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Effect of inadequate iodine status in UK pregnant women on cognitive outcomes in their children: results from the Avon Longitudinal Study of Parents and Children (ALSPAC)

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Summary

Background

As a component of thyroid hormones, iodine is essential for fetal brain development. Although the UK has long been considered iodine replete, increasing evidence suggests that it might now be mildly iodine deficient. We assessed whether mild iodine deficiency during early pregnancy was associated with an adverse effect on child cognitive development.

Methods

We analysed mother–child pairs from the Avon Longitudinal Study of Parents and Children (ALSPAC) cohort by measuring urinary iodine concentration (and creatinine to correct for urine volume) in stored samples from 1040 first-trimester pregnant women. We selected women on the basis of a singleton pregnancy and availability of both a urine sample from the first trimester (defined as ≤ 13 weeks' gestation; median 10 weeks [IQR 9–12]) and a measure of intelligence quotient (IQ) in the offspring at age 8 years. Women's results for iodine-to-creatinine ratio were dichotomised to less than 150 $\mu\text{g/g}$ or 150 $\mu\text{g/g}$ or more on the basis of WHO criteria for iodine deficiency or sufficiency in

pregnancy. We assessed the association between maternal iodine status and child IQ at age 8 years and reading ability at age 9 years. We included 21 socioeconomic, parental, and child factors as confounders.

Findings

The group was classified as having mild-to-moderate iodine deficiency on the basis of a median urinary iodine concentration of 91.1 $\mu\text{g/L}$ (IQR 53.8–143; iodine-to-creatinine ratio 110 $\mu\text{g/g}$, IQR 74–170). After adjustment for confounders, children of women with an iodine-to-creatinine ratio of less than 150 $\mu\text{g/g}$ were more likely to have scores in the lowest quartile for verbal IQ (odds ratio 1.58, 95% CI 1.09–2.30; $p=0.02$), reading accuracy (1.69, 1.15–2.49; $p=0.007$), and reading comprehension (1.54, 1.06–2.23; $p=0.02$) than were those of mothers with ratios of 150 $\mu\text{g/g}$ or more. When the less than 150 $\mu\text{g/g}$ group was subdivided, scores worsened ongoing from 150 $\mu\text{g/g}$ or more, to 50–150 $\mu\text{g/g}$, to less than 50 $\mu\text{g/g}$.

Interpretation

Our results show the importance of adequate iodine status during early gestation and emphasise the risk that iodine deficiency can pose to the developing infant, even in a country classified as only mildly iodine deficient. Iodine deficiency in pregnant women in the UK should be treated as an important public health issue that needs attention.

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