

Hypothyroidism in Pregnancy: A Hospital based cross sectional study

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Abstract

Introduction: Uncontrolled hypothyroidism is associated with serious maternal, fetal, and neonatal morbidity, and mortality. Overt hypothyroidism is defined as a clinical syndrome of hypothyroidism associated with elevated TSH and decreased serum levels of T4 or T3. Subclinical hypothyroidism is defined as a condition without typical symptoms of hypothyroidism, elevated TSH (>5 $\mu\text{U/mL}$), and normal circulating thyroid hormone.

Material & Methods: The present hospital based cross sectional study was conducted in the Department of Obstetrics and Gynaecology, Dr. B. R. Ambedkar Medical College & Hospital, Bangalore. From the outpatient clinics, a total of 200 pregnant women of 1st trimester were selected in the study. Informed consent was taken from the study participants. Complete thyroid profile was done.

Results: Mean age was found to be 23.6 ± 2.5 and mean gestational age 8.2 ± 2.6 . Among the total study participants ($n=200$), the overall prevalence of hypothyroidism was 16.5% ($n=33$). Elevated TSH levels ($>5 \text{ mIU/ml}$) was found in 16.5% (33) of the study population. With regards to thyroid hormone levels, decreased levels of T3 & T4 were observed in 24.3% (08) and 75.7% (25) had normal levels of T3 & T4. Majority had subclinical hypothyroidism 75.7% ($n=25$) and 24.3% ($n=8$) had overt hypothyroidism.

Keywords: Pregnancy, Hypothyroidism, Prevalence, Thyroid profile, Subclinical

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Introduction

Pregnancy is associated with significant but reversible changes in thyroid function which are a result of normal physiologic state and hormonal changes that alter thyroid function. These changes mean that laboratory tests of thyroid function must be interpreted with caution during pregnancy. Several risk factors predispose women to hypothyroidism during pregnancy, including autoimmune thyroid disease (AITD), type 1 diabetes mellitus, other endocrine deficiencies, Down syndrome, Turner syndrome, thalassaemia major, thyroid ablation^[1].

The high circulating estrogen levels during pregnancy change the pattern of glycosylation of TBG at the time of hepatic synthesis, leading to a longer plasma half life and, consequently, an increase in the plasma TBG concentration. This has led to increased serum T4-binding globulin and T4 concentrations. A high circulating hCG level in the first trimester leads to HCG cross reactivity with the TSH receptor, prompting a temporary increase in free T4 and partial suppression of TSH. The final physiologic change results from placental deiodination of maternal T4, which increases T4 turnover^[2].

Overt hypothyroidism is defined as a clinical syndrome of hypothyroidism associated with elevated

TSH and decreased serum levels of T4 or T3. Subclinical hypothyroidism is defined as a condition without typical symptoms of hypothyroidism, elevated TSH (>5 $\mu\text{U/mL}$), and normal circulating thyroid hormone.^[3] Serum TSH elevation indicates primary hypothyroidism, and serum free T4 levels subclinical and overt hypothyroidism. Free hormone levels are estimated, as total hormone levels are elevated due to changes in TBG levels. "Trimester-specific" ranges are in vogue for TSH with an upper limit of 2.5 $\mu\text{IU/ml}$ in the first trimester and 3 $\mu\text{IU/ml}$ in the second and third trimesters^[4].

Thyroid disorders such as chronic thyroiditis, hypothyroidism, Graves' disease, etc. are relatively common in pregnant women. Disorders of the thyroid include both overt and mild/subclinical hypothyroidism and hyperthyroidism and goitre. Hypothyroidism is estimated to occur in 0.3-0.5% of pregnancies. Subclinical hypothyroidism appears to occur in 2-3%. Autoimmune thyroiditis is the commonest cause of hypothyroidism during pregnancy. Hyperthyroidism during gestation, usually caused by Graves's disease, is rare (0.2%)^[5].

Uncontrolled hypothyroidism and hyperthyroidism are associated with serious maternal, fetal, and neonatal morbidity, and mortality. Maternal complications include miscarriage, pregnancy-induced hypertension, preterm labor, placental abruption, heart failure, and thyroid storm. Fetal and neonatal complications include stillbirth, low birth weight, goiter, hyperthyroidism, and hypothyroidism^[6].

The present study has been done with an objective to assess the prevalence of hypothyroidism among antenatal women attending a tertiary care hospital.

Material & Methods

The present hospital based cross sectional study was conducted in the Department of Obstetrics and Gynaecology, Dr. B.R. Ambedkar Medical College & Hospital, Bangalore.

Study participants were pregnant women in the first trimester coming to the outpatient department (OPD). Duration of the study was for 6 months from July 2014 to Dec. 2014.

Sample size: From the outpatient clinics, a total of 200 pregnant women of 1st trimester were selected in the study.

Exclusion criteria: Pregnant women of 2nd & 3rd trimesters, known case of thyroid disease, diabetes, heart disease, collagen disease.

A predesigned proforma was used to get demographic characteristics such as age, family history, details of pregnancy regarding gestational age, weight gain of the participants and clinical examination was done.

Subclinical hypothyroidism was defined as decreased thyroid activity with elevated TSH levels. Informed consent was taken from the study participants. Complete thyroid profile was done.

Statistical analysis: Data entry and analysis was done using the EPI INFO 3.5.4 version. Data was presented in percentages and proportions. Univariate analysis was done using chi square test with 95% level of significance ($p < 0.05$ considered statistical significant).

Results

Demographic characteristics: Majority (72.5%) of the pregnant women were in the age group of 20-25 years. Mean age was found to be 23.6 ± 2.5 . With regards to the gestational age, two thirds were between 8-12 weeks with mean gestational age 8.2 ± 2.6 .

Among the study population, about one fourth (22.5%) had a family history of thyroid disease in any one of their family member. More than forty percent were illiterates and were below poverty line. (Table 1) The mean systolic & diastolic blood pressures were 113.42 ± 5.6 and 72.32 ± 7.8 respectively.

Clinical symptoms & signs related to Hypothyroidism: The common symptoms & signs that were detected among the study population were fatigue (11%), weight gain (8%), dry skin (5%) and increased sensitivity to cold (3%).

Serum TSH, FT4 and FT3 status in the study population: Elevated TSH levels ($>5\text{mIU/ml}$) was found in 16.5% (33) of the study population. With regards to thyroid hormone levels, decreased levels of T3 & T4 were observed in 24.3% (08) and 75.7% (25) had normal levels of T3 & T4.

The overall prevalence of hypothyroidism was 16.5% ($n=33$). Out of them, majority had subclinical

hypothyroidism 75.7% ($n=25$) and 24.3% ($n=8$) had overt hypothyroidism. (Table 2)

Relation between gestational age & thyroid status: The association between gestational age and thyroid status was not found to be statistically significant ($p > 0.05$). (Table 3)

Relation between parity & thyroid status: The association between parity and thyroid status was found to be statistically significant ($p < 0.001$) which means that compared to primi, pregnant women who are multigravida were at increased risk of developing hypothyroidism. (Table 4)

Table 1: Demographic characteristics of study population ($n=200$)

| Parameter | Number (%) |
|--|-------------|
| Age (in years) | |
| <20 | 24 (12%) |
| 20-25 | 145 (72.5%) |
| 26-30 | 31 (15.5%) |
| Gestational age (in weeks) | |
| < 8 weeks | 65 (32.5%) |
| 8-12 weeks | 135 (67.5%) |
| Family History of Thyroid disease | |
| Yes | 45 (22.5%) |
| No | 155 (77.5%) |
| Literacy status | |
| Illiterate | 87 (43.5%) |
| Literate | 113 (56.5%) |
| Socio economic status | |
| Below poverty line | 95 (47.5%) |
| Above poverty line | 105 (52.5%) |

Table 2: Prevalence of Hypothyroidism among the study participants ($n=200$)

| Parameter | Number (Percentage) |
|---|---------------------|
| Overt Hypothyroidism (elevated TSH & decreased T3 & T4 levels) | 08 (24.3%) |
| Subclinical Hypothyroidism (elevated TSH & normal T3 & T4 levels) | 25 (75.7%) |
| Total Hypothyroidism | 33 (16.5%) |

Table 3: Association between gestational age & thyroid status

| Gestational age (in weeks) | Thyroid hormone levels (TSH, T3 & T4) | | p value |
|----------------------------|---------------------------------------|--------|---------|
| | Abnormal | Normal | |
| 1-6 weeks | 15 | 64 | 0.4 |
| 7-12 weeks | 18 | 103 | |
| Total | 33 | 167 | |

Table 4: Association between parity & thyroid status

| Parity | Thyroid hormone levels (TSH, T3 & T4) | | p value* |
|--------------|---------------------------------------|--------|----------|
| | Abnormal | Normal | |
| Primi | 07 | 85 | 0.001 |
| Multigravida | 26 | 82 | |
| Total | 33 | 167 | |

*p<0.05 (Statistically significant)

Discussion

Present study which aimed to detect the prevalence of hypothyroidism among the 1st trimester pregnant women attending a tertiary care hospital found that 16.5% had hypothyroidism with majority being asymptomatic (subclinical).

Study by Dhanwal DK et al^[7] observed that there is a high prevalence of hypothyroidism (14.3%), majority being subclinical in pregnant women during first trimester from India. One hundred and forty-three (14.3%) subjects had TSH values more than 4.5 mIU/L above the cutoff used for definition of hypothyroidism. Out of these, 135 had normal free T4 and therefore labeled as subclinical hypothyroidism and 7 had low free T4 suggestive of overt hypothyroidism. TPO Ab was positive in 68 (6.82%) of total, 25 (18.5%) of subclinical and 5 (71%) of overt hypothyroid patients.

A similar kind of study by Sejekan Prema^[8] on thyroid screening in pregnancy found that potential and inadequately treated hypothyroid patients present with problems in pregnancy, while adequately treated hypothyroid and true euthyroid women get normal ongoing pregnancies. So to identify these potential or overt hypothyroid women, thyroid screening with T3, T4, TSH and FT4 must be done during prenatal period, at first booking, and repeated at 8weeks interval thereafter, in pregnancy. TSH value should be kept below 2mIU/ml to get adequate control.

Gayathri R et al^[9] study on subclinical hypothyroidism and autoimmune thyroiditis in pregnancy revealed that subclinical hypothyroidism was detected in 2.8%, among them TPO antibodies positivity was seen in 57.1% whereas euthyroid women had significantly lower positivity (7%). No association was seen between hypothyroidism or TPO antibody positivity with gestational age or parity. Hypothyroidism diagnosed by elevated TSH value (> or = 5.0 mg/l) was significantly associated with increasing gestational age (Trend chi2 = 6.02, p = 0.014).

Rao VR et al^[10] study on prevalence of hypothyroidism in recurrent pregnancy loss in first trimester observed that Hypothyroidism was found in seven (4.12%) women with RPL and one in control group. The differences in the levels of serum T3, T4 and TSH between euthyroid and hypothyroid women were found significant in women with RPL in first trimester demonstrating that hypothyroidism has a statistically significant relationship with recurrent pregnancy loss in

the first trimester and suggests that diagnosis of hypothyroidism could help couples with recurrent pregnancy loss to have a successful outcome in subsequent pregnancies.

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