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Original Research Article

Prevalence of thyroid dysfunctions in pregnant women: a prospective study in a tertiary care hospital in Maharashtra, India

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ABSTRACT

Background: Thyroid dysfunction is known to be the commonest endocrinological disorder in pregnancy. A range of adverse outcomes in pregnant women and the fetus have been reported. These can be prevented if the thyroid dysfunction is diagnosed and treated as early as possible. There are limited studies conducted on the prevalence of thyroid dysfunction in pregnancy in India. Hence, this study was conducted for assessment of the prevalence of thyroid dysfunction in pregnancy.

Methods: The present study is a prospective study conducted in the Department of Obstetrics and Gynecology, MIMER Medical College and Hospital, Talegaon, Dabhade, Maharashtra. The total sample population comprised of 705 pregnant women with uncomplicated singleton intra-uterine pregnancy. All participants were screened by estimation for serum TSH in first trimester.

Results: The prevalence of thyroid dysfunction in the present study is 13.9%. Of this, prevalence of hypothyroidism is 12.76% and that of hyperthyroidism is 1.13%.

Conclusions: With this study, we conclude that there is high prevalence of thyroid dysfunction in pregnancy even in rural population. Thus, a universal screening helps in early diagnosis and preventing the aftermaths of thyroid dysfunction in pregnancy.

Keywords: Congenital hypothyroidism, Screening test, Serum TSH, Thyroid disorders in pregnancy

INTRODUCTION

Thyroid physiology has a very important role in our normal well-being and even more so in pregnancy. Thyroid disorders in pregnancy are usually underestimated in preference to other disorders like anaemia and toxemia. However, if overlooked, it can have a detrimental effect on the mother as well as the fetus.¹ The association between overt as well as subclinical thyroid disorders and dysfunction with adverse reproductive outcome is now well understood.²

During pregnancy, thyroid glands bear an extra burden, which can result in hypothyroidism.³ Even though the

dysfunction is associated with serious maternal and fetal morbidities, they are often overlooked because of non-specific symptoms and hyper metabolic state of pregnancy. There is also alteration in the normal physiology of thyroid during pregnancy. Total T₃ and T₄ levels increase by 50% during pregnancy owing to a 50% increase in thyroxine-binding globulin levels. Serum TSH levels decrease in the first trimester and increase in the second and third trimesters.^{2,3}

There is wide geographical variation in the types of thyroid disorders. The prevalence of hypothyroidism in pregnancy is around 2.5% according to the Western literature.³ The prevalence of Grave's Disease is around

0.1-0.4% and that of thyroid autoimmunity is around 5-10%.³ It is found to be more prevalent in the Asian countries as compared to West.⁴ Recent guidelines by American Thyroid Association (ATA) and the National Association of Clinical Biochemists have laid down the cut-off of Serum TSH to 2.5 m IU / L in 1st trimester and 3.0 m IU/L in 2nd and 3rd trimesters. This led to an almost 5-fold increase in the disease frequency of hypothyroidism in pregnancy.⁵

Hypothyroidism

Subclinical hypothyroidism (SCH) is defined an elevated serum TSH level with normal serum thyroxine level and overt/clinical hypothyroidism is defined as high serum TSH with low serum thyroxine levels.

Hypothyroidism is characterized by fatigue, constipation, cold intolerance, muscle cramps and excessive weight gain. A pathologically enlarged thyroid gland depends on the etiology of hypothyroidism and is more likely in women in areas of iodine deficiency or those with hashimoto thyroiditis. Other findings include oedema, dry skin, hair loss and prolonged relaxation phase of deep tendon reflexes.

The most common cause of hypothyroidism in pregnancy is Hashimoto thyroiditis which is characterized by glandular destruction from autoimmune antibodies, particularly anti-thyroid peroxidase antibodies. Clinical identification is difficult as many of the signs and symptoms are common to pregnancy itself.

Hypothyroidism in pregnancy is associated with complications of spontaneous / threatened abortion, pre-eclampsia, preterm delivery, low birth weight, intra-uterine growth retardation and high perinatal mortality. Neonatal hyperbilirubinemia and hypo-/hyperthyroidism are reported too.³ These children may also develop attention deficit disorder and hyperactivity syndrome.⁴

Hyperthyroidism

Subclinical hyperthyroidism is defined as low serum TSH level with normal serum thyroxine level and Overt hyperthyroidism is defined as low serum TSH level with elevated serum thyroxine level. Hyperthyroidism is characterized by tachycardia that exceeds of what is seen in normal pregnancy, failure to gain weight despite of adequate food intake, exophthalmos, thyromegaly, anxiety, palpitations, heat intolerance, warm and wet skin, hand tremors and systolic murmur.

The most common cause of hyperthyroidism in pregnancy is Grave's disease, an organ specific autoimmune process, associated with thyroid stimulating TSH receptor antibodies. Subclinical hyperthyroidism is not associated with adverse outcomes. But if left untreated, it may progress to overt hyperthyroidism and

result in complications like pre-eclampsia, preterm labour, low birth weight, fetal and perinatal loss.⁶

Thyroid storm and heart failure

Both these conditions are acute and life-threatening in pregnancy. Thyroid storm is a hyper-metabolic state and is rare in pregnancy. On the other hand, pulmonary hypertension and heart failure from cardiomyopathy caused by the profound myocardial effects of thyroxine is common in pregnant women. In these women, cardiomyopathy is characterised by high output state which may lead to dilated cardiomyopathy. The pregnant women with uncontrolled thyrotoxicosis have minimal cardiac reserve and the cardiac decompensation is usually precipitated by pre-eclampsia, anemia, sepsis. Frequently thyroxine-induced cardiomyopathy and pulmonary hypertension are reversible

METHODS

This prospective study was conducted in the Department of Obstetrics and Gynecology, MIMER Medical College and BST Rural Hospital. All antenatal women with uncomplicated intra-uterine pregnancies attending the OPD and IPD in our hospital were included in the study. On enrolment of the patients, a detailed history was taken, and complete examination was done. Selected patients for study were tested for Serum TSH. If it was deranged, then free T3 and free T4 levels was estimated. Patients were treated accordingly and followed up till delivery.

Reference ranges of thyroid hormone levels are (ACOG guidelines 2015):

- Normal TSH levels
 - a) First trimester: 0.1-2.5 micro IU/ml
 - b) Second trimester: 0.2-3.0 micro IU/ml
 - c) Third trimester: 0.3-3.0 micro IU/ml
- Normal T3 (T3): 60-200 ng/dl
- Normal T4 (T4): 4.5-12 microg/dl

All healthy antenatal women with singleton pregnancies and no medical disorder were included in this study. Women with multiple pregnancies, known thyroid abnormalities, known metabolic disorders like diabetes, hypertension and abnormal pregnancies like vesicular mole were excluded from the study.

RESULTS

According to the demographic distribution, out of 705 patients, 46% were primigravidas. Mean maternal age was 23.45. Most of the patients were in the age group of 20 to 25 years comprising, a total of 67.37%.

Approximately 11% of the patients were aged 30 and above. None of the patients had a family history of any thyroid disorders or goitre.

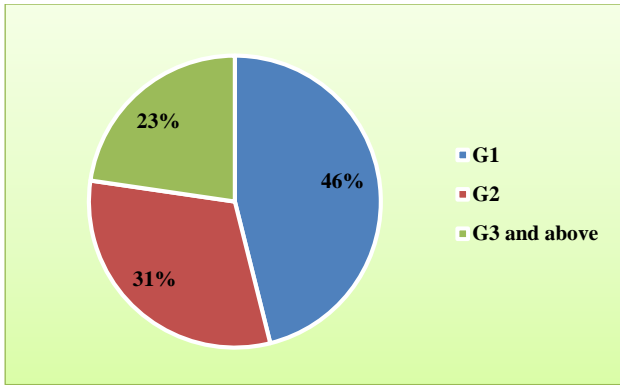


Figure 1: Distribution of cases as per gravidity (n=705).

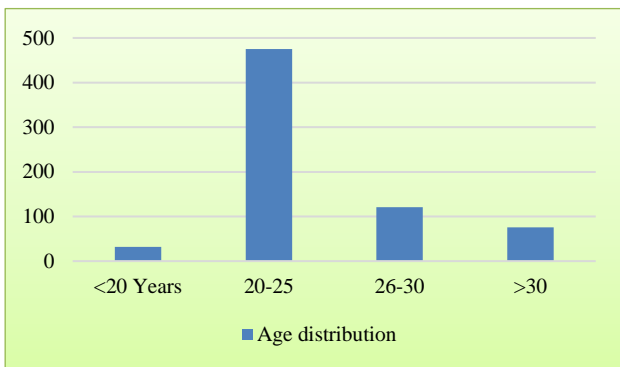


Figure 2: Distribution of cases as per age.

On clinical examination, none of the patients had a goiterous swelling or exophthalmos. On analysing the data, 86% of the patients were euthyroid. Approximately 14% had hypothyroidism, out of which 55.6% had subclinical hypothyroidism and rest had overt hypothyroidism. Out of the total studied population, 8 patients were diagnosed as hyperthyroidism and were started on propylthiouracil.

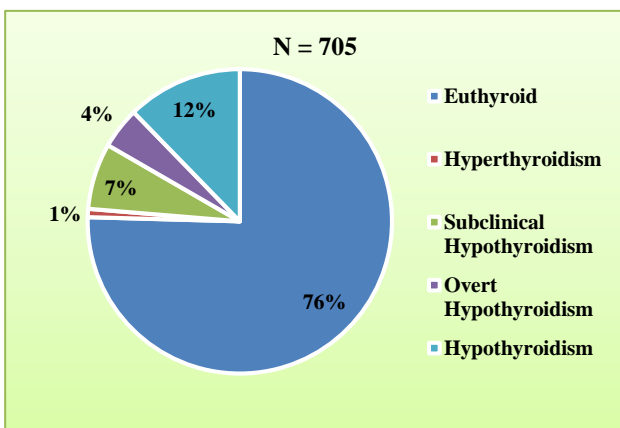


Figure 3: Distribution of cases as per parameters.

According to present study, most of the primigravida patients had hypothyroidism (46/705), with equal distribution of subclinical (23) and overt (23) disease.

Mean TSH value amongst the studied population was 2.37 mIU/L. The prevalence of thyroid disorders in the present study is 13.9%. Of this, prevalence of hypothyroidism is 13.75% and that of hyperthyroidism is 0.14%.

DISCUSSION

In western countries, many studies have shown a lower prevalence of thyroid disorders in pregnancy which is approximately 2.5%.⁶⁻⁹ But Asian studies have shown significant prevalence of thyroid disorders. There are a number of reasons for increased prevalence of hypothyroidism in pregnancy in Asia. For example, diet deficient in iodine, presence of goitrogens in diet, deficiency of micronutrients like selenium and iron.¹⁰⁻¹²

There are few Indian studies regarding the prevalence of thyroid disorders in pregnancy. Sahu et al have done thyroid function in second trimester and reported prevalence of thyroid disorders, especially Overt and Subclinical hypothyroidism to be 6.47%.¹³ Dhanwal et al conducted a study in 1000 pregnant women in Delhi reporting a prevalence of 14.3% of hypothyroidism, with a cut off of 4.5 m IU/L as upper limit of normal.¹⁴

A study in Telangana by Nabi VRM et al reported a prevalence of 26% with a cut off of 3.0m IU/L as per ATA guidelines.¹⁵ In a study conducted by Krishnamma B et al, the prevalence of thyroid dysfunction was 18.7 with that of hypothyroidism being 13.4% and of hyperthyroidism 1.3%.¹⁶

Nambiar V et al studied the Asian-Indian pregnant women and found the prevalence of hypothyroidism to be 4.8%.¹⁷ Dhanwal D et al conducted a multicentric study in 11 cities all over India in 2599 pregnant women and found the prevalence of hypothyroidism to be 13.13% which is comparable to the present study.¹⁸

In the present study by Nangia S et al in two hospitals together in Delhi, a prevalence of thyroid disorders was 1-2% amongst 400 pregnant women.¹⁹ Prevalence of hyperthyroidism, both Overt and Subclinical in various studies has been reported to be around 1%.²⁰ In the study conducted by Wang W et al the prevalence of thyroid disorders was 10.2%.²¹ Also a study conducted by Taghavi et al reported a prevalence of 14.6%.²²

The study conducted by Ajmani et al evaluated 400 pregnant women which concluded a prevalence of 13.25%.²³ In the study conducted by Thanuja et al the prevalence of thyroid disorder was less, about 5%.²⁴

In a cross-sectional study conducted by Rajput, et al. which comprised of 461 pregnant women with uncomplicated intrauterine singleton pregnancies in the first trimester of gestation without any history of thyroid disease or intake of any thyroid medication, the prevalence of thyroid disorder was high (26.5%).²⁵

Due to the significant influence that maternal thyroid dysfunction has on maternal and fetal outcomes, early identification of thyroid dysfunction and timely initiation of treatment is required. Thus, universal screening of pregnant women for thyroid dysfunction should be emphasised, especially in a country like India due to the high prevalence of undiagnosed thyroid dysfunction.

However, an early detection of thyroid dysfunctions and treatment of mother during gestation improves the outcome. Thyroid dysfunction in the mother may also affect the fetus and consequently result in thyroid dysfunction in the fetus as well. Thyroid dysfunction in the neonate is known to hamper not only the mental development but also the somatic growth.

Congenital hypothyroidism is known to result in mental retardation.²⁶ In the early days of infancy, the baby may appear normal with no obvious pathological indicators. But Symptoms or signs, when present, may appear in the form of prolonged neonatal jaundice, constipation, lethargy and poor muscle tone, poor feeding, a large tongue, coarse facies, wide fontanelle, distended abdomen and umbilical hernia.²⁷ In some studies, the risk of cerebral white matter damage is found to be doubled in neonates with hypothyroidism in the form of echolucencies in infants with low T4.²⁸ It has been observed that infants with T4 levels below threshold develop respiratory distress and need to be supplemented with oxygen for more days, more days on the ventilator and longer hospitalization.²⁹

CONCLUSION

With this study, it is concluded that there is high prevalence of thyroid dysfunction in pregnancy even in rural population. Majority among these being subclinical hypothyroidism. As maternal thyroid dysfunction has significant impact on maternal and fetal outcomes, early identification of thyroid dysfunction and timely initiation of treatment is required. Thus, universal screening of pregnant women in first trimester with Sr. TSH should be emphasised, especially in a country like India due to the high prevalence of undiagnosed thyroid dysfunction. However, an early detection of thyroid dysfunctions and treatment of mother during gestation improves the outcome.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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