Original Articles/นิพนธ์ต้นฉบับ

Prevalences of Abnormal Maternal TPO-Antibodies and TSH Levels of Thai Pregnant Women in Ramathibodi Hospital.

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Abstract

Background: Abnormal maternal thyroid function during pregnancy is associated with adverse affect to the maternal health and child development. Elevated serum thyroid stimulating hormone (TSH) in pregnant women is associated with impaired neuropsychiatric development of the child. Presence of thyroid peroxidase antibodies (TPO-Ab) is a significant risk factor for maternal postpartum thyroid disease. The objective of this study was to determine prevalences of abnormal TSH and TPO-Ab in Thai pregnancies.

Methods: Serum samples were obtained from 480 pregnant women as a part of their routine antenatal screening at Ramathibodi Hospital during August and October 2008. Measurement of TSH and TPO-Ab was done using Chemiluminescent Microparticle Immunoassay.

Results: The prevalences of abnormal TSH and TPO-Ab in Thai pregnancies were 9.79% and 13.96%, respectively. The highest frequency was found in 30-34 years-old age group. TSH abnormality was significantly associated with gestational age (p=0.037). Abnormal TSH levels were mostly in first trimester of pregnancies.

Conclusion: Since abnormal thyroid function is common in Thai pregnancies, maternal screening of TSH and TPO -Ab should be considered.

Keywords: Thyroid; Pregnancy; Screening; Anti TPO; TSH.

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Introduction

Thyroid hormones are important for energy metabolism, thermogenesis, and stimulation of growth and development of various tissues including the central nervous system. In the first trimester, a fetus is completely dependent on maternal thyroid hormones until by the end of the first trimester that the fetus begins to produce thyroid hormone on its own.[1-3] Association between abnormal maternal thyroid function during pregnancy and adverse effect to the maternal health and child development has been reported. Thyroid peroxidase antibody (TPO-Ab) which found in up to 90% of patients with autoimmune thyroid disease is the most common thyroid abnormality observed in pregnant women.[6-7] A strong correlation has been found between TPO-Ab and risk of spontaneous miscarriage.[8] Furthermore, presence of TPO-Ab is associated with postpartum thyroid disease and subsequent impaired development in children.[9-13] The determination of TPO-Ab in the early gestational age could serve as identification of pregnant at risk. Beside the TPO-Ab, serum thyroid stimulating hormone (TSH) is the most sensitive test for detecting mild thyroid hormone excess or deficiency. Abnormal TSH status in pregnant women has been associated with preterm delivery, fetal death, abruptio placenta and impaired neuropsychological development of fetus.[1,5,14,15] The objective of this study was to determine the prevalences of abnormal TSH and TPO-Ab in Thai pregnancies.

Materials and Methods

The inclusion criterion was Thai pregnant women who are in clinical euthyroid status which identified by history and physical examination by obstetricians during August to October 2008. After exclusion, there were 480 pregnant women enrolled in this study which consisted of 134 in the first trimester, 184 in the second trimester and 162 in the third trimester of pregnancy. Serum samples were obtained as a part of their routine antenatal screening at Ramathibodi Hospital and stored at -20oC until analyzed. TSH and TPO-Ab were measured by Chemiluminescent Microparticle Immunoassay (ARCHITECT; Abbott Park, IL, USA). Reference range of TSH is between 0.35 and 4.94 mIU/L. TPO-Ab level more than 5.61 IU/mL was determined as "positive". Statistical data were analyzed using Microsoft Excel and SPSS version 12 for Windows.

Results

Thyroid function of 480 clinical euthyroid Thai pregnant women was studied. Mean maternal age was 29.7 years (range 13-44 years). The total prevalences of abnormal TSH and TPO-Ab in Thai pregnancies were 9.79% (n=47) and 13.96% (n=68) respectively. Abnormal value of TSH and anti-TPO were classified according to maternal age groups (figure 1). The highest frequency of abnormal thyroid function either TSH or TPO-Ab was found in 30-34 year-old age group. However, the correlation between TSH level and maternal age was not found ($r=0.004$, $p=0.49$). Although there is no statistical difference, the highest prevalence of abnormal TSH level was found in the pregnancies in the first trimester while the highest prevalence of TPO-Ab was presented in pregnant the second trimester (Figure 2). About abnormality of TSH level, there are both abnormal high (2/47 cases, 4.3%) and low (45/47 cases, 95.7%) level. Interestingly, TSH level was significantly higher in the pregnant women with TPO-Ab positive compared to the ones with TPO-Ab negative group (Figure 3).

Discussion

Association between abnormal thyroid function and adverse outcome of pregnancy and maternal health has been widely reported. Thyroid hormone is indeed essential for metabolism and development of the fetus especially in the early time of pregnancy

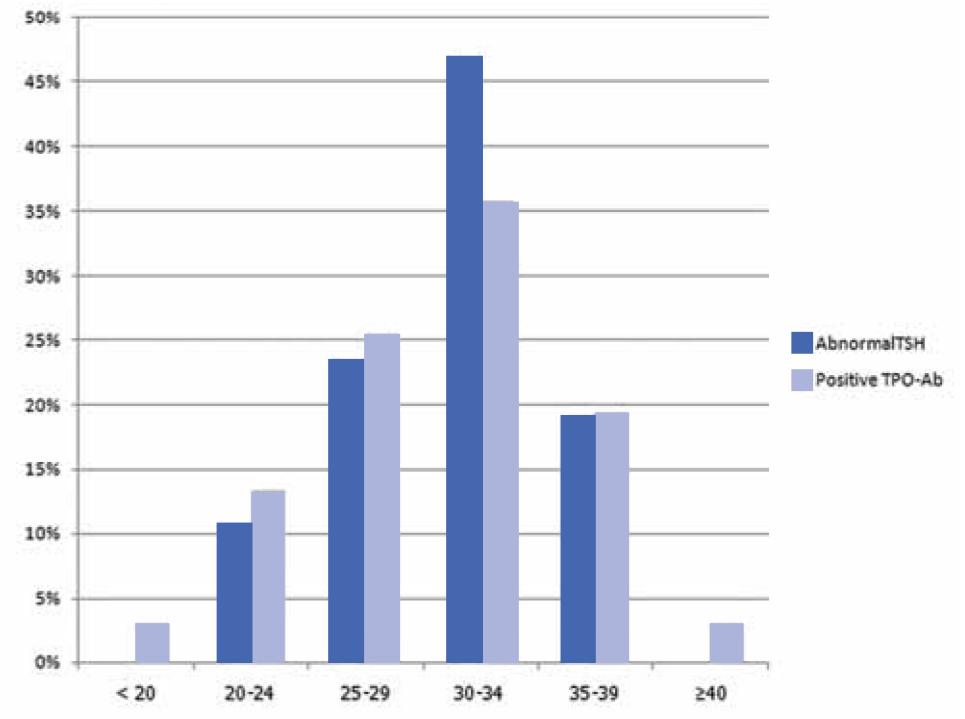

Figure 1 *Prevalences of abnormal TSH and TPO-Ab according to maternal age in Ramathibodi Hospital during August to October 2008 (x-axis represents age group and y-axis represent prevalences.)*

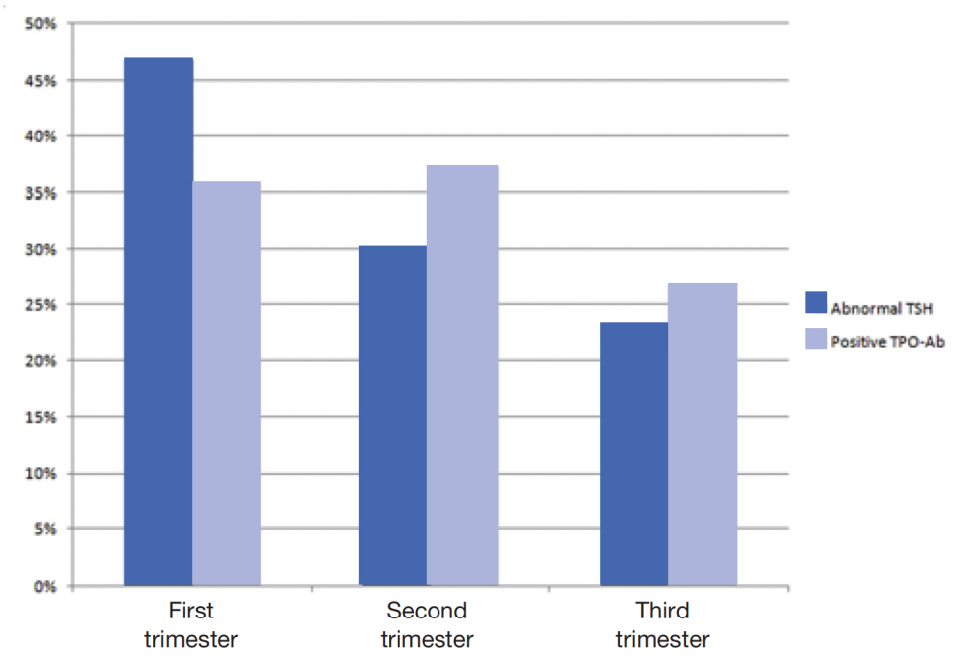

Figure 2 *Prevalences of abnormal TSH and TPO-Ab according to trimester of pregnancy in Ramathibodi Hospital during August to October 2008.*

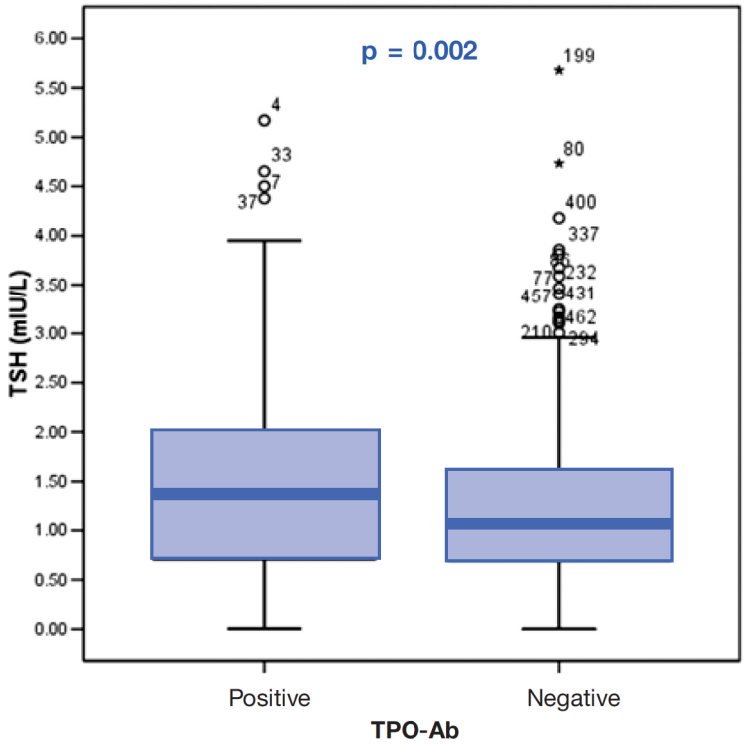

Figure 3 *TSH levels in Anti-TPO positive and negative group were compared. TSH level in Anti-TPO positive group was significantly higher than negative group (p=0.002).*

when there is the development of neural system. Since the synthesis of thyroid hormone by the fetus begins in the second trimester of pregnancy, it is totally dependent on maternal thyroid hormones in the first trimester. Therefore, any abnormalities of maternal thyroid hormone during pregnancy especially in the first trimester may affect not only the development of the fetus but also the postpartum maternal health. There is epidemiologic data about abnormal thyroid function of pregnant women from many countries but this kind of data is limited in Thailand and other South East Asian countries. Abnormal thyroid function is common among Thai pregnancies compare to the data from other countries. The prevalence of abnormal TPO-Ab level in Thai pregnancies was 13.96% which is close to the data from Turkey (12%), Russian (13.8%), Pakistan (11.2%), but lower than that the United States (19%)[8,9,18-20]. There was no correlation between TPO-Ab, maternal age and gestational age. Elevation of TPO-Ab can exert the adverse effects even when the mother is euthyroid in early pregnancy. Although it is not fully understood how thyroid autoantibody interferes with normal pregnancy but the presence of TPO-Ab during the first trimester of pregnancy can increase a chance of developing postpartum thyroiditis about 70%[5]. Once they had a postpartum thyroiditis, there are increased risk for develop permanent hypothyroidism in the next 5-10 years[11-13].

The prevalences of abnormal TSH level in our population is 9.79%. In our study the abnormal TSH level was mostly present in the first trimester of pregnancy, same as the recent study from Japan and Russian[21-22]. Most of abnormality of TSH level found here is slightly low which reflects the occult or mild maternal hyperthyroidism. The normal physiology of pregnancy may be an explanation of this finding. In the first trimester of pregnancy, there are number

of important physiological and hormonal change including increased human chorionic gonadotropin (hCG). Since hCG and TSH share identical alpha subunits and have similar beta subunits and receptors, hCG can weakly turn on the thyroid hormone synthesis which results in slightly low levels of TSH in first trimester and return to normal level throughout the duration of pregnancy[23]. To ensure this hypothesis, the dynamic change of TSH during each trimester of pregnancy must be further evaluated. The limitation of this study was the cross-sectional design so comparison of TSH levels of all trimesters of the same pregnant woman cannot be done. However, there was some interesting point about the association between TSH level and presence of TPO-Ab. We found that TSH level was significantly higher in the presence of TPO-Ab. This may indicate the subclinical hypothyroid in these mothers. However, there were the pregnant women who had TPO-Ab without abnormalities of TSH. Both groups should be followed for the pregnancy outcomes and postpartum maternal health to determine the clinical significance of TPO-Ab and TSH.

Since the prevalences of TPO-Ab and abnormal TSH are common in Thai pregnancies, appropriate guideline for screening the abnormality of maternal thyroid function during pregnancy especially in the early gestational age should be established in order to reduce morbidity and mortality due to thyroid disease in both mother and child.

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Original Articles/นิพนธ์ต้นฉบับ

ความชุกของความผิดปกติของระดับ TPO-Antibodies และ TSH ในหญิงตั้งครรภ์ในโรงพยาบาลรามาธิบดี

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บทคัดย่อ

บทนำ: ความผิดปกติของการทำงานของต่อมธัยรอยด์ในหญิงตั้งครรภ์เป็นปัญหาสำคัญที่มีผลต่อสุขภาพของทั้งมารดาและพัฒนาการของเด็ก มีรายงานความสัมพันธ์ระหว่างความผิดปกติของพัฒนาการทางด้าน neuropsychiatric ในเด็กที่เกิดจากแม่ที่มีระดับ thyroid stimulating hormone (TSH) สูงระหว่างตั้งครรภ์ นอกจากนี้ระดับ thyroid peroxidase antibodies (TPO-Ab) ที่สูงในหญิงตั้งครรภ์ยังเป็นปัจจัยเสี่ยงสำคัญของการเกิดภาวะพร่องธัยรอยด์ฮอร์โมนหลังคลอด วัตถุประสงค์ของการศึกษานี้จึงเป็นการหาความชุกของความผิดปกติของระดับ TSH และ TPO-Ab ในหญิงตั้งครรภ์ชาวไทย

วิธีการวิจัย: ในการศึกษานี้ได้ทำการตรวจระดับของ TSH และ TPO-Ab โดยวิธี Chemiluminescent Microparticle Immunoassay ในหญิงตั้งครรภ์ชาวไทยที่สุขภาพแข็งแรงและไม่มีประวัติโรคธัยรอยด์ (อยู่ในภาวะ euthyroid state) ที่มาฝากครรภ์ที่ภาควิชาสูติ-นรีเวช คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี จำนวน 480 ราย

ผลการศึกษา: ความชุกของความผิดปกติของระดับ TSH และ TPO-Ab ในหญิงตั้งครรภ์ชาวไทยคิดเป็น 9.79% และ 13.96% ตามลำดับ โดยพบความชุกสูงสุดในกลุ่มหญิงตั้งครรภ์ที่มีอายุ 30-34 ปี และพบว่าความชุกของความผิดปกติของ TSH นั้นเพิ่มขึ้นในกลุ่มที่อายุครรภ์มากขึ้น (p=0.037)

สรุปผลการศึกษา: ความผิดปกติของการทำงานของต่อมธัยรอยด์เป็นปัญหาสำคัญทั้งในด้านผลต่อสุขภาพและขนาดของปัญหาในกลุ่มประชากรหญิงตั้งครรภ์ชาวไทย ดังนั้นจึงควรจัดให้มีการตรวจคัดกรองความผิดปกติดังกล่าวในหญิงตั้งครรภ์ทุกราย

Keywords: Thyroid; Pregnancy; Screening; Anti TPO; TSH.

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