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Original Research Article

Prevalence of thyroid disorders in first trimester of pregnancy

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ABSTRACT

Background: More recently there has been growing concern that more marginal degrees of thyroid dysfunction particularly subclinical hypothyroidism (elevated TSH and normal T4 concentration) and isolated hypothyroxinemia (normal TSH and low T4) are associated with fetal loss, prematurity and impaired offspring cognitive function and potential risk for fetal loss. Thus, it would seem logical to systematically screen pregnant woman for thyroid disorders. This study focuses specifically on thyroid screening in first trimester of pregnancy.
Methods: This is a prospective cross-sectional study over 18 months (December 2020 to June 2022) in 300 patients attending the department of obstetrics and gynecology of teaching hospital attached to Khaja Bandanawaz Institute of Medical Sciences (KBNIMS), KBN University, Gulbarga for antenatal check-up during first trimester of pregnancy.
Results: As per our study prevalence of thyroid disorder 14%, subclinical hyperthyroidism 3.67% and subclinical hypothyroidism 10.33%.
Conclusions: According to data of our study, it is very ideal to subject all pregnant women for thyroid screening in first trimester with special emphasis to pregnant women in extremes of age, extremes of BMI, bad obstetric history and adverse outcome in previous pregnancy as it shows significant relationship with risk of having thyroid abnormalities.

Keywords: Thyroid dysfunction, Hypothyroidism, Hypothyroxinemia, Screening, Trimester

INTRODUCTION

Thyroid disorders are particularly common in women of reproductive age, thyroid dysfunction is frequently encountered during pregnancy, sometimes as a new diagnosis.[1,2] Thyroid hormones are essential for maintaining pregnancy and optimal fetal development.[3,4] It is well-established that overt thyroid disease is associated with adverse obstetric and offspring neuro-developmental outcomes.[3,5] More recently there has been growing concern that more marginal degrees of thyroid dysfunction particularly subclinical hypothyroidism (elevated TSH and normal T4 concentration) and isolated hypothyroxinemia (normal TSH and low T4) are also associated with fetal loss, prematurity and impaired offspring cognitive function.[6,7] In some studies, maternal thyroid autoimmunity has also been identified as a potential risk for fetal loss.

Maternal complications of untreated hypothyroidism include microcytic anemia, preeclampsia, placental abruption, postpartum hemorrhage, cardiac dysfunction and miscarriage.[9,10]

Pregnancy is accompanied by profound alterations in thyroidal economy resulting from a complex combination of factors specific for the pregnancy state such as rise in thyroxine binding globulin (TBG) concentration, effects of human chorionic gonadotrophin (hCG) on the maternal thyroid, alterations in the requirement for iodine, modifications in autoimmune regulation and the role of placenta in deiodination of iodothyronines.[11]

The prevalence of hypothyroidism is about 2% in iodine sufficient areas while overt and subclinical thyrotoxicosis occur in 0.2 and 2.5% of pregnancies, respectively.[9] Such thyroid disorders are frequently asymptomatic or difficult to distinguish from the features of normal pregnancy on clinical grounds alone. Thus, it would seem logical to systematically screen pregnant woman for thyroid disorders. However, such a screening strategy is likely to predominantly identify women with subclinical thyroid disease.[12]

This study focuses specifically on thyroid screening in first trimester of pregnancy.[9,10] The fetal thyroid cannot concentrate iodine until 10-12 weeks of gestation. Therefore, before this time, the mother must provide for all the fetus' thyroxine (T4) requirements.

Aims and objectives

Aims and objectives of the study were: to find out the prevalence of subclinical hypothyroidism and sub clinical hyperthyroidism in 1st trimester of pregnant women during their 1st antenatal visit; and with the evidence provided by these results, we want to determine if thyroid screening should made as a routine screening in pregnancy.

METHODS

Method of collection of data

Study design

This is a prospective cross-sectional study.

Study duration

The duration of the study was for 18 months (December 2020 to June 2022).

Sample size

The sample size was 300.

Source of data

Patients attending the department of obstetrics and gynecology of teaching hospital attached to Khaja Bandanawaz Institute of Medical Sciences (KBNIMS), KBN University, Gulbarga who came for antenatal check-up during first trimester trimester (upto 14 weeks).

Study protocol

After obtaining the informed consent, all patients coming to outpatient department (OPD) in first trimester of pregnancy for regular antenatal visits were randomly selected for the study. Following details of the patient noted: routine antenatal history taking, examination, general physical examination, height, weight, body mass index, systematic and per abdominal examination. Investigations: routine antenatal investigations (blood group and Rh typing, Hb%, urine routine), TSH, and FT4. Random blood samples (irrespective of fasting status) were collected from patients.

Statistical analysis

Chi-square test and proportion test was used in statistical analysis.

Laboratory values in the present set-up- TSH: 0.34 to 5.6 μIU/ml, fT3: 0.87 to 1.78 ng/ml, and fT4: 6.09 to 12.23 μg/dl

Trimester specific TSH cut off levels in pregnancy {Indian thyroid society (ITS) recommendation}- 1st trimester: 2.50 mIU/ml, 2nd trimester: 3 mIU/m, and 3rd trimester: 3 mIU/ml.[13]

Total FT4: 6.09 to 12.23 μg/dl (1.5-fold is taken as normal in pregnancy.)

Hypothyroidism is defined as an increased TSH level in serum.

Subclinical hypothyroidism is defined as: elevated TSH and normal fT4 levels (but less than 10 mIU)

Overt hypothyroidism is defined as: TSH >10 mIU and low fT4 levels.

Isolated hypothyroxinemia is defined as: normal TSH and low T4.

Hyperthyroidism is defined as: increased thyroid hormone production due to an overactive thyroid gland.

Inclusion criteria

All healthy pregnant Women in 1st trimester (upto 14 weeks) during their 1st antenatal visit with singleton pregnancy.

Exclusion criteria

Multifetal gestation, women with known thyroid and metabolic disorders like diabetes, collagen disease, hypertension and heart disease, women with already diagnosed as hyperthyroidism and hypothyroidism, with unreliable LMP details.

RESULTS

Table 1 shows that, out of 300 sample cases 258 (86.0%) of cases were diagnosed normal, 31 (10.3%) of cases were subclinical hypothyroidism and subclinical hyperthyroidism cases were 11 (3.7%) whereas no cases of overt hypothyroid cases and overt hyperthyroid cases. The

mean TSH was 2.84±1.99 and the hospital incidence of abnormal TSH was 14.0% in pregnant women.

Table 1: Diagnosis wise distribution of cases.

Diagnosis	Number of cases	Percentage
Normal	258	86.0
Overt hypothyroid	0	0.0
Subclinical hypothyroid	31	10.3
Overt hyperthyroid	0	0.0
Subclinical hyperthyroid	11	3.7
Total	300	100.0

Table 2 shows that, there was statistically significant difference of abnormal TSH cases with respect to age of pregnant women ($p<0.05$). Abnormal TSH cases were more in higher age groups of pregnant women as compare to lower age groups. There was statistically highly significant positive correlation between age and TSH values ($p<0.01$). As age of pregnant women increases with respect to TSH values were also increases.

Table 3 shows that out of 182 primi gravida cases 25 (13.7%) of cases were abnormal TSH and out of 118 multi gravida cases 17 (14.4%) of cases were abnormal TSH. There was no statistical significance difference of abnormal TSH cases among primi and multi gravida ($p>0.05$).

Table 4 revealed that out of 258 normal cases, total abortion cases are 26 (10.7%) and among those abnormal thyroid profile cases are 7 (16.6%). This shows that more abortion cases are seen in the deranged thyroid profile cases as compared to normal subjects and this is statistically significant ($p<0.05$). Out of the 7 patients, 6 had subclinical hypothyroidism and 1 (14.2%) had subclinical hyperthyroidism.

Table 5 reveals that, there was statistically very highly significant difference of distribution of hyper and hypo abnormal TSH cases among different levels of BMI ($p<0.001$). Lower level of BMI cases had observed significantly a greater number of hyper abnormal TSH cases and higher level of BMI cases had observed significantly a greater number of hypo abnormal TSH cases.

Table 2: Age wise comparison of abnormal TSH cases.

Age in years	No. of cases	Abnormal TSH cases					
		Hypo TSH cases		Hyper TSH cases		Total	
		No.	%	No.	%	No.	%
18-20	51	3	5.9	2	3.9	5	9.8
21-25	141	8	5.7	6	4.2	14	9.9
26-30	81	14	17.3	2	2.5	16	19.8
31-35	19	3	15.8	0	0.0	3	15.8
36-40	8	3	37.5	1	12.5	4	50.0
Total	300	31	10.3	11	3.7	42	14.0
Chi-square test and p value	$\chi^2=5.48$, $p=0.0175$,						
Coefficient of correlation	$r=0.233$, $p<0.01$ significant positive correlation						

Table 3: Parity wise comparison of abnormal TSH cases.

Parity	No. of cases	Normal TSH cases		Abnormal TSH cases	
		No	%	No	%
Primigravidae	182	157	86.3	25	13.7
Multigravidae	118	101	85.6	17	14.4
Total	300	258	86.0	42	14.0
Chi-square test and p value	$\chi^2=0.026$, $p=0.992$, NS				

Table 4: Comparison of abnormal TSH cases with spontaneous abortion in the past obstetric history.

History of spontaneous abortions	Total no. of cases	No. of abnormal TSH cases	Proportions
A1	16	4	25.0
A2	9	2	22.2
A3	1	1	100
A4	0	0	0.0
Total	26	7	26.9
Proportion test	Test value=2.17, $p<0.05$, significant		

Table 5: Comparison of hyper and hypo abnormal TSH cases with BMI.

BMI levels	Abnormal hypo TSH cases		Abnormal hyper TSH cases	
	No.	%	No.	%
18.5-24.9	7	22.6	9	81.8
25.0-29.9	18	58.1	2	18.2
30.0-34.9	6	19.3	0	0.0
Total	31	100.0	11	100.0
Chi-square test and p value	χ^2=12.08, p=0.001, VHS			

DISCUSSION

The present study was done in hospitals attached to KBNIMS, Gulbarga. A total of 300 patients were screened for thyroid disorders in this study. It was cross sectional study. The main aim of the study was to know the prevalence of thyroid disorders in pregnancy. The prevalence of thyroid disorders in our study was 14% with a CI of 10.5-14.9%. Our findings are consistent with the reports from the study of Sahu et al, who studied 633 pregnant women (prevalence of thyroid disorders was 12.7), which is comparable to our study.[14] The prevalence of subclinical hypothyroidism in our study was 10.33%. In the study of Sahu et al, the prevalence was 6.47%, which is comparable to our study. The prevalence of subclinical hyperthyroidism in our study was 3.67%, in a study done by Sahu et al the prevalence was 0.9% for subclinical hyper-thyroidism. Most common age group screened was 21-25 years; whereas the most common age group in which thyroid screening was done by Dhanwal et al was 25.6 years, compared to western countries, which was 27±6 years, reflecting early marriage and early conception prevalent in India. [15] The mean gestational age was 10.03±1.87 weeks.

In the present study extremes of pregnant age groups can be a risk factor for pregnancy. Results here are comparable with Sunitha et al.[16] Pregnancy loss is a common clinical problem. The leading etiologies associated with pregnancy loss include a variety of causes with regard to thyroid status both hyperthyroidism and hypothyroidism have long been associated with increase fetal loss. Further, more such association is usually reversible after appropriate treatment of the underlying disease.[17] In present study 10.7% of cases gave history of abortion in previous pregnancy which is comparable to study conducted by Negro et al there by proving that thyroid disorders have statically significant relation with pregnancy loss.[18]

Vaidya et al also concludes that targeted high risk thyroid function group would miss about one third of pregnant women with Overt or subclinical hypothyroidism or hyperthyroidism.[19] Detection of subclinical hyperthyroidism (3.67%) was quite significant in our study, the prompt treatment of which would bring a favourable maternal and fetal outcome. Hence, the role of routine screening becomes all more relevant in pregnant women as they are asymptomatic and symptoms if any ascribed to pregnancy itself.

Association between pre-pregnancy BMI and thyroid dysfunction is a debatable issue, but in our present study subclinical hyperthyroidism showed direct association between maternal weight as risks for thyroid function abnormalities. Maternal obesity is a risk factor.

Data here as compared to study published by Gowachirapant et al, where 26% of women were overweight or obese.[20] Obese women are at greater risk of complication such as longer operative time, excessive blood loss, wound infections and postoperative endomeritis. Many women gain an excessive amount of weight during pregnancy, thus compound their obstetrical risks and making them more likely to retain weight postpartum.

The endocrine society guidelines, suggest that universal thyroid screening during pregnancy is recommended in only high-risk groups, but with our study we have shown that targeted case finding will miss around 30-50% of subclinical thyroid disorder cases. Hence, concluding universal screening for all pregnant women of all age groups with special emphasis being paid to teenagers and elderly pregnant patients or with previous or present high-risk factors to prevent maternal, fetal complications and hence having safer mother and healthy child. The subclinical hyperthyroid patients do not have high risk characteristics. Hence, patients with abnormal thyroid function could be missed by targeted case finding. This study also demonstrates a secular trend in prevalence of hypothyroidism in India, when data from other previous studies were analyzed. According to American college of endocrinologists (ACOE 2002), it is very ideal to subject that all pregnant woman for thyroid screening as early as possible.[21] Therapeutic intervention should be initiated at earliest for a favourable outcome

Limitations

As sample size is small in present study, we need more studies with larger sample. Also, we need to follow up these patients throughout the pregnancy and postpartum period for better analysis.

CONCLUSION

Prevalence of thyroid disorders, especially subclinical hypothyroidism and hyperthyroidism was high as per our

study prevalence of thyroid disorder 14%, subclinical hyperthyroidism 3.67% and subclinical hypothyroidism 10.33%. Hence, it is very ideal to subject all pregnant women for thyroid screening in first trimester at first antenatal visit as early initiation of the treatment and maintenance of a normal level of thyroid hormones significantly minimizes the risk of maternal and fetal complications and makes it possible that pregnancy may be carried out to turn without severe complications to improve maternal and fetal outcome.

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