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TITLE: Hypertriglyceridemia in Very Low Birth Weight Infants on Routine Parenteral Nutrition: A Case-Control Study

Background: Hypertriglyceridemia (HiTG) often occurs in infants on parenteral nutrition (PN), especially those with low birth weight (BW). In case of HiTG, the ESPGHAN/ESPEN/ESPR 2018 guidelines recommend an intravenous (IV) lipid (FAT) titration. The consequences of IV FAT titration in small infants are largely unknown. **Objective:** To investigate the modifications of IV FAT, amino acids (AA), carbohydrates (CHO) and non-protein energy (NPE) intakes in infants with a BW less than 1250g on routine PN who developed HiTG (>250 mg/dL). **Design/Methods:** We retrospectively reviewed nutrition, growth and neurodevelopment of a cohort of infants with a BW<1250 g consecutively admitted to the "G. Salesi" Children's Hospital between Jan-2004 and Dec- 2016 who received routine PN. Patients with and without HiTG were match-paired for BW and gestational age (GA).

Results: Six hundred and fifty-eight infants of the cohort were analyzed and 196 (30%) had at least one HiTG episode in the first 10 days of life (DOL). One hundred and thirty-six HiTG patients were compared with 136 matched-controls (CNTR^{BW-GA}; **Table 1**). In the first 10 DOL, IV FAT and NPE, but not IV AA, were significantly lower in HiTG infants (**Figure 1**). The incidence of hyperglycaemia episodes associated with HiTG, was not significantly higher than in CNTR^{BW-GA} (12% vs 7%, p=0.2). We found no differences between groups in the incidence of the main complications of prematurity. Anthropometry at 36 weeks (W) and at 24 months (Mo) corrected age (CA), and neurodevelopment at 24Mo CA (HiTG vs CNTR^{BW-GA} - Cognitive composite score: 94±13 vs 95±14, p=0.6; Motor composite score: 100±14 vs 101±11, p=0.8) were also not different (**Table 2**).

Conclusion(s): At our institution, HiTG occurred in 30% of VLBW infants and IV FAT titration resulted in a significantly lower IV FAT and NPE intakes. HiTG infants on routine PN had similar growth and neurodevelopment than controls.

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TABLE TITLE:

Table 1. Demographic and clinical characteristics of HiTG and CNTR^{BW-GA} infants Table 2. Anthropometry at 36W CA and at 24Mo CA.

TABLE:

Table 1. Demographic and clinical characteristics of HiTG and CNTR^{BW-GA} infants

	HiTG n=136	CNTR^{BW-GA} n=136	Differences	p-value
Birth weight (BW) - g	875±173	877±170	-2±41	0.5
Gestational age (GA) - days	193±15	193±14	-0±1	0.9
Males, no. (%)	69 (51%)	64 (47%)	+5 (+4%)	0.5
SGA^{2SDS}, n (%)	15 (11%)	13 (10%)	+2 (+1%)	0.5
Inborn - no. (%)	126 (93%)	120 (88%)	+6 (+4%)	0.2
Singleton birth - no. (%)	102 (75%)	103 (76%)	-1 (-1%)	0.9
Apgar^{5min} – no	8 |7 8|	8 |7 8|	0	0.4
Intubated 0-24 hours of life – no. (%)	101 (74%)	100 (74%)	+1 (+1%)	0.9
Surfactant therapy– no. (%)	97 (71%)	85 (63%)	+12 (+9%)	0.1
Perinatal steroid treatment– no. (%)	115 (88%)	117 (90%)	-2 (-2%)	0.7
Major diagnoses of prematurity – no. (%)				
LOS	30 (22%)	36 (26%)	-6 (-4%)	0.4
NEC≥ grade II	8 (6%)	6 (4%)	+2 (+1%)	0.6
Cholestasis	13 (10%)	15 (11%)	-2 (-1%)	0.7
RDS and HMD	124 (91%)	123 (90%)	+1 (+1%)	0.8
BPD	34 (25%)	42 (31%)	-8 (-6%)	0.3
Asphyxia	8 (6%)	7 (5%)	+1 (+1%)	0.8
PDA	89 (65%)	95 (70%)	-6 (-4%)	0.4
PVL II-IV	3 (2%)	6 (4%)	-3 (-2%)	0.3
IVH ≥ grade III	12 (9%)	10 (7%)	+2 (+1%)	0.7
ROP ≥ grade III	2 (1%)	0 (0%)	+2 (+1%)	0.3

Data are presented as mean±SD, median |25P 75P| or no. (%). Paired t-test, Wilcoxon test, or McNemar test were used for the statistical analysis. SDS: standard deviation score; SGA: small for gestational age. BPD: bronchopulmonary dysplasia; EOS: early onset sepsis; IVH: intraventricular haemorrhage; LOS: late onset sepsis; HMD: hyaline membrane disease; NEC: necrotizing enterocolitis; PDA: patent ductus arteriosus; ROP: retinopathy of prematurity; PVL: periventricular leukomalacia; RDS: respiratory distress syndrome.

Table 2. Anthropometry at 36W CA and at 24Mo CA.

	HiTG	CNTR^{BW-GA}	Differences	p-value
WT 36W – g (n=120)	1861±354	1895±343	-34±283	0.2
WT SDS–36W - no. (n=120)	-1.91±0.88	-1.81±0.86	-0.10±0.71	0.1
TL 36W – cm (n=120)	42.6±2.5	42.7±2.5	-0.1±2.2	0.7
TL SDS-36W- no. (n=120)	-1.87±0.99	-1.84±0.96	-0.04±0.85	0.7
HC 36W – cm (n=120)	30.5±1.5	30.6±1.5	-0.1±1.9	0.5
HC SDS-36W - no. (n=120)	-1.63±1.02	-1.53±1.08	-0.10±1.36	0.4
WT at 24Mo - g, (n=43)	11627±1759	11562±2184	+65±2564	0.9
WT SDS–24Mo – no (n=43)	-0.29±1.30	-0.24±1.69	-0.05±1.90	0.9
TL at 24Mo – g (n=43)	87.5±4.2	86.1±4.6	+1.4±6.0	0.1
TL SDS–24Mo – no (n=43)	0.72±1.36	0.44±1.46	+0.28±1.82	0.3
HC at 24Mo – g (n=43)	47.8±1.9	48.0±1.6	-0.2±2.2	0.6
HC SDS–24Mo – no (n=43)	-1.05±1.56	-0.72±1.24	-0.33±1.78	0.2

Data are presented as mean±SD. Paired t-test was used for the statistical analysis. HC: head circumference; SDS: standard deviation score; TL: total length; WT: weight.
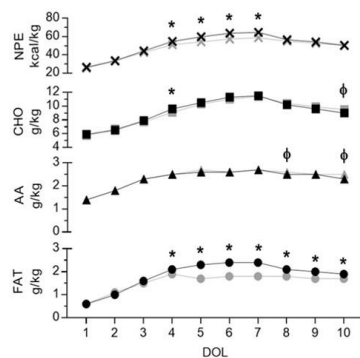

Figure 1. IV macronutrients (FAT, AA and CHO) and non-protein energy (NPE) intakes in matched cases (grey) and controls (black): FAT, g/kg (o); AA, g/kg (△); CHO, g/kg (■); NPE, kcal/kg (x). Data are presented as group means. Paired t-test was used for the statistical analysis. Significance was set-up at *$p<0.05$ (p-value between $0.05≤Φ≤0.1$; *<0.05). HiTG vs CNTR^{BW-GA}, n=136.

IMAGE CAPTION:
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