OPEN ACCESS
Scholars International Journal of Biochemistry
Abbreviated Key Title: Sch Int J Biochem
ISSN 2616-8650 (Print) |ISSN 2617-3476 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: http://saudijournals.com/sijb/

Original Research Article

Thyroid Dysfunction in Women during First Trimester of Pregnancy: Correlation with Anti-Thyroid Peroxidase Antibodies

Vanaraj Diyora[1], Tejas Shah[2*], Mritunjay Kumar Mishra[1]
[1]Tutor, Biochemistry, SBKS MI & RC, Sumandeep Vidyapeeth Deemed to be University, Piparia, Vadodara, Gujarat, India
[2]Associate Professor, Biochemistry, SBKS MI & RC, Sumandeep Vidyapeeth Deemed to be University, Piparia, Vadodara, Gujarat, India

***Corresponding author:** Tejas Shah
| **Received:** 14.02.2019 | **Accepted:** 24.02.2019 | **Published:** 28.02.2019
DOI:10.21276/sijb.2019.2.2.5

Abstract

Background: During pregnancy, thyroid dysfunction has been associated with a number of adverse outcomes. The presence of anti- Thyroid Peroxidase Antibody (anti-TPO) also results in post-partum complications. Hypothyroidism is closely associated with the presence of anti-TPO. The study aimed to evaluate anti-TPO and thyroid function tests in first trimester of pregnancy. ***Materials and Methods:*** The study was carried out at Department of Biochemistry, Medical College and SSG Hospital, Vadodara, Gujarat, India over a period of one year after prior approval from institutional ethics committee. Total 200 normal pregnant women in their first trimester were randomly selected after informed written consent. Women having known thyroid dysfunction, other endocrinopathies, undergone thyroid surgery or taking thyroid medications were excluded. Overnight fasting blood samples from participants were analyzed for anti-TPO, thyroid stimulating hormone (TSH), total T_3 and total T_4. ***Results:*** Mean maternal age was 25.56 ± 3.32 years. Out of 200, total 30 (15%) pregnant women of first trimester had TSH level >2.5 mIU/l. Out of these 30 females, 9 (4.5%) had overt hypothyroidism & 21 (10.5%) had subclinical hypothyroidism. Among these 30 hypothyroid women, 26 (13%) had found anti-TPO positive (anti-TPO >35 IU//ml) which also showed a significant positive correlation with TSH level and negative correlation with T_3 and T_4 level. ***Conclusion:*** Hypothyroidism especially sub-clinical hypothyroidism is prevalent among pregnant women with positive correlation with anti-TPO. It is suggested that anti-TPO should be added as a screening test in first trimester of pregnancy which can be useful to identify early thyroid dysfunction.

Keywords: Anti-Thyroid Peroxidase Antibody, Thyroid stimulating hormone, T_3, T_4.

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 is associated with many complications during pregnancy and delivery like miscarriage, preterm birth, placental abruption and the child may have low IQ, cretinism and developmental disorders. Many studies have shown that hypothyroid state in pregnancy is associated with maternal and fetal complications [2, 3]. During the first trimester, the fetus is completely dependent upon thyroxine 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 tests (TFT) are 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 anti-thyroid peroxidase antibodies (anti-TPO) [5]. Anti-TPO works against thyroid peroxidase, an enzyme which catalyzes iodide oxidation and iodination of tyrosyl residues of thyroglobulin. It also causes tissue destruction in other forms of thyroiditis such as postpartum thyroiditis [6]. Anti-TPO may be considered as a marker of generalized autoimmune dysfunction in the body. Anti-TPO positive women have a risk for post partum thyroid dysfunction, hypothyroidism, miscarriage, preterm delivery and perinatal death. Screening for anti-TPO 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 [8]. Hence, early diagnosis of hypothyroidism and initiation of treatment is

necessary. Thus, the present study was designed to correlate the anti-TPO levels with thyroid function tests in first trimester of pregnancy.

MATERIALS & METHODS

This cross sectional study was carried out at Sir Sayajirao General Hospital and Medical College, Vadodara over a period of one year. Before starting this study, approval from the Institutional Ethics Committee for Human Research, Medical College and S.S.G. Hospital, Vadodara was obtained (ECR/85/Inst/GJ/2013). Total 200 pregnant women visited antenatal clinic of Obstetrics and Gynecology Department in 1st trimester were enrolled in study after written informed consent. Women having known thyroid dysfunction, thyroid autoimmunity, other endocrinopathies, undergone thyroid surgery or taking thyroid medications were excluded. Detailed medical history and physical examination findings were recorded in a predesigned proforma. 3 ml of fasting blood sample was collected from participants under aseptic precautions and was analyzed for TFT i.e. total T3, total T4, TSH and anti-TPO. The analysis was done by immunoassay technique ELISA. Reference values used for these parameters were: T3=0.5-2.0 ng/ml, T4=53-121 ng/ml, TSH= 0.4-2.5 mU/l and anti-TPO= <35 IU/ml. Women with T3, T4 below the reference range along with elevated TSH were classified as having overt hypothyroidism while those having T3, T4 in normal range with TSH more than 2.5 mIU/l were diagnosed as having Subclinical Hypothyroidism.Statistical analysis was done by using GraphPad Prism software. Regression analysis was used 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 and there was a negative correlation between anti-TPO and serum T_4,T_3 level (r= -0.4871, r= -0.3037 respectively) in study subjects. Correlation of anti-TPO with thyroid function tests are shown in Figure 1, 2 & 3.

Table-1: Thyroid dysfunction found in first trimester of pregnancy (n=200)

	Frequency	Percentage
Overt hypothyroidism	9	4.5
Sub-clinical hypothyroidism	21	10.5
Euthyroid	170	85
Total	200	100

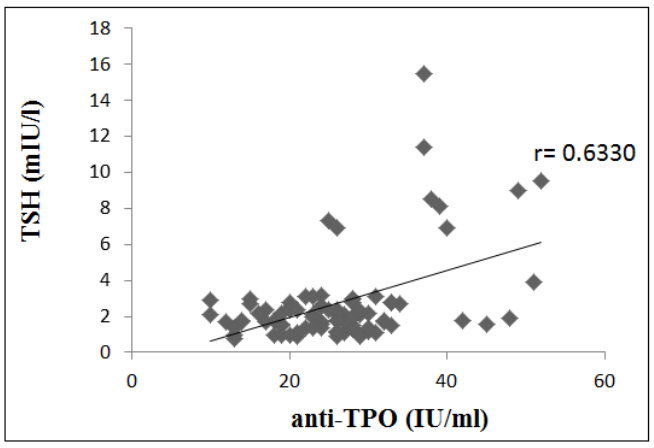

Fig-1: Correlation of serum TSH with TPO-Ab

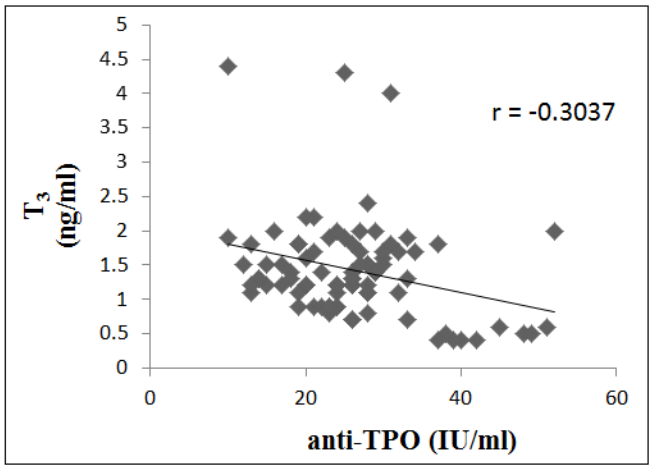

Fig-2: Correlation of serum T3 with TPO-Ab

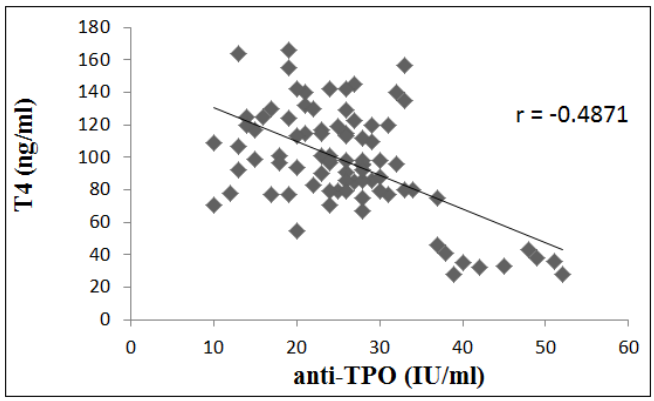

Fig-3: Correlation of serum T_4 with TPO-Ab

DISCUSSION

Thyroid dysfunctions are common during pregnancy and it can affect the outcome also. Our study revealed 15% prevalence of hypothyroidism in first trimester of pregnancy. Out of this 15%, 4.5% had overt hypothyroidism and 10.5% had sub-clinical hypothyroidism. 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 and majority of them had sub-clinical hypothyroidism [9]. High prevalence of hypothyroidism is due to high intake of dietary iodine, goitrogens and minerals like iron, selenium deficiency [10-12]. The prevalence rates may be found difference in different geographic areas and it is also due to the selection of TSH upper cut-off value. Sailakshmi *et al.,* showed a prevalence of 7.5% [6]. Sahu *et al.,* reported 6.4% prevalence of hypothyroidism [13]. Lata *et al.,* have found 24% prevalence of hypothyroidism among pregnant females with history of two or more consecutive miscarriages [14]. Thyroid autoimmunity can also alter the progression of pregnancy and thus affect its outcome. Western studies showed 10-15% prevalence of thyroid autoimmunity in pregnancy [15]. Teng *et al.,* found anti‑TPO positivity in 9.6% of first trimester pregnant Chinese women [11]. Dhanwal *et al.,* [9] reported an anti‑TPO prevalence of 6.82% in pregnant women of North India. In the current study, anti‑TPO was elevated in 26 (13%) women who had hypothyroidism which also suggest that mean TSH level was high with anti-TPO positivity. The possible reason for effect of anti-TPO on pregnancy outcome is subclinical deficiency of the thyroid hormones in women and they are unable to meet the increased requirements of thyroid hormones during pregnancy. The presence of anti-TPO adversely affects the foetus and result into spontaneous abortions, preterm delivery, IUGR etc [16, 17].

CONCLUSION

Our study concluded that Hypothyroidism especially subclinical hypothyroidism is prevalent among pregnant females. Anti-TPO positivity is associated with high level of TSH suggestive of hypothyroidism. Since thyroid dysfunction during pregnancy is associated with many fetal and maternal complications, anti-TPO 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.

REFERENCES

1. Shamali, J., & Sanjay, S. (2013). Study of Thyroid Profile in First Trimester of Pregnancy. *International Journal Recent Trends in Science and Tech*, 9(2):171-173.
2. Nahar, N. U., Naher, Z. U., Habib, M. A., & Mollah, F. H. (2013). Assessment of Thyroid Peroxidase Antibody And Thyroid Stimulating Hormone In First Trimester Of Pregnancy. *Bangladesh Journal of Medical Science*, *12*(2), 164-171.
3. Allan, W. C., Haddow, J. E., Palomaki, G. E., Williams, J. R., Mitchell, M. L., Hermos, R. J., ... & Klein, R. Z. (2000). Maternal thyroid deficiency and pregnancy complications: implications for population screening. *Journal of medical screening*, *7*(3), 127-130.
4. Wang, W., Teng, W., Shan, Z., Wang, S., Li, J., Zhu, L., ... & Chen, Y. (2011). The prevalence of thyroid disorders during early pregnancy in China: the benefits of universal screening in the first trimester of pregnancy. *European Journal of Endocrinology*, *164*(2), 263-268.
5. Zarghami, N., Rohbani-Noubar, M., & Khosrowbeygi, A. (2005). Thyroid hormones status during pregnancy in normal Iranian women. *Indian Journal of Clinical Biochemistry*, *20*(2), 182-185.
6. Sailakshmi, M. P. A., Pavan, G. A., Rekha, B. R., & Suhasini, S. A. (2014). Autoimmune thyroid disease in pregnancy. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, *3*, 321-324.
7. Chang, D. L., & Pearce, E. N. (2013). Screening for maternal thyroid dysfunction in pregnancy: a review of the clinical evidence and current guidelines. *Journal of thyroid research*.
8. Yaqoob, A. (2012). Subclinical hypothyroidism and its consequences. *J Public Health Biol Sciences*, *1*(2), 53-60.
9. Dhanwal, D. K., Prasad, S., Agarwal, A. K., Dixit, V., & Banerjee, A. K. (2013). High prevalence of subclinical hypothyroidism during first trimester of pregnancy in North India. *Indian journal of endocrinology and metabolism*, *17*(2), 281-284.
10. Marwaha, R. K., Tandon, N., Gupta, N., Karak, A. K., Verma, K., & Kochupillai, N. (2003). Residual goitre in the postiodization phase: iodine status, thiocyanate exposure and autoimmunity. *Clinical endocrinology*, *59*(6), 672-681.
11. Teng, X., Shan, Z., Chen, Y., Lai, Y., Yu, J., Shan, L., ... & Wang, S. (2011). More than adequate iodine intake may increase subclinical hypothyroidism and autoimmune thyroiditis: a cross-sectional study based on two Chinese communities with different iodine intake levels. *European journal of endocrinology*, *164*(6), 943-950.
12. Das, S., Bhansali, A., Dutta, P., Aggarwal, A., Bansal, M. P., Garg, D., ... & Sachdeva, N. (2011). Persistence of goitre in the post-iodization phase: micronutrient deficiency or thyroid autoimmunity?. *The Indian journal of medical research*, *133*(1), 103-109.
13. Sahu, M. T., Das, V., Mittal, S., Agarwal, A., & Sahu, M. (2010). Overt and subclinical thyroid dysfunction among Indian pregnant women and its effect on maternal and fetal outcome. *Archives of gynecology and obstetrics*, *281*(2), 215.
14. Lata, K., Dutta, P., Sridhar, S., Rohilla, M., Srinivasan, A., Prashad, G. R. V., ... & Bhansali, A. (2013). Thyroid autoimmunity and obstetric outcomes in women with recurrent miscarriage: a case–control study. *Endocrine connections*, *2*(2), 118-124.
15. Glinoer, D., Riahi, M., Grün, J. P., & Kinthaert, J. (1994). Risk of subclinical hypothyroidism in pregnant women with asymptomatic autoimmune thyroid disorders. *The Journal of Clinical Endocrinology & Metabolism*, *79*(1), 197-204.
16. Glinoer, D., Soto, M. F., Bourdoux, P., Lejeune, B., Delange, F., Lemone, M., ... & NAYER, P. D. (1991). Pregnancy in patients with mild thyroid abnormalities: maternal and neonatal repercussions. *The Journal of Clinical Endocrinology & Metabolism*, *73*(2), 421-427.
17. Lejeune, B., Grun, J. P., De Nayer, P. H., Servais, G., & Glinoer, D. (1993). Antithyroid antibodies underlying thyroid abnormalities and miscarriage or pregnancy induced hypertension. *BJOG: An International Journal of Obstetrics & Gynaecology*, *100*(7), 669-672.