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# To Study Incidence of Subclinical Hypothyroidism in Pregnancy and Effectiveness of Treating It

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**Abstract:** ***This study was hospital based, time bound prospective analytical study. In this study we enrolled 2000 antenatal patients and screened them for hypothyroidism. All patients were followed up till delivery. out of 2000 pregnant women included in the study, 160 women had subclinical hypothyroidism with an incidence of 8 %.subclinical hypothyroidism was most commonly observed in the age group of more than 30 years (31.81%) followed by 21 to 25 years (6.12% ), less than 20 years (5% ) and 26 to 30 years (4.5% ) of the patients The mean age of patients was 26.85 ± 3.04 years. There was a positive correlation between subclinical hypothyroidism and higher maternal age (p=0.018). The incidence of Pregnancy induced hypertension, prematurity and recurrent abortions was also higher in patients suffering from subclinical hypothyroidism. Subclinical hypothyroidism is an easily treatable maternal condition which reduces the pregnancy associated maternal and fetal morbity. Hence guidelines should be set for universal screening of hypothyroidism in pregnancy***

**Keywords:** Subclinical hypothyroidism, pregnancy induced hypertension, recurrent abortions, fetal morbidity and subclinical hypothyroidism

## 1. Introduction

Thyroid dysfunction is one of the most common endocrine disorders affecting women of reproductive age group including pregnancy.Subclinical hypothyroidism (SCH) is defined as an elevated thyrotropin (TSH) concentration with normal serum levels of thyroxine (T4). In pregnancy, overt hypothyroidism is seen in 0.2% cases and subclinical hypothyroidism (SCH) is reported to have a prevalence of 1-2% of all pregnancies.[1,2] The prevalence of hypothyroidism in pregnancy is around 2.5% according to the western literature[3].There are a few reports of prevalence of hypothyroidism during pregnancy from India with prevalence rates ranging from 4.8% to 11% and SCH is as high as 13.5% women.[1,4,5]

Current guidelines differ between aggressive cases finding approach versus testing only symptomatic women or those with a personal history of thyroid disease or other associated medical condition.[5,6-10]Therefore we conducted this study aims to highlight the need for universal screening of pregnant women for thyroid function.

## 2. Literature Survey

A butterfly-shaped organ, the thyroid gland is located anterior to the trachea, just inferior to the larynx . The medial region, called the isthmus, is flanked by wing-shaped left and right lobes.The tissue of the thyroid gland is composed mostly of thyroid follicles. The follicles are made up of a central cavity filled with a sticky fluid called **colloid s**urrounded by a wall of epithelial follicle cells. These follicles are the center of thyroid hormone production and that production is dependent on the hormones' essential and unique component: iodine.The thyroid hormones, $T_3$ and $T_4$, are often referred to as metabolic hormones because their levels influence the body's basal metabolic rate, the amount of energy used by the body at rest.

Adequate levels of thyroid hormones are also required for protein synthesis and for fetal and childhood tissue development and growth. They are especially critical for normal development of the nervous system both in utero and in early childhood, and they continue to support neurological function in adults. These thyroid hormones have a complex interrelationship with reproductive hormones, and deficiencies can influence libido, fertility, and other aspects of reproductive function.Thyroid disorders are the commonly detected endocrinopathies during pregnancy. It seems that prevalence of hypothyroidism is more in Asian countries compared with the West [1,2]. The majority of cases of hypothyroidism are considered to be subclinical type. In west, the prevalence of hypothyroidism is estimated to be 2-3% and 0.3-0.5% for subclinical and overt hypothyroidism respectively [2-4]. In India, the prevalence ranges from 4.8% to 11% [5,6]

Various hormonal changes and increased metabolic demands occur during pregnancy and profoundly affect thyroid functionThe major expected changes during normal pregnancy are an increase in the serum thyroxinebinding globulin (TBG) concentration and the stimulation of the thyrotropin (TSH) receptor by human chorionic gonadotropin (hCG) [7]. The serum TBG concentration rises almost two-fold during the first 20 weeks of gestation, and as a result, both serum total thyroxine (T4) and triiodothyronine concentrations increase [8]. The serum hCG concentration increases after fertilization and peaks at 10 to 12 weeks. During this peak, the thyrotropic activity of hCG reduces the concentration of serum TSH [9]. Later in pregnancy, the serum TSH concentration steadily returns to the normal range and the serum free T4 concentration declines [10].Maternal thyroid hormones play an important

role in fetal development. Because the fetal thyroid only produces thyroid hormones after 16 weeks of gestation, fetal development de-pends on the state of the maternal thyroid for the first half of pregnancy [11]. Therefore, maternal thyroid dysfunction can result in adverse outcomes for the fetus as well as the mother.. The serum TSH concentration is the initial and most reliable measure of thyroid function during pregnancy [12]. Due to the physiologic changes in TSH levels during pregnancy, the ATA guidelines recommend using trimester-specific reference ranges for TSH [3]. If these reference ranges are not available in the laboratory, the following reference ranges can be used: first trimester, 0.1 to 2.5 mIU/L; second trimester, 0.2 to 3.0 mIU/L; third trimester, 0.3 to 3.0 mIU/L.]. The goal of hypothyroidism treatment is to maintain the serum TSH levels within the trimester-specific reference range. Thyroid function tests should be conducted every 4 to 6 weeks during the first trimester and once during the second and third trimesters, and the dose of LT4 should be adjusted [3]. Women being treated for hypothyroidism before pregnancy need to increase their LT4 dose during pregnancy [35]. The dose requirement may increase by 30% to 50% during pregnancy and as early as 4 to 6 weeks of gestation, and may gradually increase through 16 to 20 weeks of gestation [3,36].A previous systematic review in 2011 included five articles reporting on the ad-verse outcomes associated with SCH, and the meta-analysis included a maximum of three studies for each of the evaluated outcomes ([22]).

In 2013, a Cochrane review on interventions for SCH during pregnancy did not identify any studies evaluating the effectiveness of levothyroxine therapy on maternal and neonatal outcomes ([23]).The decision on whether to treat subclinical hypothyroidism diagnosed during pregnancy is controversial.The ATA 2011 and the ES 2012 guidelines, but not the American College of Obstetricians and Gynecologists guidelines, recommend initiating levothyroxine therapy in these patients. It is important to note that therapy should start before 10 weeks of gestation as after that gestation it would not eliminate any already established fetal neuro developmental impairment from hypothyroxinemia. Pop and colleagues have provided evidence that treatment may be ineffective if given after this time [32]. The recommended treatment of maternal hypothyroidism is administration of oral levothyroxine.

## 3. Materials and Methods

This hospital based time bound prospective analytical study was conducted in the department of obstetrics and gynaecology in a tertiary care hospital in India for a study duration of one year. Total 2000women of age 18-35 years of age attending ANC OPD were enrolled in the study after matching inclusion and exclusion criteria. Institutional ethics committee permission was taken.

**Inclusion Criteria**
All women of age 18-35 years of age attending ANC OPD for registration in a tertiary care hospital in India

**Exclusion Criteria**
1) All Women below 18 and Above 35 Years of Age.
2) All Women on Treatment for Hypothyroidism Diagnosed Before Pregnancy.
3) Women Already Having The Complications That Are Being Studied Here:
   - Hypertensive Disorders Of Pregnancy
   - Intrauterine Growth Retardation
   - Intrauterine Deaths
   - Abruption
   - Preterm Labor

**Methodology**
All women registering for antenatal checkup in our tertiary care hospital were screened for hypothyroidism and incidence of hypothyroidism was calculated.

Patients with subclinical hypothyroidism were identified .

Free T3 and T4 were investigated in patients with deranged TSH values. Patients were followed throughout their gestational period during which they were treated for sub clinical hypothyroidism and their TSH levels were checked every two months.

Following complications were studied and compared by using statistical analysis with known rate
- Hypertensive Disorders Of Pregnancy
- Intrauterine Growth Retardation
- Intrauterine Deaths
- Abruption
- Preterm Labour

## 4. Results

**Table 1:** Incidence of Subclinical hypothyroidism amongst study population

| Incidence of Subclinical hypothyroidism | | Frequency | Percent |
|---|---|---|---|
| Valid | Present | 160 | 8 |
| | Absent | 1840 | 92 |
| | Total | 2000 | 100.0 |

As seen in the above table, out of 2000 pregnant women included in the study, 160 women had Subclinical hypothyroidism with an incidence of 8 %.

**Table 2:** Age Distribution amongst study population

| Age Group | | Sub-clinical hypothyroidism | | Total |
|---|---|---|---|---|
| | | Present | Absent | |
| less than 20 years | Count | 10 | 191 | 201 |
| | % | 5% | 95% | 100% |
| 21 to 25 years | Count | 30 | 458 | 488 |
| | % | 6.12% | 93.88% | 100% |
| 26 to 30 years | Count | 50 | 1051 | 1101 |
| | % | 4.50% | 95.50% | 100% |
| More than 30 years | Count | 70 | 152 | 220 |
| | % | 31.81% | 69.19% | 100% |
| Total | Count | 160 | 1840 | 2000 |
| | % | 8% | 92% | 100.00% |

Chi Square test, P value- 0.0001

As seen in the above table, the incidence of subclinical hypothyroidism was most commonly observed in the age group of more than 30 years (31.81% ) followed by 21 to 25

years (6.12% ) , less than 20 years (5% ) and 26 to 30 years (4.5% ) of the patients The mean age of patients was 26.85 ± 3.04 years.

**Table 3:** Incidence of PIH amongst study population

| PIH | | Sub-clinical hypothyroidism | | Total |
|---|---|---|---|---|
| | | Present | Absent | |
| Yes | Count | 20 | 267 | 287 |
| | % | 6.80% | 93.20% | 100% |
| No | Count | 139 | 1574 | 1713 |
| | % | 8.10% | 91.90% | 100% |
| Total | Count | 160 | 1840 | 2000 |
| | % | 8% | 92% | 100.00% |

Chi Square test, P value- 0.506

As seen in the above table, pregnancy induced hypertension (PIH) was more common in subclinical hypothyroidism patients than normal pregnancy with incidence of about 6.8%. There was statistically no significant difference between patients with PIH and study population.

**Table 4:** Premature labour amongst study population

| Prematurity | | Sub-clinical hypothyroidism | | Total |
|---|---|---|---|---|
| | | Present | Absent | |
| Yes | Count | 20 | 173 | 193 |
| | % | 10.52% | 89.48% | 100% |
| No | Count | 139 | 1668 | 1807 |
| | % | 7.70% | 92.30% | 100% |
| Total | Count | 160 | 1840 | 2000 |
| | % | 8% | 92% | 100.00% |

Chi Square test , P value- 0.192

As seen in the above table, Prematurity was more common in subclinical hypothyroidism patients than normal pregnancy with incidence of about 10.52%. There was statistically no significant difference between patients with Premature labour and study population.

**Table 5:** Recurrent abortion amongst study population

| Recurrent abortion | | Subclinical hypothyroidism | | Total |
|---|---|---|---|---|
| | | Present | Absent | |
| Yes | Count | 4 | 49 | 53 |
| | % | 7.60% | 92.40% | 100% |
| No | Count | 156 | 1791 | 1947 |
| | % | 8% | 92% | 100% |
| Total | Count | 160 | 1840 | 2000 |
| | | 8% | 92% | 100.00% |

Chi Square test, P value- 0.902

As seen in the above table, Recurrent abortion was more common in subclinical hypothyroidism patients than normal pregnancy with incidence of about 7.6%. There was statistically no significant difference between patients with Recurrent abortion and study population.

**Table 6:** Mode of delivery amongst study population

| | | Sub-clinical hypothyroidism | | Total |
|---|---|---|---|---|
| | | Present | Absent | |
| FTND | Count | 60 | 1502 | 1562 |
| | % | 3.85% | 96.15% | 100% |
| LSCS | Count | 100 | 338 | 438 |
| | % | 22.73% | 77.27% | 100% |
| Total | Count | 160 | 1840 | 2000 |
| | % | 8% | 92% | 100.00% |

Chi Square test , P value- 0.0001

As seen in the above table, LSCS rate was more common in subclinical hypothyroidism patients than normal pregnancy with incidence of about 22.73%. There was statistically significant difference between Mode of delivery and study population.

**Table 7:** BabyBirth Weight amongst study population

| | | Sub-clinical hypothyroidism | | Total |
|---|---|---|---|---|
| | | Present | Absent | |
| Less than 2 Kg | Count | 11 | 63 | 74 |
| | % | 14.28% | 85.72% | 100% |
| 2.1 – 3 Kg | Count | 146 | 1651 | 1797 |
| | % | 8.10% | 91.90% | 100% |
| More than 3 Kg | Count | 10 | 119 | 129 |
| | % | 7.70% | 92.30% | 100% |
| Total | Count | 160 | 1840 | 2000 |
| | % | 8% | 92% | 100.00% |

Chi Square test, P value- 0.117

As seen in the above table, low birth weight (LBW) babies was more commonly observed in patients with subclinical hypothyroidism than normal pregnancy with incidence of 14.28%. There was statistically no significant difference between baby birth weight and study population.

**Table 8:** APGAR score at 1 minute amongst study population

| | | Sub-clinical hypothyroidism | | Total |
|---|---|---|---|---|
| | | Present | Absent | |
| Less than 7 | Count | 19 | 125 | 144 |
| | % | 13.33% | 86.67% | 100% |
| More than 7 | Count | 139 | 1717 | 1856 |
| | % | 7.50% | 92.50% | 100% |
| Total | Count | 160 | 1840 | 2000 |
| | % | 8% | 92% | 100.00% |

Chi Square test , P value- 0.01

As seen in the above table, low APGAR score at 1 minute was more commonly observed in patients with subclinical hypothyroidism than normal pregnancy with incidence of 13.33%. There was statistically significant difference between APGAR score at 1 minute and study population.

**Table 9:** NICU admission amongst study population

| | | Sub-clinical hypothyroidism | | Total |
|---|---|---|---|---|
| | | Present | Absent | |
| Yes | Count | 20 | 143 | 163 |
| | % | 12.50% | 87.50% | 100% |
| No | Count | 140 | 1697 | 1837 |
| | % | 7.60% | 92.40% | 100% |
| Total | Count | 160 | 1840 | 2000 |
| | % | 8% | 92% | 100.00% |

- Chi Square test , P value- 0.036
- As seen in the above table, NICU admission was more commonly observed in patients with subclinical hypothyroidism than normal pregnancy with incidence of 12.5%. There was statistically significant difference between NICU admission and study population.

**Table 10:** IUD amongst study population

| IUD | | | Sub-clinical hypothyroidism | | Total |
|---|---|---|---|---|---|
| | | | Present | Absent | |
| | Yes | Count | 0 | 9 | 9 |
| | | % | 0% | 100% | 100% |
| | No | Count | 160 | 1831 | 1991 |
| | | % | 8.04% | 91.96% | 100% |
| Total | | Count | 160 | 1840 | 2000 |
| | | % | 8% | 92% | 100.00% |

- Chi Square test , P value- 0.375

- As seen in the above table, intrauterine death (IUD)was observed in none of patients with subclinical hypothyroidism than normal pregnancy. There was statistically no significant difference between intrauterine death (IUD)and study population.

## 5. Discussion

- Subclinical hypothyroidism is defined as a serum thyroid stimulating hormone (TSH) above the defined upper limit of the reference range, with a serum free thyroxine (T4) within the reference range1. Patients with subclinical thyroid disease have few or no symptoms or signs of thyroid dysfunction and thus by its very nature subclinical thyroid disease is a laboratory diagnosis.
- There has been a debate for a long time about the upper limit of normal TSH during pregnancy. Recent guidelines by American Thyroid Association (ATA) and the National Association of Clinical Biochemists have reduced this to 2.5 m IU / L in 1$^{st}$ trimester and 3.0m IU/L in 2nd / 3rd trimesters. This was done because it was seen that in more than 95% of rigorously screened euthyroid volunteers, the normal range was from 0.4 to 2.5m IU/L. This of course increases thedisease frequency of hypothyroidism in pregnancy up to 5-fold.[12]

In the present study, out of 2000 pregnant women included in the study, 160 women had subclinical hypothyroidism with an incidence of 8 %.

- The incidence of subclinical hypothyroidism was most commonly observed in the age group of more than 30 years (31.81% ) followed by 21 to 25 years (6.12% ) , less than 20 years (5% ) and 26 to 30 years (4.5% ) of the patients The mean age of patients was 26.85 ± 3.04 years and this difference was statistically significant.
- In the present study, pregnancy induced hypertension (PIH) was more common in subclinical hypothyroidism patients than normal pregnancy with incidence of about 6.8 %. There was statistically no significant difference between patients with PIH and study population.
- Prematurity was more common in subclinical hypothyroidism patients than normal pregnancy with incidence of about 10.52% and this differencewas statistically not significant.
- In the present study, recurrent abortion was more common in subclinical hypothyroidism patients than normal pregnancy with incidence of about 7.6 % and this differencewas statistically not significant.
- LSCS rate was more common in subclinical hypothyroidism patients than normal pregnancy with incidence of about 22.73%. There was statistically significant difference between Mode of delivery and study population
- In the present study, low birth weight (LBW) babies were more commonly observed in patients with subclinical hypothyroidism than normal pregnancy with incidence of 14.28%. There was statistically no significant difference between baby birth weight and study population..
- In the present study, low APGAR score at 1 minute was more commonly observed in patients with subclinical hypothyroidism than normal pregnancy with incidence of 13.33%. There was statistically significant difference between APGAR score at 1 minute and study population.

## 6. Conclusion

The maternal and fetal adverse outcomes were not higher as compared to other studies. Other studies have shown that adverse events do occur in pregnant women with subclinical hypothyroidism, but not in women with hypothyroidism on replacement therapy with Levothyroxine. Treatment improves outcomes and reduces the rate of complications. These findings provide evidence for the importance of identification and treatment of subclinical hypothyroidism in pregnancy.

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