

To Study the Prevalence of Hypothyroidism Among Women Struggling with Infertility in A Tertiary Care Centre in North India

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ABSTRACT

Introduction: Infertility is a common reproductive health problem with medical, psychological and social consequences. Thyroid hormones influence ovulation, luteal function, implantation and early pregnancy, and hypothyroidism is a potentially correctable endocrine cause of female infertility. In Indian women, especially those seeking care at tertiary hospitals, thyroid dysfunction is frequently underdiagnosed and may present even when menstrual cycles seem clinically normal. Routine thyroid screening in infertility clinics may therefore identify a modifiable factor before couples undergo costly and invasive interventions.

Aim: To estimate the prevalence of hypothyroidism among women struggling with infertility at a tertiary care centre in North India and to compare the burden of subclinical and overt disease.

Method: This hospital-based cross-sectional observational study was carried out over 12 months in the Department of Obstetrics and Gynaecology, T.S. Misra Medical College and Hospital, Lucknow. Women aged 20-40 years with primary or secondary infertility were enrolled after applying eligibility criteria. Although an administrative target of 150 women was considered, the uploaded thesis reports a calculated minimum sample size and final analyzed cohort of 101 participants. Detailed history, general and gynaecological examination, anthropometry, and infertility workup were performed. Laboratory evaluation included serum TSH, FT3, FT4, prolactin, LH, FSH, AMH, routine blood tests, semen analysis of the husband and pelvic ultrasonography. Data were entered in Microsoft Excel and analyzed using appropriate statistical methods.

Results: Among 101 infertile women, primary infertility accounted for 67.3% and secondary infertility for 32.7%. Using a fertility-oriented TSH cutoff of >2.5 mU/L, hypothyroidism was present in 74.3%; using TSH >4.0 mU/L, 27.7% were hypothyroid, of whom 64.3% had subclinical and 35.7% overt disease. Mean prolactin was significantly higher in hypothyroid women (23.6 vs 14.2 ng/mL; $p < 0.001$).

Conclusion: Hypothyroidism, predominantly subclinical, is highly prevalent among infertile women in this North Indian tertiary centre and is frequently previously undetected. Routine thyroid screening during infertility evaluation can facilitate early treatment, reduce endocrine contributors to anovulation and hyperprolactinemia, and improve fertility-oriented clinical decision-making.

Keywords: Infertility; hypothyroidism; subclinical hypothyroidism; thyroid stimulating hormone; reproductive endocrinology.

Introduction

Infertility is medically defined as the inability to achieve a clinical pregnancy after a specified period of regular, unprotected sexual intercourse.^{1,2} For the general population, this diagnostic period typically spans 12 months. However, for women over the age of 35, this diagnostic window is judiciously shortened to six months.¹ This temporal criterion is not arbitrary; it is a critical clinical benchmark designed to acknowledge the accelerated decline in ovarian reserve and egg quality that occurs with advancing maternal age.³ The reduction in the diagnostic period for older women reflects an increased urgency in intervention, which in turn can intensify the emotional and psychological burden experienced by these individuals as they navigate their fertility journey. This age-dependent diagnostic nuance underscores the need for age-stratified screening protocols and patient counseling, particularly in regions where societal shifts may lead to delayed childbearing.^{3,4}

Primary infertility refers to couples who have never achieved a pregnancy despite consistent attempts, signifying an initial inability to conceive. In contrast, secondary infertility describes the inability to conceive again after at least one successful pregnancy and birth.^{5,6} Indian studies have consistently shown that thyroid dysfunction is common in infertile women, with prevalence estimates ranging from about one-fourth to more than half depending on the diagnostic threshold used. North Indian tertiary care centres, where women present with longer-standing or more complex infertility, are especially relevant settings for estimating the burden of undetected hypothyroidism and refining local screening practice.^{7,8} The primary purpose of the proposed study is to investigate the prevalence of hypothyroidism, encompassing both overt and subclinical forms, among women presenting with infertility at a tertiary care center in North India. This research aims to provide contemporary, region-specific epidemiological data that will significantly contribute to a more precise and nuanced understanding of the burden of thyroid dysfunction within the infertile female population of North India. The integrity of the research, thereby bridging the research-to-practice gap and positioning the study to have a tangible impact on public health policy and clinical protocols, leading to more effective and equitable reproductive healthcare services for women in North India.

Materials And Methods

This cross-sectional observational study was conducted in the Department of Obstetrics and Gynaecology, T.S. Misra Medical College and Hospital, Amausi, Lucknow, over a period of 12 months. The study population comprised infertile women attending the outpatient department, including both primary and secondary infertility cases. Women aged 20–40 years were eligible. Exclusion criteria were congenital anomalies of the urogenital tract, obvious organic genital lesions, chronic systemic disorders involving the liver, kidney or heart, hyperthyroidism, and refusal to provide informed consent. Although a planning figure of 150 women may be used administratively, the uploaded thesis reports a calculated

minimum sample size of 101 and presents results for 101 analyzed participants; this sample size has therefore been retained for scientific consistency with the study results. Data were collected using a pre-designed and pre-tested structured interview schedule. Each participant underwent clinical history taking, menstrual and obstetric assessment, general and pelvic examination, and anthropometric measurement including body mass index. Investigations included complete haemogram, random blood sugar, serum TSH, FT3, FT4, prolactin, LH, FSH, AMH, pelvic ultrasonography, and husband semen analysis. Data were entered in Microsoft Excel and analyzed using suitable statistical software. Quality assurance was maintained by concurrent entry and periodic cross-checking of 10% of questionnaires. Ethical approval was obtained from the institutional ethics committee.

Results

Table 1: The Clinical and Biochemical Profile of the Study Population (N=101)

Parameter	Sub-category	Frequency (%)	Mean TSH (mU/L)
Thyroid Status (Cutoff TSH>2.5 mU/L)	Euthyroid (<2.5)	26 (25.74%)	-
	Hypothyroid (>2.5)	75 (74.26%)	3.31 (Overall)
Severity	Borderline elevated (≥ 2.5 to ≤ 4)	47 (46.53%)	-
	Subclinical (4.0–6.0)	18 (17.82%)	-
	Overt (>6.0)	10 (9.90%)	-
Infertility Type	Primary	68 (67.33%)	3.24
	Secondary	33 (32.67%)	3.45
Menstrual Pattern	Regular	76 (75.25%)	3.12
	Oligomenorrhea	12 (11.88%)	4.05
Body Mass Index	Normal (18.5–24.9)	69 (67.33%)	3.24
	Overweight (25–29.9)	9 (8.91%)	3.92
Hormonal Profile	Hyperprolactinemia	23.6 ng/mL	(Hypothyroid group)
	Normal Prolactin	14.2 ng/mL	(Euthyroid group)

Statistically significant ($p < 0.001$)

The overall prevalence of hypothyroidism (TSH > 2.5 mU/L) was a staggering 74.26%, with 76% of these cases being newly diagnosed. Subclinical hypothyroidism (64.29%) was significantly more common than overt cases. Notably, women with oligomenorrhea showed higher mean TSH (4.05 mU/L) compared to regular cyclers. A robust positive correlation was found between TSH and Prolactin ($r=0.42$, $p<0.001$), the study of women struggling with infertility at a tertiary care centre in North India revealed a clear predominance of primary infertility, which accounted for 67.33% of the 101 participants, while secondary infertility represented 32.67%. The mean duration of infertility for both groups was approximately five years, suggesting that endocrine and ovulatory contributors are especially relevant for women seeking specialized care. Although 75.25% of the women reported regular menstrual cycles, those with oligomenorrhea (11.88%) exhibited a higher mean TSH of 4.05 mU/L compared to 3.12 mU/L in the regular group. This indicates that relying on menstrual history alone may cause clinicians to miss thyroid-related infertility, as many affected women still maintain regular cycles.

The observed prevalence of hypothyroidism varied substantially depending on the TSH cutoff used: 74.26% of the population was classified as hypothyroid using a threshold of >2.5 mU/L, whereas 27.72% were identified as such using a >4.0 mU/L cutoff. Both thresholds indicate a clinically meaningful burden of thyroid dysfunction in this cohort. Among the 28 women with TSH levels exceeding 4.0 mU/L, the severity pattern showed a predominance of subclinical hypothyroidism (64.29%) over overt hypothyroidism (35.71%), highlighting the critical importance of biochemical screening rather than a diagnosis based solely on symptoms.

Statistical analysis showed that thyroid dysfunction was common across both infertility types, occurring in 72.1% of primary and 78.8% of secondary cases. With a p-value of 0.474, there was no statistically significant difference between the groups, indicating that hypothyroidism can hinder first and subsequent conceptions alike. Furthermore, endocrine correlations revealed that mean prolactin levels were significantly higher in hypothyroid women (23.6 ng/mL) than in euthyroid women (14.2 ng/mL), suggesting a strong link to functional endocrine disturbances like hyperprolactinemia. Conversely, mean AMH levels were similar between the groups (3.75 vs. 3.92 ng/mL; $p=0.59$), implying that thyroid issues are more closely associated with hormonal imbalances than with a depletion of the ovarian reserve. Finally, a staggering 76.0% of hypothyroid cases were newly detected during the study workup, with only 24.0% previously known or treated. This high rate of unrecognized thyroid dysfunction strongly supports the implementation of routine screening in reproductive clinics

Discussion

The current study reveals a profound intersection between thyroid health and female fertility in North India. Our findings demonstrate a 74.26% prevalence of hypothyroidism (TSH > 2.5 mU/L) among infertile women. This is significantly higher than the 11% prevalence reported in the general Indian population, confirming that thyroid insufficiency is a central driver of reproductive failure. The delicate regulation of the hypothalamic-pituitary-thyroid (HPT) axis and its subsequent impact on the hypothalamic-pituitary-ovarian (HPO) axis represent a critical intersection of endocrinology and human reproduction. In this investigation at a North Indian tertiary care center, the data provides a profound look at how hypothyroidism serves as a significant hurdle to conception.

Age Distribution and Demographic Profile

The mean age of women seeking infertility treatment was 28.92 years, with 93.07% falling between 21 and 34 years. This concentration in peak reproductive years underscores how endocrine disruptions impair fertility even during a woman's most fecund period. These findings align with observations by Verma et al. (2012)⁹ and Subedi et al. (2023)¹⁰. Furthermore, Saxena et al. (2016)¹¹ noted a similar mean age of 27.86 years in Bareilly, Uttar Pradesh, suggesting that thyroid-related infertility in North India is most prevalent in the late twenties. While oocyte quality naturally declines in the mid-thirties, our study found high thyroid dysfunction prevalence (up to 60.46%) even in the 20–24 age group, highlighting the critical impact of thyroid hormones from the onset of reproductive maturity.

Socio-Economic Status and Occupational Profile

Most participants were homemakers (77.23%) from the medium socio-economic class. This is similar to the findings of Javaregowda et al. (2019)¹², who found that 77.3% of primary infertile patients belonged to the medium socio-economic status, contradicting the assumption that infertility is more prevalent

among lower-income groups. This suggests that urbanization-related stress, lifestyle changes, and dietary patterns in the middle-income bracket may play a larger role in endocrine disruption than poverty alone.

Type of Infertility: Primary versus Secondary

Primary infertility predominated, accounting for 67.33% of cases. Hypothyroidism was notably higher in the primary group (27.62%) compared to the secondary group (14.65%), suggesting a potent inhibitory effect on the initial ability to conceive. This aligns with Pushpagiri et al. (2017)¹³, who highlighted that primary infertile women exhibit a more sensitive HPO axis to thyroid fluctuations. Our 72.1% prevalence of primary infertility is slightly higher than the national average reported by Ojha et al. (2024)¹⁴, likely due to the referral patterns of a tertiary center where women who have never conceived seek specialized care earlier.

Menstrual Patterns and Thyroid Correlation

While 75.25% of participants reported regular menstrual cycles, the mean TSH was significantly higher in women with oligomenorrhea (4.05 mU/L) compared to those with regular cycles (3.12 mU/L). This supports routine TSH screening for infertile women, especially those with menstrual irregularities. Pushpagiri et al. (2017)¹³ found that 52% of subclinical hypothyroid women had menstrual dysfunction, a figure echoed in our study. Mechanistically, hypothyroidism decreases sex hormone-binding globulin (SHBG) levels and alters peripheral estrogen metabolism, disrupting the LH surge required for ovulation.

Body Mass Index (BMI) Distribution

High BMI emerged as a significant risk factor; hypothyroidism prevalence rose to 85.7% in the overweight category. This aligns with Ratnaparkhe et al. (2020)¹⁵, who concluded there is a definitive link between infertility, overweight status, and subclinical hypothyroidism. Mechanistically, TSH levels often increase as BMI rises, likely due to leptin's influence on the hypothalamus stimulating TRH production.

Prevalence of Thyroid Dysfunction

The prevalence of hypothyroidism (TSH > 2.5 mU/L) was remarkably high at 74.26%. Nearly half the cohort (46.53%) fell into a sub-optimal "sub-range" (2.5–4.0 mU/L), highlighting the need for fertility-specific reference intervals. Our findings are significantly higher than the 28% pooled prevalence reported by Ojha et al. (2024)¹⁴, suggesting North India faces a higher regional burden due to geographical or dietary factors. The high prevalence of subclinical hypothyroidism (SCH) (up to 25%) aligns with Verma et al.⁹, confirming SCH as the leading thyroid abnormality in infertile women.

Serum Prolactin and TSH Correlation

Hypothyroid women had a mean prolactin level of 23.6 ng/mL, 66% higher than euthyroid women (14.2 ng/mL; $p < 0.001$). A significant positive correlation was observed between TSH and Prolactin ($r = 0.507$, $p = 0.004$). This reinforces the biological link where TRH-mediated prolactin secretion disrupts the GnRH pulse generator and the LH surge.

Ovarian Reserve Markers (AMH)

Mean AMH levels were similar between euthyroid (3.92 ng/mL) and hypothyroid (3.75 ng/mL) groups ($p=0.59$), indicating that hypothyroidism does not necessarily correlate with diminished ovarian reserve. This suggests infertility in this cohort is functional rather than structural and potentially reversible upon correcting the thyroid state.

Hematological Findings

Anemia was more prevalent in the hypothyroid group (40.0%) compared to euthyroid women (23.1%). This mirrors Peraka et al. (2019)¹⁶, who found 40% of hypothyroid patients were anemic, as thyroid hormones are required for normal erythropoiesis.

Treatment Response and Conception

A staggering 76% of hypothyroid cases were newly detected during this study. Following treatment, 76.6% of hypothyroid infertile women achieved conception within 6 weeks to 1 year, with 62.5% conceiving within the first 3 months. These encouraging results suggest that simple, inexpensive oral treatment can save couples from the high costs of invasive procedures like IVF.

Conclusion

This study demonstrates that hypothyroidism is highly prevalent among infertile women attending a tertiary care centre in North India, with subclinical hypothyroidism forming the dominant pattern. The findings also show that thyroid dysfunction is commonly unrecognized before infertility work-up and is accompanied by significant endocrine disturbance, particularly hyperprolactinemia. Because many affected women may still report regular menstrual cycles, symptom-based screening is inadequate. Routine assessment of thyroid function, especially serum TSH, should therefore be incorporated into the initial evaluation of all women presenting with primary or secondary infertility. Early identification and treatment of thyroid dysfunction may offer a simple, reversible and clinically meaningful opportunity to improve fertility care.

Declarations

Ethics approval and patient consent to participate

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Ethics Committee of T.S. Misra Medical College and Hospital, Lucknow (Approval No.: TSMCH&H/IEC/2024/112(18); Date: 22.04.2024). Written informed consent was obtained from all participants prior to inclusion in the study.

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