



THYROID DYSFUNCTION AMONG PREGNANT WOMEN: AN OBSERVATIONAL STUDY DONE AMONG WOMEN ATTENDING A TERTIARY CARE HOSPITAL OF BIHAR

Obstetrics & Gynecology

Manjari*	Assistant Professor, Department of Obstetrics and Gynecology, Madhubani Medical College and Hospital, Madhubani, Bihar, India *Corresponding Author
Minie Mohan	Professor, Department of Obstetrics and Gynaecology, Madhubani Medical College and Hospital, Madhubani, Bihar, India
Dr. Vinit Kumar	Senior Interventional Cardiologist, Heart Hospital, Patna
Amit Kumar Sinha	Assistant professor, Department of Mechanical Engineering, Shri Mata Vaishno Devi University, Katra, Jammu & Kashmir, India

ABSTRACT

Thyroid disorders in pregnancy are usually underestimated in preference to other disorders like anemia and toxemia. However, if overlooked, it can have a detrimental effect on the mother as well as the fetus. 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. **Materials and Methods:** A study was conducted in the Department of Obstetrics and Gynecology, Madhubani Medical College and Hospital, Bihar, India. The study period was 6 months from January 2022 to June 2022. 250 antenatal women with uncomplicated intra-uterine pregnancies attending the OPD and IPD in our hospital were included in the study. This study was approved by the ethic committee. SPSS software was used for data analysis. Data was expressed as percent and mean $\pm$ SD. **Results:** A total of 250 women were included in the study, out of which 172 (68.8%) were primigravidas, 49 () were G2 and rest 29 (11.6%) were G3 or above. Mean maternal age was 25.2 years with a SD of 8.6 years. Most of the patients were in the age group of 20 to 25 years. 27 out of 250 patients gave a positive family history of any thyroid disorders or goiter, this comprised 10.85 of the study population. **Conclusion:** However, an early detection of thyroid dysfunctions and treatment of mother during gestation improves the outcome.

KEYWORDS

Thyroid Dysfunction among Pregnant Women

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 anemia 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 nonspecific 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]

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 edema, 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. [3, 4]

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]

MATERIALS AND METHODS

A study was conducted in the Department of Obstetrics and Gynecology, Madhubani Medical College and Hospital, Bihar, India. The study period was 6 months from January 2022 to June 2022. 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):

1. Normal TSH value: 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
2. Normal T3 (T3): 60-200 ng/dl
3. Normal T4 (T4): 4.5-12 microgm/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.

This study was approved by the ethic committee. SPSS software was used for data analysis. Data was expressed as percent and mean $\pm$ SD.

RESULTS

A total of 250 women were included in the study, out of which 172 (68.8%) were primigravidas, 49 () were G2 and rest 29 (11.6%) were G3 or above. Mean maternal age was 25.2 years with a SD of 8.6 years.

Most of the patients were in the age group of 20 to 25 years. [Figure 1] 27 out of 250 patients gave a positive family history of any thyroid disorders or goiter, this comprised 10.85 of the study population.

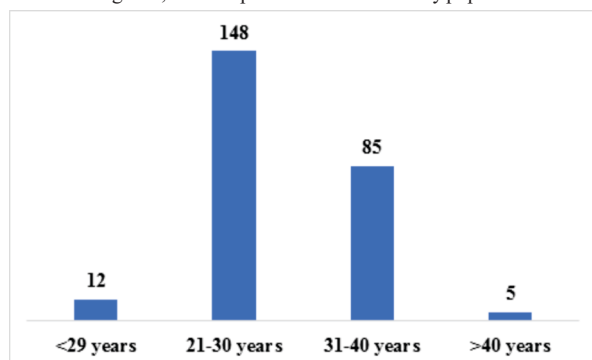


Figure 1: Column distribution of patients based on their age at the time of conception of their current pregnancy

On clinical examination, none of the patients had a goiterous swelling or exophthalmos. On analysing the data, 82% of the patients were euthyroid. Hypothyroidism was detected among 16.4% of the women, out of which near about 50% had subclinical hypothyroidism and rest had overt hypothyroidism. Out of the total studied population, 4 (1.6%) patients were diagnosed as hyperthyroidism and were started on propylthiouracil. [Figure 2] Mean TSH value amongst the studied population was 2.42 mIU/L with a SD of 1.5 mIU/L. Hence, the prevalence of thyroid disorders in the present study comes to 18%. Of this, prevalence of hypothyroidism is 16.4% and that of hyperthyroidism is 1.6%.

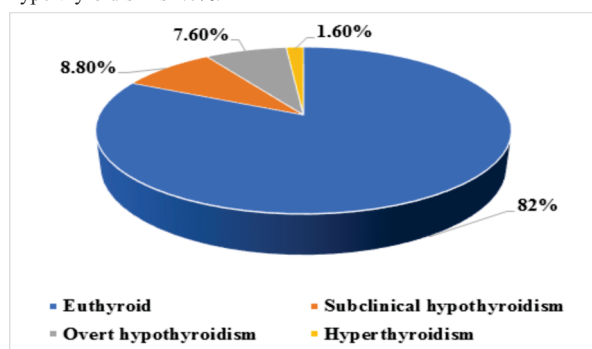


Figure 2: Distribution of patients based on their thyroid status

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 showed the 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 mIU/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 3.0 mIU/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 a 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.

REFERENCES

- Soldin OP, Tractenberg RE, Hollowell JG, Jonklaas J, Janicic N, Soldin SJ. Trimester-specific changes in maternal thyroid hormone, thyrotropin, and thyroglobulin concentrations during gestation: trends and associations across trimesters in iodine sufficiency. *Thyroid*. 2004; 14:1084-90.
- de Escobar GM, Obregón MJ, del Rey FE. Maternal thyroid hormones early in pregnancy and fetal brain development. *Best Pract Res ClinEndocrinolMetab*. 2004;18:225-48.
- LeBeau SO, Mandel SJ. Thyroid disorders during pregnancy. *EndocrinolMetabolClin North Am*. 2006;35(1):117-36.
- Ghassabian A, Bongers-Schokking JJ, de Rijke YB, van Mil N, Jaddoe VW, de Muinck Keizer-Scharma SM et al. Maternal thyroid autoimmunity during pregnancy and the risk of attention deficit/hyperactivity problems in children. The generation R study. *Thyroid*. 2012;22:178-86.
- Stagnaro-Green A, Abalovich M, Alexander E, Azizi F, Mestman J, Negro R et al. Guidelines of the American thyroid association for the diagnosis and management of thyroid disease during pregnancy and postpartum. *Thyroid*. 2011;21:1081-125.
- Casey BM, Dashe JS, Wells CE, McIntire DD, Byrd W, Leveno KJ, et al. Sub-clinical hypothyroidism and pregnancy outcomes. *Obstet Gynecol*. 2005;105:239-45.
- Glinor D. The regulation of thyroid function in pregnancy: pathways of endocrine adaptation from physiology to pathology. *Endocrine Rev*. 1997;18:404-33.
- Shan ZY. A study for maternal thyroid hormone deficiency during the first half of pregnancy in China. *Eu J Clin Invest*. 2009;39:37-42.
- Aoki Y. Serum TSH and total T4 in the United States population and their association with participant characteristics: National Health and Nutrition Examination Survey (NHANES1999-2002). *Thyroid*. 2007;17:1211-23.
- Teng X, Shan Z, Chen Y, Lai Y, Yu J, Shan L, et al. More than adequate iodine intake may increase subclinical hypothyroidism and autoimmune thyroiditis: a cross-sectional study based on two Chinese communities with different iodine intake levels. *Eur J Endocrinol*. 2011;164:943-50.
- Marwaha RK, Tandon N, Gupta N, Karak AK, Verma K, Kochupillai N. Residual goitre in the postiodization phase: Iodine status, thiocyanate exposure and autoimmunity. *ClinEndocrinol (Oxf)*. 2003;59:672-81.
- Das S, Bhansali A, Dutta P, Aggarwal A, Bansal MP, Garg D, et al. Persistence of goiter in the postiodization phase. Micronutrient deficiency or thyroid autoimmunity? *Indian J Med Res*. 2011;133:103-9.
- Sahu MT, Das V, Mittal S, Agarwal A, Sahu M. Overt and subclinical thyroid dysfunction among Indian pregnant women and its effect on maternal and fetal outcome. *Arch Gynecol Obstet*. 2010;281:215-20.
- Dhanwal DK, Prasad S, Agarwal AK, Dixit V, Banerjee AK. High prevalence of subclinical hypothyroidism during first trimester of pregnancy in North India. *Indian J*

- EndocrinolMetab. 2013;17:281-4.
15. Nabhi VRM, Bhashyakarla U. Prevalence of thyroid dysfunction among pregnant women in a rural teaching. *Sch J App Med Sci*. 2014;2(6B):2020-5.
 16. Krishnamma B. Prevalence of thyroid dysfunction in pregnant women and the need for universal screening: an observational study in Northern Andhra Pradesh population. *IJRCOG*. 2017;6(6):2536-40.
 17. Nambiar V, Jagtap VS, Sarathi V, Lila AR, Kamalanathan S, Bandgar TR, et al. Prevalence and impact of thyroid disorders on maternal outcome in Asian-Indian pregnant women. *J Thyroid Res*. 2011;2011:429097.
 18. Dhanwal DK, Bajaj S, Rajput R, Subramaniam KA, Chowdhury S, Bhandari R, et al. Prevalence of hypothyroidism in pregnancy: An epidemiological study from 11 cities in 9 states of India. *Indian J EndocrinolMetab*. 2016;20(3):387-90.
 19. Nangia AS, Aggarwal D, Bhatia P, Sharma M, Sarabhai V, Paul M. Prevalence of overt and subclinical thyroid dysfunction among pregnant women and its effect on maternal and fetal outcome. *Ind J Obstst Gynecol*. 2013;64(2):105-10.
 20. Casey BM, Dashe JS, Wells CE, McIntire DD, Leveno KJ, Cunningham FG. Subclinical hyperthyroidism and pregnancy outcomes. *Obstet Gynecol*. 2006;107:337-41.
 21. Wang W. The prevalence of thyroid disorders during early pregnancy in China: The benefits of universal screening in the first trimester of pregnancy. *Eu J Endocrinol*. 2011;164:263-8.
 22. Taghavi M, Saghaei N, Shirin S. Outcome of thyroid dysfunction in pregnancy in Mashhad, Iran. *Int J EndocrinolMetab*. 2009;2:82-5.
 23. Ajmani SN, Aggarwal D, Bhatia P, Sharma M, Sarabhai V, Paul M. Prevalence of overt and subclinical thyroid dysfunction among pregnant women and its effect on maternal and fetal outcome. *J ObstetGynaecol India*. 2014;64(2):105-10.
 24. Thanuja PM. Thyroid dysfunction in pregnancy and its maternal outcome. *J Dental Med Sci*. 2014;13(1):11-5.
 25. Rajput R. Prevalence of thyroid dysfunction among women during the first trimester of pregnancy at a tertiary care hospital in Haryana. *Ind J EndocrinolMetab*. 2015;19(3):416-9.
 26. Meijer WJ, Verloove-Vanhorick SP, Brand R, van den Brande JL. Transient hypothyroxinaemia associated with developmental delay in very preterm infants. *Arch Dis Childhood*. 1992;67:944-7.
 27. Reuss ML, Paneth N, Pinto-Martin JA, Lorenz JM, Susser M. The relation of transient hypothyroxinemia in preterm infants to neurologic development at two years of age. *New Eng J Med*. 2020;334:821-7.
 28. Leviton A, Paneth N, Reuss ML, Susser M, Allred EN, Dammann O, et al. Hypothyroxinemia of prematurity and the risk of cerebral white matter damage. *J Pediatr*. 2021;134(6):706-11.
 29. Reuss ML, Paneth N, Lorenz JM, Susser M. Correlates of low thyroxine values at newborn screening among infants born before 32 weeks gestation. *Early Hum Dev*. 2022;47(2):223-33.