



HYPOTHYROIDISM

Both hypothyroidism and hyperthyroidism in the mother during early pregnancy may increase the risk of their children having difficulty with mathematics.

BACKGROUND

Thyroid hormone is essential for normal brain development in the baby during pregnancy. The baby depends on thyroid hormone from the mother during the first trimester. Hypothyroidism and/or positive TPO antibody in the mother is associated with increased risk of early miscarriage and fetal disorders. Experimental studies on mild hypothyroidism suggest that either undertreatment or overtreatment can affect brain development in the baby.

Between 1985 and 1986, the Northern Finland Birth Cohort (NFBC) study began compiling data on a group of 9362 mothers and 9479 children. The current article used the NFBC to assess some possible clinical associations between first-trimester maternal thyroid-function tests and scholastic performance in children at ages 8 and 16 years.

THE FULL ARTICLE TITLE

Päkkilä FM et al. Maternal and child's thyroid function and child's intellect and scholastic performance. *Thyroid*. November 13, 2015 [Epub ahead of print].

SUMMARY OF THE STUDY

Between 1985 and 1986, the NFBC study began compiling demographic, maternal health, pregnancy, delivery and neonatal outcome data on a cohort of 9362 mothers and 9479 children. Blood samples were drawn in women who were 6 to 20 weeks pregnant (average 10.7 weeks; dates confirmed by ultrasound in 70%) In 2006, 5805 samples had thyroid-function tests performed. Normal values were found in 4747 mothers; 40 had overt hypothyroidism and another 318 had a normal free T₄ but an elevated TSH (subclinical hypothyroidism); 45 had overt hyperthyroidism and another 79 had a normal free T₄ but a low TSH (subclinical hyperthyroidism), while 67 had a normal TSH but a low free T₄ (hypothyroxinemia). The 5% of mothers whose TPO antibody level was above 167.7 IU/ml were deemed TPOAb-positive. Dietary iodine intake at the time was more than adequate: about 300 µg/day.

Data on the health of the cohort children were acquired from routine child welfare clinic visits, national registers, questionnaires, and clinical examinations. Parents completed a questionnaire on health, development, school, and social situations of the children at 7 to 8 years of age (90% response rate). The children's main teachers completed a questionnaire on impairments in learning reading, writing, or mathematics (92% response rate). At age 16, the adolescents were asked to self-evaluate their school performance in Finnish language and mathematics, using a data-collection tool previously shown to reflect school grades accurately (80% response rate). About 5070 individuals had teacher-estimated performance at 8 years and about 4360 had scholastic self-evaluations at 16 years.

Mothers with hypothyroidism (overt plus subclinical) were more obese, smoked less, and had significantly higher median TPO-antibody levels. Obesity was also significantly higher in mothers with hypothyroxinemia, and maternal obesity is associated with reduced offspring IQ. Mothers who had hyperthyroidism had a significantly smaller percentage of offspring who were male (36%, vs. 51% female).

No differences were found between the 8-year-old offspring of the mothers who were euthyroid and those who had hypothyroidism, hypothyroxinemia, or hyperthyroidism. Overall, 16-year-old offspring of the 358 mothers who had hypothyroidism showed no overall difference in scholastic performance as compared with the offspring of euthyroid mothers, but when the 318 cases of subclinical hypothyroidism were analyzed separately, the risk of having difficulty in mathematics was increased as compared with the 4747 adolescents from euthyroid mothers. The 16-year-old offspring of the 124 mothers with hyperthyroidism (overt plus subclinical) also had an increased risk of difficulty with mathematics.

**HYPOTHYROIDISM**, continued**WHAT ARE THE IMPLICATIONS OF THIS STUDY?**

In this Northern Finnish cohort, 16-year-old offspring of mothers with first-trimester tests that indicated subclinical hypothyroidism were at increased risk of having difficulty in mathematics. The 16-year-old offspring of mothers with tests indicating hyperthyroidism (overt plus subclinical) were also found to be at increased risk of having difficulty

in mathematics. These data suggest another reason to consider screening for thyroid disease in the mother early in pregnancy.

— Alan P. Farwell, MD, FACE

ATA THYROID BROCHURE LINKS

Hypothyroidism: <http://www.thyroid.org/hypothyroidism/>

ABBREVIATIONS & DEFINITIONS

Hypothyroidism: a condition where the thyroid gland is underactive and doesn't produce enough thyroid hormone. Treatment requires taking thyroid hormone pills.

Subclinical Hypothyroidism: a mild form of hypothyroidism where the only abnormal hormone level is an increased TSH. There is controversy as to whether this should be treated or not.

Overt Hypothyroidism: clear hypothyroidism an increased TSH and a decreased T₄ level. All patients with overt hypothyroidism are usually treated with thyroid hormone pills.

TPO Antibodies: these are antibodies that attack the thyroid instead of bacteria and viruses, they are

a marker for autoimmune thyroid disease, which is the main underlying cause for hypothyroidism and hyperthyroidism in the United States.

Euthyroid: a condition where the thyroid gland as working normally and producing normal levels of thyroid hormone.

Hyperthyroidism: a condition where the thyroid gland is overactive and produces too much thyroid hormone. Hyperthyroidism may be treated with antithyroid meds (Methimazole, Propylthiouracil), radioactive iodine or surgery.

Subclinical Hyperthyroidism: a mild form of hyperthyroidism where the only abnormal hormone level is a decreased TSH.