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Effect of thyroid screening in pregnant women a prospective observational study at NMCH & RC, Raichur.

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Abstract

Introduction: Thyroid hormone is essential for a normal pregnancy and fetal development. In the first half of pregnancy, placental and fetal development depend on the supply of maternal thyroid hormone. untreated maternal hypothyroidism is associated with a higher risk of adverse pregnancy outcomes, as well as adverse outcomes for the child.

The development of maternal thyroid disorders during early pregnancy influence the pregnancy outcome and fetal development can leads to early abortions pregnancy, induced hypertension, abruption placenta, premature birth, IUGR, low birth weight, fetal morbidity and mortality.

Aims and Objective: To study the prevalence of thyroid disorders in pregnancy and study the material and perinatal outcome of the pregnant women suffering from thyroid disorders.

Materials and Methods: Two year prospective observational study from 2017-2019 at NMCH Raichur. All antenatal cases attending the IPD/OPD singleton, primi and multi gravida less than 12 weeks.

Results: No of patients screened 350, No of thyroid disorders 51. 29 cases 8% of subclinical hypothyroid, 14 cases 4%of overt hypothyroid, 6 cases 1% of subclinical hyperthyroid, 2 cases 0% of overt hyperthyroid.

Conclusion: In modern obstrectic universal thyroid screening in pregnancy fulfills most criteria for a screening programme and holds promise for improving fetal and maternal outcomes. To detect even subclinical cases to prevents adverse fetal and maternal outcomes.

Keywords: Subclincal hypo, hyper thyroid, overt hypo, hyperthyroid, IUGR, abortions.

Introduction

Thyroid hormone is essential for a normal pregnancy and fetal development. In the first half of pregnancy, placental and fetal development depend on the supply of maternal thyroid hormone. untreated maternal hypothyroidism is associated with a higher risk of adverse pregnancy outcomes, as well as adverse outcomes for the child[1]. The development of maternal thyroid disorders during early pregnancy influence the pregnancy outcome and fetal development can leads to early abortions pregnancy, induced hypertension,

abruption placenta, premature birth, IUGR, low birth weight, fetal morbidity and mortality[2].

Pregnancy has clear effects on thyroid physiology. The fetal thyroid gland is not functionally mature until weeks 18–20 of gestation, rendering the fetus is dependent on placental transfer of maternal T4. The consequent fetal consumption of maternal thyroid hormone, as well as increasing concentrations of thyroxine-binding globulin (TBG), increasing urinary iodide clearance, and [increasing] thyroid hormone degradation by placental type 3 deiodinase, all necessitate an increase in maternal thyroid hormone production to ensure adequate maternal and fetal availability of thyroid hormone[1]. High concentrations of the pregnancy hormone human chorionic gonadotropin (hCG), a weak agonist of the TSH receptor, increase thyroid hormone production(3). These pregnancy-specific changes, along with the increased demand for thyroid hormone, might expose pre-existing mild thyroid dysfunction as gestational thyroid disease.

Overt maternal hypothyroidism is elevated concentrations of TSH with low concentrations of free T4. Subclinical hypothyroidism elevated concentrations of TSH with normal free T4 is more prevalent[4,5]

The main risk factor for maternal hypothyroidism is autoimmune thyroid disease, with thyroid peroxidase autoantibody (TPOAb) positivity occurring in roughly one-third of pregnant women with subclinical hypothyroidism[6]. Pathological hyperthyroidism (predominantly Graves disease and toxic nodules or goitres) during pregnancy is less common.[7]

Gestational hyperthyroidism elevated concentrations of free T4 and suppressed TSH is much more frequent with most cases of the disease occurring secondary to high hCG concentrations. gestational hyperthyroidism co-occurs with hyperemesis gravidarum.[7]

In addition, hyperthyroidism has been associated with negative pregnancy outcomes. High concentrations of maternal free T4 might be equally as detrimental as low free T4 concentrations for child neurodevelopment[8].

As a result of the major changes in thyroid physiology that occur during pregnancy, gestational thyroid disease is best defined according to pregnancy-specific reference ranges of TSH upper limits of 2.5 mU/l or 3.0 mU/l for the first and second or third trimesters, respectively[9,10].

Determents of thyroid (dys)function

Iodine is a major component of thyroid hormone and is essential for its production. Severe maternal iodine deficiency can lead to overt hypothyroidism and cretinism in children[11]. Although studies have predominantly focused on the consequences of low iodine intake on thyroid function, high iodine intake, and even intake within the normal range, is also associated with reduced thyroid function[12]. One cross-sectional study of 7,190 pregnant women in China demonstrated that high urinary iodine concentrations (>250 μg/l) are associated with an up to 2.2-fold higher risk of subclinical hypothyroidism and an up to 2.9-fold higher risk of hypothyroxinaemia than urinary iodine concentrations of 150-249mcg\l [12].

Studies consistently show that BMI is also a determinant of thyroid function during pregnancy. Higher BMI is associated with higher TSH concentrations[13,14], lower free T4 concentrations, higher free T3 concentrations and a higher T3:T4 ratio. A study reported that the upper TSH limit for women with a BMI between 20 kg/m2 and 25 kg/m2 is 2.86mU/l, while the upper TSH limit for women with a BMI >30kg/m2 is 3.50mU/l. Various other clinical

characteristics, including maternal age and smoking history, are risk factors for thyroid dysfunction. When analysed in combination, however, these risk factors do not accurately predict the risk of thyroid dysfunction in the general population, indicating that clinical characteristics cannot be used to accurately predict the risk of thyroid dysfunction[15].

The rapid rise in hCG concentrations during early pregnancy leads to an increase in the free T4 concentration, which subsequently leads to a decrease in the TSH concentration[16]. We have shown that the thyroidal response to hCG stimulation is severely impaired in women with thyroid autoimmunity, as reflected by TPOAb positivity. Other factors that might also reduce the thyroid gland response to hCG stimulation are a higher BMI and, to a lesser extent, higher parity (specifically ≥2) and male fetal sex[17].

Gestational hyperthyroidism

Gestational hyperthyroidism is typically considered a non-pathological condition because the biochemical disorder is driven by the physiological peak in hCG. Despite the fact that gestational hyperthyroidism generally occurs as a result of physiological changes. [18,19] Gestational hyperthyroidism have a higher risk of low birth weight and a higher risk of pre-eclampsia than patients with euthyroid pregnancies. hCG concentration measurement could help clinicians distinguish physiological from pathological forms of hyperthyroidism during pregnancy. These results warrant further studies on the different subtypes of biochemical hyperthyroidism.[20]

Aims and Objective

To study the prevalence of thyroid disorders in pregnancy and study the material and perinatal outcome of the pregnant women suffering from thyroid disorders.

Materials and Methods

Source of Data

All pregnant women attending to the obstetrics department (OPD/ IPD) at Navodaya Medical College, Raichur

Inclusion Criteria

- All antenatal cases < 12 Weeks Gestation attending the OPD / IPD.
- Singelton Pregnancy.
- Primigravida / Multigravida

Exclusion Criteria

- Multifetal gestation.
- Previously diagnosed cases with thyroid disorders.
- Known chronic disorders - Diabetes, HTN, collagen diseases, Heart diseases.
- Had previous bad obstetric history.

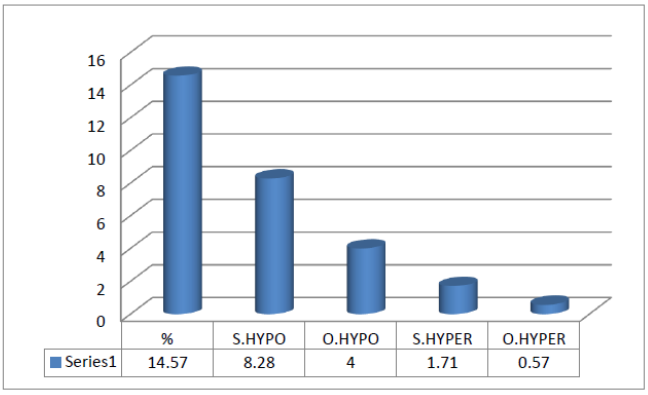
Results

Table 1: Prevalence of Thyroid Disorders

No. of patients screened	No. with thyroid disorder	% Prevalence	95% CI
350	51	14.57%	12 – 15.9

The prevalence of thyroid disorders in our study was 14.57% (51 of 350 cases) with a CI of 12-15.9%.

Graph 1: Prevalence of Thyroidal disorders among 350 women screened



The prevalence of subclinical hypothyroidism in our study was 8.28% (29 of 51 cases with thyroid

dysfunction) and overt hypothyroidism in our study was 4.0% (14 of 51 cases). The prevalence of subclinical and overt hyperthyroidism in our study was 1.71% (6 of 51 cases) & 0.57% (2 of 51 cases) respectively.

Table 2 : TSH levels in different types of Thyroid disorders

TYPE	NO. OF CASES	MEAN	SD
S.Hypo	29	4.03	1.03
O.Hypo	14	8.61	2.71
S.Hyper	6	0.02	0.01
O.Hyper	2	0.01	0

The Mean TSH of subclinical hypothyroidism in our study was 4.03 with standard deviation(S D) of 1.03 and overt hypothyroidism in our study was 8.61 with S.D 2.71. The Mean TSH of subclinical and overt hyperthyroidism in our study was 0.02 with S.D 0.01 & 0.01 respectively.

Graph 2: Maternal Complications among 29 cases of S. Hypo

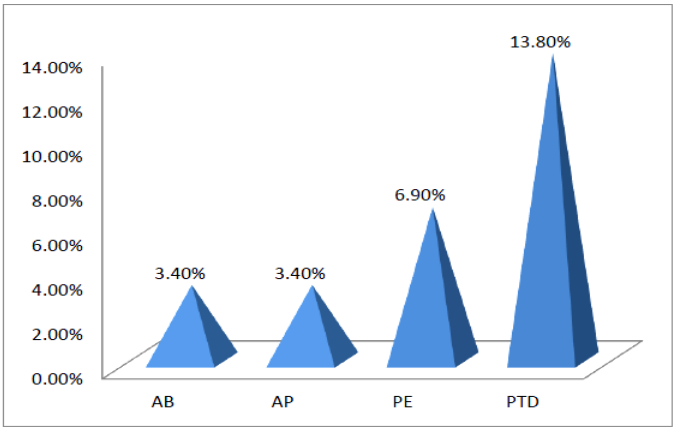


Table 3 : Fetal complications among 29 cases of S. Hypo

Complications	No. of Cases	Percentages
IUGR	2	6.9%
LBW	1	3.4%
SB	0	0

In our study, subclinical hypothyroidism was associated with complications like PE (6.9%) , AP (3.4%), PTD (13.8%), AB (3.4%), IUGR (6.9%) , LBW (3.4%), SB (0).

Graph 3 : Maternal complications among 14 cases of O. Hypo

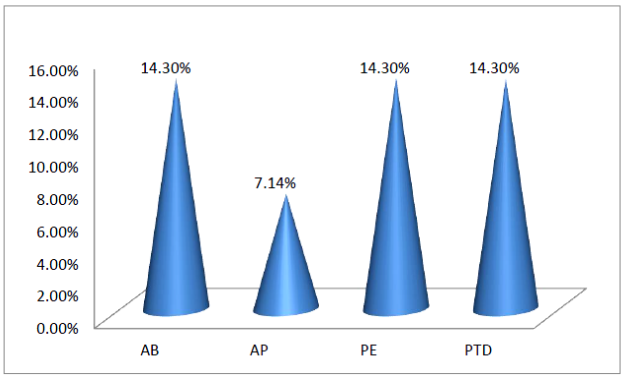


Table 4: Fetal complications among 14 cases of O. Hypo.

Complications	No. of Cases	Percentages
IUGR	2	14.3%
LBW	2	14.3%
SB	1	7.14%

Overt hypothyroidism was associated with complications like PE (14.3%) , AP (7.4%), PTD (14.3%), AB (14.3%), IUGR (14.3%) , LBW (14.3%), SB (7.14%).

Graph 4: Maternal complications among 6 cases of S. Hyper

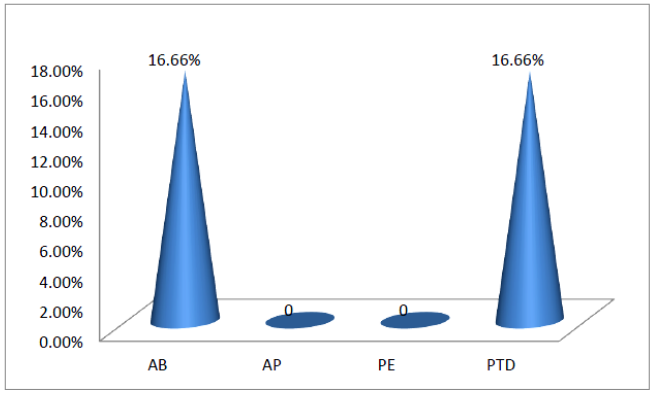


Table 6: Fetal complications among 6 cases of S. Hyper

Complications	No. of Cases	Percentages
IUGR	1	16.66%
LBW	0	0
SB	0	0

Table 7: Maternal complications among 2 cases of O. Hyper

Complications	No. of Cases	Percentage
AB	1	50.0%
AP	0	0
PE	0	0
PTD	0	0

Subclinical hyperthyroidism was associated with complications like PTD (16.6%), AB (16.6%), IUGR (16.6%). Overt hyperthyroidism was associated with complications like AB (50.0%).

Discussion

The present study was done in our hospitals Navodaya General Hospital attached to Navodaya Medical College, Raichur. A total of 350 cases were included in our study and screened for thyroid disorders. It was prospective study. The main aim of the study was to know the prevalence of thyroid disorders in pregnancy and pregnancy outcome.

Study	In our study	Alpana Singh etal 2015	Manju VK et al 2017
No Of Cases	350	400	6762 cases
Thyroid dysfunction	51(14.57%)	33 cases(8.25%)	6.2%(449)
Sub. Hypo	29 (8.2%)	6%	72% of 6.2% prevalence (324)
Overt.Hypo	14(4.0%)	1.50%	20.7%(93)
Sub. Hyper	6(1.71%)	0.75%	1.37%(6)
Overt. hyper	2(0.57%)	0	5.3%(24)
Abortion	S.hypo:1(3.4%), O.Hypo:2(14.3%), S.Hyper:1(16.6%), O.Hyper:1(50%)	Hypo:6.66%(2), Hyper:33.3%(1)	S.hypo:7.7%(25), O.Hypo:9.7%(9), Others: 3.1%(1)
Abruption	S.hypo:1(3.4%), O.Hypo:1(7.14%), S.Hyper:0, O.Hyper:0		S.hypo:1.2%(4), O.Hypo:6.5%(6), Others: 3.1%(1)
Pre Eclampsia	S.hypo:2(6.9%), O.Hypo:2(14.3%), S.Hyper:0, O.Hyper:0	Hypo:33.3%(10), Hyper:0	S.hypo:13.6%(44), O.Hypo:19.4%(18), Others: 6.3%(2)
Preterm delivery	S.hypo:3(13.8%),	Hypo:3.33%(1),	

	O.Hypo:2(14..3%), S.Hyper:1(16.6%), O.Hyper:0	Hyper:0	
IUGR	S.hypo:2(6.9%), O.Hypo:2(14..3%), S.Hyper:1(16.6%), O.Hyper:0	Hypo:16.66%(5), Hyper:0	
LBW	S.hypo:1(3.4%), O.Hypo:2(14.3%), S.Hyper:0, O.Hyper:0		
Still birth	S.hypo:0, O.Hypo:1(7..14%), S.Hyper:0,O.Hyper:0	Hypo:0, Hyper:0	

In our study, we have screened 350 patients with Sr.TSH and the prevalence of thyroid disorder was 14.57% with a CI of 12 – 15.9%. Our findings are consistent with, Sahu etal with prevalence 12.7%, Anjmania Sangita Nangia etal 13.25%, Rohini NS etal 15.7%. Compared with Manju VK etal with prevalence 6.2%, Alpana singh etal 8.25%, indicating demographic variability .

The prevalence of subclinical hypothyroidism in our study was 8.28%, while in other studies Sahu MT etal it is 6.47%, Anjmania Sangita Nangia etal is 9%, Alpana singh etal 6%. Dharra Singh Meena etal, Rohini NS etal, Manju VK etal, Sreelatha S etal has high proportion of Subclinical hypothyroid cases, which is consistent with our study.

In our study, subclinical hypothyroidism was associated with complications like PE (6.9%) , AP (3.4%), PTD (13.8%), AB (3.4%), IUGR (6.9%) , LBW (3.4%), SB(0%).

In Sahu MT et al, subclinical hypothyroidism was associated with complications like PE (9.8%) , PTD (10.3%), IUGR (2.4%) , SB(2.5%). In Anjmania Sangita Nangia etal subclinical hypothyroidism was associated with complications like PE (22.3%) , PTD (5.8%), AB (2.39%), IUGR (4.9%) , LBW (12.1%), SB(7%). In Dharra Singh Meena etal all hypothyroid had complication prevalence of PE (30%) , AP (2%), AB (2.9%), IUGR (4.9%) , LBW (12.1%), SB(1.02%). Similarly Rohini NS etal had prevalence PE (14.28%) , AP (2.5%), PTD (11.11%), AB (11.9%), IUGR (6.3%) , LBW (6.3%), SB(1%). All studies show increased risk of complications, indicating the importance of detection of subclinical hypothyroid with routine screeing and early intervention.

In our study, overt hypothyroidism was associated with complications like PE (14.3%) , AP (7.14%), PTD (14.3%), AB (14.3%), IUGR (14.3%) , LBW (14.3%), SB(7.14%). In Sahu MT et al, Overt hypothyroidism was associated with complications like PE (20.7%) , PTD (4.7%), IUGR (13.8%) , SB(2.9%). In Anjmania Sangita Nangia etal Overt hypothyroidism was associated with complications like PE (16.6%) ,AP(16.6%), PTD (33.3%), AB (16.6%), IUGR (25%) , LBW (50%), SB(16.6%). In Dharra Singh Meena etal,

PE (30%) , AP (2%), AB (2.4%), IUGR (9.18%) , LBW (13.26%), SB(1.02%). Similarly with Rohini NS et al, Alpana Singh et al, all had increased prevalence of fetal complications and Pre Eclampsia. Results in different studies were similar to our study.

In our study, subclinical hyperthyroidism was associated with complications like PTD (16.6%), AB (16.6%), IUGR (16.6%) While overt hyperthyroidism was associated with complications like AB (50%). In Rohini NS etal study the prevalence of complication in hyperthyroid cases were PE (50%) , AP (25%), PTD (50%), AB (25%). In Alpana singh etal study they obsereved 33.3% AB. Hyperthyroidism is associted with increased complications as observed in different studies, Especially Overt hyperthyroid were assoicated with increased Abortions.

Conclusion

In modern obstrectic universal thyroid screening in pregnancy fulfills most criteria for a screening programme and holds promise for improving fetal and maternal outcomes. To detect even subclinical cases to prevents adverse fetal and maternal outcomes. However, areas of uncertainty remain especially with regards to the significance of borderline biochemical abnormalities and whether correction of such abnormalities can improve outcomes. High-risk screening integrating thyroid auto-immunity into decision making is essential

Ethical approval: The study was approved by the Institutional Ethics Committee

Statistical analysis: The data were analyzed statistically at 5% level of significance and p value <0.05 were considered as significant..

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