Concurrent Session 6: Micronutrients

Thiamin status during pregnancy and pregnancy outcome

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Background – Thiamin requirements increase during pregnancy. Inadequate thiamin status has been demonstrated amongst low income, ethnically diverse pregnant women in the UK. During the first trimester of pregnancy thiamin intake has been associated with birth weight and thiamin status has been correlated with gestational age at birth.
Objective – To determine thiamin status during pregnancy in a low income, ethnically diverse population. To investigate the effect of supplementation on thiamin status and the effect of thiamin status on birth outcome.
Design – Women were recruited at their first antenatal (booking) appointment in East London. Venous blood was obtained from women at booking (n=208) and 34 weeks gestation (n=66). Participants took either a multiple-micronutrient supplement (containing 3mg thiamin) or placebo daily. Thiamin diphosphate (TDP) in whole blood was calculated after directly measuring TDP in red blood cells using HPLC coupled with a spectrofluorimeter and reagent kit. Gestational age was determined by ultrasound scan.
Outcomes – At booking 12% of participants were thiamin deficient (TDP in whole blood <66.5 nmol/l). Significant differences were seen in TDP levels by ethnicity (*P*<0.001; ANOVA); *post hoc* analysis (Scheffe) showed Caucasians had significantly higher mean TDP levels than Asians (*P* =0.018) and Africans (*P* <0.001). At 34 weeks gestation participants receiving the treatment had a higher mean TDP than those receiving placebo (100.3 vs. 88.7 nmol/l), although not significant. By 34 weeks gestation the proportion of women who were thiamin deficient increased to 24% (32% vs. 20% for placebo and treatment groups respectively). Spearman's rank correlation showed gestational age at birth was weakly, positively correlated with TDP levels at booking (*P* =0.037, r=0.152) and 34 weeks gestation (*P* =0.006, r=0.342).
Conclusions – Inadequate thiamin status exists within this low income, ethnically diverse population and ethnic differences are seen in thiamin status. Supplementation appears to improve thiamin status. Thiamin status may play a role in length of gestation, but this needs further investigation.

Could low population iodine intake be identified using neonatal TSH surveillance results?

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Background – Iodine intake in the Tasmanian population is potentially deficient. Adequate intake has been maintained in recent decades by intentional and unintentional supplementation. In the 1990s, an episode of unintended deficiency occurred as detected by urinary iodine testing in samples of school students, later reversed by opportunistic advice by obstetricians to expectant mothers (2000 to June 2002) and a program of use of iodised salt by bakers responsible for 80% of commercial bread production in Tasmania (July 2002 onwards). The question arose as to whether this episode of deficiency could be detected by the neonatal TSH surveillance program results.
Objective – To estimate the differences in the distribution of neonatal TSH results between 1992 and 2005 to evaluate the utility of the neonatal TSH surveillance program as surveillance of population iodine intake.
Design – Census of all Tasmanian neonatal TSH results between 1992 and 2005. 3 periods were examined: 1992-1999 (no intentional iodine supplementation), 2000-June 2002 (intermittent antenatal advice) and July 2002 to 2005 (iodised salt in commercial bread). 2 neonatal age groups were analysed: 36-60 hours and 60-96 hours. Proportions of population above 5 mU/L were compared, and TSH values and CI95% for centiles (50^{th} to 99^{th}) were estimated, for the 3 time periods and 2 age groups.
Outcomes – Proportions of population above 5 mU/L were 10.8% (CI95% 9.3%-12.5%), 9.3% (7.9%-11.1%) and 7.6% (6.4%-9.0%) (*P* <0.001) in the 3 time periods. TSH levels at centiles above 90^{th} were significantly higher at age 36-60 hours in 1999 compared to 2000 to 2005: eg 90^{th} centile for 1992-1999 was 5.2 (CI95% 4.91-5.49), for 2000-June 2002 was 4.9 (4.56-5.24; *P* =0.11) and for July 2002 to 2005 was 4.7 (4.39-5.01; *P* =0.006); 95^{th} centile for 1992-1999 was 6.8 (6.25-7.35), for 2000-June 2002 was 6.2 (5.62-6.78; *P* =0.061) and for July 2002 to 2005 was 5.7 (5.13-6.27; *P* =0.001); 99^{th} centile for 1992-1999 was 10.4 (7.59-13.2), for 2000-June 2002 was 9.6 (6.72-12.5; *P* =0.60) and for July 2002 to 2005 was 8.0 (5.22-10.8; *P* =0.183). No clear difference was found at ages 60-96 hours.
Conclusions – TSH level distributions at times corresponding to different population iodine intakes were distinguishable by the neonatal TSH surveillance results. The neonatal TSH surveillance program would provide extended coverage of a population more sensitive to adverse effects of low iodine intake than the school students currently sampled, at minimal extra cost. Sub-population analysis would also be possible.