

Low Delta Blood Urea Nitrogen and Poor Postnatal Growth in Extremely Low Gestational Age Newborn (ELGAN) Infants

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Abstract: Blood urea nitrogen (BUN) concentrations have shown to be associated with post-natal growth. Protein intake affects the BUN levels in preterm infants. Protein intake affects the BUN levels in preterm infants.

Keywords: blood urea nitrogen; gestational age; weight

In extremely low gestational age newborns (ELGANs), the higher limit of BUN is 21 mg/dL, and the reference range for these preterm infants is 3-21 mg/dL (1.1–7.5 mmol/L). [3] In a recent study, Thanh et al [4] showed higher BUN as a marker of better postnatal growth. They described significantly higher BUN levels in the high protein formula group than in the control group. To look at the levels of difference in BUN level (delta BUN) and postnatal growth in ELGANs, we performed this study.

We selected four ELGANs ranging from 23-25 weeks of gestation and study their BUN levels with postnatal growth. We calculated the delta BUN (the difference in the BUN level from birth to the day of assessment). The cases are briefly described below. The summary of the findings is displayed in Table 1.

Gestational age (weeks)	DOL (Days)	BUN at birth (mg/dL)	BUN on DOA (mg/dL)	Delta BUN (mg/dL)	Growth Velocity (g/kg/day)	WGR	Delta Z
25 3/7	20	17	7	10	8.11	0.29	-0.14
24 5/7	26	39	15	24	8.35	0.29	-1.34
23 1/7	32	17	11	6	8.54	0.41	-1.32
24 2/7	50	40	16	24	9.91	0.43	-1.22

To monitor their growth, we use the formulae as described earlier (Table 2). [5,6]

Method	Formula
Growth velocity (g/kg/d)	Current weight – Previous weight / Average weight x 1000
Weight Gain Ratio (WGR)	Current weight – Previous weight / 50% Weight difference
Z-score	Current Z score – Previous Z score

Average weight = Current weight + Previous weight / 2

50% Weight difference = 50% weight at current weight – 50% weight at previous weight

Z-Score: From electronic chart or <https://peditools.org/fenton2013/>

Table 2: Calculation of GV, WGR and Delta Z [5,6]

Case 1:

Preterm infant, gestational age 25 3/7 weeks. The pregnancy was complicated by no prenatal care, uncontrolled hypertension, and vaginal bleeding. The Apgar score was 3, 6, 7 at 1, 5, and 10 minutes. The infant was intubated in the delivery room. On admission to the NICU, umbilical venous and arterial catheters were inserted. The infant was placed on a high-frequency oscillator ventilator and was started on total parental nutrition. Serum electrolytes were monitored daily while on TPN, and then on enteral feeds as needed. On the day of analysis, the infant was 20 days old.

Case 2:

Preterm infant, gestational age 24 5/7 weeks. The pregnancy was complicated by concern for placental abruption. The infant was intubated in the delivery room. On admission to the NICU, umbilical venous and arterial catheters were inserted. The infant was placed on a high-frequency oscillator ventilator and was started on total parental nutrition. Serum electrolytes were monitored daily while on TPN, and then on enteral feeds as needed. On the day of analysis, the infant was 26 days old.

Case 3:

Preterm infant, gestational age 23 1/7 weeks. The mother did not receive any steroids. The Apgar score was 0, 6, 7 at 1, 5, and 10 minutes. The infant was intubated in the delivery room. On admission to the NICU, umbilical venous and arterial catheters were inserted. The infant was placed on a high-frequency oscillator ventilator and was started on total parental nutrition. Serum electrolytes were monitored daily while on TPN, and then on enteral feeds as needed. On the day of analysis, the infant was 32 days old.

Case 4:

Preterm infant, gestational age 24 2/7 weeks. The pregnancy was complicated by premature prolonged rupture of the membrane. The Apgar score was 2, and 7, at 1 and 5 minutes. The infant was intubated in the delivery room. On admission to the NICU, umbilical venous and arterial catheters were inserted. The infant was placed on a high-frequency oscillator ventilator and was started on total parental nutrition. Serum electrolytes were monitored daily while on TPN, and then on enteral feeds as needed. On the day of analysis, the infant was 50 days old.

Discussion:

We were able to demonstrate a low delta BUN level in a small group of ELGANs. All infants had poor postnatal growth. The growth velocity rate of < 10 g/kg/day as observed in all the cases (Table 1) was inadequate. Further, all ELGANs had a low weight gain ratio (WGR). A WGR closer to 1 indicates adequate growth. Similarly, the delta z- score remained negative in all the cases (Table 1). We did not look at the daily protein intake and calories of the individual cases. We are planning a prospective study to look at all the nutritional details in correlation to delta BUN.

Author contribution:

Conceptualized and wrote the manuscript.

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No competing interests to declare.

References:

1. Roggero P, Gianni ML, Morlacchi L, et al. (2010) Blood urea nitrogen concentrations in low-birth-weight preterm infants during parenteral and enteral nutrition. *J Pediatr Gastroenterol Nutr.*51(2):213-215.
2. Weintraub AS, Blanco V, Barnes M, Green RS. (2015). Impact of renal function and protein intake on blood urea nitrogen in preterm infants in the first 3 weeks of life. *J Perinatol.*;35(1):52-56.
3. Zhang Y, Zeng HH. (2020) Renal Function Profiles in Preterm Neonates With Birth Asphyxia Within the First 24 H of Life. *Front Pediatr.* 2020;8:583540.
4. Thanh LQ, Chen Y, Hartweg M, Thi Nguyen TA. (2022) Effects of higher protein formula with improved fat blend on growth, feeding tolerance and nutritional biomarkers in preterm infants: A double-blind, randomized, controlled clinical trial. *Pediatr Neonatol.*;63(3):227-238.
5. Rochow N, Landau-Crangle E, So HY, et al. (2019) Z-score differences based on cross-sectional growth charts do not reflect the growth rate of very low birth weight infants. *PLoS One.*14(5).
6. Patel AL, Engstrom JL, Meier PP, Jegier BJ, Kimura RE. (2009) Calculating postnatal growth velocity in very low birth weight (VLBW) premature infants. *J Perinatol.*; 29(9): 618-22.

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