

IODINE INTAKE AND UPTAKE IN POPULATIONS AT RISK FOR IODINE DEFICIENCY

Akademisk avhandling

Som för avläggande av medicin doktorexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentlig försvaras i Hörsal Arvid Carlsson, Academicum, Medicinaregatan 3, Göteborg, Fredagen den 7:e maj 2021, klockan 9:00

av **Sofia Manousou**

Fakultetsopponent:

Professor Laszlo Hegedüs

Department of Endocrinology and Metabolism Odense University Hospital,
Odense, Denmark

Avhandlingen baseras på följande delarbeten

- I. Manousou S, Andersson M, Eggertsen R, Hunziker S, Hulthén L, Nyström HF. 2020. Iodine deficiency in pregnant women in Sweden: a national cross-sectional study. *European Journal of Nutrition*.
- II. Manousou S, Eggertsen R, Hulthén L, Nyström HF. 2021. A randomized, double-blind study of iodine supplementation during pregnancy in Sweden: pilot evaluation of maternal iodine status and thyroid function. *European Journal of Nutrition*.
- III. Manousou S, Augustin H, Eggertsen R, Hulthén L, Nyström HF. 2021. Inadequate iodine intake in lactating women in Sweden: a pilot 1 year, prospective, observational study. *Acta Obstetrica et Gynecologica Scandinavica*.
- IV. Manousou S, Carlsson LMS, Eggertsen R, Hulthén L, Jacobson P, Landin-Wilhelmsen K, Trimpou P, Svensson PA, Nyström HF. 2018. Iodine status after bariatric surgery: a prospective 10-year report from the Swedish Obese Subjects (SOS) Study. *Obesity Surgery*

IODINE INTAKE AND UPTAKE IN POPULATIONS AT RISK FOR IODINE DEFICIENCY

Sofia Manousou

Department of Internal Medicine and Clinical Nutrition, Institute of Medicine,
Sahlgrenska Academy, University of Gothenburg, Göteborg, Sweden

Background: Iodine is essential for the production of thyroid hormones. Both iodine deficiency (ID) and iodine excess may be harmful. Iodine intake in Sweden is considered adequate for the general population due to iodization of table salt since 1936 but data on pregnant and breastfeeding women (i.e. groups with increased need for iodine) are scarce in Sweden. Moreover, bariatric surgery is increasingly popular and it is unknown whether it causes ID by decreased iodine intake and/or uptake.

Aims: To investigate iodine status and thyroid function in populations that are known to be at risk for ID (i.e. pregnant and breastfeeding women) and in populations that are assumed to be at risk for ID (i.e. patients who have undergone bariatric surgery).

Methods: **PAPER I** is a cross-sectional, observational study on a representative population in Sweden of 743 pregnant women. **PAPER II** is a pilot, randomized, controlled trial comprising 200 women who received a daily multivitamin either with iodine 150 µg or without iodine followed until delivery. **PAPER III** is an observational prospective study of 84 women followed from the third trimester of pregnancy until 12 months postpartum with a focus on breastfeeding habits. **PAPER IV** is an interventional, non-randomized, controlled trial of patients undergoing gastric bypass or vertical-banded gastroplasty derived from the Swedish Obesity Subjects study. They were compared to obese non-operated subjects and to a population-based control group. The outcomes were urinary iodine, thyroid hormones, thyroglobulin (Tg), breastmilk iodine concentration (BMIC), and dietary iodine intake.

Results: Pregnant women in Sweden presented mild ID. A daily supplement containing iodine 150 µg increased iodine status from mild ID to borderline iodine sufficiency with a positive influence on maternal Tg. Breastfeeding women in a local population presented mild ID. A minority (~20%) took iodine supplementation and presented BMIC double that of non-supplement users. Exclusively breastfeeding women at 4 months postpartum presented lower urinary iodine and higher Tg compared to the rest of the study population. Obese subjects at baseline presented higher iodine status than the general population. After bariatric surgery, iodine status decreased but remained at an adequate level at 10 years post-operatively. Whether this decrease was due to altered iodine uptake and/or intake is unknown but the patients did not develop ID.

Conclusions: In Sweden, pregnant women present mild ID. Breastfeeding women may be mildly iodine deficient, especially those who exclusively breastfeed their children. The main action to be taken is to improve the coverage of the current iodine fortification program – the efficacy and the safety of iodine supplementation to pregnant and breastfeeding women with mild ID is still unclear. Bariatric surgery does not appear to be a risk factor for ID. Regular monitoring of the iodine fortification program for both the general population and risk groups is strongly required.

Keywords: iodine, pregnancy, lactation, bariatric surgery, urinary iodine concentration, thyroglobulin, breastmilk iodine concentration, iodine supplementation, Sweden