Current Challenges in Meeting Global Iodine Requirements

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Iodine is a simple element that is widely distributed in nature, and its importance as a micronutrient rests on its essential role as a building block for the synthesis of the thyroid hormones. Iodine is an integral part of the thyroid hormone molecule. Thyroid hormone exerts multiple physiologic actions in the developing fetus, growing child and the mature adult, and it is the most potent hormonal stimulus for growth and maturation of both the brain and skeleton [1].

Iodine Deficiency

Iodine deficiency is a global problem of immense magnitude, afflicting 2 billion of the world’s population. The adverse effects of iodine deficiency in humans, collectively termed iodine deficiency disorders, result from decreased thyroid hormone production and action, and vary in severity from thyroid enlargement (goiter) to severe, irreversible brain damage, termed endemic cretinism [2]. Thyroid hormone is essential throughout life, but it is critical for normal brain development in the fetus and throughout childhood. During pregnancy, maternal thyroid hormone production must increase by 25–50% to meet maternal-fetal requirements.

Dietary Sources of Iodine

The principal sources of iodine in the diet are milk and dairy products, seafoods and foods with added iodized salt. Vegetables, fruits and cereals are generally poor sources of iodine because most of our soils and water supplies are deficient in iodine. The accepted solution to the problem is Universal Salt Iodization (USI), where all salt for human and animal consumption is iodized at a level of 20–40 µg/g [3]. In principle, mandatory fortification represents the most effective public health strategy, where safety and efficacy can be assured, and
there is a demonstrated need for the nutrient in the population. Voluntary fortification of salt and other foods has many limitations and few benefits. The current worldwide push to decrease salt intake to prevent cardiovascular disease presents an entirely new challenge in addressing iodine deficiency in both developing and developed countries [4].

Iodine Supplementation

Iodine supplementation is a useful, but expensive, inefficient and unsustainable strategy for preventing iodine deficiency. Nonetheless, iodine supplementation should be given to populations where USI has not been implemented or where it is unsuccessful [3]. It is a useful short- to medium-term strategy to prevent iodine deficiency disorders when directed to women of reproductive age, especially pregnant and breastfeeding women and their infants. Supplementation, with depot preparations of iodized oil, may be the only way of overcoming deficiency particularly in remote areas with a high incidence of neurological cretinism. A good outcome has been achieved in the mountainous regions of Tibet with this approach, which has been in place for a decade [5]. In both developed and developing countries, without USI, daily supplementation can be administered with KI or KIO₃ drops or tablets [1]. The recommendations for iodine supplementation are given in table 1. We must adapt to the challenges by applying the principle of ‘think globally but act locally’ in achieving optimal iodine nutrition for all.

Table 1. Recommendations for iodine supplementation in pregnancy and infancy in areas where USI is ineffective [3]

<table>
<thead>
<tr>
<th>Population</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>Women of childbearing age</td>
<td>Daily supplement of KI to meet the RDI of 150 µg/day or annual oral dose of 400 mg iodized oil</td>
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<tr>
<td>Women who are pregnant or breastfeeding</td>
<td>Daily supplement of KI to meet RDI of 250 µg or annual oral dose of 400 mg iodized oil</td>
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<tr>
<td>Infants aged 0–24 months</td>
<td>Daily supplement to meet RDI of 90 µg/day or single oral dose of 100 mg iodized oil for infants 0–6 months or 200 mg for infants 7–24 months</td>
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References