mean difference between length at 2.5 months and length at 3.5 months was 6.936 cm. The mean difference between Head Circumference at 2.5 months and Head Circumference at 3.5 months was 1.186 cm. The difference between the growth parameters at 2.5 month and at 3.5 months were statistically significant ($p < 0.01$). Ozdemir et al. [17] (2020) revealed

Table 1: Difference in growth parameters from birth to age of 1.5 month.

Growth parameters	No. of cases	Mean	Std. Deviation	Mean difference	t	P value
Weight at 1.5 month	140	3.16	0.513	1.15	26.076	p<0.01
Birth weight	140	2.01	0.085			
Length at 1.5 month	140	52	2.298	4.029	21.585	p<0.01
Birth Length	140	47.97	1.292			
HC at 1.5 month	140	34.01	2.367	1.957	14.237	p<0.01
HC at birth	140	32.05	1.913			

Table 2: Difference in growth parameters from age of 1.5 month to age of 2.5 months.

Growth parameters	No. of cases	Mean	Std. Deviation	Mean difference	t	P value
Weight at 2.5 month	140	4.29	0.671	1.129	20.045	p<0.01
Weight at 1.5 month	140	3.16	0.513			
Length at 2.5 month	140	54.93	2.684	2.929	10.011	p<0.01
Length at 1.5 month	140	52	2.298			
HC at 2.5 month	140	34.84	2.009	0.829	4.326	p<0.01
HC at 1.5 month	140	34.01	2.367			

Table 3: Difference in growth parameters from age of 2.5 month to age of 3.5 months.

Growth parameters	No. of cases	Mean weight	Std. Deviation	Mean difference	t	P value
Weight at 3.5 month	140	5.72	0.481	1.436	28.205	p<0.01
Weight at 2.5 month	140	4.29	0.671			
Length at 3.5 month	140	61.86	3.303	6.936	25.475	p<0.01
Length at 2.5 month	140	54.93	2.684			
HC at 3.5 month	140	36.02	1.412	1.186	9.347	p<0.01
HC at 2.5 month	140	34.84	2.009			

Table 4: Association b/w growth parameters of newborns and type of feeding.

Growth parameters	Type of feed	No. of cases	Mean weight	Std. Deviation	95% Confidence Interval for Mean		P value
					Lower Bound	Upper Bound	
Weight at 1.5 month	Formula feed	11	3.27	0.467	2.96	3.59	0.045
	Mother milk	105	3.16	0.539	3.06	3.27	
	Mixed feed	24	3.08	0.408	2.91	3.26	
Weight at 2.5 month	Formula feed	1	4				0.006
	Mother milk	126	4.29	0.658	4.18	4.41	
	Mixed feed	13	4.23	0.832	3.73	4.73	
Weight at 3.5 month	Mother milk	132	5.72	0.484	5.64	5.8	0.03
	Mixed feed	8	5.75	0.463	5.36	6.14	

Table 5: Infants who gain adequate weight at different interval.

Growth parameter	Weight at 1.5 month	Weight at 2.5 month	Weight at 3.5 month
Adequate weight gain	100 (71.43%)	120 (85.71%)	136 (97.14%)
Not gain adequate weight	40 (28.57%)	20 (14.29%)	4 (2.86%)
Total	140	140	140

the mean difference between birth weight at 2.5 months and weight at 3.5 months was 1.578 kg. The mean difference between length at 2.5 months and length at 3.5 months was 8.471 cm [17].

Conclusion

The study concluded that at 1.5 to 7 months 1.43% newborn gained adequate weight counseling was done to all mothers and during at follow up at 2.5 months 85.71% newborns gained adequate weight and at 3.5 months 97.14% newborns gain adequate weight.

The present study recognizes the necessary emphasize on the importance of growth of LBW children and proper education of their mothers about nutrition of their children for early and timely diagnosis and management of growth retardation and prevention of subsequent problems. The present study also suggests that postnatal lactational counseling leads to higher weight gain in infants as compared to those on formula feed.

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