Screening of Thyroid Function Test During First Trimester of Pregnancy

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Abstract

Introduction: During pregnancy maternal thyroid dysfunction has been associated with a number of adverse outcomes, like preterm birth, placental abruption, fetal death and impaired neurological development in the child. The presence of Thyroid Peroxidase Antibody (TPO-Ab) results miscarriage, preterm birth and maternal post-partum thyroid disease. Hypothyroidism is closely associated with the presence of Thyroid Peroxidase Antibody. If a pregnant woman is positive for TPO-Ab in early pregnancy, her chances to developing thyroid abnormalities.

Objective: To find out the level of TPO-Ab and thyroid status in first trimester of pregnancy. **Method:** Observational cross-sectional Study was designed in Department of Biochemistry, Medical college, Vadodara, Gujarat, India.

Sample Size: 200 Normal pregnant women that randomly selected from the first trimesters of pregnancy. The study parameters were - thyroid peroxidase anti-body (TPO-Ab); serum thyroid stimulating hormone (TSH); serum T_3 and serum T_4.

Result: Our study found that 30(15%) pregnant women of first trimester was hypothyroidism (TSH >2.5mIU/l) Out of these 30 females, 9(4.5%) had overt hypothyroidism & 21 (10.5%) had subclinical hypothyroidism, among these 30 subjects, 26(13%) had found TPO-Ab positive (TPO-Ab >35 IU//mL) there was a significant positive correlation between positive TPO-Ab and serum TSH level of study subjects and there was a negative correlation between serum TSH and serum T_4,T_3 level in study subjects.

Conclusion: In this study we found 15% prevalence of hypothyroidism (4.5 % overt & 10.5 % subclinical) in first trimester of pregnancy. We found positive TPO-Ab in 13% of pregnant females and all these had some thyroid dysfunctions, subclinical or overt hypothyroidism, subclinical being much more common than overt hypothyroidism.

Keywords: *Thyroid Peroxidase Antibody, Thyroid Stimulating hormone, Tri iodothyronine, Tetra iodothyronine.*

Introduction

Pregnancy is a physiological state associated with many significant changes in thyroid function. The role of thyroid hormone in embryogenesis and fetal development during pregnancy is well known. During the first trimester of pregnancy, the fetus is reliant on trans- placental passage of maternal thyroxine, as the fetal thyroid is not fully functional until about 16 weeks of gestation.[1]

It has been seen that thyroid dysfunction during pregnancy is associated with many complications during pregnancy and delivery like miscarriage, preterm birth, placental abruption and the child may have low I/Q, cretinism and developmental disorders. Many studies have shown that hypothyroid state in pregnancy is associated with maternal and fetal complications.[2-3]

During the 1st trimester, the fetus is completely dependent upon thyroxin produced by the mother. Even

a small unnoticed malfunction of the thyroid gland, which doesn't endanger the course of pregnancy, can affect the psychomotor development of the child.[4]

Thyroid function is frequently assessed during pregnancy, both to diagnose suspected thyroid abnormalities and to monitor the status of pre-existing thyroid disease. In addition to conventional TFT(T_3, T_4 & TSH) tests, many studies have suggested testing of TPO-Ab. [5]

Thyroid Peroxidase antibodies [TPO-Ab] work against thyroid peroxidase, an enzyme that plays a part in T_4 toT_3 conversion and synthesis process. It also causes tissue destruction in other forms of thyroiditis such as postpartum thyroiditis.[6] Thyroid autoantibodies may be considered as a marker of generalized autoimmune dysfunction in the body. TPO-Ab positive women have a risk for post partum thyroid dysfunction, hypothyroidism, miscarriage, preterm delivery and perinatal death. Screening for TPO-Ab level in early pregnancy may help to diagnose women at risk of hypothyroidism and thereby prevent adverse outcome of pregnancy. [7]

Many cases of hypothyroidism especially subclinical hypothyroidism remain undiagnosed during pregnancy leading to complications. Early treatment significantly reduces these complications. Hence early diagnosis of hypothyroidism and initiation of treatment is necessary. The thyroid peroxidase antibody is an important biochemical marker which can predict thyroid dysfunction in early stage of pregnancy, can help to identify the patients at risk and thereby start early treatment and decrease complications. Early treatment of hypothyroidism will prevent impaired neuropsychological development in the fetus and adverse outcomes.[1]

Not much clinical studies have been done on screening for thyroid disorders in pregnancy and in literature search I could not find any clear-cut guidelines for the diagnosis of thyroid dysfunction during pregnancy.

The present study is designed to correlate the TPO-Ab levels with thyroid function test in first trimester of pregnancy.

Aim and Objective:

Aim: To assess the utility of serum Thyroid Peroxidase Antibody(TPO-Ab) status in early pregnancy for timely diagnosis of thyroid dysfunctions.

Objective:

1. To study Thyroid Peroxidase Antibody (TPO-Ab) status in first trimester of pregnancy.
2. To measure T_3, T_4 and TSH levels during first trimester of pregnancy.
3. To correlate the TPO-Ab levels with thyroid function test in first trimester of pregnancy.

Material, Method and Statistics

The study was carried outat Sir Sayajirao General Hospitaland Medical College, Vadodara. Approval of institutes Scientific Review Committee was obtained and Ethical Clearance was obtained from the Institutional Ethics Committee for Human Research, Medical College and S.S.G. Hospital, Vadodara. (Approval No: ECR/85/ Inst/GJ/2013).

The study was done for period of 4 months, from April 2014 to August 2014, 200 pregnant women in 1st trimester were enrolled in study, who attain obs & gynec department at SSG Hospital.

Data Collection: Informed consent of subjects was obtained for participation in study and for blood collection. Detailed medical history of the subjects including personal data, present complaints and complication, treatment history, past history, family history and personal history was taken. Examination was carried out as per proforma.

Inclusion Criteria:

(a) Pregnant women in first trimester of pregnancy.

Exclusion Criteria:

(a) Patients with known thyroid dysfunction.

(b) Patients with Thyroid surgery.

(c) Patients with autoimmune disorders.

(d) Patients with any known endocrinopathy.

(e) Refusal of women to enrol into study.

All the mothers were screened for thyroid function test and TPO antibody. fasting serum sample was collected in plain vacutte, thyroid function test (T_3 T_4 TSH) & TPO antibody estimation was done by ELISA method.

Depending on their TPO-Ab levels they were divided in two groups,

Group A: (TPO-Ab positive group) TPO-Ab positive pregnant females (TPO-Ab >35 IU/ml)

Group B: (TPO-Ab negative group)TPO-Ab negative pregnant females (TPO-Ab <35IU/ml)

Statistical analysis was done by using t-test to find out significance of difference between two groups and correlation coefficient was calculated to find out statistical correlation between two variables and its significance.

Results

Total 200 pregnant women of first trimester were enrolled. Mean maternal age was 25.56 ± 3.32 years. Table-1 showed Thyroid dysfunction found in first trimester of pregnancy. Out of 200, 30 (15%) pregnant women had hypothyroidism (TSH >2.5mIU/l) Out of these 30 hypothyroid women, 9 (4.5%) had overt hypothyroidism & 21 (10.5%) had subclinical hypothyroidism. Among these 30 hypothyroid women, 26 (13%) had found anti-TPO positive (TPO-Ab >35 IU//mL, p<0.001). Table-2 showed anti-TPO status in hypothyroid women. There was a significant positive correlation between positive TPO-Ab and serum TSH level (r=0.6330) of study subjects.

Table 1: Hypothyroidism in 1st trimester of pregnant females.

Group	Total no of cases	Hypothyroidism number of cases (%)	Euthyroid number of cases (%)
Group A	26	26 (13%)	0
Group B	174	4 (2%)	170 (85%)
Total	200	30 (15%)	170 (85%)

Table 1 show that prevalence of hypothyroidism in group A & B. In TPO-Ab +ve group all cases had hypothyroidism(26 cases of hypothyroidism out of 26 TPO-Ab +ve cases) whereas in group B(TPO-Ab –ve group) 4 cases out of 174 had hypothyroidism out of total 200 subjects included in study 30 had hypothyroidism.

Subclinical and overt hypothyroidism: Table 2 shows subclinical and overt hypothyroidism.

Table 2: Hypothyroidism in 1st trimester pregnant females.

Group	Group A Number of cases (%)	Group B Number Of Cases (%)	Total no of cases
Subclinical Hypothyroidism	17 (8.5%)	4 (2%)	21
Overt Hypothyroidism	9 (4.5%)	0	9
Total no of cases	26 (13%)	4 (2%)	30

Table 2 shows the percentage of subclinical hypothyroidism and overt hypothyroidism in group A & B. TPO-Ab +ve group 17 cases had subclinical hypothyroidism and 9 cases had overt hypothyroidism (26 cases of hypothyroidism out of 26 TPO-Ab +ve cases) whereas in group B(TPO-Ab –ve group) 4 cases out of 174 had subclinical hypothyroidism out of total 200 subjects included in study.

Table 3: TPO-Ab levels in group A & group B.

Group	Group A		Group B		P- value
Parameter	Mean (Range)	SD	Mean (Range)	SD	
TPO-Ab (IU/l)	43.73(37-52)	5.44	23.24(10-34)	6.23	P<0.0001

Table 3 show that the mean ± SD of the study group A was 43.73 ± 5.44 IU/l (Range 37-52 IU/l) and group B was 23.24 ± 6.23 IU/l. (Range 10-34 IU/l). There was statically significant difference in TPO-Ab levels between two groups ($p<0.0001$).

- Correlation of TPO-Ab with thyroid function test

To find correlation between TPO-Ab & thyroid function tests I performed regression analysis.

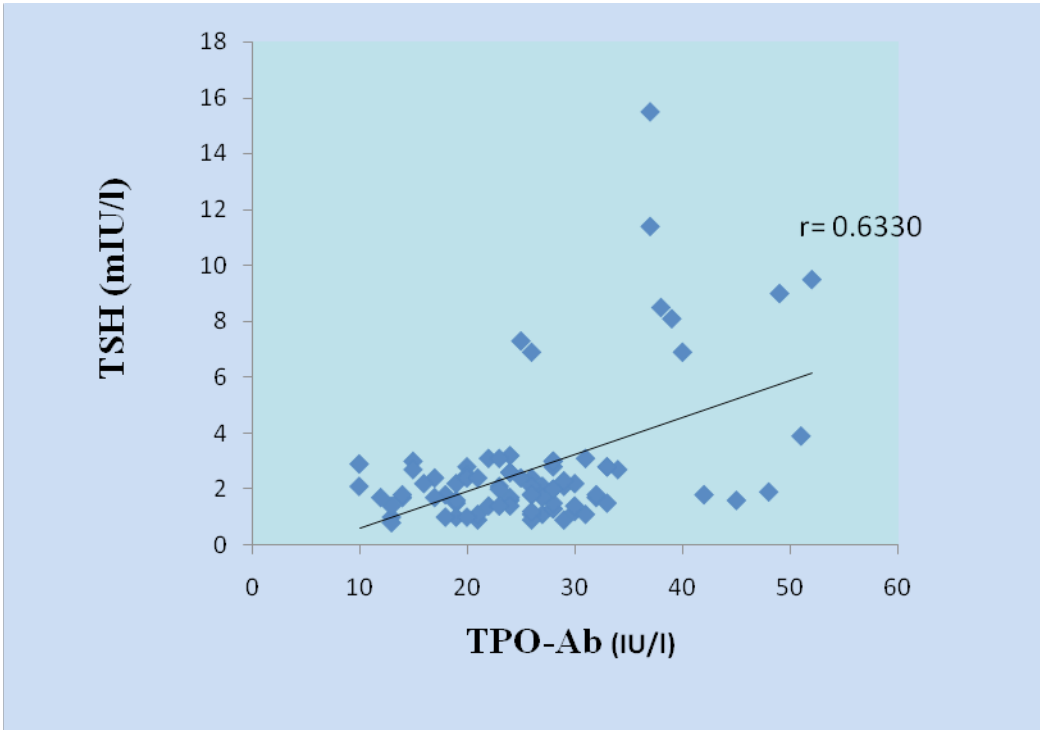

Figure 1: Correlation of serum TSH with TPO-Ab.

As seen in figure 1, a good positive correlation was found between TSH levels and TPO-Ab with r=0.6330.

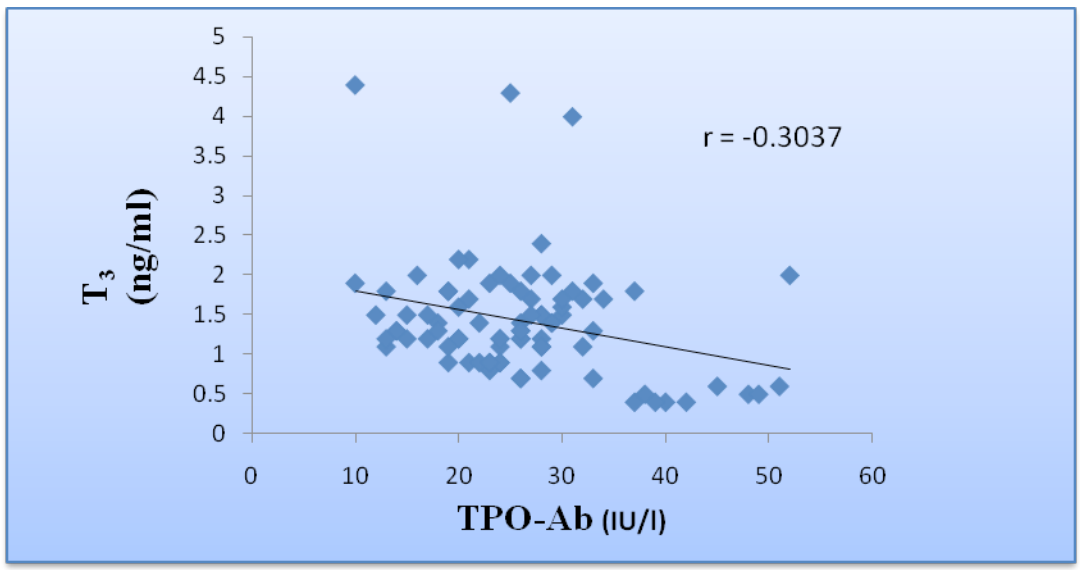

Figure 2: Correlation of serum T_3 with TPO-Ab.

Figure 2 shows that moderate negative correlation was found between T_3 levels and TPO-Ab, with r = -0.3037.

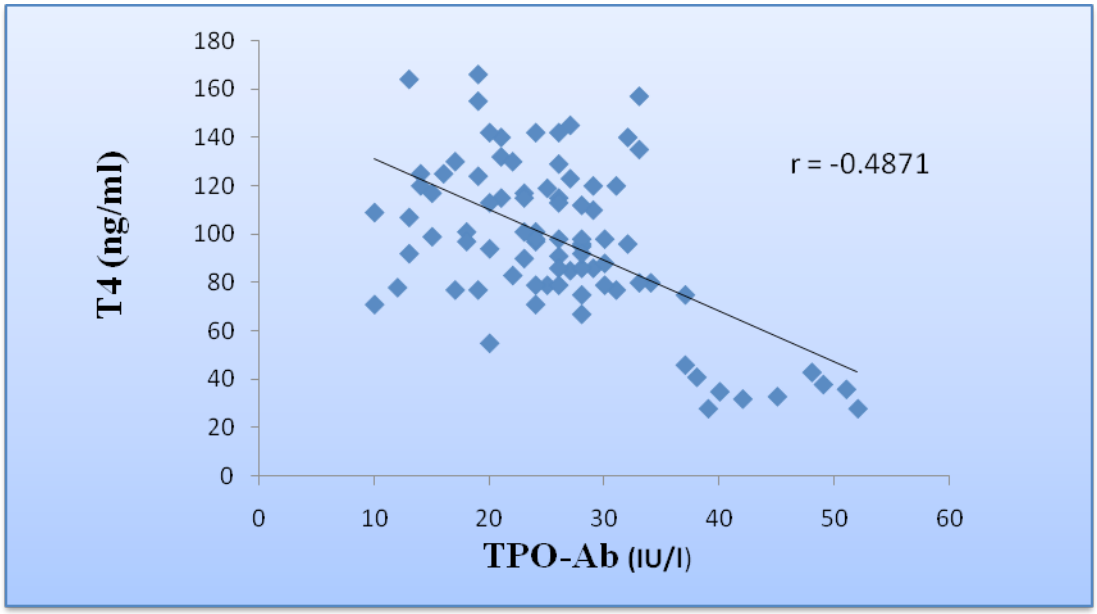

Figure 3: Correlation of serum T_4 with TPO-Ab.

Figure 3 shows that moderate negative correlation was found between T_4 levels and TPO-Ab with r = -0.4871.

Discussion

There is a significant prevalence of clinical and subclinical hypothyroidism in pregnant women. Thyroid dysfunction is associated with many complications during pregnancy and delivery like miscarriage, preterm birth, placental abruption and the child may have low I/Q, cretinism and developmental disorders. Many pregnant females have thyroid autoantibodies. The presence of thyroid autoantibodies might be a marker of underlying subtle alteration in thyroid reserve.[8]

This study was conducted 200 females in 1st trimester of pregnancy. It was observed that hypothyroidism (TSH level >3.5 mIU/l) in 30 (15%) patients. Out of these 30 cases, 9 (4.5%) had overt hypothyroidism (TSH >3.5 mIU/l & T_4<50 ng/ml) and 21 (10.5%) had subclinical hypothyroidism (TSH>3.5 mIU/l & T_4>50 ng/ml).

There are only few reports on prevalence of hypothyroidism during pregnancy from India with prevalence rates ranging from 4.8% to 24%. Dhanwal et al. reported 14.3% prevalence of hypothyroidism in the first trimester of pregnancy[9] we have reported 15% prevalence of hypothyroidism. Our results match this study. The prevalence rates may be found difference in different geographic areas and it is also due to the selection of TSH normal level and normal value may vary from laboratory to laboratory. Pavana et al. showed a prevalence of 7.5%.[6] Studies of Sahu et al. showed prevalence of hypothyroidism as 6.4%.[10] K Lata et al. have found 24% prevalence of hypothyroidism among pregnant females with history of two or more consecutive miscarriages.[11]

Conclusions

Hypothyroidism especially subclinical hypothyroidism is prevalent among pregnant females. Since thyroid dysfunction during pregnancy is associated with many fetal & maternal complications, TPO-Ab status of pregnant females should be tested in early pregnancy so that in case of thyroid dysfunction, early treatment can be started to prevent complications.

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Issue of Conflict: None

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