Prevalence of potassium, phosphorus and calcium imbalance in very low birthweight preterm infants receiving parenteral nutrition from the first day of life.

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Background

Bonsante F et al. hypothesized that **early aggressive parenteral nutrition (APN)** administration, consisting of **high protein** (2.5-3.5g/kg/day) and **high lipid** (2g/kg/day), induces an anabolic state in the cell promoting potassium and phosphorus intake, which leads to an increase in plasma calcium levels in very-low-birth-weight-preterm (VLBWP) infants.

Purpose

To report the prevalence of potassium, phosphorus and calcium imbalance during the first weeks of life in a population of VLBWP infants receiving APN from day one**.**

Material and Methods

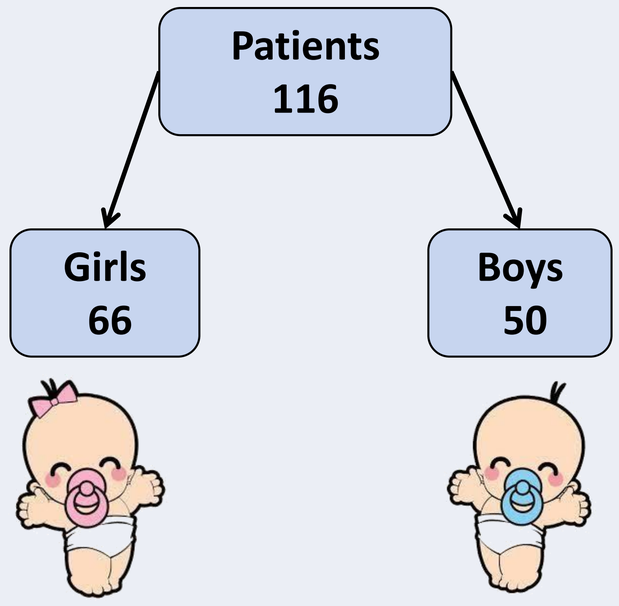
Observational study conducted at a third-level Child Hospital from January to December 2016, including preterm infants (<33 weeks' gestational age, weight < 1500g) who received parenteral nutrition (PN) and were hospitalized in the intensive care unit within the first 24 hours of life.

Clinical features, daily parenteral and enteral intake composition and blood concentrations of potassium, phosphate and calcium during the administration of PN were collected from the electronic health record *Centricity Critical Care*®. The **main data evaluated** were the mean **potassium, phosphorus** and **calcium concentrations** in plasma during treatment with PN.

Results

Characteristics		
Birth weight (g)	mean ± SD	1102,6±320
Gestational Age (weeks)	mean ± SD	28,6±2,7
Duration of PN (days)	median ± Range	7,7 (1-68)
Intrauterine Growth Restriction	N(%)	53 (45%)
Antenatal steroids	N(%)	110 (94%)
Respiratory Distress Syndrome	N(%)	87 (75%)
Patent ductus arteriosus	N(%)	34 (29%)
Intravenous ibuprofen use	N(%)	24 (20%)
Sepsis	N(%)	27 (23%)
Mean daily nutritional intakes		
Amino acids (g/kg/day)	mean ± SD	2,82±0,79
Carbohydrates (g/kg/day)	mean ± SD	7,57±2,40
Lipids (g/kg/day)	mean ± SD	1,81±0,68
Energy (Kcal/kg/day)	mean ± SD	58,57±16,67
Calcium (mEq/kg/day)	mean ± SD	1,37±0,45
Phosphate (mmol/kg/day)	mean ± SD	0,68±0,29
Potassium (mEq/kg/day)	mean ± SD	1,38±0,62
Enteral feeding (mL/day)	mean	48,05

Table 1. Characteristics, nutritional intake for 116 VLBWP



Electrolyte imbalance	**mean ± SD**	**N (%)**
Hypokalemia (K < 3 mmol/L)	1.13±0.18 mmol/L	108 (93%)
Hypophosphatemia (P < 1mmol/L)	0.77±0.17 mmol/L	22 (18%)
Hypercalcemia (Ca > 2.8mmol/L)	2.91±0.017 mmol/L	2 (1.7%)

Table 2. VLBWP (n=116) with abnormal potassium, phosphate and calcium plasma concentrations.

Conclusion

Prevalence of hypokalemia and hypophosphatemia were 93% and 18%, respectively; similar trends as in Bonsante's[1] study.

Hypercalcemia occurred in 1,7% *versus* 30,2% of infants in the Bonsante's[1] group. Apparently, calcium imbalance was detected earlier and corrected in our cohort.

Close monitoring of the analytical determinations by the pharmacist would allow anticipation and correction of electrolyte imbalances by proposing changes in PN composition.

[1]Bonsante F, et al. Initial Amino Acid Intake Influences Phosphorus and Calcium Homeostasis in Preterm Infants-It Is Time to Change the Composition of the Early Parenteral Nutrition. PLoS ONE 2013;8(8):1–9