

Iodine deficiency in Australia: is iodine supplementation for pregnant and lactating women warranted?

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Iodine deficiency has re-emerged as a significant public health problem in the Australian population. Recent studies have shown mild to moderate iodine deficiency in school-aged children and pregnant women.¹⁻⁴ Iodine deficiency, as indicated by decreased urinary iodine concentration (UIC), is inevitably a consequence of decreased dietary iodine intake.⁵ Insufficient dietary iodine results in a range of adverse conditions collectively known as iodine deficiency disorders (IDDs).⁶ The most important consequence of IDDs is damage to the developing fetus, which is the focus of this commentary.

Maternal iodine deficiency

Iodine is a trace element essential for the production of thyroid hormones. Thyroid hormones are essential for both fetal and neonatal brain development.⁷ During the first two trimesters of pregnancy, the fetus is totally dependent on placental passage of maternal thyroxine (T4) for normal brain development. A small decrease in the serum T4 level during pregnancy, from either iodine deficiency or thyroid disease, is an important risk factor for impaired psychomotor development in infants.⁸ During pregnancy, thyroid hormone requirements are increased by about 50% over prepregnancy levels. If hypothyroidism develops early in pregnancy, there is significant risk of miscarriage, premature labour and neurological damage to the fetus.⁹

Moderate to severe iodine deficiency during pregnancy may result in reduced average intelligence quotient (IQ) in the offspring. Mild iodine deficiency appears to be a likely cause of low IQ, but the relationship has not been unequivocally established. In the United States, iodine supplementation is recommended for pregnant women, yet in Australia, where the urinary iodine excretion levels of pregnant women are half those of American women, there are no formal policies for iodine supplementation.¹⁰

Iodine status of pregnant women in Australia

While recognising that UIC is not recommended for monitoring the iodine status of individuals, the World Health Organization has proposed that the median UIC is the best indicator to use in population (national) surveys to assess the iodine nutrition of pregnant and lactating women.¹¹ The median UICs for categorising iodine intake of pregnant and lactating women are summarised in Box 1.

Studies have reported low UICs in pregnant women in Australia.^{1,3,12} The median UIC of pregnant women of European background who participated in a study to test for Down syndrome in Melbourne was 52 µg/L. This study also found that 40% of the Vietnamese, Indian and Sri Lankan women in the study had UICs below 50 µg/L.¹² This indicates moderate iodine deficiency. Similar results have been shown in pregnant women in New South Wales and Tasmania.^{1,3,13,14}

Recognition of the seriousness of this issue is reflected in the proposal by Food Standards Australia and New Zealand (FSANZ) for mandatory use of iodised salt in bread. Proposal P230, Iodine

ABSTRACT

- Recent research has confirmed that Australian children and pregnant women are mildly iodine deficient. A considerable proportion of the pregnant population is moderately to severely iodine deficient.
- Even subclinical hypothyroidism in the mother, occurring as a consequence of iodine deficiency, can cause irreversible brain damage in the fetus, making it essential to avoid iodine deficiency in pregnancy.
- The proposal of Food Standards Australia and New Zealand (FSANZ) — Mandatory Iodine Fortification for Australia (P1003) — has been implemented. FSANZ openly admits P1003 is inadequate for covering the needs of pregnant women. Therefore, health professionals and the public must be properly informed about the limitations of this proposal.
- Views differ about the most effective measures to prevent iodine deficiency in Australia. We propose that women planning a pregnancy, and pregnant and lactating women should be advised to take an iodine supplement. Women with pre-existing thyroid disease should exercise caution and seek medical advice before taking a supplement.

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Fortification, has been adopted in New Zealand, and P1003, Mandatory Iodine Fortification for Australia, was implemented in Australia in October 2009.¹⁵ Despite this measure, the most vulnerable groups, pregnant and lactating women, may not be protected. The voluntary Tasmanian Iodine Supplementation Program, which began in 2001, involved monitoring the effect of fortifying bread with iodised salt on the population's iodine status.⁴

1 Median urinary iodine concentrations (UICs) used to categorise iodine intake in pregnant and lactating women¹¹

Median UIC (µg/L)	Category of iodine intake
Pregnant women	
< 150	Insufficient
150–249	Adequate
250–499	More than adequate
≥ 500	Excessive*
Lactating women[†]	
< 100	Insufficient
≥ 100	Adequate

* Iodine intake is excessive if it is more than the amount required to prevent and control iodine deficiency.

† UICs for lactating women are lower than those for pregnant women because of the iodine excreted in breast milk. ◆

Seventy per cent of bread produced in Tasmania now contains iodised salt, and the program has been successful in improving the population's iodine status, but the iodine status of pregnant women in Tasmania remains inadequate.³

Iodine supplementation in pregnancy: international experience

Views differ about how best to prevent iodine deficiency in Australia. One part of the debate is whether women planning a pregnancy and pregnant and lactating women should be advised to take an iodine supplement. A review of iodine supplementation of pregnant women in Europe highlighted six randomised controlled trials involving 450 women from populations with mild to moderate iodine deficiency. The authors concluded that iodine-containing supplements consistently benefit the iodine and thyroid status of both the mother and newborn. The concentration of iodine supplements used in the studies ranged from 50 to 230 µg/day. However, there was no clear dose response relationship between UIC and supplementation.¹⁶

A study, conducted in Switzerland, reported that 70% of the participating pregnant women received a prenatal supplement, and 13% of the received supplements contained iodine.¹⁷ This study demonstrated a statistically significant difference in the UICs between women taking iodine supplements and those not taking iodine supplements (median UIC 194 µg/L [range 31–990] and 130 µg/L [5–1881], respectively).¹⁷ Most pregnant women in Denmark take prenatal supplements, a third of which contain iodine.¹⁸

Iodine supplementation in Australia

In Australia, supplements for use during pregnancy can be purchased at pharmacies, health food stores and supermarkets. At the time of writing this article (July 2009), we identified 18 multivitamin supplements advertised for pregnancy (sources are shown in Box 2). Of the supplements currently available, 65% (12/18) contained iodine (as potassium iodide), with the recommended dose varying from 38.3 to 250 µg/day and the costs ranging from A\$5.00 to A\$29.90 for a month's supply (2009 prices).²⁰

Information in Australia about iodine supplementation during pregnancy is ad hoc. Given the cost of monthly iodine supplements and the limited advice about the health benefits, iodine supplementation is likely to be underused by women planning a pregnancy, and the distribution of women taking supplements is probably inequitable — based on the ability to pay rather than need. The report that younger women with less education and income were less likely to take folic acid supplements²¹ supports this claim.

Australia has no formal policies for iodine supplementation in pregnant and lactating women, and the use of iodine-containing supplements is not well documented. There are no public health interventions aimed at increasing the intake of iodine-containing supplements during pregnancy. A call for Australia and NZ to supplement the dietary iodine of pregnant and lactating women was made by one of us (CJE) in the newsletter of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists;²² whether or not it raised awareness among obstetricians of iodine deficiency has not been estimated. However, given the importance of women being iodine sufficient before pregnancy, health education campaigns to raise the awareness of women of childbearing age should be a high priority.

2 Sources used to identify iodine-containing supplements marketed for pregnant women in Australia*

In Australia, vitamin and mineral supplements (such as pregnancy supplements) are regulated as complementary medicines by the Therapeutics Goods Administration.¹⁹

- MIMS Online (incorporates information from both MIMS bi-monthly and MIMS annual; subscription only)
- Community pharmacy supplier catalogues, such as those of Australian Pharmaceutical Industries and Arrow Pharmaceuticals (a division of Sigma Pharmaceuticals)
- Online Australian-based pharmacies, such as PharmacyDirect; ePharmacy; PharmacyOnline; Chemist Australia; ChemistDirect; HomePharmacy; pulsepharmacy
- Web-based searches, using the search engine Google

* Information collected included product name; daily recommended dose; recommended retail price (RRP); iodine content (if available). Monthly cost was calculated according to RRP and daily recommended dose. ◆

In the United States and Canada, the Public Health Committee of the American Thyroid Association recommends iodine supplementation during pregnancy and lactation.⁷ The WHO, the United Nations Children's Fund (UNICEF) and the International Council for Control of Iodine Deficiency Disorders endorse the policy of iodine supplementation for pregnant and breastfeeding women in iodine deficient countries where universal salt iodisation has not been implemented or where it is ineffective. The Australian population is officially classified as mildly iodine deficient,² and we should have a national health policy and education campaign recommending iodine supplementation to pregnant and breastfeeding women and women considering pregnancy. An appropriate daily iodine supplement is 150 µg per day, which, coupled with the estimated daily intake of approximately 130 µg from the diet, would ensure optimal iodine nutrition for these women. Caution should be exercised for women with pre-existing thyroid disorders, who should receive individualised medical advice before taking a supplement.

Competing interests

Gisselle Gallego and Stephen Goodall co-authored reports for Food Standards Australia and New Zealand and the Department of Health and Ageing on the cost-effectiveness of iodine fortification of bread in Australia and New Zealand; the views expressed were those of the authors. Stephen Goodall is an FSANZ fellow. Creswell Eastman is the vice-chairman of the International Council for Control of Iodine Deficiency Disorders (ICCIDD), which is supported by the Australian Government Overseas Aid Program and the Canadian International Development Agency. ICCIDD is patron of the Australian Thyroid Foundation, which receives support from Cerebos (manufacturer of Saxa salt) and Blackmores.

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