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Original Research Article

Correlation of status of thyroid antibodies and thyrotropin hormone with prevalence of thyroid autoimmune disease in pregnancy

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ABSTRACT

Background: Thyroid antibodies alterations were observed because of physiological and immunological changes occurring during pregnancy and after delivery. The aim was to evaluate serum anti-thyroid peroxidase antibodies (anti-TPO-Ab), anti-thyroglobulin antibodies (anti-TG-Ab) and total triiodothyronine (total T3), total thyroxine (total T4), thyrotropin hormone (TSH) levels in pregnant women of resident of Western India.
Methods: Samples for 100 pregnant women with no apparent thyroid disorders were analyzed, using enzyme amplified chemiluminescent immune assay detection technology, in order to determine levels of total T3, total T4, TSH, anti-TPO-Ab and anti-TG-Ab in sera sample.
Results: Of these women 24% gave biochemical evidence of hypothyroidism and remaining 76 % subjects were euthyroid in pregnant study group. In study group, 90% had normal values for anti-TPO-Ab and anti-TG-Ab and 10% had results revealing the presence of autoimmune diseases of the thyroid.
Conclusions: n the present study, it was found that the level of anti-TG-Ab was found unaltered but it was found to be detected along with anti-TPO-Ab. These investigations should be performed routinely during pregnancy. Otherwise, lack of appropriate and early diagnosis and treatment can lead to neurological impairment of fetal brain as well as maternal cardiovascular diseases.

Keywords: Thyroid antibodies, Thyroid hormone, Thyroid autoimmune disease

INTRODUCTION

Thyroid hormones demand apparently increases in 2nd trimester of gestation, which is occur approximately 50% due to mainly attributed to the estrogen-driven doubling in thyroxine-binding globulin concentrations.[1-2] Transient and long term complications may occur in pregnancy. During pregnancy, women who have autoimmune disease, pregnancy can induce amelioration of the mother's disease, including thyroid complications.[3] Serum anti-thyroid peroxidase antibodies (anti-TPO) and anti-thyroglobulin antibodies (anti-TG) alterations were observed because of physiological and immunological changes occurring during pregnancy and after delivery.[4] Our aim was to evaluate serum thyroid antibodies such as anti-TPO, anti-TG and thyroid hormones such as total T3, total T4, TSH levels in pregnant women resident of Western India.

METHODS

The present study was carried out at Department of Biochemistry, Grant Medical College and Sir J. J. Group of Government Hospitals, Mumbai. All participants completed a medical history form and provided informed consent. Study subjects consisted of 100 pregnant subjects who had no history of hypertension, vomiting, fever, cough, and cold. Their mean ±SD age and

gestational age at time of study was 26.4±4.48 years and 23.8±10.2 weeks respectively. Subjects were studied for estimation of serum thyroid function tests over the period of October 2007 to June 2010 attended in Gynaecology OPD of this Institute.

Inclusion criteria

Study subjects non receiving or had received antihypertensive medications. The age of all pregnant volunteers was between 18 and 35 years with belonging to the same socio-economic background. All of them had regular ovulatory cycles, without history of thyroid complications, normal obstetric history, and had not used any contraceptive.

All the participants were also subjected to a questionnaire including family income, maternal education and occupation, living condition, personal history like age, height, weight, dietary history, religion, cast, sub cast, addiction and medication, history of lactation, gravidity, gestation period and previous laboratory investigation.

Exclusion criteria

Patients with severe liver diseases, end stage renal diseases, human immune deficiency virus infection. None of the subjects had history of polycystic ovary syndrome. Subjects on medications (therapy involving S-adenosyl-methionine, carbamazepine, phenytoin, 6-azauridine, anthopterin, antifolates, anticonvulsant agents, tamoxifen, and theophylline) were excluded from the study.

Blood sample collection

Venous blood samples were collected in test tube with aseptic precautions. After 2 hours of collections sample was centrifuged at 3000 rpm for 5 minutes. Serum was immediately stored at -20ºC until assayed. The sera with no sign of hemolysis used for the analysis of total T3, total T4, TSH, anti-TPO-Ab and anti-TG-Ab.

Biochemical analysis

Serum T3 and T4 were estimated by solid-phase, competitive chemiluminescent enzyme immunoassay method.[5] Serum TSH was estimated by the method of solid phase, two-site chemiluminescent enzyme immunometric assay method.[6] Anti-TPO-Ab is a solid phase, enzyme labeled, chemiluminescent, sequential, immunometric assay.[7] Anti-TG-Ab is a solid phase, enzyme labeled, chemiluminescent, sequential, immunometric assay.[8]

We used fully automated enzyme amplified chemiluminescent immunoassay based Immulite 1000 analyzer. Measurement of these blood parameters by using commercial kits from Siemens Medical Solutions Diagnostics, Los Angeles, CA, USA.

Statistical analysis

Numerical variables were reported in terms of mean and standard deviation. Statistical analysis of results was done by non parametric Mann-Whitney U test. In this analysis, variables showing p value less than 0.05 and 0.001 were considered to be statistically significant and highly significant respectively. Simple linear regression correlation test was used to test correlation.

RESULTS

Demographic data of euthyroid and hypothyroid pregnant subjects such as body mass index (BMI) and hemoglobin (Hb) were significantly change ($p<0.05$) whereas; age, systolic blood pressure (SBP) and diastolic blood pressure (DBP) were statistically insignificant altered when hypothyroid demographic variables compared with those of euthyroid pregnant control group (Table 1).

Table 1: Demographic data in group of study subjects.

Variables	Euthyroid (n = 76)	Hypothyroid (n = 24)	P Value
Age (Years)	24.1±4.43	24.3±4.02	0.6501 NS
Gestation age (Weeks)	29.4±8.46	28.1±10.9	0.9258 NS
BMI (Kg/m^2)	22.3±3.86	20.7±3.02	0.0466 *
SBP (mmHg)	124±6.65	122±4.78	0.4256 NS
DBP (mmHg)	81.7±4.79	81.2±4.13	0.5697 NS
Hb (g/dL)	10.0±1.01	10.9±1.20	0.0023 *
** P<0.001, * P<0.05, NS = Not significant			

Table 2: Thyroid function tests in group of euthyroid and hypothyroid pregnant subjects.

Parameters	Euthyroid (n = 76)	Hypothyroid (n = 24)	P Value
Total T3 (ng/dL)	183±28.2	88.1±28.5	0.0001**
Total T4 (µg/dL)	12.1±2.39	6.41±3.13	0.0001**
TSH (µIU/mL)	2.16±1.01	17.3±5.01	0.0001**
** P<0.001			

Table 3: Concentrations of thyroid antibodies in group of euthyroid and hypothyroid pregnant subjects.

Parameters	Euthyroid (n = 76)	Hypothyroid (n = 24)	P value
Anti-TPO-Ab(IU/mL)	3.41±4.42	89.7±194	0.0039*
Anti-TG-Ab (IU/mL)	2.11±2.39	21.4±53.9	0.0006**
** P<0.001, * P<0.05			

Table 2 shows levels of serum total T3, total T4 and TSH in euthyroid pregnant healthy subjects and hypothyroid pregnant cases. Study group showed significant ($p<0.001$) decrease in serum total T3 and total T4 levels while as serum TSH levels were showed a statistically

significant (p<0.001) increase in hypothyroid cases as compared to euthyroid pregnant control group.

Table 3 showed significant change in serum profile when euthyroid control group was compared with hypothyroid group. As can be seen, significant increase (p<0.001) were observed in serum anti-TPO-Ab and anti-TG-Ab in hypothyroid pregnant group as compared to euthyroid pregnant control group. Positive and significant (p<0.001) correlations were observed between serum TSH compared with anti-TPO-Ab and anti-TG-Ab in pregnant group with hypothyroidism (Table 4).

Table 4: Correlation of thyrotropin and anti-TPO-Ab and anti-TG-Ab in hypothyroid pregnant subjects.

Parameters	95% CI of r	r value	p value
Anti-TPO-Ab	0.532 to 0.895	0.770	0.0001**
Anti-TG-Ab	0.506 to 0.888	0.757	0.0001**

CI = Confidence interval, r = Correlation coefficient, **P<0.001

DISCUSSION

Present study showed that levels of serum anti-TPO-Ab, anti-TG-Ab, total T3, total T4 and TSH were altered in hypothyroid pregnant subjects than in age and gestation age matched euthyroid pregnant control subjects. In hypothyroid patients, BMI showed significant increase whereas SBP and DBP insignificant decrease. Importance of these parameters has been recognized estimating cardiovascular disease risk factor due to their positive association with hypertension.[9]

In the present study, the prevalence of hypothyroidism in hundred pregnant subjects attending OPD, 24% gave biochemical evidence of hypothyroidism and remaining 76% subjects were euthyroid. Of 90% had normal values for anti-TPO-Ab and anti-TG-Ab and 10% had results revealing the presence of thyroid autoimmune disease in pregnant subjects. Raised anti-TPO-Ab and anti-TG-Ab suggesting thyroid autoimmunity in women with hypothyroidism was seen in 58% whereas Indian literature shows prevalence of thyroid autoantibodies in about 60% subjects.[10] The single detection of anti-TG-Ab was found unaltered but it was found to be detected along with anti-TPO-Ab and it was 8.3% in hypothyroid pregnant women.

The present study shows that in hypothyroid pregnant subjects (n=24), serum total T3 and T4 levels were significantly (p<0.001) decreased whereas serum TSH concentration was elevated significantly (p<0.001). Serum TSH level in hypothyroid pregnant group showed significant increase (p<0.001) when compared with that of euthyroid pregnant group. Kumar A et al also showed progressive rise mean TSH level through the trimesters of pregnancy especially in the second trimester and third trimester. In our study, also TSH showed increased levels in both the second and the third trimester. The study of Kumar A et al corroborate with our findings in pregnancy. [11]

The prevalence of thyroid autoimmunity in the population of study cases of pregnancy was 10%, similar to the thyroid autoimmunity generally encountered in females.[12] In our study, the mean concentration of both thyroid antibodies (anti-TPO and anti-TG) in pregnant group showed significant increase (p=0.0039, p=0.0006 respectively) when compared to that in a control population of euthyroid pregnant subjects. Though it has not been proven, this finding is compatible with the hypothesis of increased sub fertility and miscarriage rates in women with asymptomatic autoimmune thyroid disorders.[13,14]

The serum TSH was found to have positive and significant correlation with serum anti-TPO-Ab in subjects with hypothyroid. Their correlation coefficient (r) of 0.770 (p<0.001) and 95% CI of 'r' ranged from 0.532 to 0.895 (Figure 1). A good, positive and statistically significant correlation (r=0.757 and p<0.001) was found between serum TSH and anti-TG-Ab in hypothyroid pregnant subjects. Their 95% CI of 'r' ranged from 0.506 to 0.888 (Figure 2). Our study showed increasing prevalence of thyroid autoimmunity with increasing TSH in hypothyroid cases. In western literature reported, thyroid autoimmunity observed due to progression to hypothyroidism or probably due to transplacental transfer of thyroid receptor blocking antibodies.[15-17] Our study supports the previous studies on hypothyroidism and thyroid autoimmunity in pregnancy.

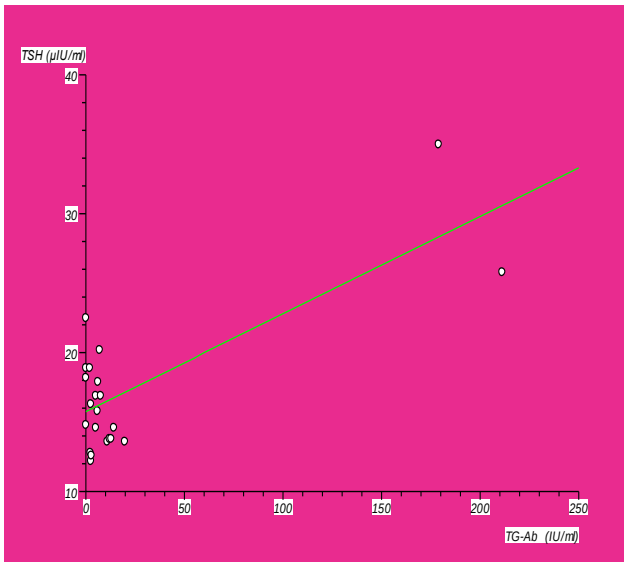

Figure 2: The correlation between serum thyrotropin and anti-TG antibody in hypothyroid pregnant subjects.

The present study confirmed this gain in sensitivity in the specific setting of pregnancy. Also, even though we used sensitive solid phase enzyme labelled chemiluminescent sequential immunometric assays to measure both anti-

TG-Ab and anti-TPO-Ab, a majority of women only had detectable anti-TPO-Ab, whereas the presence of both anti-TPO-Ab and anti-TG-Ab was found in only few of the cases; none of women only exhibited positive anti-TG-Ab.

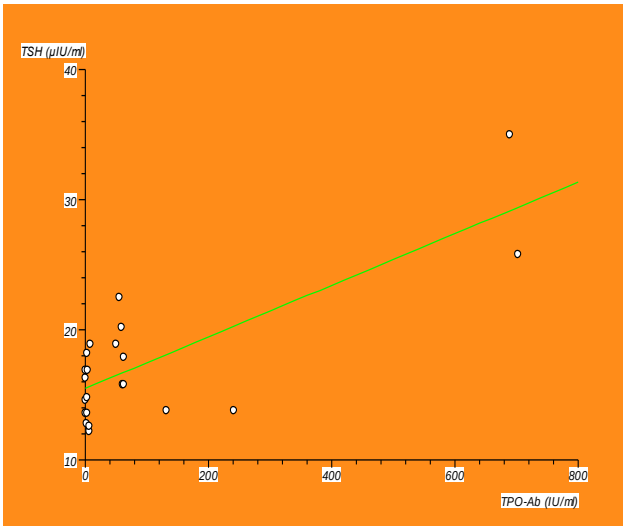

Figure 1: The correlation between serum thyrotropin and anti-TPO antibody in hypothyroid pregnant subjects.

These results lead us to propose that the systematic screening of thyroid autoimmunity should preferably include the determination of both types of thyroid antibodies. We, therefore, conclude that these investigations should be performed routinely during pregnancy. Otherwise, lack of appropriate and early diagnosis and treatment can lead to neurological impairment of fetal brain as well as maternal cardiovascular diseases.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Alexander E, Marqusee E, Lawrence J, Jarolim P, Fischer GA, Larsen PR. Timing and magnitude of increases in levothyroxine requirements during pregnancy in women with hypothyroidism. N Engl J Med. 2004;351:241-9.
2. Glinoer D, De Nayer P, Bourdoux P, Lemone M, Robyn C, van Steirteghem A, et al. Regulation of maternal thyroid during pregnancy. J Clin Endocrinol Metab. 1990;71:276-87.
3. Waldorf KMA, Nelson JL. Autoimmune disease during pregnancy and the microchimerism legacy of pregnancy. Immunol Invest. 2008;37(5):631-44.
4. Amino N, Kuro R, Tanizawa O, Tanaka F, Hayashi C, Kotani K, et al. Changes of serum anti-thyroid antibodies during and after pregnancy in autoimmune thyroid diseases. Clin exp Immunol. 1978;31:30-7.
5. Refetoff S. Thyroid function tests. In: DeGroot LJ, editor. Endocrinology, Philadelphia: Grune Stratton. 1979;1:387-428.
6. Babson AL. The Immulite automated immunoassay system. J Clin immunoassay. 1991;14:83-8.
7. Wild D. The immunoassay handbook. Great Briton: Stockton press. 1974;342-3.
8. Schatz H. The diagnostic and prognostic importance antibody against thyroid microsomal and thyroid. Dtsch Med Wschr. 1981;106:308-13.
9. Pi-Sunyer FX. Medical hazards of obesity. Ann Intern Med. 2000;160:2847-53.
10. Gayathri R, Lavanya S, Raghavan K. Subclinical Hypothyroidism and Autoimmune Thyroiditis in Pregnancy - A Study in South Indian Subjects. J Asso Phys Ind. 2009;57:691-3.
11. Kumar A, Gupta N, Nath T, Sharma JB. Sharma S. Thyroid function tests in pregnancy. Ind J Med Sci. 2003;57:252-8.
12. Volpe R. Autoimmune thyroiditis. In: Braverman LE, Utiger RD, eds. The thyroid. A fundamental and clinical text. Philadelphia, New York, London, Hagerstown: Lippincott;1991:921-33.
13. Lejeune B, Grun JP, De Nayer PH, Servais G, Glinoer D. Antithyroid antibodies underlying thyroid abnormalities and miscarriage or pregnancy induced hypertension. Br J Obstet Gynaecol. 1993;100:669-72.
14. Edelman P. Autoimmunity, fetal losses, and lupus anticoagulants: beginning of systemic lupus erythematosus or new autoimmune entity with gynecological expression? Hum Reprod. 1986;1:295-7.
15. Prummel MF, Wiersinga WM. Thyroid Autoimmunity and miscarriage. Eur J Endocrinol. 2004;150:751-5.
16. Glinoer D, Riahi M, Grun JP, Kinthaert J. Risk of subclinical hypothyroidism in pregnant women with asymptomatic autoimmune thyroid disorders. J Clin Endocrinol Meta. 1994;79:197-204.
17. Stagnaro GA, Glinoer D. Thyroid autoimmunity and risk of miscarriage. Best Pract Res Clin Endocrinol Metab. 2004;18:167-81.

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