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Study of Thyroid dysfunction in pregnancy at Government Maternity Hospital, Osmania Medical College, Hyderabad

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Abstract:
Aim: *To study the prevalence of thyroid dysfunction in antenatal women attending antenatal OPD.The association of thyroid dysfunction in relation to: Demographic profile, parity, gestational age, maternal weight and maternal medical disorders like diabetes mellitus on thyroid dysfunction.*
Background: *Thyroid disorders are the second most common endocrinal disorders in pregnancy. Overt hypothyroidism is seen in 0.3-0.5% of the pregnancies. Sub-clinical hypothyroidism is seen in 2-3% of the pregnant women. Hyperthyroidism is seen in 0.1-0.4% of the pregnant women. It has long been recognized that maternal thyroid hormone excess or deficiency can influence the outcome for mother and fetus at all stages of pregnancy.*
Material and methods: *200 antenatal women attending antenatal OPD at GMH, Osmania medical college, Hyderabad in June and July 2018 for two months are selected randomly irrespective of parity and gestational age, for screening of thyroid dysfunction by TSH estimation. The study also includes cases of known thyroid dysfunction.*
Results: *In 33 women TSH levels are abnormal.TSH levels are <0.3 µIU/ml in 3 women indicating hyperthyroidism. One of these woman was diagnosed before pregnancy.TSH level is >3.5 µIU/ml in 30 women showing hypothyroidism. 9/30 were diagnosed before pregnancy and are on thyroid replacement therapy.21 antenatal women screened are diagnosed during the present pregnancy. 2 of them had overt hypothyroidism with serum TSH >10 µIU/ml. All the women are started on thyroid replacement therapy on the advice of endocrinologist. None of the women with abnormal TSH levels detected in this pregnancy has family history of thyroid dysfunction. Blood sugar levels are normal in all of the 33 women with abnormal serum TSH values. The common associated complication was anemia; pre-eclampsia was noted in one woman. Five out of the 33 women had weight more than 70kg.*
Conclusion: *As the incidence of thyroid dysfunctions is increasing in the women of reproductive age group, even in the iodine sufficient areas, screening for thyroid dysfunction in pregnancy is advisable. It is preferable to do the screening in the 1st Trimester or at the 1st antenatal visit.*
Keywords: *Thyroid dysfunction, subclinical hypothyroidism, Thyroid screening in pregnancy*

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I. Introduction

Thyroid disorders are the second most common endocrinal disorders in pregnancy. Overt hypothyroidism is seen in 0.3-0.5% of the pregnancies. Sub-clinical hypothyroidism is seen in 2-3% of the pregnant women. Hyperthyroidism is seen in 0.1-0.4% of the pregnant women[1].It has long been recognized that maternal thyroid hormone excess or deficiency can influence the outcome for mother and fetus at all stages of pregnancy. Two pregnancy related hormones, human chorionic gonadotropin (hCG) and estrogen, cause increased thyroid hormone levels in the blood[2]. Made by the placenta, hCG is similar to TSH and mildly stimulates the thyroid to produce more thyroid hormone. Fetus depends on maternal thyroid hormone by transfer through placenta during the first trimester of pregnancy. Fetal thyroid begins to function at 10-12 weeks of gestation.

One study of outcome in hypothyroidism showed that gestational hypertension occurred more in patients with overt [36%] and sub-clinical hypothyroidism [25%]. Low birth weight was 22% in overt hypothyroidism and 9% in subclinical hypothyroidism[3]. Thyroid dysfunction in pregnancy is associated with increased incidence of pre-eclampsia, abruptio placentae, anemia, cardiac dysfunction, premature delivery, post partum hemorrhage etc. There is also an increased association with type-1 diabetes mellitus[4]. Overt hypothyroidism and severe thyrotoxicosis are associated with anovulation, sub fertility and pregnancy loss. Milder forms of both do not render a woman infertile, but they may still be associated. Iodine is a major

component of thyroid with an increase risk of miscarriage[5].Disorders of thyroid hormone production and their treatment can affect fertility, maternal well being, fetal growth and development. Pregnancy induced physiological changes may themselves exacerbate or improve thyroid disorders[5]. Maternal thyroid hormones have a role in development of fetal central nervous system as early as conception[6]. Endemic goitre can lead to pregnancy loss in as much as 30% of cases[7].

Reproductive dysfunction is one of the presentations of thyroid dysfunction[8].In Subclinical hypothyroidism, the TSH level will be elevated and T3 and T4 levels will be normal. The women do not exhibit symptoms and signs of hypothyroidism. TSH values of 0.3 to 10 are considered as subclinical hypothyroidism.[9] The preferred method for screening is the sensitive TSH assay. If TSH is more than 4 µIU/ml, the treatment is warranted. If the TSH level is between 2-4 µIU/ml and if the antibody titers are positive, the treatment is commenced. For levels below 2 µIU/ml and with positive antibody titers, a close follow up is needed through the postpartum period. For levels below 2 µIU/ml and with negative antibody titers, no treatment is required[3]. Serum TSH >2.5 µIU/ml in first trimester shows T4 insufficiency---Spencer et al[10]. Truly normal range of TSH is defined as 0.5 to 2.5 µIU/ml---William L Green[11]. 80% of the women with subclinical hypothyroidism have serum TSH levels below 10 µIU/ml[12]. In November 2002, the American Association of Clinical Endocrinologists (AACE) released new guidelines for clinical practice for the diagnosis and treatment of hyperthyroidism and hypothyroidism, which includes a new thyroid-stimulating hormone (TSH) reference range of 0.3 to 3.0 mIU/L.

II. Methodology

200 antenatal women attending antenatal OPD at GMH, Osmania medical college, Hyderabad in June and July 2018 for two months are selected randomly irrespective of parity and gestational age, for screening of thyroid dysfunction by TSH estimation. The study also includes cases of known thyroid dysfunction.

To identify the subjects, a survey is done with all beneficiaries attending antenatal OPD. Approval from the head of the hospital and oral consent from the subjects is obtained. A proforma is prepared to meet the objectives of the study. Only fully answered proforma are considered for analysis. Detailed history of all the patients related to our parameters are collected as per the proforma

The socio-demographic profile of the subject is noted in the proforma. Family history of thyroid dysfunctions is also noted. Detailed clinical examination is done to look for any symptoms and signs suggestive of thyroid dysfunction for all the women coming to the antenatal OPD. The weight of the antenatal women is recorded and the weight gain is noted. All the women are also looked for any pallor and hypertension. All the women coming to the antenatal OPD are screened for thyroid dysfunctions by estimating the serum levels of TSH. All the women are also screened for associated anemia and diabetes mellitus by estimation of complete blood picture and blood sugar levels respectively. The diagnosis of thyroid dysfunction during pregnancy is based on symptoms; clinical signs and biochemical thyroid hormones levels. Those detected to have thyroid dysfunction are started on necessary treatment. They are asked to come for regularly check up.

The results are analyzed and data is noted as to the:

- Prevalence of thyroid dysfunction in pregnancy.
- It's common clinical presentation in pregnancy.
- Its relation to demographic profile, parity, gestational age and maternal weight.
- Associated problems like PIH, anemia and diabetes mellitus
- Gestational age at 1st antenatal visit and
- Gestational age at the time of screening is noted

Serum TSH level of 0.3 µIU/ml to 2.5 µIU/ml in 1st trimester and 3.5 µIU/ml in 2nd and 3rd trimesters is considered normal. Serum TSH level <0.3 µIU/ml and > 2.5 µIU/ml in 1st trimester or > 3.5 µIU/ml in 2nd and 3rd trimesters is considered abnormal.

Serum TSH level > 2.5 µIU/ml in 1st trimester or > 3.5 µIU/ml in 2nd and 3rd trimesters to 10µIU/ml indicates subclinical hypothyroidism. Serum TSH levels of >10 µIU/ml indicates overt hypothyroidism. Serum TSH level <0.3 µIU/ml indicates hyperthyroidism

Hypertension is recorded when blood pressure reading is more than 140/90mm Hg.

Hemoglobin <10gms % is taken as anemia.

Blood sugar levels are estimated in a random sample and a value of >200 mg/dl is taken as abnormal.

III. Observation And Results

TSH Levels

TSH level in µIU/ml	Number	Percentage
<0.3	3	1.5
0.3-3.5	167	83.5
3.5-5	21	10.5
5-10	5	2.5
>10	4	2

There are 3 women with TSH below 0.3 µIU/ml and 30 women with TSH more than 3.5 µIU/ml. Abnormal TSH is seen in 16.5% women. Hypothyroidism is more common as seen in 15% women. Overt Hypothyroidism is noted in 2% women with TSH more than 10 µIU/ml

Age group

Age in yearsNumber (n)		Percentage
15-20	4	12.12
21-25	6	18.18
26-30	23	69.6

Nearly 70% of the women are between 26 to 30yrs age.

Religion

Religion	NumberPercentage	
Hindu	23	69.69
Muslim	10	30.3

Majority of the women attending our AN OPD and screened for TSH are Hindus.

Parity

Parity	Number	Percentage
Primi	12	36.36
Multi	21	63.63

63.63% are multipara.

Gestational age at first visit

Gestational age (months)	Number	Percentage
1-3	12	36.36
4-6	21	63.63
7-9	0	0

63.63% women attended AN OPD in the 2nd Trimester for the first time.

Gestational age at screening

Gestational age	Number	Percentage
1st trimester	2	6.06
2nd trimester	15	45.45
3rd trimester	6	18.18

15/33 women got the screening done in 2nd trimester and 10 women were diagnosed pre pregnancy. Only 2 women got it done in 1st trimester.

Symptoms

SIGNS	**HYPOTHYROID**	**Total=30**	**HYPERTHYROID**	**Total=3**
	Number	***Percentage***	***Number***	***Percentage***
Previous Abortions	2	**6.6**		
PIH	1	**3.33**	0	**0**
Hb <10g%	20	**66.6**	1	**33.3**
Edema	6	**20**	2	**66.6**
Skin-dry	7	**23.3**		
Palmar erythema	4	**13.3**		
Enlargement of thyroid gland	5	16.6		
Hoarseness of voice	8	26.6		

The common associated complication was anemia, which was seen in 21 out of 33 cases of abnormal thyroid levels. As most of the women attending the antenatal OPD at the Government hospitals are from low socio-economic strata, anemia may be nutritional.

Pre-eclampsia was noted in one woman, who is a known case of hypothyroidism but discontinued the treatment.

Blood sugar levels were normal in all the women with thyroid dysfunction

Diagnosis of thyroid dysfunction

Period	Number	Percentage
Pre-pregnancy	10	30.30
During pregnancy	23	69.69

Almost 70% cases of thyroid dysfunction are detected with our screening during antenatal period

In relation to weight

Weight in kg	**Number**	Percentage
40-55	14	**42.42**
56-70	14	**42.42**
71-85	4	**12.12**
86-100	0	**0**
101-115	1	**3.03**

Five out of the 33 women had weight more than 70kg. One woman with known hypothyroidism, who discontinued the treatment had obesity with a weight of 105kg.

IV. Discussion

Of the 200 women, 33 women had abnormal TSH level. Three of them showed TSH values below 0.3µIU/ml. One out of these three hyperthyroid women was diagnosed of hyperthyroidism prior to pregnancy.

TSH levels were more than 3.5µIU/ml in 30 women. Of these, 9 women were diagnosed to have hypothyroidism prior to pregnancy. In our study, 21 women were detected to have hypothyroidism and 2 women were detected to have hyperthyroidism. Out of the 21 cases, three were diagnosed to have overt hypothyroidism i.e. with TSH levels above 10µIU/ml. Two women with known hypothyroidism on treatment had high levels of TSH.

One woman, a known case of hypothyroidism since 4yrs discontinued treatment for the past 1 ½ years. She had previous history of spontaneous abortion at three months amenorrhea. In the present pregnancy she has excessive weight gain, with a present weight of 105kg. Her hemoglobin is 9g% and her TSH levels are 11.2µIU/ml.
Primi, a known hypothyroid for 8 years, attended antenatal OPD in her 5^{th} month of gestation. There is family history of hypothyroidism. She is on thyronorm 100µg/day. She also has excessive weight gain, and her hemoglobin is 9g% and TSH levels are 98µIU/ml.

Another primi, was detected to have overt hypothyroidism with TSH levels 34.35µIU/ml.
She has anemia with hemoglobin level of 8.6 g%.
A multipara (G_2) is found to have overt hypothyroidism with TSH levels of 12.81µIU/ml.

Her hemoglobin level is 8g%.
A multipara [$G_3P_2L_2$] had TSH level of 38µIU/ml and her hemoglobin was 9g%.
In 5 women, the TSH levels were greater than 5µIU/ml.
Family history of thyroid dysfunction is present in 6 out of the 10 women who have abnormal thyroid levels, prior to the present pregnancy.
None of the women diagnosed of thyroid dysfunction in the present pregnancy had family history of thyroid dysfunction.
The common associated complication was anemia; pre-eclampsia was noted in one woman. Five out of the 33 women had weight more than 70kg. Blood sugar levels were normal in all the women.

In our study group the lowest value of TSH was 0.1µIU/ml and the highest value was 98µIU/ml.
All the women diagnosed to have thyroid dysfunction were referred to endocrinologist and they are treated according to the advice of the endocrinologist. They are under regular follow up to check for the development of any complications in the present pregnancy. TSH levels are repeated every 4-6 weeks and they are maintained below 2.5µIU/ml.
TSH levels in the new born are estimated on the 4^{th} or 5^{th} day of birth.

Recently, the AACE recommended screening all women considering conception and/or all gravid women in the first trimester for thyroid dysfunction. However, the American College of Obstetricians and Gynecologists (ACOG) and the United States Preventive Services Task Force (USPSTF) have not endorsed these recommendations[13]

A seminal study by Haddow et al showed a 7 point reduction in IQ in children aged 7-9 years, where mothers had subclinical hypothyroidism in pregnancy compared to the euthyroid mothers. It points to the need for the screening pregnant women for subclinical hypothyroidism. Treat the mild thyroid failure pre-pregnancy or in first trimester.

Recent consensus guidelines do not advocate universal thyroid function screening during pregnancy but recommend testing high-risk pregnant women with a personal history of thyroid or other autoimmune disorders or with a family history of thyroid disorders. Targeted thyroid function testing of only the high-risk group would miss about one third of pregnant women with overt/subclinical hypothyroidism[14].

Adverse outcomes were less likely to occur among low-risk women in the screening group than those in the case-finding group.[15]

Screening for both thyroid dysfunction and thyroid antibodies ideally at a preconception clinic but certainly in early gestation is recommended. This review suggests that screening for thyroid function in early pregnancy and levothyroxine intervention therapy for maternal subclinical hypothyroidism should be considered but evidence is awaited.[16]

Pregnancies in women with subclinical hypothyroidism were 3 times more likely to be complicated by placental abruption (relative risk 3.0, 95% confidence interval 1.1-8.2). Preterm birth, defined as delivery at or before 34 weeks of gestation, was almost 2-fold higher in women with subclinical hypothyroidism (relative risk, 1.8, 95% confidence interval 1.1-
2.9)[17].We speculate that the previously reported reduction in intelligence quotient of offspring of women with subclinical hypothyroidism may be related to the effects of prematurity.[17] Adequate replacement therapy should be given when TSH levels are >3µIU/ml in 1^{st} trimester.[18] Accurate interpretation of both antepartum and postpartum levels of thyroid hormones is important in preventing pregnancy-related complication secondary to thyroid dysfunction[19]

V. Conclusions

As the incidence of thyroid dysfunctions is increasing in the women of reproductive age group, even in the iodine sufficient areas especially in the urban population due to stress, screening for thyroid dysfunction in pregnancy is advisable.

The incidence of newly detected cases of thyroid dysfunction in our study is 11.5%, which is significant enough to warrant thyroid screening in pregnancy. Screening has to be done even in women without family history.

64% women attended AN OPD in 2nd trimester for the first time and screening in 2nd trimester means delay in starting treatment and the adverse effects would have already started. Hence, it is preferable to do the screening in the 1st Trimester, ideally prenatally to prevent

miscarriage. The study being a short term studentship report, the follow-up of these women is not complete and complications may be picked up later in pregnancy. All of them are under regular follow-up and care.

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