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Research Article

Screening for Thyroid Function During First Trimester of Pregnancy- Should it Be Made Mandatory

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Abstract: Our study was an outpatient department (OPD) based cross sectional study. During the study period, 500 antenatal cases were screened for thyroid function at their first trimester between the age group of 18 to 35 years. Serum thyroid-stimulating hormone , FT3, FT4 estimation was done by the Chemiluminescence assay method. We have followed the recent Endocrine Society guidelines for thyroid dysfunction. Our study emphasizes the need of universal screening of thyroid function during first trimester of pregnancy by screening the antenatal cases in their first trimester .We also calculated the prevalence of thyroid disorder. The overall prevalence of thyroid disorder was found to be 49.20%. Out of 500 pregnant lady 213 (42.60% %) was suffering from subclinical hypothyroidism with mean TSH level 3.924 ±1.06mIU/ml, and 21(4.2 %) were suffering from overt hypothyroidism with mean TSH 7.325 ± 0.968mIU/ml. 9 cases were suffering from subclinical hyperthyroidism with mean TSH 0.042±0.026 and only 3 cases were suffering from overt hyperthyroidism. Rest 254 50.8%) were euthyroid with mean TSH level 1.5±0.48mIU/ml. The mean age of the study population was 25.07 ± 4.33 years. In our study we found that 46.8 % pregnant women in first trimester was suffering from hypothyroidsm .Thyroid disorders are common in pregnancy, and the most common disorder is subclinical hypothyroidism. Even though universal TSH screening is not yet recommended ,it should be considered in view of results shown by different studies and our study.
Keywords: Thyroid-stimulating hormone, Pregnancy, Hypothyroidism, Hyperthyroidism , FT3 ,FT4

INTRODUCTION

Pregnancy is a physiological state, associated with significant, but reversible changes in thyroid function[1]. Thyroid dysfunction during pregnancy is deleterious to both mother and child. Untreated hypothyroidism in pregnancy has consistently been shown to be associated with an increased risk for adverse pregnancy complications, as well as detrimental effects on fetal neurocognitive development[2]. Children born to untreated or undertreated mothers have profound effect on future intellectual development[3]. The foetal thyroid gland reaches maturity close to the end of the first trimester i.e. by the 11th - 12th week, but begins to secrete thyroid hormones around the 16th week. During this period, an adequate supply of maternal thyroid hormones must be sustained to ensure normal neurological development of the foetus[4]. About 2 - 4% women suffer subclinical or overt hypothyroidism. Hyperthyroidism is much less common than hypothyroidism. Despite the prevalence and risk associated with thyroid disease, controversy regarding universal versus high risk screening strategies remains. The American Thyroid Association (ATA) guidelines recommended screening of high risk patients only for thyroid disease in pregnancy[5]. However, according to the Endocrine Society guidelines in 2012, some members advocated for thyroid stimulating hormone (TSH) testing of all women during the first trimester of pregnancy[6].

Therefore, the present study was carried out to study the prevalence of undetected thyroid dysfunction during the first trimester of pregnancy and to emphasize the need of universal screening of thyroid function during first trimester of pregnancy.

MATERIALS AND METHODS:

The study was an outpatient department (OPD) based cross sectional study. 500 pregnant lady in first trimester between the age group of 18 to 35 years who were attending the Ante natal OPD of Gauhati Medical College are included in the study.

Known cases of thyroid disorders and other medical disorders and women who did not give consent for TSH estimation were excluded from the study.

Clearance from ethical committee is also taken. Detailed history was enquired, participants were subjected to relevant general physical examination and findings were recorded on a predesigned proforma.

From the participants under aseptic conditions 3 mL blood was sampled and analyzed for thyroid function tests, which included FT3, FT4, TSH. Estimation for FT3, FT4 and TSH was done using the electrochemiluminescence technique using VITROS immunodiagnostic system and immulite 1000 in Boichemistry Laboratory and Metabolic laboratory of Endocrinology respectively.

Intra-assay coefficients of variation for FT3, FT4, TSH and anti-TPO were 3.8%, 3.30% and 5.7% respectively. Laboratory reference range for FT3, FT4 and TSH were 2.77–5.27 pg/mL, 0.89–1.76 ng/dL and 0.4–4.0 mIU/L, respectively.

Trimester specific cut-off values for TSH, that is, 0.1–2.5 mIU/L in first trimester of pregnancy were used to diagnose hypothyroidism and hyperthyroidism. Women with FT3, FT4 below the reference range along with elevated TSH were classified as having overt hypothyroidism while those having FT3, FT4 in normal range with TSH more than 2.5 mIU/L were diagnosed as having SCH. Women with FT3, FT4 above the reference range along with TSH value <0.1 mIU/L were classified as having overt hyperthyroidism while those having FT3, FT4 in normal range with TSH <0.1 mIU/L were diagnosed as having sub-clinical hyperthyroidism.

RESULTS

A total of 500 women were enrolled for this study. Mean maternal age was 25.07 ± 4.33 years. 59.4% of the pregnant women enrolled in the study were primigravida and 40.6% were multigravida . The median FT3, FT4, and TSH were 3.2 pg/mL, 1.25ng/dL, and 1.45 mIU/L respectively.

Table-1: Prevalence of Thyroid Disorders in 500 women screened

Type of Thyroid Disorder	No. of Cases	Prevalence
Subclinical Hypothyroidism	213	42.60%
Subclinical Hyperthyroidism	9	1.80%
Overt Hypothyroidism	21	4.20%
Overt Hyperthyroidism	3	0.60%

In our study out of 500 women, serum TSH level was normal in 50.80% women. We observed subclinical hypothyroidism in 213(42.6%) cases ,which is significantly high. In our study 21(4.20%) women had overt hypothyroidism. Subclinical hyperthyroidism was detected in 9(1.80%)of cases. In our study we found only 3(0.60%) cases of overt hyperthyroidism , which is very less.

Table-2: Showing spontaneous abortion in thyroid disorders

	No. of cases		Percentage		
Euthyroid (n=254)	21		9.01%		
Subclinical Hypothyroidism (n=213)	55	75	25.8%	30.48%	*P* – value <0.001
Subclinical Hyperthyroidism (n=09)	02		22.22%		
Overt Hypothyroidism (n=21)	16		76.19%		
Overt Hyperthyroidism (n=03)	02		66.66%		
Total	96		19.2%		

In the euthyroid women 9.01% had history of previous spontaneous abortion. In women with thyroid disorders 30.48 had history of previous spontaneous abortion. In our study we obsereved that overt hypothyroidism and overt hyperthyroidism both were prone to have miscarriages which were significantly high (76.19%,66.66%) respectively .There is a statistically significant increase in pregnancy loss in thyroid disorders as compared to the normal cases, with a *p*-value of <0.001.

DISCUSSION

Overt hypothyroidism is regarded as a major risk factor for complications of pregnancy and neurocognitive deficits in the developing fetus[7,8]. In recent years, there is mounting evidence demonstrating that even subclinical hypothyroidism can produce deficits similar to overt hypothyroidism. In children (7–9 years) born to women hypothyroid during pregnancy, there is a seven point deficit in intelligence quotient

(IQ) score and delays in motor, language, and attention[9].Uncontrolled thyrotoxicosis during pregnancy is associated with miscarriage, pregnancy-induced hypertension, premature birth, low birth weight, fetal growth restriction, still birth, thyroid crisis, and congestive heart failure[10-12]. Therefore, early diagnosis of thyroid dysfunction during pregnancy and onset of rational therapy can alleviate the adverse outcomes of pregnancy.

There has been a debate for a long time regarding upper limit of TSH in first trimester pregnancy. Recent guidelines proposed by the American Thyroid Association and National Association of Clinical Biochemistry have stated that the upper limit of the serum TSH euthyroid reference range should be reduced to 2.5 mIU/L, because more than 95% of rigorously screened normal euthyroid volunteers have serum TSH values between 0.4 and 2.5 mIU/L[13]. The recent Endocrine Society guidelines for thyroid dysfunction in pregnancy published in 2012 have again lowered the upper limit of reference range for normal TSH and suggested 0.1–2.5 mIU/L as the normal range for TSH values in the first trimester[14]. Using these recent trimester specific cut-offs for the diagnosis in the present study, we found a high prevalence (42.6%, 213/500) of SCH in first trimester pregnant women in contrast to various other studies from different parts of India where a higher cut-off using nonpregnant kit reference values had been used.

There is ongoing, widespread controversy regarding the necessity of universal screening of thyroid function in pregnant women. Majority of the developed countries have national neonatal screening program but the question whether to screen all pregnant women for hypothyroidism is still not resolved. American Thyroid Association in its recently published guidelines have stated against universal screening of pregnant women for hypothyroidism[5]. But Indian Thyroid Society (ITS) guidelines clearly recommend that "all pregnant women should be screened at 1st antenatal visit by measuring TSH levels", and highlight that "ideally screening should be carried out during prepregnancy evaluation or as soon as pregnancy is confirmed"[15]. Vaidya *et al* in their study found that 30% of hypothyroid women would not have been identified using the case-finding approach[16]. Dave *et al* also in their study suggested that without adopting universal screening a large number of women with thyroid dysfunction will be missed[17].

CONCLUSION

In our study we found that 49.20% pregnant women in first trimester was suffering from thyroid disorder. Out of this 42.60% was suffering from subclinical hypothyroidism. Thyroid disorders are common in pregnancy, and the most common disorder is subclinical hypothyroidism. Considering the immense impact that maternal thyroid dysfunction has on maternal and fetal outcomes, prompt identification of thyroid dysfunction and timely initiation of treatment is essential. Thus, universal screening of pregnant women for thyroid dysfunction should be considered especially in a country like India due to the high prevalence of undiagnosed thyroid dysfunction.

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