INTERNATIONAL JOURNAL OF MEDICAL AND APPLIED SCIENCES
E-ISSN:2320-3137
Earthjournals Publisher
www.earthjournals.org

RESEARCH ARTICLE

PREVALENCE OF HYPOTHYROIDISM AMONG PREGNANT WOMEN IN MAHAKAUSHAL AREA AND ITS IMPACT ON MATERNAL AND FETAL OUTCOME

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Abstract

Hypothyroidism in pregnancy is associated with significant obstetrical and neonatal complication, which leads to increased maternal morbidity, perinatal morbidity and mortality. This prospective case control study was done to determine the current prevalence of thyroid dysfunction among pregnant women and its impact on maternal and fetal outcome. 250 pregnant women were included in study. Serum TSH level estimation was performed at their first antenatal visit irrespective of trimester and repeated in subsequent trimesters and once in puerperium, 6 weeks after. Trimester specific reference ranges of TSH were considered to evaluate the thyroid status. Free T4 level was done in women with high TSH. The statistical differences between variables were compared by Chi-square test (P value). The prevalence of hypothyroidism was 23.6 %, out of which 21.6% were subclinical and 2% were overt hypothyroid. Adverse maternal effects in overt hypothyroidism included preeclampsia (60 vs. 6% P<0.0001), severe anaemia (80 vs 7.7% P=0.007), increased caesarean section rate (60 vs 16.1% P=0.042). Adverse fetal outcomes were low birth weight (80 vs 10.8%) and increased NICU admission (80 vs 17.1%). Subclinical hypothyroidism was associated with preeclampsia (26.8 vs 6%), prolonged labour (24.3 vs 9.5%), increased caesarian section rate (22.5 vs 16.1%), low birth weight (26.1 vs 10.8%) and increased NICU admission (27.5 vs 17.1%) as compared to the euthyroid women. High prevalence and multitude of adverse outcomes are linked to untreated and inadequately treated hypothyroidism during pregnancy. Thus it is worthwhile screening for thyroid dysfunction in pregnancy.

Keywords: Fetal outcome, Maternal outcome, Pregnancy, Thyroid dysfunction

INTRODUCTION

During the last 20 years, it has been observed that thyroid physiology changes significantly during gestation. [1] Pregnancy is the period of great physiological stress for both mother and fetus. However, if any endocrine disorder like thyroid disorder is associated with pregnancy, the potential for maternal and fetal adverse outcomes can be immense. Thyroid disorders constitute one of the most common endocrine disorders in pregnancy [2]. Among thyroid disorders, hypothyroidism is more common than hyperthyroidism. Hormonal changes and metabolic needs during pregnancy result in profound alterations in thyroid gland function. Factors included like increase of thyroxine binding globulin (TBG) due to elevated estrogen and human chorionic

gonadotropin (hCG), increased renal losses of iodine due to increased glomerular filtration rate, modifications in the peripheral metabolism of maternal thyroid hormones, and modification in iodine transfer to the placenta.[3] Hypothyroidism in pregnancy is associated with significant obstetrical and neonatal complication, which leads to increased maternal morbidity, perinatal morbidity and mortality. An apparent increase in incidence of thyroid dysfnctions in pregnancy may be due to following reasons- Increasing maternal age at the time of conception, increasing awareness, easy availability of tests and its low cost.

METHODS

This prospective case control study conducted in the period from June 2013 to October 2014, in the department of obstetrics and gynecology, NSCB Medical College & Hospital, Jabalpur. Ethical clearance from the institutional ethical committee has been taken. Pregnant women coming to the OPD at their first visit (in whichever trimester they presented to us) were briefed about the study and their verbal consent was taken to get enrolled in the study. 250 pregnant women got enrolled in the study. Detailed history and examination was done. Apart from routine obstetrical investigations, serum TSH level estimation was done. In patients with deranged TSH, Free T4 test was done. TSH level repeated once in each trimester and once in puerperium after 6 weeks. Women were followed up and outcome of the pregnancy studied. Patients previously diagnosed and on treatment were also included in the study. Assay for TSH was performed using Ultrasensitive sandwich chemiluminescent immune method. For free T4 level estimation Competitive chemiluminescent immune assay was used.

Results of TSH level were obtained, correlated with gestation period and for purpose of observation, subjects were divided into three groups as per guideline of American thyroid association (ATA)

Group 1: Euthyroid, defined as TSH value in first trimester, 0.1–2.5 mIU/L; second trimester, 0.2–3.0 mIU/L; third trimester, 0.3–3.0 mIU/L
Group 2: Subclinical hypothyroidism, defined as high TSH >2.5µIU/l in first trimester and >3.0 µIU/l in second trimester) in the presence of normal levels of Free T4 (0.8–2.0 ng/dl)
Group 3: Overt hypothyroidism, defined as an elevated TSH (>2.5µIU/l in first trimester and >3.0 µIU/l in second trimester) in conjunction with a decreased FT4 concentration. Women with TSH levels of 10.0mIU/L or above, irrespective of their FT4 levels, are also considered to have overt hypothyroidism.

Patients diagnosed with hypothyroidism (both subclinical and overt) were put on appropriated dosage of levothyroxine treatment and dose adjusted till TSH returned to normal, as per the endocrinologist's opinion.

The statistical differences between variables were compared by Chi-square test (P value).

RESULTS

Serum TSH level was normal in 76.4% women. 23.6% had deranged thyroid function, all of them were hypothyroid, making the prevalence of hypothyroidism 23.6%, out of which, 2 % had overt hypothyroidism and 21.6 % had subclinical hypothyroidism. Majority of women belonged to 20-30 years of age group, which corresponds with the age of maximum fertility. Mean age of women in euthyroid, subclinical hypothyroid and overt hypothyroid group was 25±2.7, 25±3.2 and 25±5.6 years. (Table 1)

Majority of subjects in the euthyroid group (57.6%) as well as in the subclinical and overt hypothyroid group (50% & 60%) were nulliparous, and this difference was not significant statistically. (Chi square = 0.794; P=0.648) (Table 1)

Out of 250 subjects enrolled in study, 36 were lost during follow up and 13 were remained undelivered. So outcome of pregnancy in these women could not be elicited.

Incidence of severe anaemia was higher in women of subclinical hypothyroidism group (13.5% vs 7.7%) but the difference was not statistically significant. Incidence of severe anaemia was significantly higher in women of overt hypothyroidism group (80% vs 7.7%) (P=0.007). 26.8% women with subclinical hypothyroidism and 60% with overt hypothyroidism developed PIH/pre eclampsia, while in women of euthyroid group, only 6% developed PIH/pre eclampsia and this difference was statistically significant for both subclinical and overt hypothyroidism. (P<0.0001) labor was prolonged in 9.5% and normal in 90.5% of women from euthyroid group, while in women with subclinical hypothyroidism it was prolonged in 24.3% and normal in 75.6%. This analysis showed statistically significant association between subclinical hypothyroidism and prolonged duration of labor with P=0.0113 (Table 2)

83.9% of euthyroid women were delivered vaginally and 16.1% by caesarian section, while in women with subclinical hypothyroid, 77.5% delivered vaginally and 22.5% by caesarian section and in women with overt hypothyroidism 40% delivered vaginally and 60% by caesarian section. This analysis showed that requirement of caesarian section was statistically more in hypothyroid cases with Chi square 0.035 p= 0.042 and this difference was statistically significant. (Table 2)

In our study no difference was found in history of abortion in previous pregnancy between euthyroid and hypothyroid women. (p >0.05). (Table 3)

In euthyroid women 90.5% women delivered at term and 9.5% before term, while in subclinical hypothyroid group 90.2% delivered at term and 9.8% before term and in women with overt hypothyroidism 80% delivered at term and 20% before term. This difference was not statistically significant(chi square 0. 61 P=0. 63). That hypothyroidism predisposes to underweight new born was found in our study which showed birth weight was low in 10.8% and normal in 89.2% of women in euthyroid group, while among subclinical hypothyroid group 26.1% babies were of low birth weight and 73.9% were normal birth weight and among overt hypothyroid group, 80% babies were of low birth weight and only 20% were normal birth weight. This analysis was statistically significant (chi square .010 P=.015). in euthyroid women, 96.1% delivered live baby, 2.6% had spontaneous abortion and 1.3% had intra uterine death. In women with subclinical hypothyroidism, 91.8% delivered live baby, 6.1% had spontaneous abortion 2% had intra uterine death and in women with overt hypothyroidism, 100% delivered

live baby thus the relation of hypothyroidism could not be related to adverse fetal outcome, however overt hypothyroid cases were small in number (n=5, 2%). This analysis revealed no statistically significant difference in fetal outcome with chi square 0.683, P=0. 402. This study depicts that in euthyroid group, 17.1% of babies were admitted in NICU. While in subclinical hypothyroid group 27.5% and in overt hypothyroid group 80% of babies were admitted in NICU. This difference was statistically significant (Chi square1.86, P= 0.003) (Table 3)

Major indications for NICU admission of newborns were as follows:

Respiratory distress syndrome- 6.2% in euthyroid, 15.5% in subclinical hypothyroid and 40% in overt hypothyroid),

Hyperbilirubinemia- 8.5% in euthyroid, 11.9% in subclinical hypothyroid and 60% in overt hypothyroid),

Sepsis- 3.9% in euthyroid, 7.1% in subclinical hypothyroid and none in overt hypothyroid),

This analysis depicts that neonatal complications were significantly increasing with severity of hypothyroidism.

Figure 1

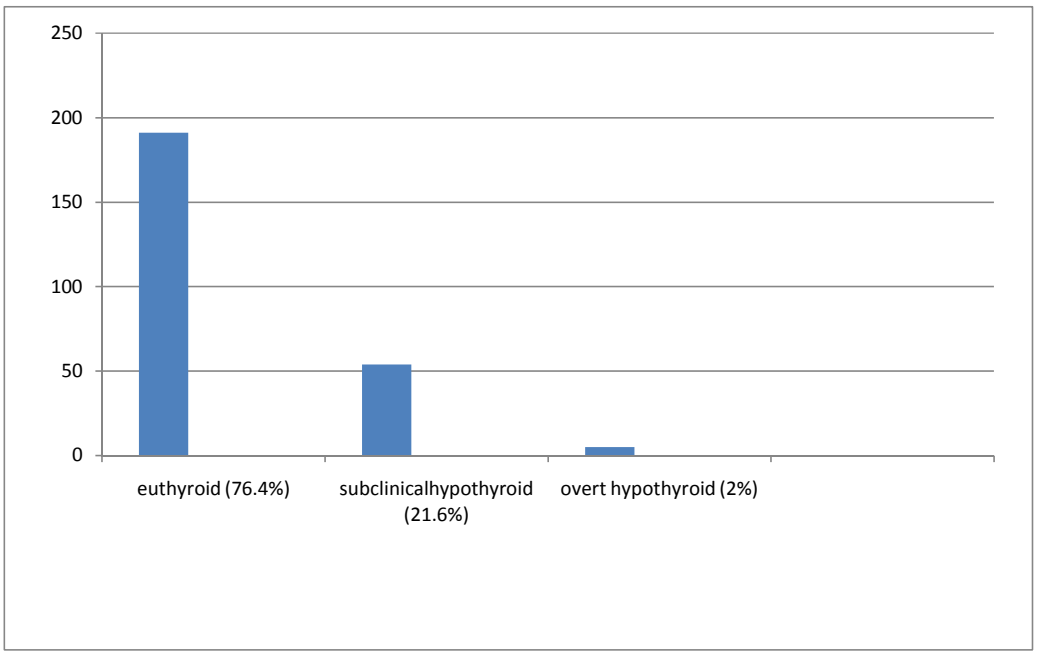

Table 1: Comparison of the socio-demographic characteristics of the subjects (n=250).

	Euthyroid	Subclinical	Overt
Age (years)			
<20	46(24.1%)	13(24.1%)	2(40.0%)
20-30	135(70.7%)	38(70.4%)	2(40.0%)
30-40	10(5.2%)	3(5.6%)	1(20.0%)
>40	0(0%)	0(0%)	0(0%)
Location			
Rural	51(26.7%)	20(37.0%)	2(40.0%)
Urban	140(73.3%)	34(63.0%)	3(60.0%)

Table 2: Comparison of the maternal outcomes of the subjects

	Group A	Group B	Group C
Severe anaemia	9 (7.7%)	5 (13.5%)	3 (60%)
Preeclampsia	9 (6%)	11 (26.8%)	3 (60%)
Prolonged labour	14 (9.5%)	10 (24.3%)	1 (20%)
Caesarian section	24 (16.1%)	9 (22.5%)	3 (60%)

Table 3: Comparison of the neonatal outcomes of the subjects

	Group A	Group B	Group C
Preterm	14 (9.5%)	4 (9.8%)	1 (20%)
Low birth weight	16 (10.8%)	8 (19.5%)	4 (80%)
Spontaneous abortion	4 (2.6%)	3 (6.8%)	0 (0.00%)
IUD	2 (1.3%)	1 (2.3%)	0 (0.00%)
NICU admission	25 (17.1%)	11 (27.5%)	4 (80%)

DISCUSSION

Prevalence of hypothyroidism during pregnancy has a wide geographic variation. Data from western countries indicates that overt hypothyroidism complicates up to 0.3-0.5% pregnancies subclinical hypothyroidism prevalence is estimated to be 2.5 %. [(1)] There are few data available from India about the prevalence of thyroid disorder in pregnancy.

In present study the prevalence of hypothyroidism was 23.6%, out of which, 2 % had overt hypothyroidism and 21.6 % had subclinical hypothyroidism.

In one study done by Diganta Das et al in lower area of Assam, found that more than 50 % pregnant women in first trimester was suffering from hypothyroidsm.[4]

Dhanwal et al. (2013) conducted a study at Maulana Azad Medical College, New Delhi, India, in which prevalence of hypothyroidism in first trimester was found to be 14.3%, out of which 13.5% was subclinical and 0.8% were overt hypothyroid. [5]

In study of Ajmani et al (2014) done in pregnant women between 13 and 26 weeks of gestation, prevalence of hypothyroidism was 12 %, out of which 3 % had overt hypothyroidism and 9 % had subclinical hypothyroidism.[6]
Dave et al (2014) studied hypothyroid cases in Madhya Pradesh, and found prevalence of hypothyroidism was 9.8%. [7]
Another study done by Abhishek Singhai, Vishal Yadav in pregnant women of Malwa region of India, 9% women had sub clinical hypothyroidism and 4% women had overt hypothyroidism. [8]
Iodine Deficiency affects 38% of worldwide population. Most common cause of hypothyroidism in developing countries like India is iodine deficiency. Hashimoto thyroiditis is the most common cause of hypothyroidism in iodine sufficient areas. [9]

Thyroid diseases are prevalent in women of child-bearing age and for this reason commonly present in pregnancy and the puerperium. [10] Uncorrected thyroid dysfunction in pregnancy has adverse effects on fetal and maternal well-being. The deleterious effects of thyroid dysfunction can also extend beyond pregnancy and delivery to affect neurointellectual development in the early life of the child.

The fetus is able to produce thyroid hormones by 8 to 10 weeks' gestation, but prior to that time, is totally dependent on maternal thyroid hormones. Thyroid hormone is critical for normal fetal brain development: neuronal multiplication, migration, and structural organization. These processes occur mainly during the second trimester when the fetus is primarily supplied with maternal thyroid hormones.[11] . A lack of adequate maternal thyroid hormone may have irreversible effects on the fetus.[12] It can lead to the disruption of normal brain growth and the development of brain damage, manifesting itself in a variety of ways, such as poor cognitive development, mental retardation, and cerebral palsy.[13,14]

Hypothyroidism in pregnancy is associated with higher risk of obstetrical complications like miscarriage, anemia, gestational hypertension, abruption placenta, increase risk of cesarean section, postpartum hemorrhage, postpartum depression and neonatal complication like-

premature birth, fetal low birth weight and neonatal respiratory distress, which leads to increased maternal morbidity, perinatal morbidity and mortality

To meet the challenge of increased metabolic needs during pregnancy, the thyroid adapts through changes in thyroid hormone economy and in the regulation of the hypothalamic- pituitary-thyroid axis. [15] Consequently, thyroid function test results of healthy pregnant women differ from those of healthy nonpregnant women. This calls for pregnancy specific and ideally trimester-specific reference intervals for all thyroid function tests but in particular for the most widely applied tests, TSH and free T4 (FT4).

Use of TSH for diagnosis of thyroid dysfunction is widely reproducible, reliable and not expensive, but evaluation of the results requires trimester specific reference ranges . [16] Upper limit for TSH should be 2.5 mIU/L in the first trimester, and 3.0 mIU/L in the second and third trimesters. Furthermore, the lower physiological limit could be 0.1 mIU/L in the first trimester, 0.2 mIU/L in the second, and 0.3 mIU/L in the third. [17] TSH and free T4 are the best tests to screen and diagnose hypothyroidism in pregnancy. Monitoring is also done by TSH and free T4 level estimation.

Anti TPO antibody has doubtful value in diagnosis.

CONCLUSION

In India prevalence of hypothyroidism in pregnancy is much higher compared to western countries. Prevalence varies widely among various states in India, as we still face iodine deficiency in many parts of the country. Our study showed very high prevalence of hypothyroidism in Mahakaushal area of Madhya Pradesh in India. With our work we would like to conclude that both subclinical and overt hypothyroidism is significantly associated with adverse maternal and fetal outcomes.

We also concludes that inspite of great discrepancies in recommendations on universal screening of hypothyroid dysfunction in pregnancy, high prevalence of hypothyroidism in our country and its great impact on maternal and fetal health makes it necessary to screen all the pregnant women in early gestation as per Indian Thyroid Society guidelines.

LIMITATIONS OF STUDY-

1. Due to small numbers of women with different thyroid classes, mainly in overt group we could not generalized the finding for population.
2. Anti TPO antibody testing was not done because this test was not available in our institute.

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