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APPROPRIATE DIETARY IODINE INTAKE DURING PREGNANCY IS IMPORTANT FOR MATERNAL AND FETAL THYROID FUNCTION

Fuse Y, Ohashi T, Yamaguchi S, Yamaguchi M, Shishiba Y, Irie M. **Iodine status of pregnant and postpartum Japanese women: Effect of iodine Intake on maternal and neonatal thyroid function in an iodine-sufficient area.** J Clin Endocrinol Metab. September 28, 2011 [Epub ahead of print].

SUMMARY

BACKGROUND

In early pregnancy, iodine requirements increase because of increased renal blood flow and glomerular filtration, which lead to increased iodine clearance and iodine loss in the urine. In later pregnancy, fetal demands for iodine increase, and iodine deprivation occurs because of the passage of iodine from the maternal circulation to the fetal–placental unit. In the postpartum period, additional iodine intake is needed to compensate for iodine loss into the breast milk. Recently, there have been increasing concerns about pregnant and lactating women, weaning infants, and older children who do not receive enough iodine in the countries that have been iodine-sufficient for several decades. In the United States and Canada, the American Thyroid Association and The Endocrine Society recommend iodine supplementation during pregnancy and lactation. The effect of dietary iodine intake during pregnancy on maternal and infantile thyroid function has not been well studied in iodine-sufficient areas, and there are few data on appropriate gestational age–specific reference ranges for urinary iodine (UI) excretion during pregnancy and lactation. The aim of this study was to examine the pattern of maternal UI excretion throughout gestation and to assess the influence of iodine status on maternal and neonatal thyroid function in an iodine-sufficient area.

METHODS

Between November 2005 and January 2007, healthy pregnant and postpartum women with no previous history of thyroid disease were consecutively recruited when they attended a routine antenatal clinic at Yamaguchi Hospital in Funabashi City, Chiba Prefecture, Japan. These women were prospectively studied during the three trimesters of pregnancy and the late puerperium at 5 to 6 weeks postpartum. Gestational dates were confirmed by ultrasound in the first trimester. Blood and random urine samples were taken from the

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participants once in each trimester and 1 month after birth; a heel-prick blood sample was taken between 72 and 120 hours after birth from all infants. The study group comprised 701 pregnant women, 545 postpartum women, and 722 newborn infants (365 boys and 350 girls). The mean (±SD) ages of the pregnant and postpartum women were 30.9±4.1 and 31.0±4.1 years, respectively. Serum thyrotropin (TSH), free thyroxine (T_4), and two thyroid autoantibodies (ThAb)—thyroperoxidase antibody (TPOAb) and thyroglobulin antibody (TgAb)—were measured in 729 serum samples obtained from 456 subjects in each trimester. Urine iodine concentration (IUC) was expressed relative to creatinine (Cr) excretion (UI/Cr; micrograms per gram of creatinine) or as a concentration in micrograms of iodine per 1000 ml of urine (micrograms per liter).

RESULTS

WHO/UNICEF/ICCIDD-recommended epidemiologic criteria based on a median UIC for assessing iodine intake in pregnant women are as follows: insufficient, <150 g/L; adequate, 150 to 249 g/L; more than adequate, 250 to 499 g/L; and excessive, ≥500 g/L. Criteria for lactating women and children less than 2 years of age are: insufficient, <100 g/L, and adequate, ≥100 g/L.

The overall median UIC during pregnancy was 219.0 µg/L, higher than that in postpartum women (135.0 µg/L). The prevalence of pregnant women with a low UIC (<100 µg/L) or a high UIC (>500 µg/L) was 16.1% and 22.2%, respectively. Urinary iodine excretion increased from 220.0 µg/L in the first trimester to 258.0 µg/L in the second trimester, decreased to 195.0 µg/L in the third trimester, and then remained at 137.0 µg/L postpartum. There were no significant direct correlations of UIC or UI/Cr with either serum TSH or free T_4 concentrations in any of the three trimesters. When the subjects were divided into two groups according to the serum TSH, with a cutoff value of 2.5 mU/L, the mean UIC and UI/Cr in the groups with a TSH of at least 2.5 mU/L had higher values as compared with the groups with <2.5 mU/L in each trimester. There was no significant difference in UIC between subjects with positive thyroid autoantibodies and those with negative antibodies. No significant correlation was found between neonatal TSH and maternal UIC or UI/Cr in each of the trimesters, gestational months, or postpartum period.

CONCLUSIONS

Iodine intake assessed by UIC in Japanese pregnant women is regarded as sufficient and not excessive according to World Health Organization criteria. Although the data are local, the authors' results provide additional information on the reference range for UIC throughout gestation in iodine-sufficient areas.

COMMENTARY

There is increased concerned in developed, iodine-sufficient countries, about the dietary intake of women of child-bearing age during pregnancy and the postpartum period (1). This Japanese study in a country with a high dietary intake of iodine reported a median UIC in pregnant women of 219 µg/L, significantly higher than the UIC in postpartum women, which was 135 µg/L. The authors did not mention whether supplementation of iodine was prescribed during pregnancy and lactation. They concluded that iodine intake assessed by UIC is sufficient in their population and not excessive. Supporting their data, the authors previously reported that the median UIC of schoolchildren from the Tokyo and Hokkaido were 282 and 288 µg/L, respectively (2), somewhat higher than in their pregnancy study. Some epidemiologic studies in certain areas with adequate or high iodine intake suggest that the incidence of subclinical hypothyroidism and autoimmune thyroiditis increases (3), but this phenomenon is still controversial (4). In the present study, there were no differences in the

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prevalence of positive autoimmunity between the women with high iodine intake and those with normal intake. One important clinical note, confirmed in this study, is the lack of relevance in the interpretation of isolated urinary iodine determination in a given patient. For the above reasons, we should not be surprised by the wide range in the UIC results in spot urine samples, ranging from 6.0 µg/L to 16,300 µg/L; therefore 16.1% of pregnant women and 35.7% in the postpartum women had iodine excretion <100 µg/L, considered insufficient by WHO/UNICEF/ICCIDD-recommended epidemiologic criteria (5). At the other extreme, 22.2% of pregnant women and 14.1% of postpartum women excreted >500 µg/L, considered excessive. Only the epidemiologic criteria in study populations based on median UIC are accepted in assessing iodine intake. UIC values are affected by many factors, such as the time of urine collection (fasting or postprandial) and spot versus 24-hour urine samples. The decrease in UIC in the postpartum period should remind us to advise our patients not to discontinue supplemental iodine (mostly in the prenatal vitamins) after delivery and to continue it throughout lactation. In summary, this study reassured us of the adequacy of dietary iodine supply in pregnancy in areas with sufficient iodine intake and of its beneficial effect on maternal and neonatal thyroid function, Because of the decrease in urinary iodine following delivery it reminds us of the need to continue iodine supplementation in the postpartum period in lactating women.

— Jorge H. Mestman, MD

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