

Study of Thyroid Function in Pregnancy, its Feto-Maternal Outcome; a Prospective Observational Study

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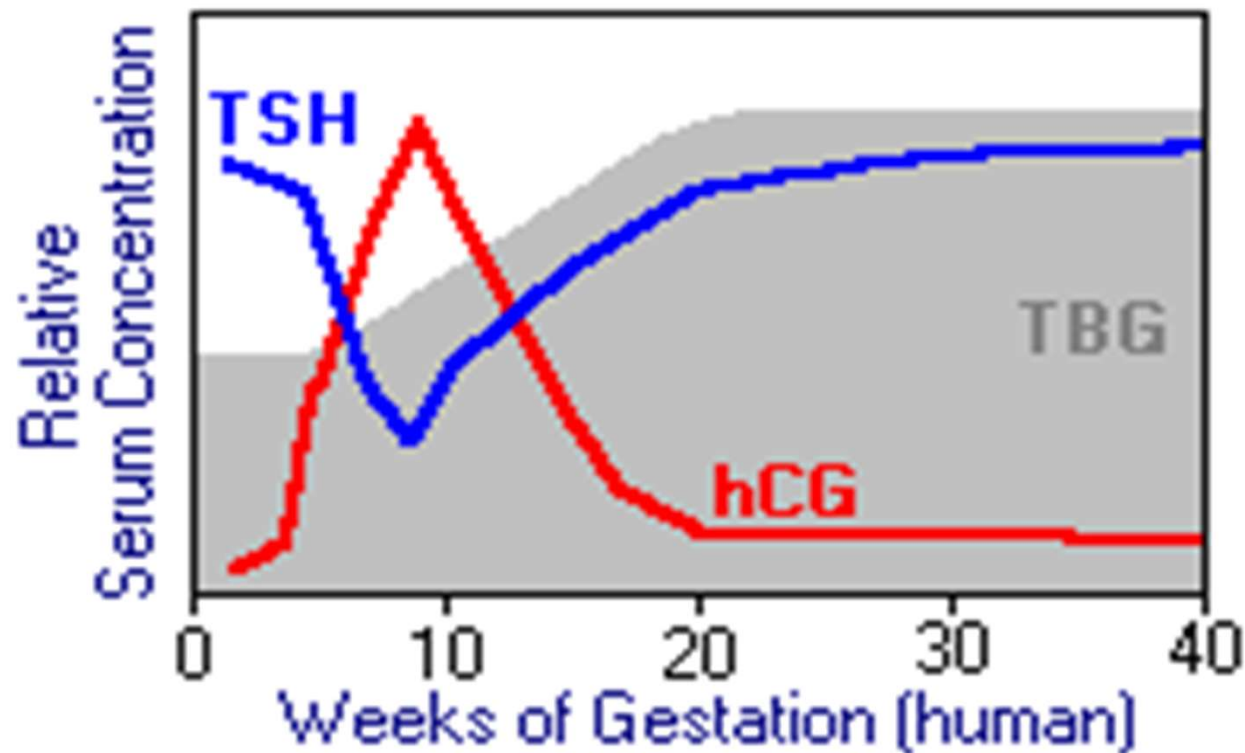
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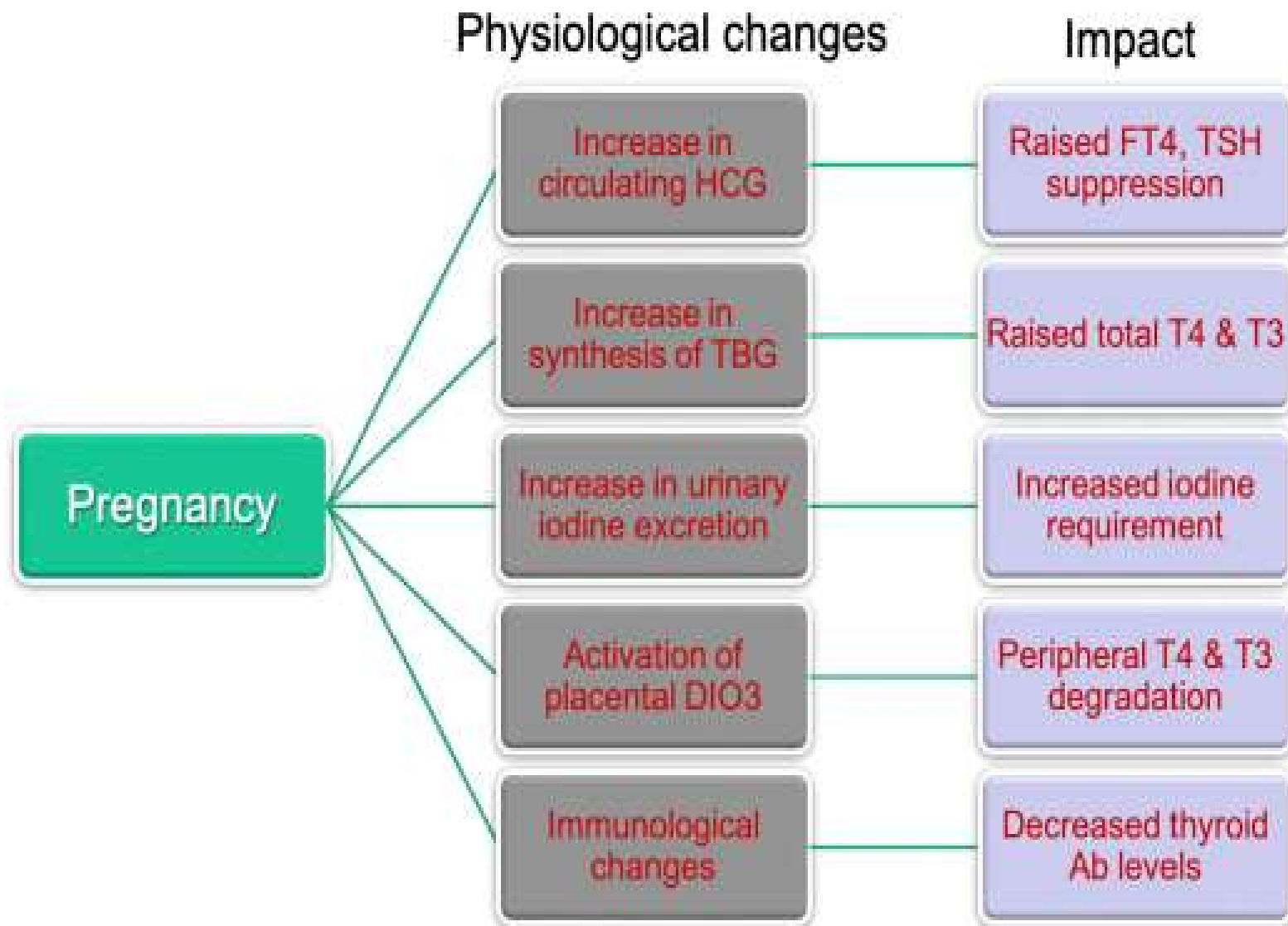
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Introduction

- Stress of pregnancy may result in clinical or sub clinical hypothyroidism in women with limited reserve[1].





Maternal complications:

- Miscarriage
- Anemia
- Preeclampsia
- Placental abruption
- Preterm delivery
- Increased rate of caesarean section
- Postpartum hemorrhage

Fetal outcomes:

- Preterm birth
- Neonatal respiratory distress syndrome
- Low birth weight (LBW)
- Increased NICU admission
- Neuropsychological and cognitive impairment

- In light of the high prevalence of thyroid disturbances in pregnancy and associated risk to mother and fetus, this study aims to determine the prevalence of thyroid disorders in pregnancy and its maternal and fetal outcomes in a tertiary care facility in Central India.

Methods

- This observational study was carried out at R. D. Gardi Medical College, Ujjain, India. Total patients 198 antenatal women in third trimester admitted into the obstetric ward with singleton pregnancy for other obstetric indications.
- Subjects were chosen irrespective of age, parity, residence and socioeconomic status.
- Women with multiple pregnancies, a known case of thyroid disorder, on any treatment or with any pre-existing medical disorder, such as diabetes mellitus, or cardiac or pulmonary disease were excluded.
- Estimation of free T3 and free T4 was subsequently carried out when TSH levels were abnormal.
- Patients with a deranged thyroid profile were subsequently assessed for maternal and fetal complications.

- Cut off values used for TSH were those indicated by **the American Pregnancy and Thyroid Association (2017)**: [2]

	TSH
1 st trimester	0.1–2.5 mIU/L
2nd trimester	0.2–3.0 mIU/L
3rd trimester	0.3 -3.0 mIU/L

- Normal fT4 and high TSH: **Subclinical hypothyroidism (SCH)**
- Low fT4 and high TSH: **Overt hypothyroidism**
- Normal fT4 and low TSH: **Subclinical hyperthyroidism**
- HighT4 and low TSH: **Overt hyperthyroidism**

Results

Table 1. Prevalence of thyroid disorders in 3rd trimester of pregnancy

Thyroid status	Prevalence	Mean TSH (mIU/L)	Mean fT4 (ng/dl)	Mean fT3 (pg/ml)
Subclinical hypothyroidism n = 11	5.6%	8.02 ± 1.25	1.09 ± 0.30	3.07 ± 0.56
Overt hypothyroidism n = 7	3.5%	11.92 ± 5.34	0.36 ± 0.24	0.81 ± 0.66
Subclinical hyperthyroidism n = 3	1.5%	0.07 ± 0.03	1.2 ± 0.10	4.1 ± 0.40

Table 2. Association of maternal and fetal risk factors in women with hypothyroidism (n = 19)

Outcome %(n)	95% CI	Odds Ratio	p value
Anaemia 26.3% (5)	1.50–15.8	4.88	0.008
Preeclampsia 15.8% (3)	1.06–19.22	4.52	0.041
Preterm 5.3% (1)	0.253–22.54	2.39	0.447
Oligohydramnios 10.5% (2)	0.034–1.15	0.19	0.072
Caesarean section 26.3% (5)	1.39–14.38	4.47	0.012
Low birth weight (LBW) 31.6% (6)	2.03–19.54	6.3	0.001
Low Apgar Score 21.1% (4)	1.04–12.70	3.64	0.042
NICU admission 42.1% (8)	0.048–0.391	0.14	0

- The risk of anemia in women with hypothyroidism is **4.8** times (95% CI = 1.5–15.8) higher than in women with euthyroidism.
- Risk of delivery of LBW babies is **6.3** times higher in women with hypothyroidism (95% CI = 2.03–19.5) than in women with euthyroidism.
- Risk of NICU admission and low Apgar score were **0.14** times (95% CI = 0.048–0.39) and **3.6** times (95% CI = 1.04–12.7) higher in babies born to women with hypothyroidism compared to those born to women with euthyroidism (Table 2).

Discussion

Prevalence:

- First trimester values are more important than 2nd and 3rd trimester. Because it has an immense role in preventing maternal complications later on, if SCH is diagnosed early.
- The observed prevalence of thyroid disorder in 3rd trimester of pregnancy in the present study is 11%, which is comparable to the prevalence observed in a study conducted by Weiwei Wang et al. (10.2%) [3] and Ajmani et al. (13.25%) [4].
- A recent review suggests that stricter criteria of TSH values with a 2.5 cut-off may be considered too low. Many women would be unnecessarily diagnosed as having SCH and may be subjected to the therapeutic burden of LT4 treatment [5].

Association of Maternal and fetal outcome with thyroid disorder

1. Anemia

- Iron deficiency causes impairment of the heme dependent enzyme thyroid peroxidase, thereby limiting synthesis of thyroid hormones [6].
- In the present study, anemia was observed in 26.3% of women with hypothyroidism while other authors have observed occurrence of anemia in 4.2% of women with hypothyroidism [7] and in another study, it was as high as 60% [8].

2. Pre-eclampsia

- Hypothyroidism causes vascular smooth muscle contraction both in systemic and renal vessels, which leads to increased diastolic pressure, peripheral vascular resistance, and decreased tissue perfusion, which could be the pathophysiology of preeclampsia in hypothyroidism [9,10].

- In the present study, pre-eclampsia was observed in 15.8% of women with hypothyroidism. These results are comparable to those of other studies, in which preeclampsia was observed in 13.6% women with SCH and 14.7 in overt hypothyroidism [11, 12]

3. Cesarean section

- Increased rate of cesarean delivery is another outcome, observed in 26.7% ($p = 0.012$) of women with hypothyroidism. Other authors have reported rates of cesarean delivery of 22.9% in women with hypothyroidism [12]. The reason for the increased risk of cesarean delivery may be due to the associated pregnancy complications, such as hypertensive disorders.

4. Fetal outcomes

- Low birth weight is associated with hypothyroidism due to its association with preeclampsia. Reduced fetal thyroxine may cause disruption to the development of the pituitary-thyroid axis of the newborn and fetal pituitary growth hormone secretion [13-15].
- In this study LBW was observed in 31.6% of women with hypothyroidism, as compared to 20% observed in another study [16].
- NICU admission in thyroid dysfunction was 42.1%, which is similar to the rates of 46.6 and 42% [17, 16].
- Low Apgar scores occurred in 21.1% of babies born to women with hypothyroidism, compared to 20% observed in another study [11].

Conclusion

- Considering the results, we feel that estimation and diagnosis of thyroid parameters has high clinical relevance. However, there is an ongoing debate regarding cost-effectiveness of universal vs. targeted screening in pregnant women. Current recommendations suggest targeted TSH screening for women at high risk for thyroid disease before or during early pregnancy.
- This study concludes that there is a high prevalence of thyroid dysfunction in pregnancy **(11%)** in Central India, with the majority of women being subclinical hypothyroidism.
- Association of maternal anemia, preeclampsia, increased cesarean delivery, presence of LBW babies, low Apgar score and increased number of NICU admission; is a major finding of this study.

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