A Study on Thyroid Function in Pregnancy in a Medical College of Odisha

Authors
Dr Poonam Mehta¹, Dr Jyostnarani Patnaik²
¹PG Student, ²Professor & Head
Dept. of Physiology, Hi-Tech Medical College & Hospital, Bhubaneswar, Odisha

ABSTRACT
Aim: The aim of this study was to assess the thyroid function among pregnant women in a Medical College Hospital of Odisha.

Methods: A total of 200 healthy, pregnant women within the age of 18-32 years appearing at Gynecology & Obstetrics OPD, Ante-natal clinic and also from indoor wards of Hi-Tech Medical College & Hospital, Odisha were included in this study. Women, who were diagnosed or treated for thyroid dysfunction, aged less than 18 years or more than 32 years, having other endocrinopathies like Diabetes Mellitus, with eclampsia or Pre-eclampsia, with any other pre-existing medical disorders complicating pregnancy, multiple pregnancy, gestational diabetes mellitus were excluded from the study. Serum samples were assayed for TSH, FT₄ and FT₃ levels using ADVIA Centaur® CP Immunoassay System. The TSH value > 4.5 MIU/Lit was considered to be elevated above the normal limit and was regarded as hypothyroidism.

Results: 24% of all pregnant women participating in this study had hypothyroidism and majority (83.33%) of these hypothyroid women had sub-clinical hypothyroidism.

Conclusion: This study concludes that there is a high prevalence of hypothyroidism, majority being subclinical in pregnant women from India. Hence universal screening of hypothyroidism may be desirable in our country.

INTRODUCTION
Pregnancy is associated with significant but reversible changes in thyroid function. Thyroid disorders such as chronic thyroiditis, hypothyroidism, Graves' disease etc. are relatively common in pregnant women. Uncontrolled hyperthyroidism and hypothyroidism are associated with serious maternal, fetal, and neonatal morbidity, and mortality. The aim of this study was to assess the maternal thyroid function among pregnant women in a Medical College Hospital of Odisha.

METHODS
The present study was a prospective cross-sectional study conducted in the time period from September 2013 to August 2015. The target population was the pregnant women from Gynecology & Obstetrics OPD, ante-natal clinic and indoor wards of Hi-Tech Medical College & Hospital, Odisha. A total of 200 healthy, pregnant women within the age of 18-32 years appearing at Gynae & Obstetrics OPD, Ante-natal clinic and also from indoor wards of Hi-Tech Medical College & Hospital, Odisha were included in this study.
study. Women, who were diagnosed or treated for thyroid dysfunction, aged less than 18 years or more than 32 years, having other endocrinopathies like Diabetes Mellitus, with eclampsia or Pre-eclampsia, with any other pre-existing medical disorders complicating pregnancy, multiple pregnancy, gestational diabetes mellitus were excluded from the study.

Personal data (e.g. age, address), number of miscarriages, number of pregnancies, thyroid problems, H/O medication were taken. 5 ml venous blood sample was collected from 200 pregnant women Blood samples were collected from each individual in the early morning in one EDTA containing vial and one plain vacutainer tube. Serum was separated from whole blood for all specimens in vacutainer using fine centrifugation at 3000 rpm for 15 min. Serum samples were sent to the lab within 2 hours of collection, for analysis. Serum samples were assayed for TSH, FT$_4$ and FT$_3$ levels in Hi-tech Medical College Central Lab. The ADVIA Centaur® CP Immunoassay System was used for estimation of TSH, FT$_4$, FT$_3$.

**RESULTS**

The results were as follows:

60 women (30%) were in the age group of 18-20 years, 64 women (32%) were in the age group of 21-23 years, 32 women (16%) were in the age group of 24-26 years, 28 women (14%) were in the age group of 27-29 years and rest 16 women (8%) were in the age group of 30-32 years. (Table 1)

Among 200 pregnant women, 160 (80%) were in first trimester. 28 women (14%) were in second trimester and rest 12 women (6%) were in the third trimester. (Table 2)

The TSH value > 4.5 MIU/Lit was considered to be elevated above the normal limit and was regarded as hypothyroidism. The values in between 0.5 - 4.5 MIU/Lit was considered as normal euthyroid state and TSH value < 0.5 MIU/Lit was considered to be lower than normal was regarded as hyperthyroid state. Among 200 women, 48 (24%) had their TSH value > 4.5 MIU/Lit and thus considered as hypothyroid. 148 (74%) women had normal TSH level and rest 4(2%) women had their TSH level lower than lower limit of normal reference range.(Table 3 & Chart 1)

Out of these 48 hypothyroid pregnant women (with TSH > 4.5 MIU/Lit), 40 had normal free T4 level (0.7 – 1.9 ng/ml). They were considered as subclinical hypothyroid. Rest 8 hypothyroid women had free T4 level lower than lower limit of normal range (< 0.7 ng/ml). Therefore, they were considered as overt hypothyroid.(Table 4 & Chart 2)

Free T4 level was within normal range (0.7 – 1.9 ng/ml) in 188 pregnant women (94%) out of 200. 8 women (4%) had FT4 level less than 0.7 ng/ml and rest 4 women (2%) had FT4 level higher than 1.9 ng/ml. The mean (SD) FT4 was 1.19 ± 0.84 ng/ml. (Table 5)

Free T3 level was within normal range (2 – 4.4 pg/ml) in 184 pregnant women (92%) out of 200. 12 women (6%) had FT3 level less than 2 pg/ml and rest 4 women (2%) had FT3 level higher than 4.4 pg/ml. The mean (SD) FT3 was 3.12 ± 0.92 pg/ml. (Table 6)

| Table 1: Distribution of age groups in pregnant women |
| --- |
| **Age Group** | 18-20 yrs | 21-23 yrs | 24-26 yrs | 27-29 yrs | 30-32 yrs |
| **Number (%)** | 60 (30%) | 64 (32%) | 32 (16%) | 28 (14%) | 16 (8%) |

| Table 2: Trimester wise distribution of pregnant women |
| --- |
| **Trimester** | First Trimester | Second Trimester | Third Trimester |
| **Number (%)** | 160 (80%) | 28 (14%) | 12 (6%) |
Table 3: Distribution of TSH level in pregnant women

| TSH Level (MIU/Lit) | Number (%) |
|---------------------|------------|
| > 4.5 MIU/Lit       | 48 (24%)   |
| 0.5 - 4.5 MIU/Lit   | 148 (74%)  |
| < 0.5 MIU/Lit       | 4 (2%)     |

Table 4: Distribution of subclinical & overt hypothyroidism in hypothyroid pregnant women

| Hypothyroid Status                     | Number (%) |
|----------------------------------------|------------|
| Total Hypothyroid (TSH > 4.5 MIU/Lit)  | 48 (100%)  |
| Subclinical Hypothyroid (Higher TSH, Normal Free T4 level) | 40 (83%)  |
| Overt Hypothyroid (Higher TSH, lower Free T4 level) | 8 (17%)  |

Table 5: Distribution of free T4 level in pregnant women

| FT4 Level | Number (%) |
|-----------|------------|
| <0.7 ng/ml | 8 (4%)     |
| 0.7-1.9 ng/ml | 188 (94%)  |
| >1.9 ng/ml | 4 (2%)     |
Table 6: Distribution of free T3 level in pregnant women

| FT3 Level | <2 pg/ml | 2 – 4.4 pg/ml | >4.4 pg/ml |
|-----------|----------|---------------|-----------|
| Number (%)| 12 (6%)  | 184 (92%)     | 4 (2%)    |

DISCUSSION
There are lot of debates regarding the normal upper limit of TSH in pregnancy. Recent guidelines proposed by the ATA and National Association of Clinical Biochemistry have stated that it is likely that in the future the upper limit of the serum TSH euthyroid reference range will be reduced to 2.5 IU/L for all adults\(^1\). However, the American Association of Clinical Endocrinologists & The Endocrine Society consensus panel recommends that 4.5 IU/L be maintained as the upper limit of normal. The reason is that although persons within the range of 2.6–4.5 mIU/L may have subclinical thyroid disease, there is a lack of evidence of adverse outcome in this group.\(^2\)

Mild maternal hypothyroidism (subclinical hypothyroidism) has been implicated as the cause of neuro-psychointellectual deficit in offspring\(^3,4\). Accurate reference intervals in early pregnancy would make it possible to better define this condition. In cases of overt hypothyroidism the fetal consequences can be extreme \(^5\). However, it appears that the maternal level and delivery of FT4 and not T3 to the fetus is critical for the neuropsychological development of the fetus \(^6\).

CONCLUSION
The present study was aimed to evaluate thyroid function during pregnancy. The major findings were that 24% pregnant women attending a Medical College hospital in Odisha have hypothyroidism and majority (83.33%) of these women have sub-clinical hypothyroidism. This study concludes that there is a high prevalence of hypothyroidism, majority being subclinical in pregnant women from India. Hence universal screening of hypothyroidism may be desirable in our country.

REFERENCES
1. Laboratory medicine practice guidelines. Laboratory support for the diagnosis and monitoring of thyroid disease. Guidelines Committee, National Academy of Clinical Biochemistry Thyroid. 2003 Jan; 13(1):3-126.
2. Surks MI, Ortiz E, Daniels GH, Sawin CT, Col NF, Cobin RH, et al. Subclinical thyroid disease: Scientific review and guidelines for diagnosis and management. JAMA. 2004;291:228–38.
3. Glinoer D, Delange, F. (2000). The potential repercussions of maternal, fetal, and neonatal hypothyroxinemia on the progeny. Thyroid. 10:871–887.
4. Haddow J. E, Palomaki G. E, Allan W. C, Williams J. R, Knight G, Gagnon, J, O’Heir C. E, Mitchell M. L, Hermos R. J, Waisbren S. E, Faix J. D, Klein R. Z. (1999). Maternal thyroid deficiency during pregnancy and subsequent neuropsychological development of the child. New England Journal of Medicine, 341:549–555. 73
5. Delange, F. (2000) The role of iodine in brain development. Proceeding of the Nutrition Society 59:75–79.
6. Morreale de Escobar G, JesúsObregón M, Escobar del Rey F. (2000). Is neuropsychological development related to maternal hypothyroidism or to maternal hypothyroxinemia? Journal of Clinic Endocrinology Metabolism, 85:3975–3987.
CORRESPONDING AUTHOR

Dr. Poonam Mehta, Final Year PG Student, 
Department of Physiology, Hi-Tech Medical 
College & Hospital, Bhubaneswar, Odisha, India 
Email: poonam7201@yahoo.co.in 
Mob: +91-9431348151