Hypothyroidism and its relation to pregnancy

Sharayu Shanmathi

Intern
Saveetha Dental College

INTRODUCTION:
The body, in order to maintain its internal environment has to balance normal hormonal levels. But sometimes these levels change and the following manifestations of hyperthyroidism and hypothyroidism can be seen.

Hypothyroidism has the following clinical manifestations-tiredness, abnormal weight gain ,baldness,bradycardia. And it brings about a phenomenal change during pregnancy. The effects can be studied by segregating them in different trimesters.

CONTENTS:

The variations that are bought about in the three trimesters have been extensively studied in the following research and review papers.There is change in the thyroid hormone levels throughout the pregnancy.hypopthyrodism can begin during prgnancy period or may be pre-existing.It is a challenging to diagonsehypothyrodism during pregnancy as some of the signs are related with that of pregnancy

FIRST TRIMESTER:

According to DHANWAL D.K and others a total of thousand pregnant women who were attending Loknayak and Kasturba hospitals with a diagonosed thyroid disease were studied.The study subjects were approx of 25.6 years of age and mean gestational age was 10.3 weeks.Acocrding to this study hypothyrodism especially sub-clinical is found to be positive(13.4%) in North Indian women during first trimester

SECOND TRIMESTER:

According to William L.Roberts and others 3064 blood specimens were collected from asians(13%),blacks(22%),Hispanics(23%),Whites(42%) TSH,total and free iodothyronine,thyroglobuline auto antibodies and thyroidperoxidase auto antibodies were measured.serum samples were positive for TgAb and TPOAb in asians(10.6%,12.4%)-the highest and blacks(1.8%,4.1%)-the least respectively.Whites were found to have increased TSH.Asians had the lower and upper refernce limits of TT3.By this study the women in the second trimester were found to hvedifferntrefernce from those of non-pregnant individuals.

THIRD TRIMESTER:

According to Bourcigaux and others 114 pregnant Perisian women were studied at the third trimester of pregnancy.in this study there was an increase in thyroxine binding globulin were uncreased in all frenchpregnanat women and FT4 levels were decreased by about 30%.The increase in total thyroxine were found to be only 27%.By this study there is insufficient iodine in women which could be responsible for deficient increase in TT4.it can be corrected by systemic iodine supplementation.

DISCUSSION:

Accordingto the study in U.S 23512 pregnancies only one child was born due to the complications of hypo/hyperthyroidism in women.This data is frmconsortorian of study labour between 2002 to 2008 according to the study by Casey and others pregnancy outcomes in women with elevated TSH and normal free thyroxine levels were evaluated by thyroid screening.subclinical hypothyroid pregnant women Parkland hospital were choosen.the pregnancy outcome were compared with those in pregnant women whose TSH value is found 2 b normal and d percentiles between 5th and 95th out of 25756 women who were screened only one infant was delivered.and 404 of those were considerd to have subclinical hypothyrodism which were three times more likely to be complicated by placental abruption according to a study reported on in the New England Journal of Medicine in 1999,babies born to mothers with untreated hypothyroidism are almost four times more likely to have lower IQs and learning difficulties, according to a study . The study went on to note, however, that children whose mothers were undergoing treatment for an underactive thyroid scored almost the same as children born to mothers with normal thyroid function.

According to research presented at the June 2000 Endocrine Society conference ("Maternal Thyroid Function During Early Pregnancy and Neurodevelopment of the Offspring," June 21, 2000, Clinical Symposium: Impact of Maternal Thyroid Function on the Fetus and Neonate) there is increasing evidence that even normal FT4 levels that fall into the lowest tenth percentile during the early stages of pregnancy can be associated with poor infant development. Low-normal FT4 is not defined as maternal hypothyroidism when TSH is normal, but these outcomes indicate that screening and treatment for thyroid problems may be warranted in all women.

The study concluded that women with a low normal FT4 -- in the lowest 10th percentile at 12 weeks' gestation -- are at risk for children with developmental delay. Further, the researchers found that "TSH, during early gestation, seems to be without any value to pick up these women at risk."

Accordin to Joanne F. Rovet The study involved 36 six-month-old infants born to hypothyroid women treated with levothyroxine, who were diagnosed prior to or during their pregnancies, and 22 control infants.Children of women with hypothyroidism—an under-active thyroid—who had elevated thyroid stimulating hormone (TSH) in the first and second trimesters of pregnancy, had a significantly reduced ability to see visual contrasts, compared to women with hypothyroidism with normal TSH levels during the first two trimesters, and pregnant women with normal thyroid levels,

Children born to mothers with untreated hypothyroidism during pregnancy score lower on IQ tests than children of healthy mothers, according to a study conducted by Dr. James Haddow and partially funded by the National Institute of Child Health and Human Development (NICHD) and reported in the August 19 issue of the New England Journal of Medicine. However, children whose mothers were being treated for the condition scored almost the same as children born to healthy mothers. These findings suggest that early detection and treatment of hypothyroidism in pregnant women may be a critical part of prenatal care. From 25,216 frozen serum samples obtained during pregnancy, researchers identified 62 women who had children between January 1987 and March 1990 and who, in retrospective analysis, were identified as having been hypothyroid during their pregnancies. These children were compared to a carefully matched group of 124 control children whose mothers' thyroid function in pregnancy was normal.

At the time of the study, the children ranged in age from 7 to 9 years. They participated in a series of 15 psychological tests relating to intelligence, attention, language, reading and school problems, and visual-motor performance.

The children born to mothers who were hypothyroid during pregnancy scored an average of 4 points lower in IQ tests than the control children, and 15 percent had IQ scores lower than 85, compared to only 5 percent of the control children who scored that low. Overall, the case children scored poorer on all 15 individual tests than the children born to healthy mothers.

Of the 62 women with hypothyroidism, 48 did not receive treatment during pregnancy for their condition. Their children's IQ scores averaged 7 points lower than children of mothers without the condition, and 19 percent had IQ scores below 85. However, the children born to mothers who were receiving treatment scored similarly to the control children, suggesting that treatment can help mitigate the adverse effects.

REFERENCES

[1] Surks MI, Ortiz E, Daniels GH, et al. Subclinical thyroid disease: scientific review and guidelines for diagnosis and management. JAMA 2004; 291:228.
[2] Committee on Patient Safety and Quality Improvement, Committee on Professional Liability. ACOG Committee Opinion No. 381: Subclinical hypothyroidism in pregnancy. ObstetGynecol 2007; 110:959.
[3] De Groot L, Abalovich M, Alexander EK, et al. Management of thyroid dysfunction during pregnancy and postpartum: an Endocrine Society clinical practice guideline. J ClinEndocrinolMetab 2012; 97:2543.
[4] Kaplan MM. Management of thyroxine therapy during pregnancy. EndocrPract 1996; 2:281.
[5] Alexander EK, Marqusee E, Lawrence J, et al. Timing and magnitude of increases in levothyroxine requirements during pregnancy in women with hypothyroidism. N Engl J Med 2004; 351:241.
[6] Vadiveloo T, Mires GJ, Donnan PT, Leese GP. Thyroid testing in pregnant women with thyroid dysfunction in Tayside, Scotland: the thyroid epidemiology, audit and research study (TEARS). ClinEndocrinol (Oxf) 2013; 78:466.
[7] Loh JA, Wartofsky L, Jonklaas J, Burman KD. The magnitude of increased levothyroxine requirements in hypothyroid pregnant women depends upon the etiology of the hypothyroidism. Thyroid 2009; 19:269.
[8] Abalovich M, Alcaraz G, Kleiman-Rubinsztein J, et al. The relationship of preconception thyrotropin levels to requirements for increasing the levothyroxine dose during pregnancy in women with primary hypothyroidism. Thyroid 2010; 20:1175.
[9] Yassa L, Marqusee E, Fawcett R, Alexander EK. Thyroid hormone early adjustment in pregnancy (the THERAPY) trial. J ClinEndocrinolMetab 2010; 95:3234.
[10] Stagnaro-Green A, Abalovich M, Alexander E, et al. Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. Thyroid 2011; 21:1081.
[11] Blatt AJ, Nakamoto JM, Kaufman HW. National status of testing for hypothyroidism during pregnancy and postpartum. J ClinEndocrinolMetab 2012; 97:777.
[12] Vaidya B, Hubalewska-Dydejczyk A, Laurberg P, et al. Treatment and screening of hypothyroidism in pregnancy: results of a European survey. Eur J Endocrinol 2012; 166:49.
[13]
[14] Allan WC, Haddow JE, Palomaki GE, et al. Maternal thyroid deficiency and pregnancy complications: implications for population screening. J Med Screen 2000; 7:127.
[15] Klein RZ, Haddow JE, Faix JD, et al. Prevalence of thyroid deficiency in pregnant women. ClinEndocrinol (Oxf) 1991; 35:41.

[16] Casey BM, Dashe JS, Wells CE, et al. Subclinical hypothyroidism and pregnancy outcomes. ObstetGynecol 2005; 105:239.
[17] Wilson KL, Casey BM, McIntire DD, et al. Subclinical thyroid disease and the incidence of hypertension in pregnancy. ObstetGynecol 2012; 119:315.
[18] Schneuer FJ, Nassar N, Tasevski V, et al. Association and predictive accuracy of high TSH serum levels in first trimester and adverse pregnancy outcomes. J ClinEndocrinolMetab 2012; 97:3115.
[19] Negro R, Schwartz A, Gismondi R, et al. Increased pregnancy loss rate in thyroid antibody negative women with TSH levels between 2.5 and 5.0 in the first trimester of pregnancy. J ClinEndocrinolMetab 2010; 95:E44.
[20] Baker VL, Rone HM, Pasta DJ, et al. Correlation of thyroid stimulating hormone (TSH) level with pregnancy outcome in women undergoing in vitro fertilization. Am J ObstetGynecol 2006; 194:1668.
[21] Cleary-Goldman J, Malone FD, Lambert-Messerlian G, et al. Maternal thyroid hypofunction and pregnancy outcome. ObstetGynecol 2008; 112:85.
[22] Negro R, Schwartz A, Gismondi R, et al. Universal screening versus case finding for detection and treatment of thyroid hormonal dysfunction during pregnancy. J ClinEndocrinolMetab 2010; 95:1699.
[23] Li, Y, Shan, Z, Teng, W, et al. Abnormalities of maternal thyroid function during pregnancy affect neuropsychological development of their children at 25-30 months. ClinEndocrinol 2010; 72:825.
[24] Smit BJ, Kok JH, Vulsma T, et al. Neurologic development of the newborn and young child in relation to maternal thyroid function. ActaPaediatr 2000; 89:291.
[25] Lazarus JH, Bestwick JP, Channon S, et al. Antenatal thyroid screening and childhood cognitive function. N Engl J Med 2012; 366:493.
[26] GOLDSMITH RE, STURGIS SH, LERMAN J, STANBURY JB. The menstrual pattern in thyroid disease. J ClinEndocrinolMetab 1952; 12:846.
[27] Abalovich M, Gutierrez S, Alcaraz G, et al. Overt and subclinical hypothyroidism complicating pregnancy. Thyroid 2002; 12:63.
[28] Krassas GE, Pontikides N, Kaltsas T, et al. Disturbances of menstruation in hypothyroidism. ClinEndocrinol (Oxf) 1999; 50:655.
[29] Hallengren B, Lantz M, Andreasson B, Grennert L. Pregnant women on thyroxine substitution are often dysregulated in early pregnancy. Thyroid 2009; 19:391.
[30] LaFranchi SH, Haddow JE, Hollowell JG. Is thyroid inadequacy during gestation a risk factor for adverse pregnancy and developmental outcomes? Thyroid 2005; 15:60.
[31] Leung AS, Millar LK, Koonings PP, et al. Perinatal outcome in hypothyroid pregnancies. ObstetGynecol 1993; 81:349.
[32] Wasserstrum N, Anania CA. Perinatal consequences of maternal hypothyroidism in early pregnancy and inadequate replacement. ClinEndocrinol (Oxf) 1995; 42:353.
[33] Davis LE, Leveno KJ, Cunningham FG. Hypothyroidism complicating pregnancy. ObstetGynecol 1988; 72:108.
[34] Stagnaro-Green A, Chen X, Bogden JD, et al. The thyroid and pregnancy: a novel risk factor for very preterm delivery. Thyroid 2005; 15:351.
[35] Pop VJ, Kuijpens JL, van Baar AL, et al. Low maternal free thyroxine concentrations during early pregnancy are associated with impaired psychomotor development in infancy. ClinEndocrinol (Oxf) 1999; 50:149.
[36] Haddow JE, Palomaki GE, Allan WC, et al. Maternal thyroid deficiency during pregnancy and subsequent neuropsychological development of the child. N Engl J Med 1999; 341:549.
[37] Glinoer D. The regulation of thyroid function in pregnancy: pathways of endocrine adaptation from physiology to pathology. Endocr Rev 1997; 18:404.
[38] Ain KB, Mori Y, Refetoff S. Reduced clearance rate of thyroxine-binding globulin (TBG) with increased sialylation: a mechanism for estrogen-induced elevation of serum TBG concentration. J ClinEndocrinolMetab 1987; 65:689.
[39] Ballabio M, Poshychinda M, Ekins RP. Pregnancy-induced changes in thyroid function: role of human chorionic gonadotropin as putative regulator of maternal thyroid. J ClinEndocrinolMetab 1991; 73:824.
[40] Yamazaki K, Sato K, Shizume K, et al. Potent thyrotropic activity of human chorionic gonadotropin variants in terms of 125I incorporation and de novo synthesized thyroid hormone release in human thyroid follicles. J ClinEndocrinolMetab 1995; 80:473.
[41] Glinoer D, de Nayer P, Bourdoux P, et al. Regulation of maternal thyroid during pregnancy. J ClinEndocrinolMetab 1990; 71:276.
[42] Yeo CP, Khoo DH, Eng PH, et al. Prevalence of gestational thyrotoxicosis in Asian women evaluated in the 8th to 14th weeks of pregnancy: correlations with total and free beta human chorionic gonadotrophin. ClinEndocrinol (Oxf) 2001; 55:391.
[43] Goodwin TM, Montoro M, Mestman JH, et al. The role of chorionic gonadotropin in transient hyperthyroidism of hyperemesis gravidarum. J ClinEndocrinolMetab 1992; 75:1333.
[44] Lockwood CM, Grenache DG, Gronowski AM. Serum human chorionic gonadotropin concentrations greater than 400,000 IU/L are invariably associated with suppressed serum thyrotropin concentrations. Thyroid 2009; 19:863.
[45] Stagnaro-Green A, Abalovich M, Alexander E, et al. Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. Thyroid 2011; 21:1081.
[46] Dashe JS, Casey BM, Wells CE, et al. Thyroid-stimulating hormone in singleton and twin pregnancy: importance of gestational age-specific reference ranges. ObstetGynecol 2005; 106:753.

[47] Stricker R, Echenard M, Eberhart R, et al. Evaluation of maternal thyroid function during pregnancy: the importance of using gestational age-specific reference intervals. Eur J Endocrinol 2007; 157:509.
[48] Gilbert RM, Hadlow NC, Walsh JP, et al. Assessment of thyroid function during pregnancy: first-trimester (weeks 9-13) reference intervals derived from Western Australian women. Med J Aust 2008; 189:250.
[49] Fitzpatrick DL, Russell MA. Diagnosis and management of thyroid disease in pregnancy. ObstetGynecolClin North Am 2010; 37:173.
[50] Lambert-Messerlian G, McClain M, Haddow JE, et al. First- and second-trimester thyroid hormone reference data in pregnant women: a FaSTER (First- and Second-Trimester Evaluation of Risk for aneuploidy) Research Consortium study. Am J ObstetGynecol 2008; 199:62.e1.
[51] Lee RH, Spencer CA, Mestman JH, et al. Free T4 immunoassays are flawed during pregnancy. Am J ObstetGynecol 2009; 200:260.e1.
[52] Soldin OP, Tractenberg RE, Hollowell JG, et al. Trimester-specific changes in maternal thyroid hormone, thyrotropin, and thyroglobulin concentrations during gestation: trends and associations across trimesters in iodine sufficiency. Thyroid 2004; 14:1084.
[53] Kahric-Janicic N, Soldin SJ, Soldin OP, et al. Tandem mass spectrometry improves the accuracy of free thyroxine measurements during pregnancy. Thyroid 2007; 17:303.
[54] Yue B, Rockwood AL, Sandrock T, et al. Free thyroid hormones in serum by direct equilibrium dialysis and online solid-phase extraction--liquid chromatography/tandem mass spectrometry. ClinChem 2008; 54:642.
[55] Leung AM, Pearce EN, Braverman LE. Iodine content of prenatal multivitamins in the United States. N Engl J Med 2009; 360:939.
[56] Burrow GN, Fisher DA, Larsen PR. Maternal and fetal thyroid function. N Engl J Med 1994; 331:1072.
[57] Vulsma T, Gons MH, de Vijlder JJ. Maternal-fetal transfer of thyroxine in congenital hypothyroidism due to a total organification defect or thyroid agenesis. N Engl J Med 1989; 321:13.
[58] Bajoria R, Fisk NM. Permeability of human placenta and fetal membranes to thyrotropin-stimulating hormone in vitro. Pediatr Res 1998; 43:621.
[59] Roti E, Gnudi A, Braverman LE, et al. Human cord blood concentrations of thyrotropin, thyroglobulin, and iodothyronines after maternal administration of thyrotropin-releasing hormone. J ClinEndocrinolMetab 1981; 53:813.
[60]
[61] Casey BM, Dashe JS, Wells CE, et al. Subclinical hyperthyroidism and pregnancy outcomes. ObstetGynecol 2006; 107:337.
[62] American College of Obstetricians and Gynecologists.. ACOG Practice Bulletin. Clinical management guidelines for obstetrician-gynecologists. Number 37, August 2002. (Replaces Practice Bulletin Number 32, November 2001). Thyroid disease in pregnancy. ObstetGynecol 2002; 100:387.
[63] Abalovich M, Gutierrez S, Alcaraz G, et al. Overt and subclinical hypothyroidism complicating pregnancy. Thyroid 2002; 12:63.
[64] Hallengren B, Lantz M, Andreasson B, Grennert L. Pregnant women on thyroxine substitution are often dysregulated in early pregnancy. Thyroid 2009; 19:391.
[65] LaFranchi SH, Haddow JE, Hollowell JG. Is thyroid inadequacy during gestation a risk factor for adverse pregnancy and developmental outcomes? Thyroid 2005; 15:60.
[66] Leung AS, Millar LK, Koonings PP, et al. Perinatal outcome in hypothyroid pregnancies. ObstetGynecol 1993; 81:349.
[67] Wasserstrum N, Anania CA. Perinatal consequences of maternal hypothyroidism in early pregnancy and inadequate replacement. ClinEndocrinol (Oxf) 1995; 42:353.
[68] Davis LE, Leveno KJ, Cunningham FG. Hypothyroidism complicating pregnancy. ObstetGynecol 1988; 72:108.
[69] Stagnaro-Green A, Chen X, Bogden JD, et al. The thyroid and pregnancy: a novel risk factor for very preterm delivery. Thyroid 2005; 15:351.
[70] Pop VJ, Kuijpens JL, van Baar AL, et al. Low maternal free thyroxine concentrations during early pregnancy are associated with impaired psychomotor development in infancy. ClinEndocrinol (Oxf) 1999; 50:149.
[71] Haddow JE, Palomaki GE, Allan WC, et al. Maternal thyroid deficiency during pregnancy and subsequent neuropsychological development of the child. N Engl J Med 1999; 341:549.
[72] Idris I, Srinivasan R, Simm A, Page RC. Maternal hypothyroidism in early and late gestation: effects on neonatal and obstetric outcome. ClinEndocrinol (Oxf) 2005; 63:560.
[73] Allan WC, Haddow JE, Palomaki GE, et al. Maternal thyroid deficiency and pregnancy complications: implications for population screening. J Med Screen 2000; 7:127.
[74] Klein RZ, Haddow JE, Faix JD, et al. Prevalence of thyroid deficiency in pregnant women. ClinEndocrinol (Oxf) 1991; 35:41.
[75] Surks MI, Ortiz E, Daniels GH, et al. Subclinical thyroid disease: scientific review and guidelines for diagnosis and management. JAMA 2004; 291:228.
[76] Committee on Patient Safety and Quality Improvement, Committee on Professional Liability. ACOG Committee Opinion No. 381: Subclinical hypothyroidism in pregnancy. ObstetGynecol 2007; 110:959.
[77] De Groot L, Abalovich M, Alexander EK, et al. Management of thyroid dysfunction during pregnancy and postpartum: an Endocrine Society clinical practice guideline. J ClinEndocrinolMetab 2012; 97:2543.

[78] Horacek J, Spitalnikova S, Dlabalova B, et al. Universal screening detects two-times more thyroid disorders in early pregnancy than targeted high-risk case finding. Eur J Endocrinol 2010; 163:645.
[79] Bussen S, Steck T. Thyroid autoantibodies in euthyroid non-pregnant women with recurrent spontaneous abortions. Hum Reprod 1995; 10:2938.
[80] Prummel MF, Wiersinga WM. Thyroid autoimmunity and miscarriage. Eur J Endocrinol 2004; 150:751.
[81] Männistö T, Vääräsmäki M, Pouta A, et al. Perinatal outcome of children born to mothers with thyroid dysfunction or antibodies: a prospective population-based cohort study. J ClinEndocrinolMetab 2009; 94:772.
[82] Glinoer D, Soto MF, Bourdoux P, et al. Pregnancy in patients with mild thyroid abnormalities: maternal and neonatal repercussions. J ClinEndocrinolMetab 1991; 73:421.