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Original Research Article

Factors affecting postnatal weight gain of very low birth weight babies during NICU stay in a tertiary care centre in Southern India: an observational study

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ABSTRACT

Background: The survival of very low birth weight babies has significantly improved in recent years. Postnatal growth has an impact on neurodevelopment and hence identifying the risk factors that curb growth is crucial.
Methods: We did a retrospective cohort study over 3 months in our NICU studying 40 very low birth weight babies. Our objective was to observe the time taken to regain birth weight and study the risk factors affecting postnatal weight gain.
Results: Among the 40 babies studied, 22 babies had significant delay in regaining birth weight. Risk factors such as birth weight, birth asphyxia, parenteral nutrition, respiratory distress syndrome, surfactant requirement, patent ductus arteriosus, necrotizing enterocolitis, sepsis, hyperbilirubinemia, anemia had statistically significant association with delay in regaining birth weight.
Conclusions: Many studies have established a linear correlation between postnatal growth velocity and neurodevelopmental outcome. Ascertaining and managing the factors affecting weight gain in very low birth weight babies is essential and challenging part and anticipating the risk factors in advance helps us to achieve desirable weight gain in these babies.

Keywords: Very low birth weight, Postnatal growth, Neurodevelopment

INTRODUCTION

Ideally, the growth velocity of a premature infant should be exactly similar to the growth velocity of a fetus of the same gestational age.[1] But, it is practically difficult to attain this weight gain goal, which in turn results in undernourishment of premature infants at the time of discharge.[2] Approximately 20% of very low birth weight infants are small for gestational age (defined as weight less than 10th percentile) at the time of birth.[3] The Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network has published growth outcomes of very low birth weight infants over the past several decades and it showed incidence of growth failure at 3 weeks postmenstrual age was 97% between 1995 and 1996 and 91% between 1997 and 2002.[4,5] In the report between 2003 and 2007, the incidence of postnatal growth failure decreased to 79%, possibly reflecting widespread use of early parenteral nutrition at most neonatal intensive care units.[6]

It is of utmost importance that all the risk factors leading to poor weight gain in very low birth weight infants are detected early and treated efficiently, so that atleast we get a step closer to our ideal weight gain goal.

Objectives

Objectives were to observe the time taken to regain birth weight in very low birth weight babies during stay in neonatal intensive care unit and to study the risk factors affecting weight gain in very low birth weight babies during stay in neonatal intensive care unit.

METHODS

We did a retrospective cohort study in Neonatal Intensive care Unit of Kauvery Hospital, a tertiary care hospital in Trichy, South India, over a period of 3 months from May 2021 to July 2021. We studied a total of 40 very low birth weight babies after implementing the inclusion and exclusion criteria. Inclusion criteria was babies less than 1500 gram admitted in NICU. Exclusion criteria included babies with severe congenital malformations, babies discharged within 14 days of birth, babies died within 14 days of birth. Data regarding the 40 babies were collected from our medical records department retrospectively pertaining to their physical, demographical character-istics, the time of initiation of first feed, the time to reach full feed, feeding modalities, the complications encountered during their NICU stay, the length of stay and the time taken to regain birth weight. Since this is a retrospective study, ethical committee approval was not required.

Statistical analysis was performed using SPSS (version 23.0). The continuous variable expressed as Mean and Standard deviation. Categorical variables expressed as frequency and percentage. Independent 't' test used to find the significance difference between groups. Correlations relationship between two variables analyzed by applying Pearson′s coefficient. Chi square test and Fisher's Exact test were used to find out association between categorical variables, $p \leq 0.05$ was considered statistically significant (Figure 1).

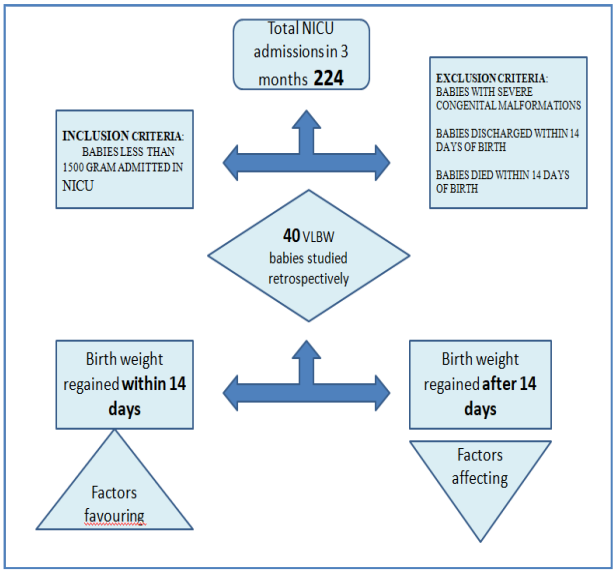

Figure 1: The inclusion and exclusion criteria.

RESULTS

We enrolled a total of 40 very low birth weight newborns over a 3-month period. Among them, 1 (2.5%) was extreme preterm ≤27 weeks+6 days, 19 (47.5%) were very preterm 28 weeks to 31+6 days, 12 (30%) were moderate preterm 32 weeks to 33+6 days, 6 (15%) were late preterm 34 weeks to 36+6 days and 2 (5%) were term ≥37 weeks neonates. 60% of the enrolled neonates were IUGR (24), 5% (2) were less than 1 kg, 50% (20) were between 1-1.25 kg and 45% (18) were between 1.25-1.5 kg. 60% of them were male and 40% were female neonates. Enteral feeding was initiated within 48 hours for 75% of the enrolled neonates, median time to reach full feed was 7 days and the median time to regain birth weight was 17 days.

Table 1: Risk factors with statistically significant association with postnatal delay in weight gain of very low birth weight babies.

Parameter	Among 40 VLBW babies	Delay in regaining birth weight >14 days	P value
Birth weight <1 kg	2	2	
1-1.25 kg	20	14	0.056
1.25-1.5 kg	18	6	
Birth asphyxia	16	15	<0.001
Feed intolerance/NEC	14	12	0.004
Delay in reaching full feeds more than 7 days	18	15	0.001
Ventilator	16	14	0.001
Anemia/blood transfusion	16	16	<0.001
Sepsis	11	11	<0.001
Hypoglycemia	17	17	<0.001
Patent ductus arteriosus	15	12	0.014
Interventricular haemorrhage	11`	11	<0.001

Of the 40 neonates, birth weight was regained within 14 days among 18 (45%) and 22 (55%) had delay. 22 (55%) reached full feed within 7 days and among those 22, 15 (68.2%) regained birth weight within 14 days. All of them received oromotor stimulation, expressed breast milk, probiotics, human milk fortifier and kangaroo mother care. Of the 40 neonates enrolled in the study, 16 were asphyxiated (APGAR <7/10 at 5 minutes), of which 15 neonates (93.75%) had delay in regaining birth weight. Among the non-asphyxiated neonates (24), 17 (70.8%) regained their birth weight within 14 days. Among the 18 neonates who regained birth weight within 14 days, 17 (94.4%) received parenteral nutrition and among those 22 neonates with delayed weight gain, only 4(18.2%) received parenteral nutrition. 14 babies developed necrotising enterocolitis among which 12 babies had delay in regaining birth weight. 20 neonates had umbilical venous catheterization. 14 neonates (63.6%) underwent mechanical ventilation and had delay in weight gain. 13 neonates (59.1%) required surfactant. 36 neonates were on O2 support and 23 neonates required CPAP at some point during NICU stay. 5 neonates developed thrombocytopenia. 16 neonates (72.7%) required blood transfusion. Among the 22 neonates with delay in weight gain, 11 (50 %) had sepsis (blood culture showing growth). 24 neonates developed neonatal hyperbilirubinemia. 17 neonates with delay in weight gain (77.3%) had hypoglycemia at some point of time during their NICU stay. 39 neonates required ionotropic support and 17 had electrolyte imbalance. 15 neonates had patent ductus arteriosus, among which 12 had delay in weight gain. Of the 18 neonates who regained birth weight within 14 days, none of them had interventricular haemorrhage while among the 22 with delay, 11 (50%) of them had IVH (Table 1).

DISCUSSION

Among the 40 neonates, 18 regained birth weight within 14 days and 22 babies had delay. The mean birth weight was 1.238 kg comparable to 1.257 kg ±190.7 g in a study by Saluja et al.[7] Enteral feeding was initiated within 48 hours for 75% of the enrolled neonates. In our study, 94.4% babies who regained birth weight within 14 days, were started on enteral feeds before 48 hours, which is comparable to the result of Mudahemuka et al.[8] Median time to reach full feed was 7 days and median time to regain birth weight was 17 days, which is comparable to 15.9 days to 16.4 days in the study by Xjokanma et al.[9] Whereas Ehrenkranz documented a time of regaining birth weight of 11-18 days.[10] In our study, among the 18 neonates who achieved birth weight within 14 days, 17 (94.4%) received parenteral nutrition, which is comparable to Ahuja et al.[11] In our study, risk factors affecting postnatal weight gain that had statistically significant association with a $p \leq 0.05$ were birth weight <1.25 kg, extreme prematurity, birth asphyxia, need for ventilator and surfactant administration, late initiation of trophic feeding, delay in reaching full feeds, feed intolerance, necrotizing enterocolitis, sepsis, neonatal hyperbilirubinemia, anemia and blood transfusion, patent ductus arteriosus, interventricular haemorrhage and metabolic abnormalities such as hypoglycemia.

Limitations

Ours was a retrospective study and collecting data from the medical records department was time consuming. Hence, we restricted our period of study to 3 months. Our sample size of 40 very low birth weight babies cannot be considered adequate to establish the association between the risk factors shown. Further larger studies among the South Indian population are needed.

CONCLUSION

Many studies have established a linear correlation between postnatal growth velocity and neurodevelopmental outcome. Ascertaining and managing the factors affecting weight gain in very low birth weight babies is essential and challenging part. In our study, the neonates who regained birth weight early i.e., who had good growth velocity, received early initiation of trophic feeding, early and rapid increment of parenteral nutrition and early achievement of full feeds (within 7 days). Anticipating the risk factors in advance, helps to achieve desirable weight gain in these babies, in turn contributing to their neuro-development.

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