A Study on Evaluation of Thyroid Function in Pregnancy with Pregnancy Outcome in a Tertiary Care Centre

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ABSTRACT

BACKGROUND

Thyroid disease is the second most common cause of endocrine dysfunction in women of childbearing age. Foetus is dependent on maternal thyroxine and drugs that affect the maternal thyroid also affect the foetal gland.

METHODS

This is a prospective study, conducted in the Department of Obstetrics and Gynaecology, Institute of Maternal and Child Health, Medical College, Calicut, among pregnant women with abnormal TFT detected in the first trimester or early second trimester. Age, parity, type of thyroid dysfunction, symptoms and signs were recorded. Incidence of hyperemesis, previous abortions, and prolonged period of infertility were also recorded. Incidence of various maternal & foetal complication were studied.

RESULTS

Out of 131 cases, 77 were hypothyroid and 54 were hyperthyroid. Overt hypothyroid 51 cases were (38.9%), subclinical hypothyroid 26 (19.8%), overt hyperthyroid 39 (29.8%) and subclinical hyperthyroid 15 (11.5%). 40.5% of thyroid disorders complicating pregnancy occurred in the age group of 20-25 years. PIH (27.5%), anaemia (50%), IUGR (38.5%), Oligamnios (26%), were observed during antenatal period. Preterm labour (19.8%), LBW babies (38.2%), are also observed among these women. 20.6% babies needed NICU admission.

CONCLUSIONS

Thyroid dysfunction during pregnancy is quite common in our population. Hypothyroidism is more common than hyperthyroidism. Thyroid dysfunction during pregnancy especially hyperthyroidism is associated with hyperemesis & has to be detected by routine screening. Thyroid dysfunction may have adverse effect on infertility & RPL. Maternal complications like PIH, anaemia, oligamnios, preterm labour, & foetal complications like IUGR, LBW, NICU admission are also common in thyroid disorders complicating pregnancy.

KEYWORDS

Overt Hypothyroidism, Overt Hyper Thyroidism, Subclinical Hypothyroidism, Subclinical Hyper Thyroidism

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BACKGROUND

Thyroid disease is the second most common cause of endocrine dysfunction in women of childbearing age. Incidence of hypothyroidism in pregnant women is 2–3%, whereas about 0.1–0.4% of pregnant women are hypothyroid, of whom 0.3–0.5% have overt hypothyroidism and 2–2.5% present with subclinical hypothyroidism,[1] approximately 1 in 10 pregnant women develop antibodies to TPO or thyroglobulin during the first trimester and hypothyroidism develops in about 16% of these women. The incidence of thyroid autoimmunity (TAI) is around 5–10%.[2] Hypothyroidism is widely prevalent in pregnant women in a developing country like India, with prevalence rates ranging from 4.8% to 11%.[3] but the detection rate is not up to its magnitude.

The physiology of thyroid is very much modified during normal pregnancy which, help to prepare the maternal thyroid gland to cope with the metabolic demands of pregnancy. The size of the thyroid gland increases by 10-40% during pregnancy. There is a 50% increase in the production of thyroxine (T4) and triiodothyronine (T3), and a 50% increase in the daily requirement of iodine. Beta-Human chorionic gonadotropin has structural similarity with thyroid-stimulating hormone (TSH) which causes thyroid stimulation since the first trimester so that pregnant women have lower serum TSH concentrations than non-pregnant women.[4] The circulating levels of thyroid-binding globulin (TBG) are also increased due to oestrogen stimulation. Pregnancy induced physiological changes may themselves exacerbate or improve thyroid disorders. There are several important issues that must be considered when thyroid disorders occur during pregnancy. These include understanding normal thyroid physiology during pregnancy, establishing the diagnosis, treatment and neonatal complications.

There is an intimate relationship between maternal and foetal thyroid function. The foetal thyroid starts trapping iodine and synthesize thyroid hormones after 12 weeks of gestation. Up to this time it is dependent on the maternal stores as thyroid hormone is essential for physiological brain development of the foetus .Iodine is transferred across the placenta by active diffusion and passive transport. The anti-thyroid antibodies can cross the placenta and cause transient neonatal hypothyroidism. Drugs that affect the maternal thyroid also affect the foetal gland. It is important to maintain a maternal euthyroid status to prevent foetal complications. There is also a high risk of preterm birth, low birth weight, and respiratory distress in the neonate. Children born to hypothyroid mothers are found to have low IQ and attention deficit hyperactivity disorder.[5]

Many thyroid disorders are being diagnosed and treated during pregnancy and the obstetric outcome is good. Overt hypothyroidism and severe thyrotoxicosis are frequently encountered and are associated with anovulation and infertility. Women with hypothyroidism have increased risk of gestational hypertension, anaemia, abruptio placenta and postpartum haemorrhage.[6] Milder forms of both hypothyroidism and hyperthyroidism do not render a woman infertile, but they may still be associated with an increased risk of miscarriage. Hyperthyroidism can lead to pre-eclampsia, prematurity, low birth weight, intrauterine growth restriction, stillbirth, thyroid storm, and maternal congestive heart failure.

The most common and reliable test to diagnose thyroid dysfunction is serum TSH levels. The reliability of measuring Serum FT4 levels in pregnancy is low as it is influenced by increased TBG and decreased albumin concentrations.[7,8]

A detailed study contemplated to understand the clinical profile and maternal and foetal complications of thyroid disorders complicating pregnancy would help the treating doctor to institute appropriate therapy, follow up and monitor the patients during the course of treatment, guide him when and where to start as well as stop the treatment, to foresee the complications and manage them accordingly. The present study gives certain interesting disclosures supporting and contradicting various observation of the disease.

METHODS

This is a prospective study conducted over a period of one year in the Department of Obstetrics and Gynaecology, Institute of Maternal and Child Health, Medical College, Calicut.

Study Population

Pregnant women with abnormal TFT detected in the first trimester or early second trimester. Approval and informed consent were obtained from the patients before they participated in the study. Institutional approval for the study from the institutional research committee and its proforma were obtained following standard institutional research committee procedures. The upper limit for TSH was taken as 2.5 mIU/L in the first trimester, and 3.0 mIU/L in the second and third trimesters. The lower physiological limit was taken as 0.1 mIU/L in the first trimester, 0.2 mIU/L in the second, and 0.3 mIU/L in the third.[9] The reference range for FT3, and FT4 were taken as 0.27-3.34 (ng/100 mL), and 0.45-2.24 (ng/100 mL), respectively. Hypothyroidism was diagnosed by a high TSH level specific to each trimesters with low FT3 and FT4 levels. Similarly hyperthyroidism was diagnosed by low TSH with high FT3 and FT4 levels Subclinical hypothyroidism (SH) was diagnosed as normal FT4 levels with high TSH. Subclinical hyperthyroidism was diagnosed as a serum TSH concentration below the lower limit of reference range, with FT4 and FT3 concentrations within normal reference range. A total of 131 cases who were detected to have abnormal TFT were selected. Age, parity of the patient, type of thyroid dysfunction, symptoms and signs were recorded in a proforma.

Incidence of hyperemesis gravidarum, previous abortions and prolonged period of infertility were also recorded. Duration of treatment also noted in the study.

	Abortions		Infertility		PIH		IVGR		Oligamnios		Preterm Labour		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Overt hypothyroidism	29	61%	21	56.7%	20	47.6%	16	41%	12	35.2%	9	34.6%	51	38.9%
Subclinical hypothyroidism	6	12.7%	5	13.5%	5	11.9%	6	15.3%	7	20.5%	5	19.2%	26	19.8%
Overt hyperthyroidism	9	19.1%	8	21.6%	13	30.9%	15	38.4%	12	35.2%	10	38.4%	39	29.8%
Subclinical hyperthyroidism	3	6.3%	3	8.1%	4	9.5%	2	5.1%	3	8.8%	2	7.6%	15	11.5%
Total	47	100%	37	100%	42	100%	39	100%	34	100%	26	100%	131	100%

Table 1. Maternal Outcomes in Thyroid Disorder

Incidence of maternal complications like PIH, anaemia, oligamnios also noted. Incidence of IUGR, low birth weight babies, preterm labour were also studied. Neonatal TFT was checked and those having abnormal TFT were noted. Incidence of NICU admission and the indication for the same was also studied.

Exclusion Criteria

Pregnant women detected to have abnormal TFT in the late second trimester and third trimester were not included in the study. Pregnant women with normal TFT and those having collagen vascular disease and heart disease complicating pregnancy were also excluded.

Statistical Analysis

Data analysis was done by Epi Info Version 3.5 and SPSS 16. Data was analysed using chi square test and Fisher's exact size.

RESULTS

Out of 131 cases, 77 were hypothyroid and 54 were hyperthyroid. Overt hypothyroid 51 (38.9%), subclinical hypothyroid 26 (19.8%), overt hyperthyroid 39 (29.8%) and subclinical hyperthyroid 15 (11.5%). 40.5% of thyroid disorders complicating pregnancy occurred in the age group of 20-25 years. 38.9% of disease occurred in the age group of 26-30 years. 57.3% of cases were primigravida and 3.8% were parity 4 and above. Heat intolerance (18.3%) and fatigue (19.1%) was the common symptoms observed in hyperthyroid women. Cold intolerance was seen in 16.8% of hypothyroid women. Tachycardia was seen in 25.6% of overt hyperthyroid women and 13.3% of subclinical hyperthyroid cases.

Incidence of hyperemesis gravidarum was more among overt hyperthyroid group followed by subclinical hyperthyroid group. Abortions were more among overt hypothyroid group. Prolonged period of infertility was more among overt hypothyroid group (41.2%). 66.4% started treatment in the first trimester and 33.6% in the second trimester. PIH was observed in 27.5% of study group. Severe PE was observed in 4.6% of study group. Incidence of PIH was more in overt hyperthyroid group (30.8%).

Mild anaemia was observed in 50% of subclinical hypothyroid and almost equally distributed in both overt hypo and hyperthyroid group. Incidence of IUGR was more among overt hyperthyroid (38.5%) followed by overt hypothyroid (31.4%). Oligamnios was observed in 26% of study group. Preterm labour was observed in 19.8% of study group and the incidence was more in overt hyperthyroid.

Mode of delivery was LSCS in 29% of cases. Indication for LSCS was prolonged period of infertility in 24.2% cases of foetal distress in 6.1% cases. LBW was observed in 38.2% of study group. 99% of babies had Apgar >1'9. Neonatal TFT was abnormal in 2 cases. One in overt hypothyroid and other in overt hyperthyroid group. 20.6% of babies needed NICU admission. Indication for NICU admission was because of LBW (11.5%) and foetal distress (6.1%). There were 2 NND, one in overt hypothyroid group and other in overt hyperthyroid group. There were 2 anomalies, one in overt hypothyroid group and other in overt hyperthyroid group.

Disease	Number	Percentage
Overt hypothyroid	51	38.9
Subclinical hypothyroid	26	19.8
Overt hyperthyroid	39	29.8
Subclinical hyperthyroid	15	11.5
Total	**131**	**100**

Table 1. Distribution of Patients Based on Type of Disease

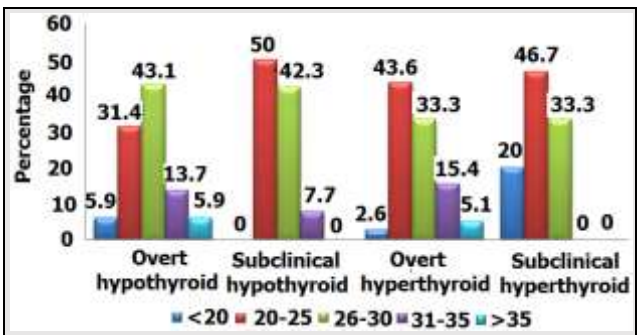

Figure 1. Age Distribution

40.5% of thyroid disorders complicating pregnancy occurred in the age group of 20-25 years. 38.9% of disease occurred in the age group of 26.30 years.

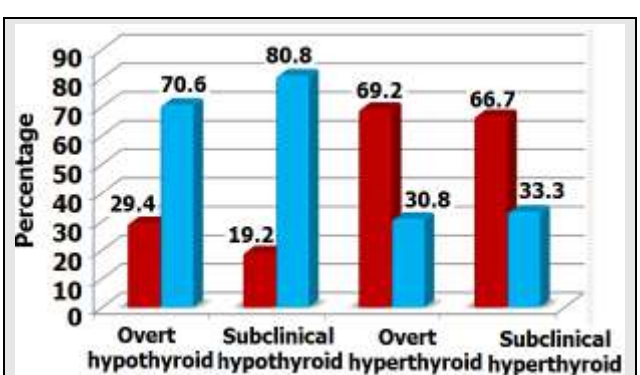

Figure 2. Hyperemesis Gravidarum

DISCUSSION

Thyroid disorders constitute one of the commonest endocrine disorders seen in pregnancy. The incidence of overt thyroid dysfunction in pregnant women is 1.3 per 1000 for hypothyroidism and 3.9 per 1000 for hyperthyroidism. Subclinical forms of thyroid disorders are more common in 23 per 1000 for hypothyroidism and 15 per 1000 for hyperthyroidism. Both maternal and foetal complications occur when thyroid function is deranged.

A total of 131 patients with thyroid dysfunction during pregnancy were evaluated during the study period of 1 year. Out of these, 77 cases were hypothyroid and 54 were hyperthyroid. Overt hypothyroidism is pregnancy is rare because of its association with anovulation and infertility.

The age wise distribution of thyroid disorders during pregnancy was analysed and found that 40.5% of thyroid disorders occurred in the age group of 20-25 years. Though there is no significant association between age and disease, this has led to the concept of screening for thyroid dysfunction. It is desirable to detect any disease in its early stage, especially if treatment would provide improvement in both quality and longevity of life to the affected person. This is comparable to study by Aziz Nuzhat et al[10] which also shared an increased incidence of thyroid dysfunction in pregnancy in the age group of 20-25 years.

Among 131 cases, 75 cases were primi gravida (57.3%) and only 5 cases were seen in parity 5 and above (3.8%). In the study of Aziz Nushat[10] 34.1% were primiparas and 8.07% were parity 5 and above.

Reports of Glinoer D, Larsen PR[11] 1999 had stated that physical findings in thyrotoxic patients are same as those of pregnant non-thyrotoxic subjects. The present study showed a definite significant association of fatigue, palpitation, heat intolerance, weight loss, tachycardia and tremor with thyrotoxicosis in pregnancy.

Presence of weight loss or failure to gain weight was the most significant single clinical finding which when taken in isolation stood as a predictor of thyrotoxicosis in pregnancy. This is well proven and reported in various studies. Cold intolerance was the most significant clinical finding observed in hypothyroid pregnant women.

This study showed a higher incidence of hyperemesis with hyperthyroidism especially overt hyperthyroidism which showed 69.2% association with hyperemesis. Presence of hyperemesis leading to weight loss should raise the possibility of thyrotoxicosis complicating pregnancy (Goodwin TM 1992,[12] Kmura et al 1993[13] and Tsurta E et al 1995).[14]

47 cases, out of 131 gave history of abortion previously (36%). Out of these, 4 cases (3.1%) were having 3 or more abortions previously. No direct evidence suggest that thyroid disease is disorders with recurrent miscarriage. However the presence of ant thyroid antibodies may represent a generalized autoimmune abnormality rather than a specific thyroid dysfunction.

Among 131 cases, 37 had infertility (28.2%). Infertility was more in the overt hypothyroid group. The relationship of infertility with thyroid dysfunction was overworked in a retrospective study in 299 infertility woman showing on over all prevailed of hypothyroidism (both subclinical and overt) of 4%.[15]

66.4% patients with thyroid disorders started treatment during the first trimester in our study. 33.6% started treatment in the second trimester. Amino N et al[16] described progressive improvement of hyperthyroidism during the course of gestation and postpartum exacerbation of the same. Both these phenomena were not observed in our population due to unknown reasons.

Maternal complications like gestational hypertension was observed in 27.5% and severe preeclampsia in 4.6% of population. A similar study showed that Gestational hypertension (eclampsia, preeclampsia and pregnancy induced hypertension) occurred more commonly in patients with overt and subclinical hypothyroidism than in the general population with rates of 22%, 15% and 7.6% respectively.[17]

The present study showed significant association of IUGR (29%), oligamnios (26%) and preterm labour with thyroid disorders. Larger studies are required to prove or disapprove this important observation.

The majority of babies had birth weight between 2500-3000 gms. The number of babies with birth weight less than 2000 gms was 9%. This is comparable to study by Aziz Nuzhat (9%). 13 babies had 1-minute Apgar less than 9. 27 babies needed NICU admission and the indication for NICU admission was high due to LBW followed by foetal distress.

Neonatal TFT was abnormal in 2 cases, 1 in overt hypothyroid and another in overt hyperthyroid. There were 2 NND and the cause was grade III MSAF, severe perinatal asphyxia and other NND was due to multiple congenital anomalies.

CONCLUSIONS

Thyroid dysfunction during pregnancy is quite common in our population, hypothyroidism being more common than hyperthyroidism. Subclinical thyroid disorders are widely prevalent in pregnant women and lead to increased incidence of pregnancy related complications. Thyroid disorders during pregnancy were found to be more common in the age group 20-25 years and in primiparas. Thyroid disorders during pregnancy especially hyperthyroidism is associated with hyperemesis and has to be detected early by routine screening in all cases of life-threatening hyperemesis and treated promptly to prevent maternal and foetal complications. The disturbances in thyroid function have diverse effects on infertility. Both hyper- and hypo-thyroidism cause infertility and recurrent pregnancy loss. Common maternal complications associated with thyroid dysfunction during pregnancy include PIH, anaemia, oligamnios and preterm labour. Foetal complications include IUGR, LBW, NICU admissions and lactational failure. Pregnancies with thyroid disorders need high-risk approach. Though TSH level slightly falls during first trimester, it is a good screening tool for thyroid dysfunction in pregnancy.

In our view, patients with high risk pregnancy should have thyroid screening done during pregnancy at the earliest. Careful antenatal and intrapartum foetal monitoring is necessary for a good maternal and foetal outcome in these patients.

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