

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20253530>

Original Research Article

Evaluation of thyroid disorders in pregnancy- prevalence and its varieties

Harkiranjit Kaur¹, Maninderjit Kaur Padda¹, Ritika Narayan¹, Gurpreet Kaur^{2*}

¹Department of Obstetrics and Gynecology, MGM Medical College and LSK Hospital, Kishanganj, Bihar, India

²Department of Pathology, MGM Medical College and LSK Hospital, Kishanganj, Bihar, India

Received: 08 August 2025

Revised: 16 September 2025

Accepted: 26 September 2025

*Correspondence:

Dr. Gurpreet Kaur,

E-mail: gbk10june@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Thyroid disorders represent one of the most common endocrine problems in pregnancy, with maternal hypothyroidism being the most frequent. Global prevalence of hypothyroidism during pregnancy varies widely, from 2.5% to 11%, and is reported to be higher in Asian countries compared to global estimates. The overall prevalence of thyroid disorder in pregnancy is estimated at up to 33.9% comprising hypothyroidism (31.6%) and hyperthyroidism (2.3%). Although hyperthyroidism is relatively uncommon, affecting only 0.1-0.4% of pregnancies, it is associated with greater maternal and fetal complications. Despite the higher prevalence of thyroid disorders in India, data on their distribution and adverse outcomes remain limited. Further research is therefore necessary to improve understanding and guide clinical practice in this population.

Methods: A cross-sectional study was carried out at MGM Medical College and LSK Hospital over an 18-month period. The study population included pregnant women attending the antenatal clinic. Based on the estimated prevalence of thyroid disorders in India (33.9%), the minimum required sample size was calculated as 344 participants.

Results: During the study, 344 antenatal women underwent thyroid evaluation. Of these, 112 were diagnosed with some form of thyroid disorder. The prevalence of thyroid dysfunction in pregnancy was calculated 32.56%.

Conclusions: Given this high prevalence, universal thyroid function testing at the first antenatal visit is strongly recommended. Women of higher maternal age are particularly prone to developing thyroid dysfunction. The mean TSH, FT₃ and FT₄ values in euthyroid participants (n=232) may serve as useful reference values for this region in future studies.

Keywords: Hypothyroidism, Pregnancy, Prevalence

INTRODUCTION

Pregnancy is a time of complex hormonal changes. In women with normal thyroid function, there is an increase in thyroxine (T₄) and triiodothyronine (T₃) production, which results in inhibition of thyroid-stimulating hormone (TSH) in the first trimester of pregnancy, due to a high human chorionic gonadotropin (hCG) level that stimulates the TSH receptor because of partial structural similarity.¹ A large plasma volume and thus an altered distribution of thyroid hormone, increased thyroid hormone metabolism, increased renal clearance of iodide, and higher levels of

hepatic production of thyroxine-binding globulin (TBG) in the hyper estrogenic state of pregnancy are responsible for higher thyroxine requirements in pregnancy.²

The most frequent thyroid disorder in pregnancy is maternal hypothyroidism. The geographical variation in the prevalence of hypothyroidism during pregnancy is very wide and ranges from 2.5% to 11%.³ The prevalence of hypothyroidism is more in Asian countries as compared to western countries. In India, thyroid disorders are among the most common endocrine disorders in pregnant women, with an estimated prevalence of up to 10%.⁴ Despite the

high prevalence of thyroid disorders in pregnancy in India, there is still limited data on the types of thyroid disorders and their association with adverse maternal and fetal outcomes.

Clinical or subclinical thyroid disorders are usually detected during pre-conceptional counselling or in women who have just conceived and have done tests for thyroid function. According to recent American Thyroid Association (ATA) 2011 guidelines, if laboratory-dependent, trimester-specific ranges for TSH are not available, the recommended reference ranges for TSH are 0.1 to 2.5 mIU/l in the first trimester, 0.2 to 3.0 mIU/l in the second trimester, and 0.3 to 3.0 mIU/l in the third trimester.⁵

Maternal hypothyroidism has been associated with increased risk of low birth weight, fetal distress, and impaired neuropsychological development.⁶

Thyroid dysfunction is usually overlooked and ignored in pregnant women because of the nonspecific and hyper metabolic state of pregnancy.⁷

Hypothyroidism, this condition can be overt, with clear clinical symptoms and elevated thyroid stimulating hormone (TSH) levels, or subclinical where TSH levels are elevated but free thyroxine (FT4) levels remain normal. Autoimmune thyroiditis, such as Hashimoto's thyroiditis, is a common cause of hypothyroidism during pregnancy.⁸

Hyperthyroidism, predominantly caused by Graves' disease, hyperthyroidism in pregnancy can lead to complications if not properly managed. Gestational transient thyrotoxicosis, a temporary condition due to elevated human chorionic gonadotropin (hCG) levels, can also occur.⁹

Postpartum thyroiditis, this inflammatory condition occurs after childbirth and can present as transient hyperthyroidism, hypothyroidism, or a biphasic pattern. It affects approximately 5-9% of women postpartum.

However, there is limited data on the prevalence and types of thyroid disorders in pregnancies, particularly in north Bihar populations. This study was done to provide a better understanding of the prevalence and types of thyroid disorders in pregnancies, which can inform clinical practice and help, identify women who may require closer monitoring or treatment. Additionally, identifying the association between thyroid disorders and adverse outcomes can help guide interventions to improve pregnancy outcomes for women with thyroid disorder.

Objectives

To estimate the prevalence of thyroid disorders in pregnancies in a specific population. To classify the types of thyroid disorders (mainly subclinical hypothyroidism,

subclinical hyperthyroidism, overt hypothyroidism and overt hyperthyroidism) in pregnancies. To assess the association between maternal age, gestational age, and the occurrence of thyroid disorders in pregnancies.

METHODS

This cross-sectional study was conducted at MGM Medical College and LSK Hospital, a tertiary care center in India from June 2023 to December 2025. The study population consisted of pregnant women attending the antenatal clinic at MGM Medical College and LSK Hospital Kishanganj during the study period. The estimated prevalence of thyroid disorders in pregnancy in India is up to 33.9%.

Reported by Kumar et al, assuming a 33.9% prevalence of thyroid disorders in pregnancy and a 5% margin of error with 95% confidence interval, the minimum sample size required for this study was calculated using the single population proportion formula; $n = Z^2 \times p \times (1-p) / E^2$; where: n = minimum sample size, Z = Z-score for the desired confidence interval (1.96 for 95% CI), p = estimated prevalence of thyroid disorders (0.10) E = margin of error (0.05). Using this formula, the sample size calculated as $n = (1.96)^2 \times 0.134 \times (1 - 0.34) / 0.05^2 = 344.32$. Therefore, the minimum sample size required for this study was 344 participants.

Data collection and procedure included detailed demographic and clinical data, including age, gestational age, parity, and relevant medical history which were collected using a structured questionnaire. Blood samples were obtained from participants to evaluate thyroid function and serum levels of thyroid-stimulating hormone (TSH), free thyroxine (FT₄), and free triiodothyronine (FT₃) were measured using chemiluminescent immunoassay techniques.

The prevalence and types of thyroid disorders in pregnancy was determined according to the American Thyroid Association (ATA) guidelines, 2011. The recommended reference ranges: TSH: 0.1 to 2.5 mIU/l in the first trimester, 0.2 to 3.0 mIU/l in the second trimester, 0.3 to 3.0 mIU/l in the third trimester. Free T₄: 0.8 to 1.53 ng/dl in first trimester, 0.7 to 1.20 ng/dl in second trimester, 0.7 to 1.20 ng/dl in third trimester.

The study was approved by the institutional ethical committee and written informed consent was obtained from all enrolled patients.

RESULTS

Data was analyzed using appropriate statistical methods. The prevalence of thyroid disorders in pregnancy and its different types was expressed as percentages. The association between thyroid disorders and different demographic and obstetric variables was analyzed using appropriate statistical tests. P value <0.05 was considered

as significant. The data was analyzed using IBM SPSS version 26. Discrete (categorical) groups, compared by Chi-squared test (χ^2) to correlate demographic distribution in groups.

During the study total 344 antenatal women were assessed for thyroid evaluation of which 112 cases have some form of thyroid disorder.

Table: 1 Prevalence of thyroid disorders in pregnancy.

Total number of antenatal women participated during the study period	Thyroid disorders cases detected	Prevalence
344	112	32.56%

Table 2: Types of thyroid disorders in pregnancy (n=112).

Types of thyroid disorder	Frequency	Percent
Subclinical hypothyroidism	84	75.00
Overt hypothyroidism	21	18.75
Subclinical hyperthyroidism	7	6.25

In the present study comprising 112 pregnant women with thyroid disorders, the subclinical hypothyroidism was the most common thyroid disorder observed, affecting 84 women (75.00%), followed by overt hypothyroidism in 21 cases (18.75%). Subclinical hyperthyroidism was noted in

7 cases (6.25%), while no cases of overt hyperthyroidism were detected in the study population.

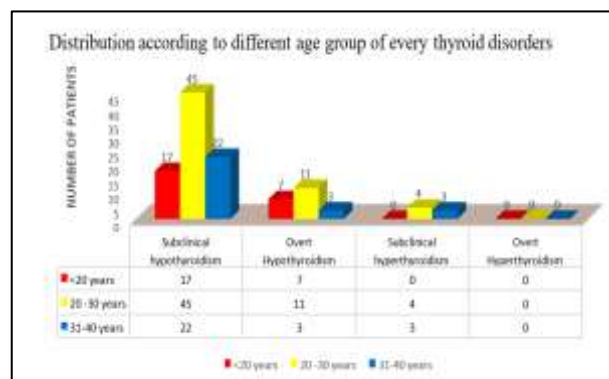


Figure 1: Distribution according to different age group of every thyroid disorders.

Among the 112 pregnant women with thyroid disorders studied, the highest number of thyroid disorders was observed in the 20-30 years age group. Specifically, subclinical hypothyroidism was most common in this age group with 45 cases, followed by 17 cases in those aged below 20 years, and 22 cases in the 31-40 years group. Overt hypothyroidism was observed in 11 women aged 20-30 years, 7 women under 20 years, and 3 women aged 31-40 years. Subclinical hyperthyroidism was detected in 4 women in the 20-30 years age group and women in the 31-40 years group, with no cases reported in those under 20 years. Overt hyperthyroidism was not observed in any age group.

Table: 3 Distribution according to different gravidity status of every thyroid disorders.

Thyroid disorder	G1	G2	≥G3	Frequency
Subclinical hypothyroidism	27	35	22	84
Overt hypothyroidism	3	11	7	21
Subclinical hyperthyroidism	0	4	3	7
Total	30	50	32	112

Table 4: Distribution according to different trimester of every thyroid disorders.

Thyroid disorder	First trimester	Second trimester	Third trimester	Total
Subclinical hypothyroidism	37	29	18	84
Overt hypothyroidism	11	7	3	21
Subclinical hyperthyroidism	4	3	0	7
Total	52	39	21	112

Table 5: Mean and SD values of thyroid hormone parameters in different thyroid disorder patients and also in euthyroid pregnant women.

Thyroid disorder	TSH Mean±SD (mIU/l)	FT ₃ Mean±SD (pg/ml)	FT ₄ Mean±SD (ng/dl)
Subclinical hypothyroidism	8.66±1.21	3.1±0.3	1.23±0.28
Overt hypothyroidism	14.23±1.54	0.99±0.44	0.31±0.12
Subclinical hyperthyroidism	0.12±0.10	3.96±0.24	1.54±0.27
Euthyroid	1.81±0.46	3.51±0.32	1.27±0.22

Out of the total 112 pregnant women with thyroid disorders, subclinical hypothyroidism was most frequently observed in G2 women (second pregnancy) with 35 cases, followed by 27 cases in primigravida (G1) and 22 cases in women with gravidity $\geq$ G3. Overt hypothyroidism was seen in 11 cases among G2 women, 7 cases in those with gravidity $\geq$ G3, and 3 cases in primigravida. Subclinical hyperthyroidism occurred in 4 women of G2 and 3 women with gravidity $\geq$ G3, with no cases in primigravida. Overt hyperthyroidism was not detected in any gravidity group. Overt hyperthyroidism was not detected in any gravidity group.

In our study of 112 pregnant women with thyroid disorders were distributed across all three trimesters. In the first trimester 29 were diagnosed with subclinical hypothyroidism, 7 with overt hypothyroidism, and 4 with subclinical hyperthyroidism. In the second trimester, 37 had subclinical hypothyroidism, 11 had overt hypothyroidism, and 3 had subclinical hyperthyroidism. In the third trimester, 18 had subclinical hypothyroidism and 3 had overt hypothyroidism, while no cases of hyperthyroidism were noted. Notably, no cases of overt hyperthyroidism were observed in any trimester throughout the study.

The mean and standard deviation (SD) values for thyroid-stimulating hormone (TSH), free triiodothyronine (FT₃), and free thyroxine (FT₄) across different thyroid disorders. Subclinical hypothyroidism showed a TSH mean of 8.66 ± 1.21 mIU/l, while overt hypothyroidism had the highest TSH mean at 14.23 ± 1.54 mIU/l. FT₃ and FT₄ values were lowest in overt hypothyroidism. No cases of overt hyperthyroidism were observed in the study.

DISCUSSION

A healthy thyroid gland is instrumental in coping with the increased physiological demands during pregnancy and maintains adequate thyroid functioning. Any alteration in the maternal thyroid hormone levels consequently affects the fetomaternal outcomes.

The prevalence of any form of thyroid disorder is high (32.56%) in the study; which is nearly similar to the study conducted by Roushali et al.¹⁰ They observed an overall prevalence of thyroid disorders in pregnancy was 33.9%, is higher than the reported prevalence in other studies from India and abroad; high prevalence in Asian countries can be attributed to decreased iodine intake, presence of goitrogens in diet, and worsening of micronutrient deficiency such as selenium and iron deficiency during pregnancy; another reason for differences in prevalence can be using different cut-off values for thyroid hormone parameter. On the other hand, Dasgupta et al conducted a study in a tertiary care hospital in eastern India reported prevalence of thyroid disorders in pregnant women was 7.36% which is very low as compared to this study; may be due to improved iodine supplementation, enhanced

screening and diagnosis and using trimester specific reference ranges.¹¹

The prevalence of different types of thyroid disorders in the study accounts hypothyroidism to be the highest (93.75%) with 18.75% of overt hypothyroidism and 75% SCH and the prevalence of subclinical hyperthyroidism is 6.25% a similar study was conducted by Yassae et al observed subclinical hypothyroidism and overt hypothyroidism were present in 131 (89.1%) and 16 (10.9%) pregnant women respectively.¹² Which were higher as compared to the study done by Dhanwal et al that observed a prevalence of hypothyroidism to be around 14.3% and the majority of those pregnant women had SCH.¹³ while Gayathri et al reported a 2.8% prevalence of SCH.¹⁴ Similarly Ramprasad et al documented 4.4% subclinical hypothyroidism, 1.6% overt hypothyroidism, and 0.6% subclinical hyperthyroidism.¹⁵ Compared to these reports, our study shows a markedly higher prevalence of both subclinical and overt hypothyroidism, which may be attributed to regional factors, population differences or lower TSH cut-off thresholds used for defining dysfunction.

Our findings are not consistent with the systematic review by Gopinath et al, which reported a pooled prevalence of 8.7% for subclinical hypothyroidism and 1.3% for overt hypothyroidism in Indian pregnant women.¹⁶ The higher prevalence observed in our study may reflect improved detection, increasing awareness, or a genuine regional rise in thyroid dysfunction, potentially linked to nutritional iodine fluctuations or autoimmune thyroiditis. Furthermore, the absence of overt hyperthyroidism in our study is notable and parallels the findings of Dasgupta et al who also reported a very low prevalence of overt hyperthyroidism in pregnancy (0.02%).¹¹ This may reflect the rarity of overt hyperthyroid states in the antenatal population and potentially underscores the early medical intervention or preconception management in women with pre-existing thyroid disease.

In this study, the majority of pregnant women with thyroid dysfunction were between 20-30 years of age (53.57%), followed by those in the 31-40 years age group (25%), while 21.4% were below 20 years. This distribution is comparable to the findings reported by Dhanwal et al, who also noted that thyroid disorders were more prevalent in younger women.¹³ Interestingly, their study from north India highlighted a positive correlation between increasing maternal age and the incidence of subclinical hypothyroidism, suggesting that age may still be a contributing risk factor in certain populations. Likewise, Dasgupta et al emphasized that thyroid abnormalities are frequently encountered among women in their twenties and early thirties.¹¹ Which matches our findings. However, our study's detection of significant cases even in women under 20 years of age raises concerns about the early onset of thyroid dysfunction, possibly due to nutritional, environmental, or autoimmune factors prevalent in the region.

Regarding gravida distribution, our results indicated that gravida 2 women formed the largest subgroup (44.7%), followed by primigravida (26.7%) and those with gravida ≥ 3 (28.5%). These findings are consistent with the study by Dasgupta et al who reported a similar pattern, wherein the majority of thyroid disorder cases occurred in multigravida women, although no statistically significant association with parity was observed.¹¹ Additionally, Ramprasad et al found that both primigravida and multigravida women were affected, indicating that thyroid dysfunction in pregnancy may not be strongly dependent on parity but rather on regional iodine status, autoimmune predisposition, or early screening practices.¹⁵ Interestingly, subclinical hyperthyroidism occurred only in G2 and $\geq G3$ women, with no cases reported in primigravida, indicating a possible cumulative endocrine stress or unrecognized thyroid imbalance from previous pregnancies. Our study population's age and gravida distribution are therefore broadly in line with previously published Indian studies reaffirming the demographic vulnerability of women in their reproductive peak years to thyroid dysfunction and reinforcing the importance of routine thyroid screening irrespective of parity or maternal age.

In terms of trimester-wise distribution, our study noted that 35.7% of participants with thyroid disorders were in the first trimester, 45.5% in the second trimester, and 18.75% in the third trimester. These proportions suggest that a significant number of women were diagnosed with thyroid abnormalities beyond the first trimester, highlighting the importance of continued thyroid monitoring throughout pregnancy. This trend is slightly different from the study by Dhanwal et al which focused predominantly on the first trimester and reported a higher prevalence of subclinical hypothyroidism during that period (15.8%).¹³ However, our findings echo those of Ramprasad et al who emphasized that thyroid dysfunctions are commonly detected across all trimesters, necessitating vigilant screening policies not limited to early gestation.¹⁵

In our study, the mean TSH level in women with subclinical hypothyroidism was 8.66 ± 1.21 mIU/l, while it peaked at 14.23 ± 1.54 mIU/l in those with overt hypothyroidism, reflecting the expected gradation in thyroid dysfunction severity. Correspondingly, FT3 and FT4 levels were lowest in overt hypothyroidism. Mean and SD of TSH, FT3 (33.51 pg/ml) and FT4 (1.27 pg/l) levels were also evaluated among euthyroid participants. These trends are in agreement with biochemical patterns described in earlier studies, including that of Mithal et al which also highlighted significantly elevated TSH levels and decreased FT4 in hypothyroid cases during pregnancy.¹⁷ The stratification of thyroid function parameters by disorder type in our cohort reinforces the utility of serum TSH as a sensitive initial screening tool, supported by FT3/FT4 evaluation for confirmatory differentiation between subclinical and overt states.

The limitation of the study was that the follow up of patients with thyroid disorders for fetomaternal complications was not in the purview of the study. External factors e.g. lack of awareness of pre pregnancy thyroid evaluation, social taboos for declaring pregnancy lately results in missing the golden period of evaluation of thyroid disorders. Chances of potential bias for using different methods and biochemical parameter for thyroid estimation.

CONCLUSION

This study underscored the significant burden of thyroid dysfunction among pregnant women, with subclinical hypothyroidism emerging as the most common abnormality. Prevalence is high so we propose for universal thyroid status evaluation in pregnancy at the first visit.

Patients with higher age, if becomes pregnant are more prone to develop thyroid disorders.

The majority of affected women were in their reproductive prime, particularly those in their second pregnancy and second trimester onwards of gestation; so, the golden period of correction for fetal benefit were missed for most of the cases. We suggest while doing antenatal workup the multigravida screening should be repeated in the later trimester also.

This study concluded the evaluation of thyroid disorders using ATA guideline (2011), which is easy and standard technique; and Indian endocrinology society also suggests the same.

The mean TSH, FT3, FT4 evaluated for euthyroid (n=232) patients can be considered as reference values in this locality for further studies.

Funding: No funding sources

Conflict of interest: None declared

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

REFERENCES

1. Gupta P, Jain M, Verma V, Gupta NK. The study of prevalence and pattern of thyroid disorder in pregnant women: a prospective study. *Cureus*. 2021;13(7):e16437.
2. Unnikrishnan AG, Menon UV. Thyroid disorders in pregnancy. *Indian J Endocrinol Metab*. 2013;17(1):76-82.
3. Williams GR. Neurodevelopmental and neurophysiological actions of thyroid hormone. *J Neuroendocrinol*. 2008;20(6):784-94.
4. Krajewski DA, Burman KD. Thyroid disorders in pregnancy. *Endocrinol Metab Clin North Am*. 2011;40:739-63.

5. 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(10):1081-125.
6. Haddow JE, Palomaki GE, Allan WC, Williams JR, Knight GJ, Gagnon J, et al. Maternal thyroid deficiency during pregnancy and subsequent neuropsychological development of the child. *N Engl J Med.* 1999;341(8):549-55.
7. Jani RS, Munshi DS, Jani SK, Munshi SP, Solanki SB, Pandya VM. Prevalence and fetomaternal outcome of thyroid disorder in pregnancy. *Int J Med Sci Public Health.* 2014;3(8):944-8.
8. Ain KB, Mori Y, Refetoff S. Reduced clearance rate of thyroxine-binding globulin (TGB) with increased sialylation: a mechanism for estrogen-induced elevation of serum TBG concentration. *J Clin Endocrinol Metab.* 1987;65(4):689-702.
9. Pratt DE, Kaberlein G, Dudkiewicz A, Karande V, Gleicher N. The association of antithyroid antibodies in euthyroid pregnant women with recurrent first trimester abortions in the next pregnancy. *Fertil Steril.* 1993;60(6):1001-5.
10. Roushali K, Bansal R, Kaur H, Shergill, Garg P. Prevalence of thyroid dysfunction in pregnancy and its association with fetomaternal outcomes: A prospective observational study from a tertiary care institute in Northern India. *Clin Epidemiol Glob Health.* 2023;19:101201.
11. Dasgupta A, Dasgupta S, Sarkar S, Mandal A. Pattern of thyroid disorders in pregnancy in a tertiary care hospital in eastern India. *J Fam Med Prim Care.* 2017;6(2):261-5.
12. Yassaee F, Farahani M, Abadi AR. Prevalence of subclinical hypothyroidism in pregnant women in Tehran, Iran. *Int J Fertil Steril.* 2014;8(2):163-6.
13. 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 Endocrinol Metab.* 2013;17(2):281-4.
14. Gayathri R, Lavanya S, Raghavan K. Subclinical hypothyroidism and autoimmune thyroid disease in pregnancy. *Indian J Endocrinol Metab.* 2012;16(4):552-4.
15. Ramprasad M, Bhattacharyya A, Bhattacharyya A, et al. Prevalence of thyroid disorders in pregnant women from eastern India: A single-centre study. *Indian J Endocrinol Metab.* 2018;22(3):410-3.
16. Gopinath P, Valappil VE, Gomathi KG, Thomas N, Rajaratnam S. Prevalence of hypothyroidism in pregnancy: An epidemiological study from 11 cities in 9 states of India. *Indian J Endocrinol Metab.* 2016;20(3):387-90.
17. Mithal A, Bansal B, Kalra S. Gestational diabetes in India: Science and society. *Indian journal of endocrinology and metabolism.* 2015;19(6):701-4.

Cite this article as: Kaur H, Padma MK, Narayan R, Kaur G. Evaluation of thyroid disorders in pregnancy- prevalence and its varieties. *Int J Reprod Contracept Obstet Gynecol* 2025;14:3857-62.