

Physical Growth and Respiratory Morbidity in VLBW Neonates at One Year of Postnatal Age – A Cohort Study

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Abstract

Objectives: This study was done to assess the anthropometry at one year of postnatal age in Very low birth weight (VLBW) neonates and to assess respiratory morbidities during first year of life.

Methods: This was a prospective cohort study conducted at Department of Pediatrics, Apollo BGS Hospital for a period of 2 years. All VLBW neonates who got discharged from NICU during the study period and were able to come for regular follow up were included. This cohort was followed up every three monthly till one year of postnatal age. The weight, length and head circumference at 12+0.5 months of postnatal age were measured. Respiratory morbidities during 1st year of life were assessed using a preformed questionnaire.

Results: Out of 45 cases enrolled in our study, 29 cases were followed till 1 year of age. Four babies died and 12 babies were lost to follow up. 55% of the neonates were less than 3rd percentile with respect to weight and head circumference and 48% of the neonates was less than 3rd percentile with respect to length at one year of age. 17% of the infants had frequent cough, 7% of infants needed inhaled steroids and 3.5% of infants required rehospitalization during first one year of life.

Conclusion: There is a significant failure in the catch up growth in first one year of life of VLBW babies. These neonates have significantly higher respiratory morbidities during first year of life.

Keywords: Respiratory morbidity; Physical growth; VLBW neonates; Long term outcome

Introduction

Very low birth weight (VLBW) neonates constitute 3.4% of all live births in India [1]. With recent improvement in medical care, survival of these babies has improved in India. However, incidence of adverse long term outcomes among these VLBW survivors is relatively high [2-4]. Western literature shows a high incidence of growth failure in these high risk neonates [2]. This growth failure starts in their NICU stay and tends to persist even during childhood. Also, these preterm and VLBW infants suffer from recurrent respiratory symptoms in their first year of life [5,6]. VLBW babies are four times more likely to be hospitalized in the first year of life than normal birth weight infants and are more likely to have a disproportionate duration of hospital stay [7,8]. The increased risk of rehospitalisation for preterm and very low birth weight infants is likely a reflection of their compromised health status.

Even though, short term survival of VLBW babies is improving in India, there is very little data on long term morbidities in this high risk group. Hence, we aimed to study the growth and respiratory morbidities in these VLBW neonates by 1 year of postnatal age.

Materials and Methods

All the VLBW babies who were admitted within first 24 hrs of birth and discharged from NICU, Apollo BGS Hospitals, Mysore were eligible for inclusion. Their anthropometry and gestational age was recorded. At the time of discharge, parents were enquired about their feasibility for long term follow up and were included in the study only if they consented for follow up visits.

These babies were followed up every 3 monthly till 12 months of postnatal age. The 4th visit was planned between 11.5 to 12.5 months of postnatal age and data was collected for only those babies who presented during this window period. The length (measured using

infantometer), weight (measured in electronic weight scale with accuracy of +10 g) and head circumference (HC) (measured using non stretchable measuring tape) were recorded. All these parameters were plotted on WHO growth chart and percentile of these measurements were noted and compared. A preformed questionnaire was given to the parents on their 4th visit and asked to complete the questionnaire about their baby's respiratory symptoms and treatment requirements. The baseline data were collected from inpatient records. The data was entered in Microsoft excel 2007 format and statistical analysis was done using Epi info 7 software. The study was approved by institutional ethics committee and informed consent from parents was taken.

Results

45 cases were enrolled during the study period. Out of these, 29 cases were followed up to 1 year of age. 4 babies died post discharge and 12 babies could not come for follow up as parents moved on to different places. In the Table 1, the baseline parameters are presented across these 3 groups. They were comparable across these three groups with no statistically significant difference in any of these parameters.

Table 2 is showing anthropometric measurement at 1 year of chronological age. A significant proportion of infants were weighing less than 3rd percentile (55%) and were short (48%). Only a small

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Received June 23, 2018; Accepted July 04, 2018; Published July 11, 2018

Citation: Gururaja G, Prithvish CM, Devaranavadagi RA (2018) Physical Growth and Respiratory Morbidity in VLBW Neonates at One Year of Postnatal Age – A Cohort Study. Neonat Pediatr Med 4: 158. doi: [10.4172/2572-4983.1000158](https://doi.org/10.4172/2572-4983.1000158)

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number of babies (17%) had weight of 15-50th percentile. 55% of these babies had HC less than 3rd centile.

Table 3 shows anthropometric measurement at 1 year of chronological age in AGA and SGA babies. 56% of babies had weight less than 3rd centile in AGA group at 1 year of postnatal age compared to SGA babies in whom 54% of babies had weight less than 3rd centile. 63% of babies in AGA group had head circumference less than 3rd centile compared to SGA babies in whom 46% babies had head circumference less than 3rd centile.

Table 4 shows respiratory morbidity among these babies followed up till 1 year of age. 17% babies had frequent cough, 14% had wheeze and required nebulisation at least once, 17% patients used inhaled steroids and one baby required hospitalization (3.5%). We also compared respiratory morbidities in 1st year of life between different gestational age groups. Between gestational age 26-30 weeks (n=14), 2 babies had frequent cough, wheeze and required nebulization and hospitalization, and one baby used inhalers/steroids. Between 30-33 weeks of gestational age (n=12), 3 babies had cough, 2 had wheeze and required nebulization. Between 34-36 weeks, none had respiratory symptoms.

Discussion

In our study we enrolled a total of 45 cases of which 4 cases died

and 12 cases were lost to follow up. 29 cases were followed till 1 year of age; our follow up rate was 64.4%. We have taken the definition for the catch up group as more than 10th percentile of WHO growth standards.

The baseline parameters at birth were comparable across all the three groups (babies who were followed up, babies who were not followed and babies who died). There was no statistically significant difference in any parameters.

42% of the babies were small for gestational age (SGA) in our study. This is comparable with study done by Modi M et al. who reported 46% of SGA population [9]. However, this number is disproportionately higher than national average and western data [1,10,11]. It could be due to higher incidence of IUGR in our population. Our centre catered to predominantly outborn babies and referral bias might have also contributed for this excess SGA babies. In contrary to this, western data shows lower incidence of SGA among VLBW babies.

In our study, a significant 55% of babies were falling below 3rd centile by one year age. Only 3.5% of babies had grown above 50th centile. Dusick et al. and Bavdekar et al. reported 46% of babies were less than 10th centile and Bavdekar et al. noted that only 20% of VLBW babies attained catch up growth [12,13]. As the SGA is a major predictor of post natal growth our population having 42% of SGA babies were expected to show poorer catch up growth [14]. A similar

Baseline parameters	Cases followed up till 1 year (n=29)	Cases lost to follow up (n=12)	Cases died post discharge (n=4)
SGA [#] n (%)	13 (44.8%)	41.0	25
Birth weight*(g)	1160 ± 190	1230 ± 0.17	1010 ± 0.22
Gestation age* (weeks)	31.0 ± 2.2	29.75 ± 2.2	31.91 ± 3.77
Length*(cm)	39 ± 3	39.6 ± 2.7	40.25 ± 3.3
Head circumference* (cm)	28.02 ± 2	28.2 ± 1.4	28.37 ± 2.6
Male [#]	16 (55.2%)	9 (75%)	3 (75%)

*Values expressed as mean ± SD, #Values expressed as n (%).

Table 1: Baseline characteristics of the VLBW babies.

Percentiles	Weight n (%)	Length n (%)	Head circumference n (%)
Less than 3 rd	16 (55%)	14 (48%)	16 (55%)
3-15 th	7 (24%)	5 (17%)	5 (24%)
15-50 th	5 (17%)	6 (21%)	7 (24%)
50-85 th	0	4 (14%)	0
85-97 th	0	0	0
More than 97 th	1 (3.5%)	0	1 (3.5%)

Table 2: Anthropometry at one year of chronological age (n=29).

	Weight*		Length*		Head circumference*	
	AGA	SGA	AGA	SGA	AGA	SGA
<3 rd percentile	9 (56%)	7 (54%)	7 (44%)	7 (54%)	10 (63%)	6 (46%)
3-15 th percentile	2 (13%)	5 (39%)	1 (6%)	4 (31)	2 (12%)	3 (23%)
>15 th percentile	5 (31%)	1 (7%)	8 (50%)	2 (15%)	4 (25%)	4 (31%)

*All values in n (%)

Table 3: Anthropometric measurement at 1 year of age in AGA (n=16) and SGA (n=13) babies.

Morbidities	Number of cases (%)
Frequent cough	5 (17%)
Wheeze	4 (14%)
Nebulization	4 (14%)
Inhaled Steroids	2 (7%)
Hospitalizations	1 (3.5%)
ICU admissions	1 (3.5%)
Inhalers	1 (3.5%)

Table 4: Showing respiratory morbidity (n=29).

failure in growth in length and head circumference was also noted in our study population. In our study 48% of babies had length less than 3rd centile at one year of age. HC was less than 3rd centile in 55% at one year. Study done by Mukhopadhyay et al. showed that 41% of VLBW babies were underweight by 1 year of age while 32% were stunted and 21% had microcephaly [15].

The incidence of respiratory morbidities in our study is marginally less than the incidence reported in literature. The data reported by Greenough et al. showed an incidence of 20% for the wheeze and 10% for the use of steroids. de Mello et al. reported that, 53% of VLBW babies had respiratory morbidities [5,6]. The marginally lower incidence of respiratory morbidities in our cohort is probably because of less severe respiratory morbidities in neonatal period in relatively more mature but SGA babies.

3.5% of our babies required rehospitalization. In contrast, other studies have shown rehospitalization rate ranging from 11.5% to 23.5% [7,8]. Reason for small percentage of rehospitalization in our study is probably because of small sample size and predominant SGA population.

The small sample size and relatively poor follow up rate have been the major drawback in our study. Also, data on these high risk infants from Indian region is very limited for any decent comparison. Further studies with higher numbers are needed to understand the growth and morbidity pattern in these babies.

Conclusions

There is a significant failure in the catch up growth in first one year of life of VLBW babies. These neonates have significantly higher respiratory morbidities during first year of life. Interventions to improve both in hospital and post discharge nutrition as well as regular follow up monitoring are needed to improve long term health of these babies.

Contributors: PCM collected the data, RAD contributed in writing manuscript and GG conceptualized the study and did data analysis.

References

1. Indian Council of Medical Research New Delhi. Neonatal-Perinatal Database 2002-2003.
2. Datar A, Jacknowitz A (2009) Birth weight effects on children's mental, motor, and physical development: evidence from twins data. *Matern Child Health J* Nov 13: 780-794.
3. Greenough A, Limb E, Marston L, Marlow N, Calvert S (2005) Risk factors for respiratory morbidity in infancy after very premature birth. *Arch Dis Child Fetal Neonatal Ed*.
4. Marlow N (2004) Neurocognitive outcome after very preterm birth. *Arch Dis Child Fetal Neonatal Ed* 89: 224-228.
5. De Mello RR, Dutra MV, Ramos JR, Daltro P, Boechat M (2006) Neonatal risk factors for respiratory morbidity during the first year of life among premature infants. *Sao Paulo Med J* 124: 77-84.
6. Greenough A, Maconochie I, Yuksel B (1990) Recurrent respiratory symptoms in the first year of life following preterm delivery. *J Perinat Med* 18: 489-494.
7. McCormick MC, Shapiro S, Starfield BH (1980) Rehospitalization in the first year of life for high-risk survivors. *Pediatrics* 66: 991-999.
8. Cavalier S, Escobar GJ, Fernbach SA, Quesenberry CP, Chellino M (1996) Postdischarge utilization of medical services by high-risk infants: experience in a large managed care organization. *Pediatrics* 9: 693-699.
9. Modi M, Saluja S, Kler N, Batra A, Kaur A (2013) Growth and neurodevelopmental outcome of VLBW infants at 1 year corrected age. *Indian Pediatr* 50: 573-578.
10. Hack M, Weissman B, Borawski-Clark E (1996) Catch-up growth during childhood among very low-birth-weight children. *Arch Pediatr Adolesc Med* 150: 1122-1129.
11. Pierrat V, Marchand-Martin L, Guemas I, Matis J, Burguet A (2011) EpiPAGE Study Group. Height at 2 and 5 years of age in children born very preterm: the EPIPAGE study. *Arch Dis Child Fetal Neonatal Ed* 96: 348-354.
12. Dusick AM, Poindexter BB, Ehrenkranz RA, Lemons JA (2003) Growth failure in the preterm infant: can we catch up? *Semin Perinatol* 27: 302-310.
13. Bavdekar AR, Vaidya UV, Bhave SA, Pandit AN (1994) Catch up growth and its determinants in low birth weight babies: a study using Z scores. *Indian Pediatr* 31: 1483-1490.
14. Wang PW, Fang LJ, Tsou KI (2014) Taiwan Infant Developmental Collaborative Study Group. The growth of very-low-birth-weight infants at 5 years old in Taiwan. *Pediatr Neonatol* 55: 114-119.
15. Mukhopadhyay K, Mahajan R, Louis D, Narang A (2013) Longitudinal growth of very low birth weight neonates during first year of life and risk factors for malnutrition in a developing country. *Acta Paediatr* 102: 278-281.