23

TO BE BORN AT HIGH ALTITUDE: INFLUENCE OF ALTITUDE, NUTRITION AND SOCIOECONOMIC CONDITIONS ON FETAL GROWTH

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Chronic hypoxia in high altitude constitutes an associated factor for fetal growth restriction, even when there is genetic adaptation, as observed in studies performed in populations living at high altitudes (Tibet, Andes, Europe and North America). Socioeconomic and nutritional deprivation is frequently observed in those populations, being also associated to fetal growth. Objective: To analyze anthropometric measures at birth in relation with altitude, and to assess the effect of maternal nutrition status, socioeconomic conditions and altitude on those measures. Population and methods: The study was based on the information registered in the Perinatal Information System (SIP - Clap-OPS) by the provincial team from the province of Jujuy and forwarded to national level, between 1996–1998. Variables included pre-gestational BMI, maternal weight gain, maternal education, birth weight (BW), length at birth (LB), and head circumference (HC). Cases were grouped in three categories according to the altitude of the institution where the childbirth was attended: 84.1% R1, 5.8% R2 and 10.1% R3, being the latter the area at higher altitude (Puna). Confounding variables were controlled by exclusion and analytical tools. Results: From 25,811 registries, 24,651 with complete information were selected. Mean BW was 3259 ± 538 g in R1; 3162 ± 420 in R2, and 3080 ± 483 in R3, with a difference of 179 grams between R1 and R3, (F 110.7; $p < 0.001$) and 209 g between R1 and R3 (F 199; $p < 0.001$) in term deliveries. In this group, LB difference was 0.3 cm (F=274,9, $p<0.001$), and HC difference was 0.6 cm (F102.7; $p < 0.001$) between low and highlands (R1 and R3, respectively). Multivariate analysis, by linear regression, showed a final model to predict BW = -1557.4 183.2 * birth at high altitude + 28.9 * parity + 13.3 * 8.7 BMI + 8.7 * maternal weight gain + 113.3 * gestational age at birth + Σ. Conclusion: Altitude influences BW significantly. Nevertheless, nutritional and social factors have a direct and sinergic relationship with BW.

24

ABSORPTION OF WHEAT FLOUR FORTIFIED WITH REDUCED IRON

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Background. Reduced iron is one of the most commonly used iron fortificants, because of its low cost and lack of chemical reactivity. The bioavailability of this fortificant has not been reliably measured in humans because of technical difficulties. Objective. To assess iron bioavailability of wheat flour fortified with reduced iron. Methods. Homemade bread fortified with two reduced iron compounds was produced. We used an in vitro digestion and the Caco-2 cells model to measure the bioavailability of two types of reduced Fe (8 and >20 μm particle size), using ferritin formation by Caco-2 cells and intracellular Fe concentration as indicators of Fe incorporated to the enterocyte. Results. In vitro digestion experiments showed higher values of solubility and dialyzability of reduced-8 μm Fe compared to reduced >20 μm Fe. Intracellular iron and ferritin concentrations in Caco-2 cells exposed to digest from bread fortified with reduced-8 μm Fe were higher than in bread fortified with reduced >20 μm Fe. When bread fortified with $FeSO_4$:ascorbic acid (molar ratio 1:2) was used as a reference, the relative iron bioavailabilities of the bread fortified with reduced-8 μm Fe or >20 μm Fe were 68.2% and 31.1 %, respectively. Conclusion. Reduced iron is a good compound to be used in wheat flour fortification

25

RESPIRATORY MECHANICS IN CHILDREN WITH POST-VIRAL CHRONIC PULMONARY DISEASE (PCPD)

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Viral lower respiratory tract infections can cause severe lung injury resulting in a chronic condition known as PCPD. We have previously shown that patients with PCPD have a severe and fixed airway obstruction and changes in the elastic recoil properties of the lung [increased resistance (R) and decreased compliance (C)] during the first two years of life. The aim of the study was to evaluate the respiratory mechanics with the forced oscillation technique (FOT), in older children with PCPD. Methods. Respiratory mechanics of patients diagnosed with PCPD and followed at our hospital was prospectively evaluated (6 years after initial injury) during 2000/2001. Measurements were done using FOT (Vmax machine series 2, SensorMedics). Bronchodilator response (BDR) was evaluated 30 min after the inhalation of 200 mcg salbutamol. Inclusion critera were: diagnosis of PCPD, older than 4 yrs, capable of performing PFTs, and clinically stable. A control group of children older than 4 yrs with a normal spirometry was included for comparison. Study group (SG): 17 patients (12 male; mean age 7 yrs; age-range 4–14); Control group (CG): 17 children (5 male; mean age 7 yrs; range 4–15). Results were as follows (mean $\pm$ SD): R 4–16 ($cmH_2O/l/s$) SG 8.5 ± 3 & CG 4.9 ± 1 ($p<0.01$); R 0 SG 10.1 ± 4 & CG 5 ± 1 ($p<0.01$); R Mn SG 7.5 ± 2 & CG 4.9 ± 1 ($p<0.01$); C (ml/cmH2O) SG 5.4 ± 3 & CG 20.5 ± 12 ($p<0.01$). Coefficients of variation were adequate (7.3, 8, 7.6, and 16 for R 4–16, R 0, R Mn and C, respectively). BDR (SG only) was: R 4–16: 16.5 %, R 0: 21 %, R Mn: 13.3%, C: 41.8%. Children with PCPD showed persistent changes in their respiratory mechanics 6 years after the initial insult. They showed an increase in resistance and a decrease in compliance compared to the control group.

26

ARE NEONATAL GROWTH STANDARDS ADEQUATE TO DIAGNOSE FETAL GROWTH RESTRICTION IN PRETERM BABIES?

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Introduction: Growth standard derived from birth weight at different gestational ages (neonatal curves) probably underestimate small-for-gestational-age (th percentile) prevalence in comparison with ultrasonographically determined fetal growth standards. The aim of this observational study was to compare local neonatal standards and estimated fetal weight using different models at similar gestational ages. Material and Methods: 55706 singleton births between 25 and 42 weeks of gestation born at Maternidad Sardá, Buenos Aires from 1988 to 1999, were included (preterms -25th to 36th weeks- n = 3745). Fractional growth curve was built using Mongelli's formula, which for any gestational age, yields fetal weight as a percentage of the final term weight. Percentage differences were calculated at 10th and 50th percentile levels between observed weight (neonatal curve) and estimated weight (fractional curve). These differences were then compared with the 95% CI (absolute mean error of estimated weight). Comparisons were made among Maternidad Sardá's fractional curve, a similar one from Notingham (UK) and the fetal ultrasonographic standard from Hadlock. Results: Neonatal weights were significantly lower than those derived from fractional curve for percentiles 10th and 50th. At percentile 10th, weights calculated from neonatal standards during the premature period were significantly lower than those estimated ultrasonographically, while Sardá fractional curve was slightly above Nottingham's. Percent differences between neonatal and predicted weights were highly statistically significant during the premature period, being consistently higher for the 10th percentile (p = 0.009). Differences at 10th percentile were in a systematic way higher than the upper limit of the 95% CI. Conclusions: Local neonatal standard based on birth weight for gestational age, probably underestimate fetal growth and therefore underestimate the proportion of prematures which are small-for-gestational-age.

27

BOTULIN TOXIN A-TREATMENT OF SPASTIC CEREBRAL PALSY

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Aim: To determine the effectiveness of botulin toxin A- (BTXA) treatment of spasticity in lower limbs of children with cerebral palsy (CP), and compare results with the traditional treatment. Patients and Methods: Study sample: 12 patients per group. Selection criteria: ambulatory patients of both sexes (age range, 2–8 yrs), with spastic diparetic or hemiparetic CP diagnosis, increased myostatic reflex and improved motor prepositioning and positioning of the feet , 1+ and 3 scores (modified Ashworth Scale) in the muscle groups under study (gemellus, 10 patients, and internal rectus, 1 patient). Design: Randomized clinical trial. Treatment: Patients received 5 U/kg BTXA injections per muscle (maximum dose: 400 U) at the beginning of the study and 16 weeks later. The informed consent of the patients was required in all instances. Variables evaluated: Functional improved prepositioning and positioning of the feet, evaluated by the modified Ashworth Scale, joint range of motion, active foot dorsiflexion, ambulation speed, step length and size, motor function (GMFM test), percentage of foot support, myostatic reflex and parents' opinion. Results: Results from 17 patients (11 treated and 6 controls) who completed the study period are presented, age-range 2.25 – 7.33 yrs (x= 4.5 yrs). Ten cases corresponded to diparesis and 7 to hemiparesis. Follow-up: 32 weeks. The injection of gemellus resulted in improved Asworth scale scores (1 score), increased passive mobility (especially in quick movements) and increased plantar support. The myostatic reflex changed from 16.7 (95% CI, 8–25) at the beginning to –8 (95% CI, -26 – -10) 32 weeks later (p=0.002). There were no significant changes in the patient who received BTXA in the internal rectus. Parents from patients of the intervention group valued the marked (9 patients) and moderate (1 patient) improvements obtained. Conclusion: The use of BTXA is as effective as the traditional treatment for dynamic equinus gait. The results obtained in this long-term clinical randomized trial are promising but not conclusive, especially with reference to functional assessments.

28

ANALYSIS OF SOCIOCULTURAL FACTORS INFLUENCING SCHOOL FAILURE IN ADOLESCENTS

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School failure is a very important problem among adolescents. Identification of underlying associated sociocultural factors would allow to take action on this problem. In order to evaluate the prevalence of school failure among adolescents and analyze the associated sociocultural factors, an anonymous survey was carried out among students attending 10 public and private schools in Buenos Aires city. We considered school failure repeating at least one school-year during secondary school. 1722 surveys were analyzed. The age-range of adolescents was 13 - 20 yrs; 47.6% were female. The prevalence of school failure was 20.8 % and it was significantly associated with public school attendance (OR= 4.4; IC 95%= 3.36–5.79), elementary school failure (OR=1.99; IC 95%=1.27–3.12), need of extra examination (1) (OR=5.92; IC 95%= 4.58–7.66), need of extra examination (2)(OR= 4.70; IC 95%= 3.63- 6.10), absenteeism (OR= 1.66; IC 95%= 1.30- 2.11), expulsion (OR= 4.60; IC 95%= 2.38–8.93), not living with both parents (OR= 1.53; IC 95%=1.19–1.97), domestic violence (OR=1.92; IC95%=1.21–3.15), mother with no university studies (OR= 4.16; IC95% = 2.87 – 6.06), father with safe job (OR=1.54;IC 95%=1.14–2.10), smoking (OR= 2.42; IC95% = 1.88–3.10), alcohol (OR=1.55;IC 95%=1.22–1.98), drugs (OR=2.16;IC 95%=1.45–3.18), sexual intercourse (OR=3.22;IC 95%=2.51–4.12), pregnancy (OR=2.71;IC 95%=1.15–6.32). The multivariate analysis showed a significant association between school failure and public school attendance (OR= 2.93; IC 95%= 2.15–3.98), need of extra examination (1) (OR= 2.10; IC 95%=1.49–2.96), need of extra examination (2) (OR=1.87; IC 95%=1.33–2.63), absenteeism (OR= 1.36; IC 95%= 1.03–1.79), expulsion (OR= 3.06; IC 95%=1.48–6.31), mother with no university studies (OR= 0.53; IC 95%=0.38–0.74), sexual intercourse (OR= 1.99; IC 95%=1.49–2.67), and smoking (OR=1.44; IC 95%=1.05–1.97). The prevalence of school failure as well as of the associated sociocultural factors was similar to that reported in similar studies performed in Spain and Uruguay. Taking these results into account would enable us to take preventive actions.