IODINE DEFICIENCY IN PREGNANCY
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Iodine is an essential nutrient required for the biosynthesis of thyroid hormones thyroxine (T4) and triiodothyronine (T3), which are responsible for regulating growth, development and metabolism. For many people, the major source of dietary iodine is salt fortified with iodine. In its natural form iodine can be found in sea water, marine plants and in some minerals and soil.

Role of Iodine in Pregnancy and Lactation
Recently WHO/UNICEF increased the Recommended Nutrient Intake (RNI) for iodine during pregnancy and lactation to 250 μg/day.1 Since the foetus is totally dependent in early pregnancy on maternal thyroid hormones for normal brain development, it is very important that pregnant women consume enough iodine.2 Throughout pregnancy there are major alterations in thyroid function as a result of metabolic demands and hormonal changes.3 The concentrations of T4 and T3 rise significantly until approximately mid-gestation and then remain relatively stable until the end of gestation at term. Iodine requirements increase substantially during pregnancy; initially as a result of a 50% increase in thyroid hormone production and a 30% to 50% increase in the renal excretion of iodine, and later in gestation when iodine passes through the placenta for foetal production of thyroid hormones.3 Maternal and foetal thyroid hormones are essential in regulating the development of the foetal brain and nervous system including the creation and growth of nerve cells, the formation of synapses, which are required for communication between nerve cells, and myelination.4

During breastfeeding, thyroid hormone production and urinary iodine excretion return to non-pregnancy levels, but iodine requirements remain elevated because iodine is concentrated in the mammary gland for excretion in breastmilk.5 Breast milk iodine content varies with maternal dietary iodine intake and is lowest in iodine-deficient areas and highest where additional iodine is routinely provided through supplements or universal salt iodisation.6 As long as maternal iodine intake is adequate, breastmilk can meet infant iodine needs.

There are many studies which have reported a decrease of IQ points in children born to mothers living in iodine deficient regions of world untreated in pregnancy compared to supplemented mothers also living in severely iodine deficient regions. A meta-analysis of 18 studies concluded that maternal iodine deficiency lowered offspring IQ score by 13.5 points.7 There is strong evidence that iodine supplementation improves foetal outcomes with severe iodine deficiency.8 Thus, adequate intake of iodine throughout pregnancy is critical.

Manifestations of Iodine Deficiency in Pregnancy
Severe iodine deficiency provokes a range of disorders including endemic goiter, hypothyroidism, cretinism, decreased fertility, miscarriage, increased infant mortality, hypothyroxinaemia, trophoblastic or embryonic foetal disorders and mental retardation.9

Severe iodine deficiency during pregnancy causes maternal and foetal hypothyroxinemia.10 Thyroid hormone is required for normal neuronal migration, myelination synaptic transmission and plasticity during foetal and early postnatal life,11 and hypothyroxinemia during these critical periods causes irreversible brain damage with mental retardation and neurologic abnormalities. The consequences depend on the timing and severity of the hypothyroxinemia. Two classic forms of cretinism— neurologic and myxedematous cretinism have been described, but they can also occur in a mixed form.12 Whether mild-to-moderate maternal iodine deficiency produces more subtle changes in cognitive and/or neurologic function in the offspring is uncertain. However, some studies have reported developmental impairment in the offspring of affected mothers, even if maternal hypothyroidism is mild and asymptomatic. Interpretation of these studies is limited because they were conducted in iodine-sufficient populations. It is unclear whether maternal hypothyroxinemia, subclinical hypothyroidism, or both occur in otherwise healthy pregnant women with mild-to-moderate iodine deficiency.13

Indicators of Iodine Status during Pregnancy and Infancy
Urinary iodine concentration (UIC) is a universally accepted measure of iodine status. UIC is a good indicator of the previous day’s dietary iodine intake as up to 90% of iodine is excreted in the urine.14 The WHO currently recommends that a median UIC in a population of pregnant women of 150–249 μg/L indicates adequate iodine intake. WHO recommendation

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that a <3% frequency of thyrotropin values >5 mU/L indicates iodine sufficiency in a population.¹

**Strategies to Prevent or Correct Iodine Deficiency in Pregnancy**

For nearly all countries, the primary strategy for sustainable elimination of iodine deficiency in pregnancy remains universal salt iodization. However, implementation of universal salt iodization is not always feasible, which may result in insufficient access to iodized salt for women of childbearing age and pregnant women. Iodine supplementation of these groups should be considered.¹

International Federation of Gynecology and Obstetrics (FIGO)-2015 states that that even with use of iodized salt and eating seafood 2-3 days per week, a woman's daily iodine intake would be approximately half the amount recently recommended during pregnancy and lactation.¹² Organisations like American Academy of Pediatrics recommends that all the pregnant and breast-feeding women should seek out prenatal supplements that contain iodine. American Thyroid Association & Endocrine Society-2011 guidelines recommends that the women attempting to conceive and pregnant women take a prenatal vitamin containing 150mcg of iodine while IOM (Institution of medicine) recommends daily iodine intake of 220 mcg during pregnancy and 290 mcg during lactation.

WHO/UNICEF recommends iodine supplementation of 250 μg/d for pregnant and lactating women, 150 μg/d for women of reproductive age or an annual dose of 400 mg of iodised oil. WHO/UNICEF recommends that countries assess their salt iodization programs and then decide whether supplementation is indicated.¹

From an implementation perspective, pregnant and postpartum women often have contact with the healthcare system, which generally provides or recommends prenatal and sometimes postnatal micronutrient supplementation - usually iron and folic acid. Similarly, iodine supplementation could be integrated into routine antenatal and postnatal care. To reach women prior to pregnancy, existing contacts with the healthcare system or other platforms could be used to provide or recommend iodine supplementation for those planning on becoming pregnant and/or to all women of reproductive age because pregnancies are often unplanned (as is done with folic acid supplementation recommendations in many settings).

**References**


