



Winter Meeting, 11–12 December 2013, Diet, gut microbiology and human health

A longitudinal study of iodine status throughout gestation in UK women

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Iodine is essential for the production of thyroid hormones which are of particular importance for brain and neurological development of the fetus during pregnancy⁽¹⁾. A recent nationwide survey has highlighted the fact that the UK, a country previously considered to be iodine sufficient, may have a high prevalence of iodine deficiency in young women⁽²⁾; furthermore, a study of UK pregnant women has found an association between iodine deficiency in the first trimester and lower IQ and reading scores in the child⁽³⁾. As there are no UK data on the effect of advancing gestation on iodine status, we aimed to assess iodine status throughout gestation with repeated measures in the same woman in a cohort of UK pregnant women. We also investigated associations between iodine status and season.

Iodine status was measured in 229 women recruited to a selenium trial at the John Radcliffe Hospital, Oxford (selenium supplementation did not have a significant effect on iodine status). The majority of women (98%) were not using prenatal supplements that contained iodine. Iodine concentration was measured in spot-urine samples that were collected at 12, 20 and 35 weeks' gestation; urinary creatinine concentration was also measured to correct for urine dilution.

The WHO defines iodine deficiency in a population of pregnant women as a median urinary iodine concentration of <150 µg/L⁽⁴⁾; the median value in all urine samples in our cohort ($n=662$) was 56.8 µg/L (IQR 31.1–104.3) and the iodine-to-creatinine ratio was 116 µg/g (IQR 77–177.5), thus classifying this cohort as mildly-to-moderately iodine-deficient^(1,4).

	First trimester $n=228$	Second trimester $n=222$	Third trimester $n=212$	All trimesters $n=662$
Median iodine concentration, µg/L (IQR)	42.0 (24.5–84.8)	52.0 (30.9–103.3)	69.4 (43.7–122.8)	56.8 (31.1–104.3)
Median iodine-to-creatinine ratio, µg/g (IQR)	102.5 (67.3–166.8)	120.0 (80.0–185.0)	126.0 (84.3–182.8)	116.0 (77.0–177.5)
Iodine status:				
% ≥ 150 µg/g	32.5	38.3	36.8	35.8
% 50–149 µg/g	56.1	56.3	56.6	56.3
% <50 µg/g	11.4	5.4	6.6	7.9

A linear mixed-effects model was used to explore the repeated iodine measures, revealing significant changes in log iodine-to-creatinine ratio over the course of gestation ($P<0.001$); mean iodine-to-creatinine ratio was significantly lower in the first trimester than in the second ($P=0.001$) and third ($P=0.001$). A significant effect of season of urine sampling was also found with higher iodine-to-creatinine levels in winter than in summer ($P=0.001$).

These results add to the increasing evidence that there is a high prevalence of mild-to-moderate iodine deficiency in UK pregnant women, especially in those who are not using an iodine-containing prenatal supplement. This may have potential consequences for fetal neurodevelopment. We have shown that iodine status increased over the course of gestation, although the reason for this is not clear. Further study is required to confirm our findings.

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