Iodine and selenium status and intake, and iodine nutritional knowledge of women of childbearing-age in Palmerston North, New Zealand.

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ABSTRACT

Objective: To explore the iodine and selenium status and intakes, and iodine nutritional knowledge of women of childbearing-age in Palmerston North, New Zealand (NZ), after the implementation of mandatory fortification of bread with iodine.

Method: Fifty women of childbearing-age (non-pregnant and not breastfeeding) were interviewed (recruited) for the assessment of dietary intake and nutritional knowledge using a researcher-led questionnaire, including a semi-quantitative food frequency questionnaire and 24-hour dietary recall. Fifty 24-hour urine samples were obtained and total volumes were measured. Iodine and selenium were analysed using the inductive-coupled plasma mass spectrometry.

Result: The median urinary iodine concentration was 64.7 mcg/l, which represents a mild iodine deficiency (ID), according to the WHO. Based on the individual iodine status, 70% of the participants were iodine deficient, categorised as marginal (30%), mild (30%) and moderate (10%). Iodine intake estimated from urinary iodine excretion (UIE) showed that 34% did not achieve the Estimated Average Requirement (EAR)(<100 mcg/day) and 46% met the Recommended Dietary Intake (RDI)(150 mcg/day). The median iodine intake was 129.8 mcg/day, indicating suboptimal intake. The major contributors to iodine intake were milk (35.6%), bread (24.6%), fish and seafood (15%) and egg (13.8%). The majority of respondents were unaware of the mandatory fortification of bread with iodine (70%) and also unaware of the ID problem in NZ (52%). The median excretion of selenium was 31.6 mcg/day and the intake estimated from urinary excretion was 57.5 mcg/day, with both values above the safe range for women (30 mcg/day), according to the WHO. Based on the 24-hour recall, the majority (70%) had inadequate selenium intake (<50 mcg/day), whilst only 20% met the RDI intake of 60 mcg/day. There was a moderate correlation between the urinary selenium excretion and UIE (Spearman's rank order; $\underline{r}$ (50)=0.547,$p<0.05$).

Conclusion: ID is still a problem in this population, although mandatory fortification has been implemented. However, this study shows improved iodine status and intake compared to previous studies and it thus signifies the benefits of iodine-fortified bread. In order to help eliminate ID in NZ, an additional strategy, such as the implementation of iodine fortification in another food vehicle should be considered.

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“So, verily, with every difficulty, there is relief. Verily, with every difficulty there is relief” (Holy Quran 94:5-6)

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LIST OF ABBREVIATIONS

EAR	Estimate average requirement
FFQ	Food frequency questionnaire
FNB	Food Nutrition Board
GPx	Glutathione peroxidase
ICCDD	International Council for Control of Iodine Deficiency Disorder
ID	Iodine deficiency
IDD	Iodine deficiency disorder
IDIs	Iodothyronine 5' deiodinases
IOM	Institute of Medicine
MOH	Ministry of Health
NHANES	National Health and Nutrition Examination Survey
NIS	Na/I active transporter
NRV	Nutrient references value
NTD	Neural tube defects
NZ	New Zealand
NZTDS	New Zealand Total Diet Survey
PII	Plasma inorganic iodide
RDA	Recommended dietary allowance
RDI	Recommended dietary intake
TBG	Thyroid-binding globulin
TGR	Total goitre rate
Thg-DIT	Thyroglobulin-3,5-diiodotyrosine
Thg-MIT	Thyroglobulin-3-monoiodotyrosine
TR	Thyroid hormone receptor
TRH	Thyrotropin-releasing hormone
TSH	Thyroid-stimulating hormone
UIC	Urinary iodine concentration
UIE	Urinary iodine excretion
UNICEF	United Nations International Children Emergency Fund
USI	Universal salt iodisation
WHO	World Health Organization

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ETHICS

Ethic approval for this study (Application 10/03) was obtained in March 2010 from the Massey University Ethics Committee (MUHEC) (Appendix 13).