COMPARATIVE STUDY OF EXTREMELY LOW BIRTH WEIGHT BABIES (ELBW) VERSUS VERY LOW BIRTH WEIGHT BABIES (VLBW) TILL ONE YEAR OF CORRECTED AGE IN TERMS OF GROWTH

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ABSTRACT

BACKGROUND

Wide-ranging differences in growth exist between full-term babies born with normal weight and those born prematurely. With the exception of infants with severe impairment, infants weighing less than 1500 grams are likely to remain smaller than their normal weight peers at adolescence. WHO defines low birth weight infants as those born with birth weight less than 2500 grams. It is further subdivided into Very Low Birth Weight (VLBW) babies: Birth weight < 1500 grams and Extremely Low Birth Weight (ELBW) babies: Birth weight < 1000 grams.

Aim- To compare the growth of VLBW babies versus ELBW babies till one year of corrected age.

MATERIALS AND METHODS

Partially cohort study design in which 60 babies in two groups; Group 1 of 30 babies (extremely low birth weight, i.e. < 1000 gms) and Group 2 of 30 babies (very low birth weight, i.e. < 1500 gms) were followed up till one year of corrected age. Follow-up was done at 3rd, 6th, 9th and 12th month of corrected age.

RESULTS

In this study of total 60 neonates, 30 were ELBW babies and 30 were VLBW babies. In this study, the mean birth weight of ELBW babies was 870 grams and mean birth weight of VLBW babies was 1.2 kg. In this study, there exists a significant difference in the Gestational age of babies in the ELBW and VLBW group. In the ELBW group babies, mean gestational age was 29 weeks which was less than the gestational age of babies in VLBW group, which was 30.03 weeks. On the follow-up of growth at 12 months of corrected age, babies who weighed less than 3rd centile consisted of 73.1% of ELBW babies and 26.9% of VLBW babies. There was statistical difference between two groups. At 12 months of corrected age, babies whose length was less than 3rd centile consisted of 53.8% of ELBW babies and 46.2% of VLBW babies, which was statistically insignificant. During follow-up at 12 months of corrected age, babies whose head circumference was less than 1st centile consisted of 54.5% of ELBW babies and 45.5% of VLBW babies which was statistically insignificant.

CONCLUSION

In this study, on comparing the two groups the growth of ELBW babies faltered more compared to their VLBW counterparts during this one-year follow-up study.

KEY WORDS

ELBW, VLBW, Length, Weight, Head Circumference.

HOW TO CITE THIS ARTICLE: Jayasree JT, Mammen DS, Krishnan DK, et al. Comparative study of extremely low birth weight babies (ELBW) versus very low birth weight babies (VLBW) till one year of corrected age in terms of growth. J. Evolution Med. Dent. Sci. 2018;7(42):4571-4575, DOI: 10.14260/jemds/2018/1019

BACKGROUND

WHO defines low birth weight infants as those born with birth weight less than 2500 grams.¹ It is further subdivided into-

- Very Low Birth Weight (VLBW) babies: Birth weight < 1500 g.
- Extremely Low Birth Weight (ELBW) babies: Birth weight < 1000 g.

'Financial or Other Competing Interest': None.

Submission 10-08-2018, Peer Review 28-09-2018,

Acceptance 03-10-2018, Published 15-10-2018.

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DOI: 10.14260/jemds/2018/1019

Wide-ranging differences in growth exist between full-term (FT) children born with normal birth weight and those born prematurely. With the exception of infants with severe impairment, infants weighing less than 1500 g are likely to remain smaller.² Infants born at weights categorised as very low birth weight (VLBW: 1000 - 1499 g) and extremely low birth weight (ELBW: < 1000 g) remain smaller than their normal birth weight peers at adolescence.^{3,4,5,6}

Objective- To compare the growth of VLBW babies versus ELBW babies till one year of corrected age.

MATERIALS AND METHODS

Study Design- Cohort study.

Study Setting

Tertiary care setting, inborn nursery, outborn nursery and well-baby clinic of Department of Paediatrics, Govt. Medical College, Kottayam.

Inclusion Criteria

ELBW and VLBW babies admitted in inborn nursery and outborn nursery.

- ELBW (Birth wt. - < 1000 gm)
- VLBW (Birth wt. - < 1500 gm)

Exclusion Criteria

Babies with chromosomal anomalies and congenital malformations will be excluded from the study.

Methodology

Consecutive cases satisfying the inclusion criteria and sample size, admitted in inborn and outborn nursery and followed up in well-baby clinic in Dept. of Paediatrics, Govt. Medical College, Kottayam during the study period at 3, 6, 9 and 12 months of corrected age. In this study, the two groups are classified on the basis of weight band alone, i.e. ELBW or VLBW. Their gestational age is not taken into account, hence not further sub-divided into term or preterm LGA, SGA, AGA etc.

Data Management and Analysis

Data management done using descriptive statistics, inferential statistics along with percentage analysis. Descriptive statistics suggest mean and standard deviation for identifying the preliminary nature of data. Inferential statistics such as Chi-square test and student's t-test used for hypothesis testing. The data was entered in Microsoft Excel and further statistical analysis was done using SPSS software version 22.

I. Assessment of Growth**A. Assessment of Weight**

Birth weight of the baby was recorded after delivery on an electronic weighing machine with an accuracy of measurement of ± 5 gms (± 5 gms accuracy) in NICU. On follow-up, weight of the baby was recorded on an electronic weighing machine. Underweight is defined as weight less than 3rd centile or less than 2 standard deviations for the age according to WHO growth charts.

B. Assessment of Length

Infantometer for measuring length; measurement adjusted to nearest 0.1 cm during every follow-up visit. Stunting defined as length less than 3rd centile or less than 2 standard deviations according to WHO growth charts.

C. Assessment of Head Circumference

Non-stretchable tape to assess head circumference; measurement adjusted to nearest 0.1 cm during every visit. Microcephaly is defined as head circumference less than 1st centile or less than 3 standard deviation for the age according to WHO growth charts.

This study was designed with an objective to compare the morbidity of ELBW babies versus VLBW babies at birth and to compare the growth of VLBW babies versus ELBW babies till one year of corrected age.

RESULTS

Total number of infants 60-

- Total number of infants in ELBW group = 30
- Total number of infants in VLBW group = 30

	Group	N	Mean
Birth Weight	ELBW	30	.87
	VLBW	30	1.20

Table 1. Data and Result of Birth Weight between Babies in ELBW and VLBW Group

The Table 1 shows that ELBW group babies' mean birth weight is .87 kg and VLBW babies mean birth weight is 1.2 kg.

	Group	N	Mean	Std. Deviation	T	P value
Gestational Age	ELBW	30	29.00	1.017	4.35	.000
	VLBW	30	30.03	.809		

Table 2. Data and Result of Significant Difference in the Gestational Age between Babies in ELBW and VLBW Group

The obtained t-value is 4.35, which is greater than the table value of 1.96 ($p < 0.05$) at 0.05 level of significance. That means there exists a significant difference in the Gestational age of babies in the ELBW and VLBW group.

	Group	N	Mean	Std. Deviation	T	P value
Head Circumference	ELBW	30	27.00	.830	3.37	.000
	VLBW	30	28.10	1.583		

Table 3. Data and Result of Significant Difference in the Head Circumference at Birth between Babies in ELBW and VLBW Group

The obtained t-value is 3.37, which is greater than the table value of 1.96 ($p < 0.05$) at 0.05 level of significance. That means there exists a significant difference in the Head Circumference of babies in the ELBW and VLBW group.

	Group	N	Mean	Std. Deviation	T	P value
Length	ELBW	30	37.00	.871	6.31	.000
	VLBW	30	40.00	2.421		

Table 4. Data and Result of Significant Difference in the Length at Birth between Babies in ELBW and VLBW Group

The obtained t-value is 6.31, which is greater than the table value of 1.96 ($p < 0.05$) at 0.05 level of significance. That means there exists a significant difference in the length of babies in the ELBW and VLBW group.

Follow-Up Analysis

Group		Weight at 3 m			Total
		< 3rd Centile	3rd to 50 th Centile	Greater than 50 th Centile	
ELBW Babies	Count	5	16	9	30
	%	25.0%	57.1%	75.0%	50.0%
VLBW Babies	Count	15	12	3	30
	%	75.0%	42.9%	25.0%	50.0%
Total	Count	20	28	12	60
	%	100.0%	100.0%	100.0%	100.0%

Table 5. Weight at 3 Months of Age

$\chi^2 = 8.57$, $p = .014$ ($p < 0.05$).

Table 5 shows that there is a significant difference between the two groups in weight at 3 months of age p-value, $p = .014$ ($p < 0.05$). Among underweight i.e. < 3rd centile at 3 months of age, 25% was ELBW babies i.e. 5 babies and 75% were VLBW babies i.e. 15 babies. Among the babies whose weight fell between 3rd and 50th centile, 57% were ELBW and 42% were VLBW. Among the babies who weighed more than 50th centile, 75% were ELBW and 25% were VLBW babies.

$X^2 = 8.44$, $p = .015$ ($p < 0.05$)

Group		Weight 12 m			Total
		< 3rd Centile	3rd to 50 th Centile	Greater than 50 th Centile	
ELBW Babies	Count	19	9	2	30
	%	73.1%	47.4%	13.3%	50.0%
VLBW Babies	Count	7	10	13	30
	%	26.9%	52.6%	86.7%	50.0%
Total	Count	26	19	15	60
	%	100.0%	100.0%	100.0%	100.0%

Table 6. Weight at 12 Months of Age

$X^2 = 13.65$; $p = .001$ ($p < 0.05$); $df = 2$

Table 6 shows that there is a significant difference between the two groups in weight at 12 months of age. P-value, $p = .001$ ($p < 0.05$); $df = 2$. At 12 months corrected age, babies who weighed less than 3rd centile consisted of 73.1% of ELBW babies and 26.9% of VLBW babies. Among those who weighed between 3rd and 50th centile, 47.4% were ELBW babies and 52.6% were VLBW babies. Babies who weighed more than 50th centile consisted of 13.3% ELBW and 86.7% of VLBW babies.

Group		Length at 3 m			Total
		< 3rd Centile	3rd to 50 th Centile	Greater than 50 th Centile	
ELBW Babies	Count	14	10	6	30
	%	73.7%	50.0%	28.6%	50.0%
VLBW Babies	Count	5	10	15	30
	%	26.3%	50.0%	71.4%	50.0%
Total	Count	19	20	21	60
	%	100.0%	100.0%	100.0%	100.0%

Table 7. Length at 3 Months of Age

$X^2 = 8.12$; $p = .017$ ($p < 0.05$); $df = 2$

Table 7 shows that there is a significant difference between the two groups in length at 3 months of age. P value, $p = .017$ ($p < 0.05$); $df = 2$. At 3 months of corrected age, babies whose length is less than 3rd centile consisted of 73.7% of ELBW babies and 26.3% of VLBW babies. Among those whose length was between 3rd and 50th centile, 50 were ELBW babies and 50% were VLBW babies. Babies whose length is more than 50th centile consisted of 28.6% ELBW and 71.4% of VLBW babies.

Group		Length at 12 m			Total
		< 3rd Centile	3rd to 50 th Centile	Greater than 50 th Centile	
ELBW Babies	Count	14	8	8	30
	%	53.8%	40.0%	57.1%	50.0%
VLBW Babies	Count	12	12	6	30
	%	46.2%	60.0%	42.9%	50.0%
Total	Count	26	20	14	60
	%	100.0%	100.0%	100.0%	100.0%

Table 8. Length at 12 Months of Age

$X^2 = 1.24$; $p = .538$ ($p > 0.05$); $df = 2$

Table 8 shows that there is no significant difference between the two groups in length at 12 months of age. $P = .538$ ($p > 0.05$); $df = 2$. At 12 months of age, babies whose length is less than 3rd centile consisted of 53.8% of ELBW babies and 46.2% of VLBW babies. Among those whose length was between 3rd and 50th centile, 40% were ELBW babies and 60% were VLBW babies. Babies whose length is more than 50th centile consisted of 57.1% ELBW and 42.9% of VLBW babies.

Group		Head Circumference 3 m			Head Circumference
		< 1st Centile	3rd to 50 th Centile	50 th Centile	
ELBW Babies	Count	12	14	4	30
	%	44.4%	56.0%	50.0%	50.0%
VLBW Babies	Count	15	11	4	30
	%	55.6%	44.0%	50.0%	50.0%
Total	Count	27	25	8	60
	%	100.0%	100.0%	100.0%	100.0%

Table 9. Head Circumference at 3 Months of Age

$X^2 = .693$; $p = .707$ ($p > 0.05$); $df = 2$

Table 9 shows that there is no significant difference between the two groups in head circumference at 3 months of age. $P = .707$ ($p > 0.05$); $df = 2$. At 3 months of corrected age, babies whose head circumference is less than 1st centile consisted of 44.4% of ELBW babies and 55.6% of VLBW babies. Among those whose head circumference was between 3rd and 50th centile, 56% were ELBW babies and 44% were VLBW babies. Babies whose head circumference is more than 50th centile consisted of 50% ELBW and 50% of VLBW babies.

Group		Head Circumference 12 m			Head Circumference
		< 1st Centile	3rd to 50 th Centile	> 50 th Centile	
ELBW Babies	Count	18	8	4	30
	%	54.5%	42.1%	50.0%	50.0%
VLBW Babies	Count	15	11	4	30
	%	45.5%	57.9%	50.0%	50.0%
Total	Count	33	19	8	60
	%	100.0%	100.0%	100.0%	100.0%

Table 10. Head Circumference at 12 Months of Age

$X^2 = .746$; $p = .689$ ($p > 0.05$); $df = 2$

Table 10 shows that there is no significant difference between the two groups in head circumference at 12 months of age; $p = .689$ ($p > 0.05$); $df = 2$. At 12 months of corrected age, babies whose head circumference is less than 1st centile consisted of 54.5% of ELBW babies and 45.5% of VLBW babies. Among those whose head circumference was between 3rd and 50th centile, 42.1% were ELBW babies and 57.9% were VLBW babies. Babies whose head circumference is more than 50th centile consisted of 50% ELBW and 50% of VLBW babies.

DISCUSSION

The study was conducted with an objective of comparing the growth of ELBW and VLBW babies till one year of corrected age.

In this study of the total 60 neonates, 30 are ELBW babies and 30 are VLBW babies. In this study, the mean birth weight of ELBW babies is 870 grams and mean birth weight of VLBW babies is 1.2 kg.

In this study there exists a significant difference in the gestational age of babies in the ELBW and VLBW group. In the ELBW group babies, mean gestational age is 29 weeks which is less than the gestational age of babies in VLBW group which is 30.03 weeks.

In a study published in Indian Paediatrics Journal; October 2003 volume about maternal and neonatal profile and immediate outcome in ELBW babies, mean gestational age was 27.8 weeks and mean birth weight was 831 grams.⁷

In another study about the outcome of very low birth weight infants over 3 years report from an Iranian Centre; among VLBW babies mean gestational age was 29.6 ± 2.5 weeks; mean birth weight was 1179 ± 257 grams.⁸ In another follow-up study of very low birth weight infants born and treated within a perinatal centre. Mean birth weight and gestation was 1066 ± 19.3 gms and 29.5 ± 0.3 weeks, respectively.⁹

a. Discussion on Follow-Up of Weight

In this study, during follow-up of weight of two groups, there is a significant difference between the two groups in weight at 3 months of age. Among underweight, i.e. < 3rd centile at 3 months of age 25% was ELBW babies that is 5 babies and 75% were VLBW babies i.e. 15 babies. Among the babies whose weight fell between 3rd and 50th centile, 57% were ELBW and 42% were VLBW. Among the babies who weighed more than 50th centile, 75% were ELBW and 25% were VLBW babies.

At 6 months of age, babies who weighed less than 3rd centile consisted of 66.7% of ELBW babies and 33.3% of VLBW babies. Among those who weighed between 3rd and 50th centile, 55.6% were ELBW babies and 44.4% were VLBW babies. Babies who weighed more than 50th centile consisted of 22.2% ELBW and 77.8% VLBW babies, i.e. weight gain was better among the VLBW babies compared to the ELBW group during the period of 3 to 6 months.

At 9 months of age, babies who weighed less than 3rd centile consisted of 72% of ELBW babies and 28% of VLBW babies. Among those who weighed between 3rd and 50th centile, 47.4% were ELBW babies and 52.6% were VLBW babies. Babies who weighed more than 50th centile consisted of 18.8 ELBW and 81.3% of VLBW babies.

At 12 months corrected age, babies who weighed less than 3rd centile consisted of 73.1% of ELBW babies and 26.9% of VLBW babies. Among those who weighed between 3rd and 50th centile, 47.4% were ELBW babies and 52.6% were VLBW babies. Babies who weighed more than 50th centile consisted of 13.3% ELBW and 86.7% of VLBW babies.

In another study about growth and neurodevelopmental outcome of VLBW infants at 1 year corrected age after early growth failure, VLBW infants experience a catch up in growth beyond infancy through adolescence.¹⁰⁻¹⁴

They observed a steady improvement in all anthropometric parameters of VLBW infants from discharge to 12 months. This growth pattern is consistent with findings of other authors, who reported a similar magnitude of improvement in anthropometric Z-scores.^{11,13}

b. Discussion on Follow-Up of Head Circumference

In this study, there exists a significant difference in the head circumference of babies in the ELBW and VLBW group at birth. The ELBW group babies' mean head circumference is 27 cm, which is less than the babies in VLBW group i.e. 28.1cm.

In this study, but during follow-up there is no significant difference between the two groups in head circumference at 3 months of corrected age. At 3 months of corrected age, babies whose head circumference is less than 1st centile i.e. microcephaly consisted of 44.4% of ELBW babies and 55.6% of VLBW babies.

Among those whose head circumference was between 3rd and 50th centile, 56% were ELBW babies and 44% were VLBW babies. Babies whose head circumference is more than 50th centile consisted of 50% ELBW and 50% of VLBW babies.

At 6 months of age, babies whose head circumference was less than 1st centile consisted of 54.5% of ELBW babies and 45.5% of VLBW babies. Among those whose head circumference was between 3rd and 50th centile, 42.1% were ELBW babies and 57.9% were VLBW babies. Babies whose head circumference was more than 50th centile consisted of 50% ELBW and 50% of VLBW babies, i.e. head growth of VLBW showed improvement over 3rd month to 6th month compared to the ELBW counter parts.

At 9 and 12 months of age, babies whose head circumference was less than 1st centile consisted of 54.5% of ELBW babies and 45.5% of VLBW babies. Among those whose head circumference was between 3rd and 50th centile, 42.1% were ELBW babies and 57.9% were VLBW babies. Babies whose head circumference was more than 50th centile consisted of 50% ELBW and 50% of VLBW babies.

In this study during the 9th and 12th month assessment of head circumference, the growth continued along the same centiles for both the groups. At 12 months of corrected age, there is no statistical difference in the head circumference between two groups.

c. Discussion on Follow-Up of the Length of the Babies

In this study, there is a significant difference between the two groups in length at 3 months of age. At 3 months of corrected age, babies whose length was less than 3rd centile consisted of 73.7% of ELBW babies and 26.3% of VLBW babies. Among those whose length was between 3rd and 50th centile, 50 were ELBW babies and 50% were VLBW babies. Babies whose

length was more than 50th centile consisted of 28.6% ELBW and 71.4% of VLBW babies.

There is a significant difference between the two groups in length at 6 months of age. At 6 months of age, babies whose length is less than 3rd centile consisted of 75% of ELBW babies and 25% of VLBW babies. Among those whose length was between 3rd and 50th centile, 47.4% were ELBW babies and 52.6% were VLBW babies. Babies whose length was more than 50th centile consisted of 28.6% ELBW and 71.4% of VLBW babies, i.e. VLBW babies growth was better in terms of length compared to the ELBW counterparts.

At 9 and 12 months of age, babies whose length was less than 3rd centile consisted of 53.8% of ELBW babies and 46.2% of VLBW babies. Among those whose length was between 3rd and 50th centile, 40% were ELBW babies and 60% were VLBW babies. Babies whose length was more than 50th centile consisted of 57.15 ELBW and 42.9% of VLBW babies.

CONCLUSION

- This study with partially retrospective and prospective study design was conducted to compare the growth of ELBW babies versus VLBW babies till one year of corrected age.
- In this study of the total 60 neonates, 30 were ELBW babies and 30 were VLBW babies.
- In this study, the mean birth weight of ELBW babies is 870 grams and the mean birth weight of VLBW babies is 1.2 kg.
- In this study, there exists a significant difference in the Gestational age of babies in the ELBW and VLBW group. In the ELBW group, babies' mean gestational age is 29 weeks which is less than the Gestational age of babies in VLBW group which is 30.03 weeks.

Implication of the Study

In this study, on comparing two groups, the growth of ELBW babies faltered more compared to their VLBW counterparts during this one year follow-up study. Hence, growth monitoring and early stimulation will be benefitted for both groups, especially for ELBW babies.

Limitation of the Study

In this study, the subjects were followed up for only one year. Most of the literature shows that the VLBW and ELBW babies does not show catch up growth till 2 years of corrected age. Since the study duration is limited, only limited conclusions can be made on their growth and development.

ACKNOWLEDGEMENTS

I express my thanks and gratitude to Dr. Savitha P, Professor and HOD, Department of Paediatrics, Government Medical College, Kottayam.

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