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A study of prevalence of hypothyroidism in pregnancy and its impact on maternal & neonatal outcomes in a multispecialty hospital in Hyderabad

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Abstract

Background: Evaluation of thyroid disease in pregnancy is important for gestational maternal health, obstetric outcome, and subsequent development of the child. The following study was undertaken to estimate the prevalence of hypothyroidism in pregnancy, including both overt and subclinical hypothyroidism and its impact on maternal and neonatal outcomes.

Materials & Methods: In 380 women, serum TSH and FT4 estimation was done by the sensitive chemiluminescent method in our hospital laboratory. Based on their TSH and FT4 report they were divided into 3 groups. Group I: pregnant females with overt hypothyroidism. Group II: pregnant females with subclinical hypothyroidism. Group III: pregnant females with Euthyroid status. Maternal and neonatal outcomes was recorded.

Results: Out of 380 women in study group, 341(89.7%) women were euthyroid, 24 (6.2%) had subclinical hypothyroidism and 15 (3.9%) had overt hypothyroidism. The mean FT4 levels among mothers with overt hypothyroidism was 0.47 ng/dl. The mean FT4 levels among mothers with subclinical hypothyroidism was 1.13 ng/dl. The mean FT4 levels euthyroid mothers was 1.13 ng/dl. The mean TSH levels among mothers with overt hypothyroidism was 10.80 ng/dl. The mean TSH levels among mothers with subclinical hypothyroidism was 4.89 ng/dl. The mean TSH levels euthyroid mothers was 1.41 ng/dl. Total 43 (11.3%) mothers developed gestational hypertension. Gestational hypertension was present in 9% Euthyroid mothers, 29.1% mothers with subclinical hypothyroidism and 33.3% mothers with overt hypothyroidism. Pre-eclampsia was present in 7.6% of Euthyroid mothers, 12.5% of mothers with subclinical hypothyroidism and 26.6% of mothers with overt hypothyroidism. Gestational diabetes mellitus was present in 8.2% of Euthyroid mothers, 12.5% of mothers with subclinical hypothyroidism and 33.3% of mothers with overt hypothyroidism. Premature rupture of membranes was present in 10.2% of Euthyroid mothers, 29.2% of mothers with subclinical hypothyroidism and 40% of mothers with overt hypothyroidism. Preterm delivery was present in 12.3% of Euthyroid mothers, 20.8% of mothers with subclinical hypothyroidism and 13.3% of mothers with overt hypothyroidism.

Conclusion: A high prevalence of subclinical and overt hypothyroidism in pregnant women, with the prevalence of subclinical hypothyroidism being 6.4% and overt hypothyroidism being 2.8%. Due to the immense impact that the maternal thyroid disorder has on maternal and fetal outcome, prompt identification of thyroid disorders and timely initiation of treatment is essential. Thus, universal screening of pregnant women for thyroid disorder should be considered especially in a country like India where there is a high prevalence of undiagnosed thyroid disorder.

Keywords: Thyroid disorder, pregnancy, maternal

Introduction

Evaluation of thyroid disease in pregnancy is important for gestational maternal health, obstetric outcome, and subsequent development of the child. Thyroid diseases affect up to 4% of all pregnancies with primary hypothyroidism being the most prevalent disease [1]. Thyroid hormone requirements increase in pregnancy, possibly leading to hypothyroidism among those with limited thyroidal reserve. The most common cause of hypothyroidism in pregnancy is Hashimoto Thyroiditis. Hypothyroidism is associated with fetal loss, placental abruptions, preeclampsia, preterm delivery and reduced intellectual function in the offspring. It is now well known that not only overt, but also subclinical hypothyroidism (SCH) has adverse effects on maternal and fetal outcome [2].

Fetal thyroid gland is not functional up to 12 weeks of gestation. Thyroid releasing hormone crosses the placenta to stimulate fetal thyroid, so maternal thyroid function is very important

during the first trimester [3]. The role of the thyroid gland in pregnancy and the impact of thyroid disorders on the course of pregnancy and development of the offspring have drawn a considerable interest in the recent years, both in the medical and in the general society [4, 5]. About 2 and 4% women suffer subclinical or overt- hypothyroidism. Increasing evidence suggests that subclinical hypothyroidism may be associated with *in vitro* fertilization failure, subfertility, infertility, spontaneous abortion, placental abruption, gestational hypertension, preeclampsia, preterm delivery, postpartum thyroid dysfunction, depression including postpartum depression, conversion to overt hypothyroidism, and impaired cognitive and psychomotor child development [6, 7]. Data from recently published studies have underscored the association between miscarriage and preterm delivery in women with normal thyroid function who test positive for thyroid peroxidase (TPO) antibodies. Prenatal and postnatal adverse effects including attention deficit and hyperactivity syndrome have been reported in children born to hypothyroid mothers [8, 9]. Therefore, the following study was undertaken to estimate the prevalence of hypothyroidism in pregnancy, including both overt and subclinical hypothyroidism and its impact on maternal and neonatal outcomes.

Materials & Methods

The present study was conducted on 380 pregnant women who came to Department of Obstetrics and Gynecology, Vijay Marie Hospital and Educational Society, Hyderabad, Telangana for antenatal checkup and met inclusion and exclusion criteria were enrolled in our study and followed till delivery.

All pregnant women were screened for hypothyroidism by doing FT4 and TSH levels at the first visit. If they are found to have high TSH values with low FT4 (overt hypothyroidism) or normal FT4 (subclinical hypothyroidism) they are started on thyroxin supplement. Repeat TSH and FT4 are done at 4-6 weeks to see response to treatment and dose is optimized accordingly.

Serum TSH and FT4 estimation was done by the sensitive chemiluminescent method in our hospital laboratory. Based on their TSH and FT4 report they were divided into 3 groups. Group I: pregnant females with overt hypothyroidism. Group II: pregnant females with subclinical hypothyroidism. Group III: pregnant females with Euthyroid status. Maternal and neonatal outcomes was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

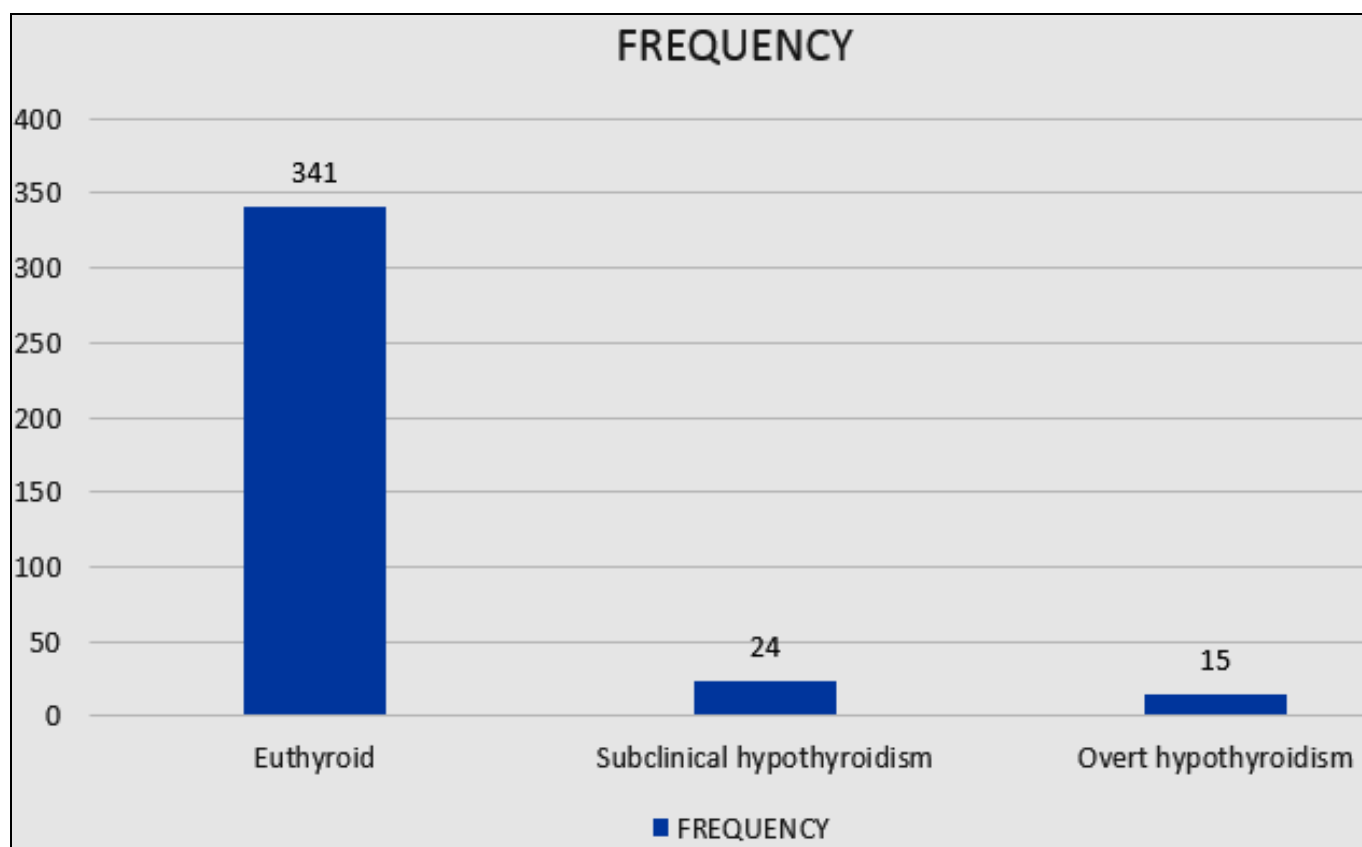
Results

Table 1: Prevalence of hypothyroidism in pregnancy

Thyroid status	Frequency	Percentage
Euthyroid	341	89.7
Subclinical hypothyroidism	24	6.2
Overt hypothyroidism	15	3.9
Total	380	100

Table 2, Graph 1 shows that out of 380 women in study group, 341 (89.7%) women were euthyroid, 24 (6.2%) had subclinical

hypothyroidism and 15 (3.9%) had overt hypothyroidism.



Graph 1: Prevalence of hypothyroidism in pregnancy

Table 2: Assessment of parameters

Parameters	Overt	Subclinical	Euthyroid	P value
FT4 level	0.47±0.13	1.13±0.20	1.13±0.19	0.05
TSH level	10.80±6.29	4.89±1.98	1.41±0.61	0.02
Gestational hypertension	31	7	5	0.03
Pre-eclampsia	26	3	4	0.05
Gestational diabetes mellitus	29	3	5	0.01
PROM	35	7	6	0.02
Preterm delivery	42	5	2	0.04
Spontaneous abortion	3	0	1	0.01
Anemia	27	5	4	0.02
1 minute APGAR score ≤ 7	19	2	3	0.04
intrauterine fetal death	18	7	5	0.03

The mean FT4 levels among mothers with overt hypothyroidism was 0.47 ng/dl. The mean FT4 levels among mothers with subclinical hypothyroidism was 1.13 ng/dl. The mean FT4 levels among mothers with overt hypothyroidism was 1.13 ng/dl. The mean TSH levels among mothers with overt hypothyroidism was 10.80 ng/dl. The mean TSH levels among mothers with subclinical hypothyroidism was 4.89 ng/dl. The mean TSH levels among euthyroid mothers was 1.41 ng/dl. Total 43 (11.3%) mothers developed gestational hypertension. Gestational hypertension was present in 9% Euthyroid mothers, 29.1% mothers with subclinical hypothyroidism and 33.3% mothers with overt hypothyroidism. Pre-eclampsia was present in 7.6% of Euthyroid mothers, 12.5% of mothers with subclinical hypothyroidism and 26.6% of mothers with overt hypothyroidism. Gestational diabetes mellitus was present in 8.2% of Euthyroid mothers, 12.5% of mothers with subclinical hypothyroidism and 33.3% of mothers with overt hypothyroidism. Premature rupture of membranes was present in 10.2% of Euthyroid mothers, 29.2% of mothers

with subclinical hypothyroidism and 40% of mothers with overt hypothyroidism. Preterm delivery was present in 12.3% of Euthyroid mothers, 20.8% of mothers with subclinical hypothyroidism and 13.3% of mothers with overt hypothyroidism. Spontaneous abortion was present in 3 (0.8%) Euthyroid mothers and 1 (6.6%) mother with overt hypothyroidism. No mother with subclinical hypothyroidism had spontaneous abortion. Anemia was present in 8% of Euthyroid mothers, 20.8% of mothers with subclinical hypothyroidism and 26.6% of mothers with overt hypothyroidism. 19 (5.6%) babies born to Euthyroid mothers, 2 (8.3%) babies born to mothers with subclinical hypothyroidism and 3 (20%) babies of mothers with overt hypothyroidism had 1 minute APGAR score ≤ 7. Among Euthyroid mothers 2 (0.6%) had intrauterine fetal deaths. Among mothers with subclinical and overt hypothyroidism 1 (4.2%) and 1 (6.7%) had intrauterine fetal death. The difference was significant ($p < 0.05$).

Table 3: Maternal outcomes

Parameters	Variables	LSCS	Normal delivery
Mode of delivery	Euthyroid (n=341)	78 (22.8%)	264 (77.2%)
	Subclinical hypothyroidism (n=24)	9 (37.5%)	15 (62.5%)
	Overt hypothyroidism (n=15)	8 (53.3%)	7 (46.6%)
Fetal distress	Euthyroid (n=341)	78 (22.8%)	11 (14.1%)
	Subclinical hypothyroidism (n=24)	9 (37.5%)	4 (44.4%)
	Overt hypothyroidism (n=15)	8 (53.3%)	5 (62.5%)

Fetal distress was the cause for LSCS in 14% of Euthyroid mothers, 44.4% of mothers with subclinical hypothyroidism. Latter was significantly higher when compared to Euthyroid mothers. Among 8 mothers with overt hypothyroidism who had LSCS, 62.5% had fetal distress. It was significantly higher when compared to Euthyroid mothers.

Discussion

Maternal overt hypothyroidism, subclinical hypothyroidism, and hypothyroxinemia are associated with adverse outcomes in pregnancy, including miscarriage, pregnancy-induced hypertension, preterm delivery, placental abruption, and impaired neuropsychological development of children^[10, 11]. The following study was undertaken to estimate the prevalence of hypothyroidism in pregnancy, including both overt and subclinical hypothyroidism and its impact on maternal and neonatal outcomes.

We found that out of 380 women in study group, 341 (89.7%) women were euthyroid, 24 (6.2%) had subclinical hypothyroidism and 15 (3.9%) had overt hypothyroidism. In a study by Abadi *et al.*^[12], the prevalence of hypothyroidism was 23.6% (95% CI: [19.4–27.8]). Overt DM (AOR=9.125, CI (3.106–26.812)), History of recurrent pregnancy loss (AOR=12.938, CI (4.958–33.763)), hypertension during pregnancy (AOR=6.718, CI (2.326–19.994)) and preterm delivery (AOR=7.015, CI (3.234–13.958)) were variables associated with hypothyroidism in pregnancy.

We found that the mean FT4 levels among mothers with overt hypothyroidism was 0.47 ng/dl. The mean FT4 levels among mothers with subclinical hypothyroidism was 1.13 ng/dl. The mean FT4 levels among euthyroid mothers was 1.13 ng/dl. The mean TSH levels among mothers with overt hypothyroidism was 10.80 ng/dl. The mean TSH levels among mothers with

subclinical hypothyroidism was 4.89 ng/dl. The mean TSH levels euthyroid mothers was 1.41 ng/dl. Total 43 (11.3%) mothers developed gestational hypertension. Gestational hypertension was present in 9% euthyroid mothers, 29.1% mothers with subclinical hypothyroidism and 33.3% mothers with overt hypothyroidism. Pre-eclampsia was present in 7.6% of euthyroid mothers, 12.5% of mothers with subclinical hypothyroidism and 26.6% of mothers with overt hypothyroidism. Gestational diabetes mellitus was present in 8.2% of euthyroid mothers, 12.5% of mothers with subclinical hypothyroidism and 33.3% of mothers with overt hypothyroidism. Dabar *et al.* [13] sixty-one studies were found eligible and included in this review. The pooled estimate of the prevalence of hypothyroidism in pregnant women was 11.07% (95% CI: 8.79–13.84, $I^2 = 99\%$). Pooled prevalence estimates of subclinical and overt hypothyroidism are 9.51% (95% CI: 7.48–12.04, $I^2 = 98\%$) and 2.74% (95% CI: 2.08–3.58, $I^2 = 94\%$).

We observed that premature rupture of membranes was present in 10.2% of euthyroid mothers, 29.2% of mothers with subclinical hypothyroidism and 40% of mothers with overt hypothyroidism. Preterm delivery was present in 12.3% of euthyroid mothers, 20.8% of mothers with subclinical hypothyroidism and 13.3% of mothers with overt hypothyroidism. Spontaneous abortion was present in 3 (0.8%) euthyroid mothers and 1 (6.6%) mother with overt hypothyroidism. No mother with subclinical hypothyroidism had spontaneous abortion. Anemia was present in 8% of euthyroid mothers, 20.8% of mothers with subclinical hypothyroidism and 26.6% of mothers with overt hypothyroidism. 19 (5.6%) babies born to euthyroid mothers, 2 (8.3%) babies born to mothers with subclinical hypothyroidism and 3 (20%) babies of mothers with overt hypothyroidism had 1 minute APGAR score ≤ 7 . Among euthyroid mothers 2 (0.6%) had intrauterine fetal deaths. Among mothers with subclinical and overt hypothyroidism 1 (4.2%) and 1 (6.7%) had intrauterine fetal death. Kumar *et al.* [14] found that overall prevalence of thyroid disorders in pregnancy was 33.9%, with hypothyroidism (31.6%) being more common than hyperthyroidism (2.3%). A significant association was found between thyroid disorders and feto-maternal complications (p value < 0.001). Adverse maternal effects observed in the hypothyroid group as compared to the euthyroid group were preeclampsia (14.7% vs. 5.6%), anemia (7.4% vs. 6.1%), abortion (7.4% vs. 0.5%) and meconium-stained liquor (5.3% vs. 2.5%). Abortion (71.4%) was the main complication in the hyperthyroid group.

The shortcoming of the study is small sample size.

Conclusion

This study showed a high prevalence of subclinical and overt hypothyroidism in pregnant women, with the prevalence of subclinical hypothyroidism being 6.4% and overt hypothyroidism being 2.8%. Due to the immense impact that the maternal thyroid disorder has on maternal and fetal outcome,

prompt identification of thyroid disorders and timely initiation of treatment is essential. Thus, universal screening of pregnant women for thyroid disorder should be considered especially in a country like India where there is a high prevalence of undiagnosed thyroid disorder.

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