Prevalence of Subclinical and Overt Hypothyroidism in Antenatal Women: A Study From Tertiary Care Center in North India


Department of Pathology, VMMC and Safdarjung Hospital, New Delhi

Keywords: Hypothyroidism, Subclinical Hypothyroidism, Overt Hypothyroidism, Pregnancy

ABSTRACT

Introduction: Thyroid hormones play a critical role in fetal neurodevelopment in pregnancy and postnatal life. Hypothyroidism (HT) is common in pregnancy and is associated with several adverse and fetal outcome. The benefits of treating overt HT during pregnancy include improved obstetric and neonatal outcomes.

Methods: This cross-sectional study included 2492 pregnant women. The serum TSH were measured by ELISA and patient with 0.1-4.5 mIU/L were considered as normal, while patient with serum TSH of greater than 4.5 mIU/L to 10 mIU/L with normal fT4 were considered to be subclinical HT, patient with serum TSH >10 mIU/L were categorized as overt HT.

Results: Out of total cases, 78.25% cases were found to have normal TSH while 15.56% cases were found to have SHT and 3.41% cases were affected with overt HT.

Discussion: Pregnancy involves several physiological changes that affect maternal thyroid function and thyroid hormone levels. HT in pregnancy is associated with increased risk of adverse pregnancy and fetal outcomes that can be ameliorated by adequate levo-thyroxine therapy. This study showed prevalence of subclinical hypothyroidism (SCH) to be 15%, while 3.4% antenatal women were found to have overt HT.

Conclusion: Timely management of HT and SCH is required to achieve a successful pregnancy outcome and serum TSH level is a simple and reliable indicator of thyroid status in pregnancy.

*Corresponding author:
Dr Arti Khatri, H No. 5, Village Shahpur Garhi, Narela
Phone: +91 9871322982
Introduction
Thyroid hormones play a critical role in fetal neurodevelopment during pregnancy and in postnatal life. Fetus is totally dependent on maternal thyroid hormones for initial 16 weeks which is a critical period for fetal neurodevelopment, marking the importance of normal maternal thyroid status as a critical factor for development and maturation of fetus. Hypothyroidism (HT) is common in pregnancy, especially in developing countries like India. Hypothyroidism during pregnancy is associated with several adverse and fetal outcome. The benefits of treating overt HT during pregnancy include improved obstetric and neonatal outcomes. This study try to find out the regional prevalence of subclinical and overt HT in pregnant females in a tertiary care center using serum TSH levels.

Materials and Methods
This cross-sectional study included 2492 pregnant women (age 18-45, mean 26.5 years) who came to Obstetrics and Gynaecology laboratory, Safdarjung hospital from Oct 2015 to Jan 2016. Antenatal patients with viable pregnancy and no previous history of any thyroid disorders were included in the study. For serum TSH measurement, venipuncture was performed after an overnight fast, between 8 and 11:30 a.m. in the morning. 5 mL blood sample was collected in serum separator tubes with yellow top (Becton, Dickinson and Company, Franklin Lakes, NJ, USA) at their first antenatal visit. Following centrifugation at 4000 g for 10 min, serum samples were separated and analyzed immediately. The serum levels of thyroid stimulating hormone (TSH) were measured by solid phase sandwich enzyme linked immunoassay method [Calibiotech, Inc. (CBI) TSH Streptavidin ELISA Kit]. In this study we have taken normal upper limit of TSH as 4.5 mIU/L. The patient with serum TSH >10 mIU/L were categorized as overt HT.

Result
Out of a total of 2492 subjects, 1950 (78.25%) cases were found to have normal TSH level between 0.1-4.5 mIU/L, 388 (15.56%) cases were found to have subclinical HT with serum TSH value between 4.5-10 mIU/L and 85 (3.41%) cases with serum TSH value greater than 10 mIU/L (Fig 1). In this study TSH value greater than 4.5 mIU/L was taken as criteria of HT irrespective of the gestational age. Reduced levels of serum TSH were also found in the study with 69 (2.76%) cases having serum TSH less than 0.1 mIU/L.

Discussion
This cross sectional study involved a total of 2492 antenatal cases in which serum TSH was measured and prevalence of HT studied. Several physiological changes occur during pregnancy that affects maternal thyroid function and thyroid hormone levels. Human chorionic gonadotropin (hCG) is structurally similar to TSH, and has a direct stimulating effect on the thyroid gland through TSH receptor. The thyrotrophic effect of hCG causes increased thyroid hormone production resulting in a transient increase in free thyroxine (FT4) towards the end of the first trimester.

There has been a debate regarding normal upper limit of TSH in pregnancy. Recent guidelines proposed by the ATA and National Association of Clinical biochemistry have stated, it is likely that in the future the upper limit of the serum TSH euthyroid reference range will be reduced to 2.5 mIU/L for all adults, since more than 95% of rigorously screened normal euthyroid volunteers have serum TSH values between 4.5 and 2.5 mIU/L. However, the American Association of Clinical Endocrinologists and the Endocrine Society consensus panel continued to recommend that 4.5 mIU/L should be the upper limit of normal, although some individuals with TSH values between 2.6-4.5 mIU/L may have subclinical thyroid disease but there is lack of adverse outcome in this group. So, in this study we have taken upper limit of normal TSH as 4.5 mIU/L. Overt hypothyroidism is diagnosed with a high serum thyroid stimulating hormone (TSH) concentration in conjunction with a low serum thyroxine concentration or an isolated TSH concentration of above 10 mIU/L. Subclinical hypothyroidism is a biochemical diagnosis based on a high TSH concentration with normal thyroxine.
effects of maternal HT were found to be ameliorated by adequate levo-thyroxine therapy,12 emphasizing further the importance of early detection and treatment of SCH and HT. Haddow and colleagues reported that children of women whose TSH were increased during pregnancy had a slight but significant reduction in intelligent quotient scores between 7 and 9 years of age when compared with infants of euthyroid women.13

Overt HT diagnosed during pregnancy should be corrected as rapidly as possible by correcting thyroid status of the patient. T4 dosage should be titrated rapidly to reach and thereafter maintain serum TSH concentrations of less than 2.5 mIU/liter (in an assay using the International Standard) in the first trimester (or 3 mIU/liter in second and third trimesters) or to trimester specific TSH ranges. Thyroid function tests should be again measured within 30 – 40 days and then every 4 – 6th week.14

This study showed prevalence of SHT to be 15%, while 3.4 % antenatal women were found to have overt HT. Other studies found the prevalence of SHT and overt HT to be 2-3% and 0.3-0.5% respectively in west.15 The prevalence of hypothyroidism in India varies from 4.8% to 11% as observed from few studies.16,17 While overt hypothyroidism requires active management, SCH treatment is still controversial with Endocrine Society guidelines recommending levothyroxine therapy in all women with SCH while American Thyroid Association guidelines recommend treating women with SCH who are TPO-Ab positive and women with SCH with a TSH above 10 mIU/liter, irrespective of thyroid antibody status, due to lack of evidence to show treating SCH with TSH below 10 mIU/liter would be useful.18 Final aim of treatment of hypothyroidism is to achieve a successful pregnancy outcome and serum TSH level is accepted as an accurate indicator of thyroid status in pregnancy.

Conclusion
Subclinical and overt hypothyroidism has high prevalence in this study when compared to previous studies. As fetal brain needs adequate thyroxine for the neuronal development, all antenatal women with HT should be treated with thyroxine to prevent IQ decrement. Furthermore regional studies are required for screening of HT in antenatal women for effective intervention to prevent detrimental effects of HT on fetus and mother.

Acknowledgements
None

Funding
None

Competing Interests
Not Declared

References
7. Surks MI, Ortiz E, Daniels GH, et al. Subclinical thyroid disease: Scientific review and guidelines for diagnosis and management. JAMA 2004;291:228-38.


