Prevalence of thyroid dysfunction and its effects on fetomaternal outcome in pregnant women of Eastern Uttar Pradesh, India

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INTRODUCTION

Thyroid dysfunction constitutes as a major problem in women of childbearing age, which has an important implication in pregnancy and the puerperium for both mother and the baby. The most frequent thyroid disorder in pregnancy is maternal hypothyroidism. It can lead to premature birth, preeclampsia, increased fetal mortality and low birth weight.1-4 Maternal hypothyroidism in the first trimester of pregnancy may be harmful to fetal brain development and lead to mental retardation.5,6 In pregnancy, overt hypothyroidism is seen in 0.2% cases and subclinical hypothyroidism in 2.3% cases. Fetal loss, fetal growth restriction, preeclampsia and preterm delivery are the usual complications of overt hyperthyroidism seen in 2 of 1000 pregnancies whereas mild or subclinical hyperthyroidism is seen in 1.7% of pregnancies and not associated with adverse outcomes.

The prevalence of thyroid disorders during pregnancy has a wide geographical variation. Western literature shows a prevalence of hypothyroidism in pregnancy of 2.5% and hyperthyroidism in pregnancy has a prevalence of 0.1 to 0.4%.7 There is paucity of data on prevalence of thyroid disorders in Indian pregnant women; few reports show a prevalence of 4.8 to 11% amongst Indian pregnant population.8,9 So, this study was designed to determine the prevalence of thyroid dysfunction during early pregnancy and to evaluate the feto-maternal outcome in Eastern Uttar Pradesh.
METHODS

This prospective observational study was carried out in the Department of Obstetrics and Gynecology, BRD Medical College, Gorakhpur over a period from August 2016 to July 2017. All antenatal women >18 years of age attending Department of Obstetrics and Gynecology for antenatal care with gestational age ≤ 20 weeks, singleton pregnancy, irrespective of their gravida status (primigravida or multigravida) were included in the study. Women with multifetal gestation, pre-existing thyroid dysfunction, renal, hepatic or any other chronic illness, previous bad obstetric history with known cause were excluded from the study. Detailed history was taken focusing on symptoms of thyroid disorders, menstrual history and obstetric study. Thorough physical examination was done giving emphasis on clinical examination of thyroid and obstetrical examination. Blood grouping and Rh typing, complete blood examination, liver function test, renal function test, fasting glucose levels, serum electrolytes, complete urine examination, HIV, HBsAg, ultrasound scan of abdomen, FT3, FT4 and serum TSH levels were assessed in all the selected patients.

The reference ranges of the test values used in this study were as per the Guidelines of American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. As per regulation of 14.2 of ATA Guidelines, if trimester specific ranges for TSH are not available in the laboratory, the following normal reference ranges are recommended: 1st trimester-0.1 to 2.5 m IU/ml, 2nd trimester-0.2 to 3.0 m IU/ml and 3rd trimester- 0.3 to 3.0 m IU/ml. Normal free T4 level is 0.7 to 0.8 n/ml and free T3 level is 1.7 to 4.2 pg/ml. Depending on hormone values patients were classified into:
- Subclinical hypothyroidism-High serum TSH level with normal fT4 and fT3 level.
- Overt hypothyroidism-High serum TSH level with fT4 and fT3 less than normal range.
- Subclinical hyperthyroidism-Low serum TSH level with normal fT4 and fT3 level.
- Overt hyperthyroidism-Low serum TSH level with fT4 and fT3 more than normal range.

Subclinical/ overt hypothyroid cases were treated with Thyroxine. Subclinical/ overt hyperthyroid cases were treated with Propylthiouracil. Every 4 weeks, TSH level was estimated and the dose of the drug was adjusted. Patients were followed up until delivery and the pregnancy and fetal outcome were documented. An informed consent was obtained from every participant and the study was ethically approved by Institutional Ethical Committee.

RESULTS

In the current study, 152 out of 720 pregnant women screened had thyroid disorders. The prevalence of thyroid disorders in the present study was 21.11%. The prevalence of subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism and overt hyperthyroidism was 15.9%, 2.7%, 1.6% and 0.5% respectively (Table 1).

Table 1: The categories of thyroid dysfunction during pregnancy.

| Categories                  | No. of cases | %    | TSH levels mean±SD | BMI mean±SD |
|-----------------------------|--------------|------|--------------------|-------------|
| Subclinical hypothyroidism  | 115          | 15.9 | 4.53±1.42          | 23.46±1.6   |
| Overt hypothyroidism        | 20           | 2.7  | 8.96±3.46          | 24.67±1.4   |
| Subclinical hyperthyroidism | 12           | 1.6  | 0.024±0.016        | 22.76±1.0   |
| Overt hyperthyroidism       | 5            | 0.5  | 0.012±0.008        | 21.82±1.2   |

Thus, hypothyroidism was found to be more common than hyperthyroidism. Amongst the patient with thyroid dysfunction, subclinical hypothyroidism was the most common thyroid disorder. In the present study, the mean BMI was 23.46±1.6 Kg/m² for subclinical hypothyroid, 24.67±1.4 Kg/m² for overt thyroid, 22.76±1.0 Kg/m² for subclinical and 21.82±1.2 Kg/m² for overt hyperthyroid patients. The obese women had higher TSH concentration and were prone to develop hypothyroidism than normal weight women. The mean TSH level in cases of subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism and overt hyperthyroidism was 4.53±1.42 m IU/ ml, 8.96±3.46 m IU /ml, 0.02±0.016 m IU/ ml and 0.012±0.008 m IU /ml respectively. The mean age of antenatal women was 24.8±4.09 years and majority of them were multigravida (Table 2). 60.83 % of women were illiterate, 29.44 % had primary education and 9.72% had secondary education. Most of them were Hindus (80.27%) while 19.7% belonged to Muslim religion. 84.02% women were from rural area and 15.97% were from urban area. Mean gestational age was found to be 11.2±3.92 weeks. In the current study most, common complication observed in subclinical hypothyroidism was preeclampsia (9.56%) followed by preterm delivery (7.82%) and abortions. However, in overt hypothyroidism the incidence of preeclampsia, preterm delivery and abortions was 20%, 10% and 5% respectively.
Major fetal complications in hypothyroid mothers (subclinical as well as overt) were intrauterine growth restriction (IUGR), low birth weight and stillbirth.

Table 2: Sociodemographic profile of pregnant women.

| Variables               | No. of cases | %  |
|-------------------------|--------------|----|
| Age (years)             |              |    |
| ≤25                     | 446          | 61.94 |
| 26-30                   | 202          | 28.05 |
| 31-35                   | 72           | 10   |
| Educational status      |              |    |
| Illiterate              | 438          | 60.83 |
| Primary                 | 212          | 29.44 |
| Secondary               | 70           | 9.72 |
| Food habits             |              |    |
| Vegetarian              | 446          | 61.94 |
| Non-vegetarian          | 274          | 30.05 |
| Gravidity               |              |    |
| Primigravida            | 286          | 39.7 |
| Multigravida            | 434          | 60.27 |
| Gestational age         |              |    |
| < 12 weeks              | 440          | 61.11 |
| ≥ 12 weeks              | 280          | 38.89 |
| Religion                |              |    |
| Hindu                   | 578          | 80.27 |
| Muslim                  | 142          | 19.7 |
| Geographical distribution|             |    |
| Rural                   | 605          | 84.02 |
| Urban                   | 115          | 15.97 |

Out of 12 cases of subclinical hyperthyroidism, two patients developed preeclampsia, one had preterm delivery and one case had abortion.

Table 3: Maternal and fetal complications in hyperthyroidism.

| Complications                        | No. of cases | %  |
|--------------------------------------|--------------|----|
| Maternal complications of subclinical hyperthyroidism |              |    |
| Preeclampsia                         | 11           | 9.56 |
| Preterm delivery                     | 9            | 7.82 |
| Abortions                            | 5            | 4.3  |
| Abruptio placenta                    | 2            | 1.7  |
| Fetal complications of subclinical hyperthyroidism |              |    |
| IUGR                                 | 8            | 6.9  |
| Low birth weight                     | 4            | 3.48 |
| Still birth                          | 2            | 1.7  |
| Maternal complications of overt hyperthyroidism |              |    |
| Preeclampsia                         | 3            | 20   |
| Preterm delivery                     | 2            | 10   |
| Abortions                            | 1            | 5    |
| Abruptio placenta                    | 1            | 5    |
| Fetal complications of overt hyperthyroidism |              |    |
| IUGR                                 | 2            | 10   |
| Low birth weight                     | 2            | 10   |
| Still birth                          | 1            | 5    |

Major fetal complications in subclinical hyperthyroid patients were IUGR (16.6%), and stillbirth (8.33%).

Table 4: Fetomaternal outcome in hyperthyroid patients.

| Outcome                                                   | No. of cases | %  |
|-----------------------------------------------------------|--------------|----|
| Maternal complications of subclinical hyperthyroidism     |              |    |
| Pre-eclampsia                                            | 2            | 16.6 |
| Preterm delivery                                         | 1            | 8.33 |
| Abortions                                                | 1            | 8.33 |
| Fetal complications of subclinical hyperthyroidism        |              |    |
| IUGR                                                      | 2            | 16.6 |
| Stillbirth                                               | 1            | 8.33 |
| Maternal complications of overt hyperthyroidism           |              |    |
| Abortion                                                 | 3            | 60   |

DISCUSSION

Thyroid disorders are one of the most common endocrine disorders in women during pregnancy and are associated with adverse maternal and fetal outcomes in pregnancy. However, an early detection of thyroid dysfunctions and treatment of mother during gestation improves the outcome. Prevalence of thyroid dysfunction during pregnancy varies from 2.6-10%. However, some studies done in India, Dhanval et al and Ajmani et al have reported higher prevalence of thyroid dysfunction in pregnancy (14.5% and 12% respectively). The higher prevalence of iodine deficiency could have been the reason for these figures among pregnant women in India. However, the current study demonstrated even higher prevalence of thyroid dysfunction (21.11%) among pregnant mothers. This is comparable to the study performed by Bajaj et al and Rajput et al who found a prevalence of 24.07% and 26.5% respectively.

In the present study, the prevalence of subclinical hyperthyroidism is 15.9% and overt hyperthyroidism is 2.7%. This is in accordance to the study performed by Bajaj S et al who showed a prevalence of subclinical hyperthyroidism 18.9 % and overt hyperthyroidism 2.46%. Sahu et al have done thyroid function test in second trimester and reported prevalence of thyroid disorders, especially overt and subclinical hyperthyroidism to be 6.47%. Various reasons have been proposed for increased prevalence of hypothyroidism in pregnancy in Asia. Increased iodine intake in diet, presence of goitrogens in diet as reported from studies in India, deficiency of micronutrients like Selenium and iron are some of the reasons ascribed to the high hypothyroidism prevalence in India.

In the current study, the prevalence of subclinical hyperthyroidism was 1.6% which was comparable to the study performed by Thanuja et al (1.3%). Prevalence of overt hyperthyroidism was found to be 0.5% which was in accordance to the study conducted by Taghvi et al (0.6%) and Ajmani et al (0.5%). The mean age at presentation is lower (24.8±4.09 years) compared to the
ACKNOWLEDGMENTS

Authors would like to thank Dr. Shaila Mitra, Head of Department of Pathology, BRD Medical College, Gorakhpur for the support during study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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CONCLUSION

This study concludes that there is a high prevalence of hypothyroidism 21.11%, majority being subclinical in pregnancy. Universal screening for thyroid function and timely and appropriate treatment will improve pregnancy outcome.
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Cite this article as: Kumari A, Srivastav R, Mitra S. Prevalence of thyroid dysfunction and its effects on fetomaternal outcome in pregnant women of Eastern Uttar Pradesh, India. Int J Reprod Contracept Obstet Gynecol 2018;7:4379-83.