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Children of mothers with iodine deficiency during pregnancy are more likely to have lower verbal IQ and reading scores at 8–9 years of age

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Context

Iodine deficiency is one of the leading causes of preventable brain damage. Although the relationship between maternal severe iodine deficiency and impaired cognitive function in children is well-established, less is known about the effects of mild-to-moderate iodine deficiency during early pregnancy. There have been only three intervention studies of maternal iodine supplementation on childhood cognitive measures; all were small and neither placebo-controlled nor randomised, but did suggest some improvements in cognitive outcome.^{1–3} On the basis of historical data, the UK population is likely to be iodine sufficient overall, but mild-to-moderate iodine deficiency may be present in some subsets of the population.

Methods

Bath and colleagues examined a 1040 mother-and-child pair subset from the Avon Longitudinal Study of Parents and Children. The research database contains data on over 14 000 pregnant women and their infants born between 1991 and 1992 in the former county of Avon, England. Creatinine-corrected median urinary iodine concentrations (UICs) taken from first trimester singleton pregnancies were assessed for their association with the child's IQ scores at 8 years of age and reading ability at 9 years of age. Mothers' UICs were categorised into two subsets: <150 and ≥150 µg/g. Among the iodine-deficient group (<150 µg/g), women were further categorised by severe iodine deficiency (<50 µg/g) and mild-to-moderate iodine deficiency (50–150 µg/g). The association between maternal UICs and childhood cognitive measures were adjusted for 21 socioeconomic, parental and child factors as potential confounders.

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Competing interests None.

Findings

The children whose mothers were iodine deficient during the first trimester of pregnancy had increased odds of having a total IQ and reading ability in the lowest quartiles, compared with the children of mothers with UICs $\geq 150 \mu\text{g/g}$. Furthermore, there was a trend towards poorer scores among the children of severely iodine-deficient mothers, compared with those of mild-to-moderately iodine-deficient mothers. The ORs of some tests were attenuated and not significant after adjustment for several potential confounders.

Commentary

Although universal salt iodisation (USI) has been adopted as a common method of eradicating iodine deficiency on the population level in many countries, the UK has no official USI programme and has not had a national survey of its iodine status since the 1940s. The recent reports suggest that British schoolgirls and pregnant women are iodine deficient. Bath and colleagues demonstrated that mild-to-moderate iodine deficiency in the UK pregnant women is associated with a reduced IQ test performance in the child at 8–9 years of age.

The rigour of the study could be improved if the subject distribution and baseline maternal characteristics between the iodine-sufficient versus iodine-deficient groups were better matched. Furthermore, none of the studies to date, including the present report, are large, placebo-controlled, randomised trials, which could provide a clear justification for the widespread adoption of iodine supplementation during pregnancy. Currently, a half of the US prenatal multivitamins contain iodine.⁴ Although the American Thyroid Association recommends $150 \mu\text{g}$ iodine daily during preconception, pregnancy and lactation in North America and Canada,⁵ only 20.3% of pregnant US women take an iodine-containing multivitamin.⁶ There are no data concerning the availability of or use of iodine-containing supplements among UK pregnant women.

The important study undertaken by Bath and colleagues supports the growing body of evidence that iodine deficiency, even in the mild-to-moderate range, during early fetal development may impact negatively on later cognitive development. We support the authors' call to action for a renewed assessment of the iodine status in the UK and rigorous, large trials of iodine supplementation in the regions of mild-to-moderate iodine deficiency.

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Implications for practice and research

- Children of mothers with iodine deficiency during the early pregnancy have an increased risk of impaired cognitive development at 8–9 years of age, even after adjustment for potential confounding factors.
- Among iodine-deficient women, the child's cognitive scores showed a downward trend with a decreasing maternal iodine intake.
- Further research is warranted to confirm the present findings.