RESEARCH ARTICLE

PREVALANCE AND FETOMATERNAL OUTCOME OF THYROID DISORDER IN PREGNANCY

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ABSTRACT
Background: Thyroid diseases are the commonest endocrine disorders affecting women of reproductive age group and hence constitute the commonest endocrine disorder in pregnancy also. 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 as well as interfere with ovulation and fertility. Thyroid dysfunction is often overlooked in pregnant women because of the nonspecific symptoms and the hyper metabolic state of pregnancy. Hence thyroid function test becomes essential to know the thyroid status in pregnancy and also to detect the subclinical disease.
Aims & Objective: To establish the prevalence and effect of thyroid disorder on pregnancy outcome.
Materials and Methods: The study is an observational study carried on 100 women coming for antenatal check-up in Private hospital, Ahmedabad from January 2011 to January 2012. All women who were included in this study were followed from 11-14 weeks of pregnancy up to delivery.
Results: It was observed that the maximum numbers of patients were in 21– 25 years (52%) age group. Euthyroid (87%), hyperthyroid (1%), subclinical hyperthyroid (2%), hypothyroid (2%), and subclinical hypothyroid (8%) cases were detected. Neonatal jaundice developed in all Hyperthyroid patient, 50% (1/2) of patients with Subclinical hyperthyroidism, 50% (1/2) of patients with Hypothyroidism, 75% (6/8) of patients with Subclinical Hypothyroidism and 48.27% (42/87) of patients with Euthyroid.
Conclusion: Gestational age specific reference intervals are of utmost importance by which clinicians can reliably evaluate thyroid function and monitor thyroxine replacement therapy in pregnant women. TPOAb (Thyroid peroxidase Antibody) positive patients are associated with an increased risk of abortion and these infants are more often born preterm. TSH is the hallmark in detection of hypothyroid as well hyperthyroid so TSH should be included in the list of routine investigations done in all antenatal women in first trimester. If TSH values are abnormal then FT3, FT4 and TPOAb need to be checked.
Key Words: Thyroid Disease; Pregnancy; Feto-Maternal Outcome; Prevalence

Introduction

Thyroid diseases are the commonest endocrine disorders affecting women of reproductive age group and hence constitute the commonest endocrine disorder in pregnancy also. 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 as well as interfere with ovulation and fertility.[1,2]

Maternal hypothyroidism is the most common disorder of thyroid function in pregnancy and has been associated with miscarriage, fetal loss, preeclampsia, preterm delivery, placental abruption, low birth weight, fetal distress and reduced intellectual function of the offspring. These adverse outcomes have been associated with both overt hypothyroidism found in about 0.2% of pregnancies as well as subclinical hypothyroidism found in about 2.3% of pregnancies.[3-6] Subclinical hyperthyroidism is found in 0.4% of pregnancies.[7] Maternal and fetal complications of hyperthyroidism include congestive heart failure, thyroid storm, hyperemesis gravidarum, preeclampsia, preterm delivery, fetal growth restriction, still birth, fetal and neonatal thyrotoxicosis.[8]

Autoimmune thyroid dysfunctions remain a common cause of both hyperthyroidism and hypothyroidism in pregnant women. Graves's disease accounts for more than 85% of all cases of hyperthyroid, whereas Hashimoto thyroiditis is the most common cause of hypothyroidism. Postpartum thyroiditis (PPT) reportedly affects 4-10% of women. PPT is an autoimmune thyroid disease that occurs during the first year after delivery. Usually it is manifested by 6 to 12 weeks postpartum. Women with PPT present with transient thyrotoxicosis, hypothyroidism, or transient thyrotoxicosis followed by hypothyroidism.

Thyroid dysfunction is often overlooked in pregnant women because of the nonspecific symptoms and the

hyper metabolic state of pregnancy.[9] Hence thyroid function test becomes essential to know the thyroid status in pregnancy and also to detect the subclinical disease.

Materials and Methods

Source Area: Private hospital in Ahmedabad

Study Design: Observational Study.

Sampling Method: 100 Antenatal patients between 11-14 weeks of gestation undergoing Antenatal Care follow up at private hospital in Ahmedabad.

Inclusion Criteria: All pregnant women between 11-14 weeks of pregnancy.

Exclusion Criteria: (i) Multi-fetal gestation; (ii) Known chronic disorder like diabetes and hypertension; (iii) Previous bad obstetric history

Method: The present study was conducted on 100 ANC women after obtaining informed consent selected from private hospital in Ahmedabad. These women were followed from 11-14 weeks up to term. A detailed history was taken regarding the symptoms and sign of thyroid disorders which included Menstrual, Obstetric, Past, Medical, Family, Personal history. A through general physical examination in which Pulse, BP, Temperature, Respiratory rate was noted followed by CVS, CNS, RS, Local thyroid examination. Per abdomen and per vaginal examination was also done. Patient's blood samples were sent for TSH, FT3, FT4 levels. TSH level >2.5 μU/ml then TPOAb was checked. In overt and subclinical hypothyroidism with or without TPOAb positive thyroxine dosage was titrated to maintain serum TSH <2.5 μU/ml in first trimester and < 3 μU/ml in second and third trimester. In overt hyperthyroidism PTU (propyl thiouracil) was given to the patient. Every 6-8 weekly TSH levels were estimated and the dose of drug adjusted accordingly. At the end, the obstetrical and perinatal outcome of pregnancy was noted. According to Marwaha et al. 2008 the following reference intervals for FT3, FT4 and TSH determined for each trimester of pregnancy are recommended for evaluation of thyroid status of pregnant Indian women.

American Thyroid Association 2011 recommended trimester-specific reference ranges for TSH are: (i) First trimester: 0.1–2.5 μU/mL; (ii) Second trimester: 0.2–3.0 μU/mL; (iii) Third trimester: 0.3–3.0 μU/mL.

Table-1: Pregnancy and thyroid related hormones

Hormones	Trimester		
	First	Second	Third
FT3 (pmol/L)	1.92–5.86	3.2–5.73	3.3–5.18
FT4 (pmol/L)	12–19.45	9.48–19.58	11.32–17.70
TSH (μU/ml)	0.6–5.0	0.44–5.78	0.74-5.70

So in this study following first trimester reference ranges of FT3, FT4,TSH are taken.-TSH- 0.1–2.5 μU/mL,FT3-1.92–5.86 pmol/L, FT4-12–19.45 pmol/L (FT3, FT4 and serum TSH were done by chemiluminescence immunoassay method).

Overt Hypothyroidism: This includes women with a TSH concentration above the trimester-specific reference interval (>2.5μU/ml) with a decreased FT4 (<12 pmol/L) and FT3 (<1.92 pmol/L), and all women with a TSH concentration >10.0 (μU/ml) irrespective of the level of FT4.

Subclinical Hypothyroidism: It is defined as a serum TSH between 2.5 and 10 (μU/ml) with normal FT4 and FT3 concentration.

After confirming high TSH abnormality (TSH>2.5), TPOAb measurement is a necessity for establishing presence of thyroid autoimmunity as a cause of mild subclinical hypothyroidism. The development of thyroid failure considered when higher concentration of TPOAb is present.

Increased levels of TPOAb is associated with (normal level TPO Ab-0 to 40) increased pregnancy failure rates, increased incidence of gestational thyroid dysfunction and pre-disposition to post-partum thyroiditis.

Hyperthyroidism: It is defined when TSH is low (<0.1μU/ml) and FT4 (>19.45 pmol/L) or FT3 (>5.86 pmol) is high.

Subclinical Hyperthyroidism: It occurs when FT4 (>19.45 pmol/L) or FT3 (>5.86 pmol) is high and TSH normal (0.1-2.5μU/ml).

Results

Overt or inadequately treated hypothyroidism is a risk factor of miscarriage and possibly preterm birth and fetal death. This study showed that in patients having overt hypothyroidism 50% (1/2) had IUD, 100% (2/2) developed preeclampsia, 100% (2/2) presented with preterm labour and 50% (1/2) had abruption.

Table-2: Characteristics of the Patients

Characteristics		N	%
Age Group (years)	18-20	23	23
	21-25	52	52
	26-30	20	20
	31-35	05	5
Parity	Primigravida	32	32
	Multigravida with previous viable pregnancy	56	56
	Multigravida with previous abortion (s)	12	12
Thyroid Status	Euthyroid	87	87
	Hyperthyroid	1	1
	Subclinical hyperthyroid	2	2
	Hypothyroid	2	2
	Subclinical hypothyroid	8	8

Table-3: TSH level & maternal and fetal outcome

		TSH (µU/ml)					
		< 0.1	0.1-2.5	2.6-5	5.1-7.5	7.6-10	> 10
No. of cases		1	89	6	2	1	1
Maternal	FTND (> 37 weeks)	0	39	3	0	0	0
	LSCS (> 37 weeks)	0	33	1	1	0	0
	VD (< 37 weeks)	0	8	0	0	0	1
	LSCS (< 37 weeks)	1	5	1	0	1	0
	Hyperemesis gravidarum	1	4	0	0	0	0
	Preeclampsia	1	12	1	1	1	1
	Abruption	0	2	1	0	0	1
	IUD	0	2	0	0	0	1
	Abortion	0	4	1	1	0	0
	Postpartum thyroditis	0	NA	1	0	1	0
Fetal	LBW	1	19	2	0	1	0
	Congenital anomaly	0	3	0	0	0	0
	Jaundice	1	43	4	1	1	0

Table-4: Thyroid peroxidase Antibody (TPOAb) & maternal and fetal outcome

		TPOAb	
		Positive	Negative
No. of cases		5	5
Maternal	FTND (> 37 weeks)	0	3
	LSCS (> 37 weeks)	2	0
	VD (< 37 weeks)	0	1
	LSCS (< 37 weeks)	2	0
	Hyperemesis gravidarum	0	0
	Preeclampsia	3	1
	Abruption	1	1
	IUD	0	1
	Abortion	1	1
	Postpartum thyroditis	2	0
Fetal	LBW	3	0
	Congenital anomaly	0	0
	Jaundice	4	2

Maximum numbers of patients were in 21– 25 years (52%) age group. This was the age group of peak reproductive period. Table 4 shows that out of 5 patients with positive TPOAb, 3 developed preeclampsia, 4 underwent LSCS outofwhich2 were preterm, 2 patients developed postpartum thyroiditis, 4 babies develop neonatal jaundice. All above complications were much lower in patients with negative TPOAb.

Discussion

On the basis of the results of this study, combined with those reported in the literature, some recommendations can be drawn. Gestational age specific reference ranges are of utmost importance because 8% of the patients would be missed for the diagnosis of subclinical hypothyroidism in this study. By gestational age specific reference intervals clinicians can reliably evaluate thyroid function and monitor thyroxine replacement therapy in pregnant women.

Overt or inadequately treated hypothyroidism is a risk factor of miscarriage and possibly preterm birth and fetal death (Abalovich et al. 2002, Allan et al. 2000).[4,20] This study showed that in overt hypothyroidism woman 50% (1/2) had IUD, 100% (2/2) developed preeclampsia , 100% (2/2) had preterm labour, 50% (1/2) had abruption. Another main previous finding is that the offspring of mothers with hypothyroidism have adverse neuropsychological outcome (Haddow et al. 1999) Pop et al. 2003, Henrichs et al. 2010).[6,20] Our results also show that mothers with TPOAb positive (50%), with hypothyroidism and subclinical hypothyroidism during pregnancy, have a very high incidence of subsequent thyroid disease, which would warrant routine check-up of these women later in their lives.

These findings indicate that adequate treatment of those with known hypothyroidism and reorganization of those at risk of progressing to overt hypothyroidism during pregnancy is to be recommended – preferably before pregnancy. It is recommended that those with overt hyperthyroidism, as defined by the new trimester-specific reference intervals, are treated and closely monitored, as the need for antithyroid therapy typically

Table-5: Thyroid status & maternal and fetal outcome

Maternal or fetal complication	Thyroid status				
	Euthyroid	Hyperthyroid	Subclinical Hyperthyroid	Hypothyroid	Subclinical Hypothyroid
Hyperemesis gravidarum (N=5)	3 (3.44%)	1 (100%)	1 (50%)	0	0
Preeclampsia (N=17)	11 (12.64%)	1 (100%)	1 (50%)	2 (100%)	2 (25%)
Preterm delivery (N=17)	13 (14.95%)	1 (100%)	0	1 (50%)	1 (12.50%)
Abruptio (N=4)	2 (2.30%)	0	0	1 (50%)	1 (12.50%)
Abortion (N=6)	4 (4.60%)	0	0	0	2 (25%)
IUD (N=3)	2 (2.30%)	0	0	1 (50%)	0
Fetal distress (N=15)	11 (12.65%)	0	1 (50%)	1 (50%)	2 (25%)
Neonatal jaundice (N=51)	42 (48.27%)	1 (100%)	1 (50%)	1 (50%)	6 (75%)

decreases as pregnancy progresses. The first few weeks of pregnancy are the most important time for brain development in the fetus and even subtle T4 deficiency in the mother may lead to poorer neuropsychological outcome.

Conclusion

By gestational age specific reference intervals clinicians can reliably evaluate thyroid function and monitor thyroxine replacement therapy in pregnant women. TPOAb positive are associated with an increased risk of abortion and these infants are more often born preterm. TSH is the hallmark in detection of hypothyroid as well hyperthyroid so TSH should be included in the list of routine investigations done in all antenatal women in first trimester. If TSH values are abnormal then FT3, FT4 and TPOAb need to be checked.

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