

Catch-up Growth of Low Birth Weight Infants: A Study Among the Infants Born in the Backward Areas of Howrah

Arpita Mandal Nandi

Panchla Mahavidyalaya, Howrah, India

Email address:

mandalarpita@yahoo.co.in

To cite this article:

Arpita Mandal Nandi. Catch-up Growth of Low Birth Weight Infants: A Study Among the Infants Born in the Backward Areas of Howrah. *Social Sciences*. Vol. 8, No. 5, 2019, pp. 206-213. doi: 10.11648/j.ss.20190805.11

Received: March 8, 2019; **Accepted:** July 5, 2019; **Published:** September 10, 2019

Abstract: *Background:* Babies having low birth weight are comparatively more susceptible to infection and are unable to grow to their full potential of physical and mental development. This often lead to high infant morbidity and mortality. Hence, it becomes important to identify the low birth weight infants and offer them adequate care. This study was carried in the District of Howrah. This study was conducted among 732 LBW survivors and 314 NBW controls from birth to nine months of age. Their growth trends (weight, length, head and chest circumferences) were followed and compared. *Objectives:* The physical growth pattern of low birth weight and normal birth weight babies under study were compared, relative influence of certain variables on the catch up growth of LBW infants were to be determined and the catch up growth in terms of increments in Height, Length, Weight, Head and Chest Circumferences were analyzed. *Results:* The catch-up growth among the LBW infants in almost all the anthropometric measurements were of lower values as compared to their NBW counterparts. However the increments in growth were seen to be higher in different months of age for different measurements. The catch-up growth was contributed by gestational age, birth weight, birth length, birth head and chest circumferences. Regarding catch-up growth, length, head circumference and chest circumference were the parameters to start up early as in the 1st month in case of chest circumference followed by length and head circumference in the 2nd month of age. Weight was quite late as much as 4th month. LBW babies were much closer to their NBW counterparts in the 6th month in all the parameters under this study.

Keywords: Catch up Growth, Low Birth Weight, Preterm, IUGR

1. Introduction

In India, low birth weight has been of a high incidence and the subsequent morbidity and mortality continues to be of a major issue in the domain of public health intervention. The determinants of the growth and development of the low birth weight infants are mostly socio-economic, and the effects of the birth weight are reflected in the growth and development of the infants [4, 24]. Majority of the LBW infants show accelerated growth, or catch up growth as it is termed. Most of this catch up growth takes place during 6 to 12 months of life both in terms of weight and/or length, [20, 25]. The effect of "Catch-up-growth" is most pronouncedly seen in the LBW infants who tend to catch up mostly in weight during the post-natal period [19, 23]. Infants born for small for their gestational age (SGA) show catch up growth in the first few months of their life [14]. India has one-third of all babies born as low birth weight. There have been initiatives adapted

by the Indian Government to promote rapid growth in infancy [21]. Infectious morbidities, under nutrition and stunting in children are the key factors that the policy makers have to deal with. However, socio-economic transition and urbanization make the Indian environment uncertain for attaining the optimal growth pattern of such infants. Studies have shown the effect of catch up growth is more pronounced in LBW infants [26]. As we consider catch up growth to be a measure of favorable outcome, it becomes important to identify its determinants [3].

The present study analyses catch up growth and its determinants in a group of LBW infants followed up longitudinally from birth to 9 months of age.

Aims and Objectives:

- To compare the physical growth pattern of low birth weight and normal birth weight babies under study.
- To find out the relative influence of certain variables on the catch up growth of LBW infants.

- c. To analyze the catch up growth in terms of increments in Height, Length, Weight, Head Circumference and Chest Circumference.

2. Materials and Methods

A total of 732 infants born weighing 1500gms or less, in the Howrah District Hospital were considered for this study. On the other hand, 314 infants born of normal birth weight were considered for comparison. The infants were considered from the very first month of their birth in between two weeks to 30 days age. The mother and the family was adequately explained on the scientific base of the study and that the utility of the results derived will further give us knowledge

on how to care for the low birth weight infants born and to reduce the number of problems that the families go through. The following information were recorded from the Hospital:

1. Birth weight
2. Sex
3. Gestational age assessment
4. Neonatal illness if any
5. Type of milk provided in the very first month.

The weight was measured by standard electronic scales while length and circumferential measurements were measured by flexible measuring tapes. The catch-up in all anthropometric measurements was observed.

3. Results

Table 1. Comparison of pattern of weight increment between Low birth weight (LBW) and Normal weight infants (NBW) from birth to nine months of age.

Age	LBW				NBW				t
	No.	Mean wt. (in gms)	Mean Increment (in gms)	SD	No.	Mean wt. (in gms)	Mean increment (in gms)	SD	
0	732	1540.08	-	-	314	2683.72	-	-	-
1	732	2080.00	539.92	87.37	314	3356.37	672.65	81.28	0.47
2	732	2791.63	711.63	93.41	314	4080.69	724.32	97.78	0.83
3	732	3427.91	636.28	107.89	314	4727.96	647.27	101.81	0.67
4	732	3937.28	509.37	91.49	314	5204.27	476.31	63.93	1.93*
5	732	4468.12	530.84	81.36	314	5621.08	416.81	52.03	6.41*
6	732	4884.35	416.23	69.43	314	5999.69	378.61	56.17	2.38*
7	732	5157.00	272.65	73.16	314	6280.60	280.91	64.28	0.67
8	732	5465.28	308.28	53.42	314	6538.29	257.69	57.81	1.98*
9	732	5711.87	246.59	41.17	314	6806.66	268.37	53.91	0.71

P<0.05

Analysis of Table 1: As weight of the LBW and NBW infants were recorded from birth to nine months of age, it was seen that the mean birth weight of the LBW infants were lower as compared to their NBW counterparts all throughout the period of follow up. The mean increments of weight recorded in each month reveal that in the 4th, 5th 6th and 8th months the LBW infants showed higher weight increments than the NBW infants. The differences shown in these months were significant at 5% level.

Table 2. Pattern of weight increment comparison between preterm and IUGR infants from birth to nine months of age.

Age	Preterm				IUGR				t
	No.	Mean wt. (in gms)	Mean increment (in gms)	SD	No.	Mean wt. (in gms)	Mean increment (in gms)	SD	
0	281	1519.13	---	---	451	1803.26	---	---	---
1	281	2059.30	540.17	70.41	451	2309.80	607.54	85.41	0.81
2	281	2747.21	687.91	127.03	451	2903.38	593.58	98.63	0.67
3	281	3375.42	628.21	93.11	451	3570.67	667.29	84.07	2.51*
4	281	3878.54	503.12	62.36	451	4068.03	497.26	57.52	1.89*
5	281	4398.11	519.57	94.15	451	4565.61	497.58	44.07	1.73
6	281	4805.81	407.69	90.26	451	4955.12	389.51	64.47	0.05
7	281	5070.71	264.91	88.71	451	5214.55	259.43	47.13	0.18*
8	281	5375.27	304.56	51.73	451	5500.93	286.38	46.71	2.17*
9	281	5613.94	238.67	43.27	451	5728.54	227.61	0	1.28

P<0.05

Analysis of Table 2: The pattern of weight increment of the preterm and IUGR infants were compared in this table. The observation was that the preterm babies were lower in mean weight as compared to the IUGR infants till the age of 3 months only. Fourth month onwards the mean increment in weight was higher in the preterm babies than their IUGR counterparts. Significant differences at 5% level was seen in the 3rd, 4th, 7th and 8th month of age.

Table 3. Pattern of length increment comparison between LBW and NBW infants from birth to nine months of age.

Age	LBW				NBW				t
	No.	Mean Length (cm)	Mean increment (cm)	SD	No.	Mean Length (cm)	Mean increment (cm)	SD	
0	732	41.43	---	---	314	44.52	---	---	---
1	732	44.30	2.87	0.37	314	46.99	2.47	0.51	5.27*
2	732	46.83	2.53	0.54	314	49.38	2.39	0.63	2.48*
3	732	49.51	2.68	0.47	314	51.86	2.48	0.58	1.69
4	732	51.69	2.18	0.59	314	53.84	1.98	0.61	0.74
5	732	53.48	1.79	0.56	314	55.48	1.64	0.57	0.70
6	732	55.09	1.61	0.48	314	57.15	1.67	0.61	0.13
7	732	56.36	1.27	0.53	314	58.84	1.69	0.58	2.38*
8	732	57.90	1.54	0.47	314	60.42	1.58	0.62	0.19
9	732	59.33	1.43	0.50	314	61.99	1.57	0.48	0.17

P<0.05

Analysis of Table 3: This table shows the comparison of the increment of length in the LBW and NBW infants from birth to nine months of age. In contrast to weight increments length did not show higher values for the LBW infants all throughout the nine months of age. However 2nd, 3rd and 7th months show significant differences in weight increment at 5% level.

Table 4. Pattern of length increment comparison between Preterm and IUGR infants from birth to nine months of age.

Age	Preterm				IUGR				t
	No.	Mean Length (cm)	Mean increment (cm)	SD	No.	Mean Length (cm)	Mean increment (cm)	SD	
0	281	39.46	---	---	451	42.31	---	---	---
1	281	42.25	2.79	0.46	451	44.95	2.64	0.39	0.43
2	281	44.74	2.49	0.53	451	47.31	2.36	0.47	1.37
3	281	47.31	2.57	0.47	451	50.00	2.69	0.49	0.76
4	281	51.27	3.96	0.63	451	53.17	3.17	0.57	0.93
5	281	53.00	1.73	0.51	451	55.22	2.05	0.52	3.43*
6	281	54.57	1.57	0.50	451	56.41	1.19	0.49	2.17*
7	281	55.81	1.24	0.54	451	57.54	1.13	0.41	1.78
8	281	57.29	1.48	0.43	451	58.86	1.32	0.46	1.89
9	281	58.65	1.36	0	451	60.29	1.43	0	1.27

P<0.05

Analysis of Table 4: This table compares the length increment among the preterm and IUGR infants from birth to nine months of age. It reveals that the mean length values in the preterm infants were lower all throughout and in contradiction to it the increments showed higher values in all the months of age, and moreover 5th and 6th show significant differences at 5% level.

Table 5. Pattern of Head Circumference (HC) increment comparison between LBW and NBW infants from birth to nine months of age.

Age	LBW				NBW				t
	No.	Mean HC (cm)	Mean increment (cm)	SD	No.	Mean HC (cm)	Mean increment (cm)	SD	
0	732	28.23	---	---	314	30.95	---	---	---
1	732	30.20	1.97	0.27	314	32.96	2.01	0.46	0.58
2	732	31.93	1.73	0.38	314	34.64	1.68	0.39	2.47*
3	732	33.60	1.67	0.49	314	36.20	1.62	0.41	0.38
4	732	34.83	1.23	0.53	314	37.23	0.97	0.37	3.69*
5	732	35.81	0.98	0.47	314	38.07	0.84	0.28	1.31
6	732	36.64	0.83	0.38	314	38.84	0.77	0.27	3.56*
7	732	37.33	0.69	0.29	314	39.53	0.69	0.27	1.13
8	732	37.90	0.57	0.27	314	40.16	0.63	0.28	0.48
9	732	38.53	0.63	0.36	314	40.76	0.60	0.27	0.17

P<0.05

Analysis of Table 5: Head circumference measurements were compared here between the LBW and NBW infants through the nine months of age of the infants. Results show the same trend as in case of weight and length measurements that, the LBW infants had lower values in all the months of study while increments had higher values in the 2nd, 4th and 6th month of age as compared to the NBW infants and the differences were significant at 5% level.

Table 6. Pattern of Head Circumference (HC) increment comparison between Preterm and IUGR infants from birth to nine months of age.

Age	Preterm				IUGR				t
	No.	Mean HC (cm)	Mean increment (cm)	SD	No.	Mean HC (cm)	Mean increment (cm)	SD	
0	281	27.01	---	---	451	29.48	---	---	---
1	281	28.99	1.98	0.23	451	31.59	2.11	0.27	1.06
2	281	30.75	1.76	0.38	451	33.38	1.79	0.46	0.29
3	281	32.53	1.78	0.26	451	34.91	1.53	0.54	2.03
4	281	33.65	1.12	0.41	451	36.27	1.36	0.57	1.47
5	281	34.82	1.17	0.46	451	37.20	0.93	0.40	1.88
6	281	35.90	1.08	0.40	451	38.07	0.87	0.31	0.83
7	281	36.43	0.53	0.28	451	38.50	0.43	0.23	3.08*
8	281	37.17	0.74	0.24	451	39.01	0.51	0.21	1.49
9	281	37.86	0.69	0.24	451	39.51	0.50	0.24	1.28

P<0.05

Analysis of Table 6: Among the LBW infants, the preterm and the IUGR infants were further compared in the measurements of the Head circumference measurements. The IUGR infants caught up at a higher rate as compared to their preterm counterparts. However the preterm infants showed higher increments from the 3rd month of age and continued till the 9th month. Significant difference at 5% level was found only in the 7th month.

Table 7. Pattern of Chest Circumference (CC) increment comparison between LBW and NBW infants from birth to nine months of age.

Age	LBW				NBW				t
	No.	Mean CC (cm)	Mean increment (cm)	SD	No.	Mean CC (in gms)	Mean increment (in gms)	SD	
0	732	24.04	---	---	314	27.15	---	---	---
1	732	26.82	2.78	0.41	314	29.88	2.47	0.49	2.17*
2	732	29.07	2.47	0.47	314	31.75	2.19	0.53	4.21*
3	732	31.06	1.89	0.59	314	32.68	1.69	0.51	2.48*
4	732	32.91	1.58	0.48	314	34.14	1.23	0.37	7.48*
5	732	33.06	1.27	0.37	314	35.03	0.97	0.41	3.17*
6	732	34.73	1.02	0.31	314	36.08	0.74	0.38	1.89*
7	732	36.02	0.98	0.27	314	37.89	1.12	0.39	1.37
8	732	37.04	0.67	0.31	314	40.01	1.93	0.36	0.28
9	732	38.06	0.71	0.28	314	41.22	0.78	0.34	0.43

P<0.05

Analysis of Table 7: This table show the measurements of Chest circumference and its comparison in the LBW and NBW infants. The LBW infants here too follow the same trend of having lower values all throughout the nine months of age as compared to the NBW infants. Higher increments were seen in the 1st to 6th month of age among the LBW infants. The differences in these month of age show significance at 5% level.

Table 8. Pattern of Chest Circumference (CC) increment comparison between Preterm and IUGR infants from birth to nine months of age.

Age	Preterm				IUGR				t
	No.	Mean CC (cm)	Mean increment (cm)	SD	No.	Mean CC (cm)	Mean increment (cm)	SD	
0	281	22.37	---	---	451	25.27	---	---	---
1	281	25.38	3.01	0.49	451	28.20	2.93	0.38	1.25
2	281	28.25	2.87	0.45	451	30.87	2.67	0.47	0.17
3	281	30.59	2.34	0.68	451	32.85	1.98	0.44	3.11*
4	281	32.26	1.67	0.29	451	34.58	1.73	0.57	0.31
5	281	33.61	1.35	0.43	451	35.85	1.27	0.31	0.18
6	281	34.67	1.06	0.29	451	36.88	1.03	0.27	0.41
7	281	35.65	0.98	0.27	451	37.85	0.97	0.18	2.81*
8	281	36.88	1.23	0.24	451	38.61	0.76	0.29	1.87
9	281	37.85	0.97	0.28	451	39.44	0.83	0.24	0.95

P<0.05

Analysis of Table 8: Chest circumference measurements were here compared between the preterm and IUGR infants. The preterm infants here lagged behind their IUGR

counterparts almost in measurements as well as increments except in the 8th month. Significant difference was seen in the 3rd and 7th month at 5% level.

Table 9. Catch- up growth of weight of LBW in comparison to NBW infants from first to six months (n=732).

Age	NBW mean wt. (gms) $\pm 2SD$	Catch-up growth among LBW
1	3356.37 \pm 486.48	325 (44.39)
2	4080.69 \pm 687.31	366 (50.0)
3	4727.96 \pm 791.46	426 (58.1)
4	5204.27 \pm 825.91	447 (61.06)
5	5621.08 \pm 865.33	153 (20.90)
6	5999.69 \pm 578.32	528 (72.13)

Percentage are shown in parenthesis

Analysis of Table 9: This table reveals that a greater proportion of LBW infants (72.13) caught up with the range of 2 Standard Deviation of their NBW counterparts in context of weight at the 6th month age.

Table 10. Catch- up growth of length of LBW in comparison to NBW infants from first to six months (n=732).

Age	NBW mean length (cms) $\pm 2SD$	Catch-up growth among LBW
1	46.99 \pm 4.07	549 (75.0)
2	49.38 \pm 4.79	598 (81.6)
3	51.86 \pm 4.83	606 (82.7)
4	53.84 \pm 5.17	608 (83.0)
5	55.48 \pm 5.39	605 (82.6)
6	57.15 \pm 5.68	593 (81.0)

Percentage are shown in parenthesis

Analysis of Table 10: According to this table, the maximum number of LBW infants (608) caught up with their NBW counterparts at the 4th month (83.0%) after which their proportion gradually decreased till 6th month of age (81.0%).

Table 11. Catch- up growth of head circumference of LBW in comparison to NBW infants from first to six months (n=732).

Age	NBW mean HC (cms) $\pm 2SD$	Catch-up growth among LBW
1	32.96 \pm 2.13	319 (43.5)
2	34.64 \pm 2.01	373 (50.9)
3	36.26 \pm 2.37	355 (48.4)
4	37.23 \pm 2.41	412 (56.2)
5	38.07 \pm 2.39	491 (67.0)
6	38.84 \pm 2.27	453 (61.8)

Percentage are shown in parenthesis

Analysis of Table 11: This Table reveals that at the 5th month highest number of LBW infants (67.0) caught up with their NBW counterparts in relation to the head circumference.

Table 12. Catch- up growth of chest circumference of LBW in comparison to NBW infants from first to six months (n=732).

Age	NBW mean CC (cms) $\pm 2SD$	Catch-up growth among LBW
1	29.62 \pm 2.49	240 (32.7)
2	31.81 \pm 2.83	366 (50.0)
3	33.50 \pm 2.74	321 (43.8)
4	34.73 \pm 2.36	466 (63.6)
5	35.70 \pm 2.18	466 (63.6)
6	36.44 \pm 2.34	466 (63.6)

Percentage are shown in parenthesis

Analysis of Table 12: The table reveals maximum number

of LBW infant (63.6%) caught up with their NBW counterparts in relation to chest circumference at the 4th month after which the proportion remained same till the 6th month of age.

4. Discussion

Low birth weight is one of the major concerns in the domain of public health problems in India and developing countries. The occurrence of LBW in any community is indicator enough of its poor health status of pregnant women and inadequate prenatal care[16]. The babies born low in birth weight have a bad start in life and prove to develop diseases due to recurrent infections, malnutrition and are often handicaps in neuro-developmental stages [8]. Studies show emerging issues of life style diseases like, diabetes, hypertension and coronary artery disease in adult life of the LBW born [15]. Thus, LBW is a risk factor for adverse outcome in life.

In the present study, there was a scope to analyze the growth pattern of the preterm and IUGR infants. The results reveal that in general the preterm infants experienced faster rates in terms of growth increment compared to the IUGR infants. As comparisons were made in context of the growth pattern, between the preterm and IUGR infants, it was observed that the parameters considered here, weight (Table 2), length (Table 4), Head circumference (Table 6) and chest circumference (Table 8), show lower values in all the parameters for the preterm infants than the IUGR infants. This trend persisted all throughout the study period from birth to nine months of age. This observation is well in accordance with various studies like [7, 11, 15]. However, studies [9, 19, 22]. differ in saying that the mean weight of the preterm had higher values from the fourth month onwards as compared to the IUGR infants. In the present study, the values for weight also followed the same trend as other measurements. Preterm infants were having lower values as compare to their IUGR counterparts all throughout (Table 2). Considering the monthly increments of the anthropometric measurements, the results reveal in favor of the preterm.

Table 13. Comparisons of increment of each anthropometric parameter between preterm and IUGR infants.

Age	Wt. increment	Length increment	HC increment	CC increment
1	Less	More	Less	More
2	More	More	Less	More
3	Less	More	More	More
4	More*	More	More	Less
5	More	Less*	More	More
6	More	More*	More	More
7	More*	More	More*	Same
8	More*	More	More	Same
9	More	Less	More	Same

* statistically significant difference

This study (according to Table 13) reveals that, the mean

weight increment of the preterm was higher as compared to the IUGR infants except for 1st month and 3rd month (Table 2). The mean length increments (Table 4) were higher among the preterm infants consistently throughout the eight months of age, except for the ninth month showing slight lower values. The 5th and 6th month differences were found to be significantly higher. Table 6 reveals the differences of increments in HC, where preterm however show higher increments in the 3rd, 5th, 6th, 7th, 8th and 9th months. In case of increments in Chest circumference (Table 8), higher values were in favor of the preterm from the 1st month till the ninth month except for the 4th month.

When given adequate care, LBW infants can show significant catch –up growth. The monthly incremental variability of the anthropometric parameters is influenced mainly by gestational age, birth weight, effect of illness, nutritional intake, heredity and environmental factors at home [12]. Here the growth of the Normal birth weight (NBW) infants was taken considering it as the standard at each month in order to compare the LBW infants. It was taken into consideration that, both the groups lived in more or less homogenous environmental condition. As all the infants were followed up till nine months of age, analysis of

catch-up growth was done up to nine months. In this study, Tables 1, 3, 5, 7 show the comparisons of anthropometric parameters and their increment, between LBW and NBW infants. Table 9 summarize the findings regarding the catch-up growth of the LBW under study. According to this, length showed the highest percentage, 85.3 % catch up in the 3rd month in LBW infants, followed by weight 74.6% in the 6th month. Head circumference showed an increase in the 5th month among 68.1% LBW infants while 63.6% infants showed catch-up in the chest circumference in the 4th month age.

Table 14. Scores assigned to multifactorial analysis of different categorical variables.

Variables	Scores assigned	
	1	2
Catch up	No	Yes
Religion	Muslim	Hindu
Maternal literacy	Illiterate	Literate
Infant sex	Male	Female
Neonatal morbidity	Yes	No

Absolute values were assigned to the continuous variables for multifactorial analysis.

Table 15. The correlation matrix of 11 variables.

Variables	G. age	Religion	Income	Sex	Weight	M. Lit	Length	HC	CC	Morbidity	Catch up
G. age	1.00	0.17	0.42*	0.23	0.58*	0.29	0.44*	0.79*	0.68*	0.19	0.47*
Religion		1.00	-0.17	0.05	0.20	0.11	0.03	0.08	0.06	-0.06	0.23
Income			1.00	-0.33	0.33	0.39	0.20	0.47*	0.47*	0.13	0.26
Sex				1.00	-0.13	-0.17	-0.15	-0.04	-0.04	-0.23	0.06
Weight					1.00	0.39*	0.87*	0.81*	0.77*	0.37*	0.68*
M. Lit						1.00	0.34	0.37*	0.31	0.03	-0.03
Length							1.00	0.63*	0.57*	0.31*	0.61*
HC								1.00	0.96*	0.34*	0.51*
CC									1.00	0.37*	0.57*
Morbidity										1.00	0.17
Catch-up											1.00

*Significant correlation at 0.05 level (2 tailed)

Table 16. Binary Logistic Regression analysis for Catch-up growth among the LBW babies N=732.

Model Summary:

-2 log likelihood	Cox and Snell R square
17.680	0.484

Classification Table:

Observed Catch-up	Predicted Catch-up		Percentage Correct
	Catch-up	No catch-up	
Catch-up	22	502	96.5
No Catch-up	166	42	79.6
Overall percentage			89.3

Variables in equation:

	B	S.E	df	Sig	Exp(B)
Birth Weight	0.017	0.004	1	0.007	1.013
Constant	-24.317	7.983	1	0.007	0.000

Variables not in equation:

	Score	df	Sig
Variables G.age	0.096	1	0.749
B. length	0.000	1	0.979
B.HC	0.473	1	0.488
B.CC	0.169	1	0.667
Overall	0.864	4	0.917

According to table 16, the binary logistic regression explain 48.4% (R square) of the total variation of catch –up growth, was due to the factors like gestational age, birth weight, length, Head circumference and Chest circumference among the other variables. Birth weight play a statistically significant role in this regression analysis. Thus in prediction of catch –up growth, gestational age, length, Head circumference, and Chest circumference play statistically significant roles.

Binary logistic regression analyses (Tables 14, 15, 16) was performed. It was found that the independent variables like-

gestational age, weight, length, Head circumference and Chest circumference had statistically significant correlation with the dependent variable catch-up growth. Whereas, religion, income, maternal literacy and morbidity had no correlations at all. Independent variables were significantly correlated among themselves.

5. Conclusion

Low birth weight in itself is a concern for all. Babies born LBW are more susceptible to infection and do not grow to their full potential of physical and mental abilities. Hence, it becomes vital to identify the new borns with LBW and provide them adequate care for their survival and well being. As the LBW and the NBW infants lived in more or less homogenous environmental conditions, it can be concluded that, the environmental factors affecting the growth pattern of both the groups were similar. Nearly 24.7% of the infants born in the studied area were LBW infants, which emphasizes the need for implementing new interventions aiming to prevent the birth of low birth weight babies. Despite the existence of good quality antenatal care services catered by the Howrah District Hospital, quite a high incidence (24.7%) of LBW suggests that there is a lacuna in the process. The community level awareness has to be generated so that mothers avail early and adequate ANC. The need for maternal care should also be given more attention.

Conflict of Interest

The author declares that she has no competing interests.

References

- [1] Adair LS, Fall CH, Osmond C, Stein AD, Martorell R, Ramirez-Zea M, et al. COHORTS GROUP: Associations of Linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from birth cohort studies: *Lancet*. 2013, 382: 525-534.
- [2] Anchieta LM, Xavier CC, Colosimo EA. Growth velocity of preterm appropriate for gestational age newborns. 2004, 80 (5): 417-424.
- [3] Bavdekar AR, Vaidya UV, Bhava SA, Pandit AN. Catch up growth and its low birth weight babies: a study using Z scores. *Indian Pediatr*. 1994, 31 (12): 1483-90.
- [4] Bertino Di Niola P, Guiliani F, Corcia A, Varalda A, Occhi L, Rossi C. Evaluation of postnatal growth of preterm infants. *J Matern Fetal Neonatal Med*. 2011, 2: 9-11.
- [5] Brandt I, Sticker EJ, Gausche R, Lentze MJ. Catch-up growth of supine length/height of very low birth weight, small for gestational age preterm infants to adulthood. *J Pediatr*. 2005, 147 (5): 662-668.
- [6] Cameron N, Pettifor J, De Wet T, Norris S. The relationship of rapid weight gain in infancy to obesity and skeletal maturity in childhood. *Obes res*. 2003, 11: 457-460.
- [7] Dasgupta P, Hauspie R. Perspective in human growth, development and maturation. Springer-Science; Business Media, 2001, B. V.
- [8] Desai AB, Mukherjee D. Growth and Development. IAP Textbook of Pediatrics. 1st edition. Jaypee Brothers Medical Publishers (P) Ltd. 2000, 76-79.
- [9] Fenton TR, Kim JH. A systematic review and meta-analysis to revise the Fenton growth chart for preterm infants. *BMC Pediatr*. 2013, 13: 59.
- [10] Fewtrell MS, Morley R, Abbott RA, Singhal A, Stephenson T, Mac Fadyen UM, et al. Catch-up growth in small-for-gestational age term infants: a randomized trial. *The Am J of Clinical Nutrition*, 2010, 74 (4): 516-523.
- [11] Furmaga JW. Methods of growth assessment for low birth weight children. *Med Wieku Rozwoj*. 2003, 7 (2): 109-120.
- [12] Gerdes M, Bernbaum J. Follow-up care of the low birth weight infant. *Indian J Pediatrics*. 1998, 65: 829-839.
- [13] Harding JE, Mc Cowan LM. Perinatal predictors of growth patterns to 18 months in children born small for gestational age. *Early Hum Dev*. 2003, 74 (1): 13-26.
- [14] Jain V, Singhal A. Catch-up growth in low birth weight infants: striking a healthy balance: *Rev Endocr Metab Disord*. 2012, 13: 141-147.
- [15] Kabore P, Potvliege C, Sanor H, Baushere P, Dramaix M. Growth velocity and survival of full term low birth weight infants in an African rural area (Burkina Faso). *Arch. Pediatrics*. 2004, 11 (7): 807-814.
- [16] Kramer MS. Determinants of low birth weight: Methodological assessment and meta analysis. *Bulletin WHO*. 1987, 65 (5): 663-737.
- [17] Lucas A. Early nutrition and later outcome. Nutrition of the very low birth weight infant. Nestle nutrition workshop series, Lippincott Williams and Wilkins, Philadelphia. 1999, 43: 2-18.
- [18] Martin A, Connelly A, Bland RM, Reilly JJ. Health impact of catch-up growth in low birth weight infants: systematic review, evidence appraisal and meta-analysis. *Maternal and Child nutrition*. 2017, 13 (1). Epub.
- [19] Patro-Golab B, Zalewski BM, Kolodziej M, Konwenhoven S, Poston L, Godfrey KM, et al. Nutritional interventions or exposures in infants and children aged up to 3 years and their effects on subsequent risk of overweight, obesity and body fat: a systematic review. *Obes Rev*, 2016, 17: 1245-1257.
- [20] Paul B, Saha I, Dasgupta A, Chaudhuri RN. A study on catch-up growth among Low birth weight infants in an urban slum of Kolkata. *Indian J Pub health*. 2018, 52 (1): 16-20.
- [21] Raajimakers A, Allegaert K. Catch-up growth in Former preterm neonates: No time to waste. *Nutrients*. 2016.
- [22] Savage JS, Birch LI, Marini M, Anzman- Franca S, Paul IM. Effect of the INSIGHT responsive parenting intervention on rapid infant weight gain and overweight status at age 1 year: a randomized clinical trial. *JAMA Pediatr*. 2016, 170: 742-749.
- [23] Singhal A. Long-term adverse effect of early growth acceleration or catch-up growth. *Annals of Nutr and Metab*. 2017; 70: 236-240.

- [24] Tanner JM. Catch-up growth in man. Br Med Bull; 1981; 37: 233-238.
- [25] Were FN, Bwibo NO. Early growth of very low birth weight infants. East African Med J. 2006; 83 (3): 84-89.