

Thyroid Status and Treatment Responses of Hypothyroid Infertile Women

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<p>Abstract: <i>Background:</i> Hypothyroidism significantly affects female fertility by disrupting menstrual cycles, ovulation, and endometrial receptivity. Thyroid hormones regulate ovarian function, and their deficiency can impair reproductive outcomes. Early diagnosis and appropriate treatment may improve fertility. This study aimed to assess thyroid status and treatment responses in hypothyroid infertile women receiving levothyroxine therapy. <i>Methods:</i> This hospital-based observational study was conducted at the Department of Medicine, Community Based Medical College, Bangladesh, from January 2023 to July 2023. A total of 63 hypothyroid infertile women were recruited using a convenient purposive sampling technique. Thyroid function was evaluated through serum TSH, FT4, and FT3 levels. All participants received levothyroxine therapy, and treatment responses were assessed by monitoring thyroid hormone levels, menstrual cycle regularity, ovulation, and pregnancy outcomes. Data analysis was performed using SPSS version 23.0. <i>Results:</i> Among 63 hypothyroid infertile women, 51 (81.0%) achieved euthyroid status after levothyroxine therapy. Menstrual regularity improved in 48 (76.2%), and ovulation occurred in 43 (68.3%). Pregnancy was achieved in 27 (42.9%), with 21 (77.8%) resulting in ongoing pregnancies. Women with TSH <10 μIU/mL and normal BMI showed better treatment responses. <i>Conclusion:</i> Levothyroxine therapy improves thyroid function and fertility outcomes in hypothyroid infertile women. It enhances menstrual regularity, promotes ovulation, and increases pregnancy rates. Women with lower baseline TSH and normal BMI show better treatment responses. Early thyroid optimization plays a crucial role in improving reproductive health and pregnancy outcomes.</p> <p>Keywords: Hypothyroidism, Infertility, Levothyroxine, Ovulation, Pregnancy outcome, Thyroid function.</p> <p>Copyright © 2025 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.</p>	<p>Research Paper</p>
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INTRODUCTION

Hypothyroidism is a common endocrine disorder that significantly impacts female reproductive health. It affects ovarian function, menstrual cycle regulation, and endometrial receptivity, leading to infertility and poor pregnancy outcomes¹. Thyroid hormones play a crucial role in the hypothalamic-pituitary-ovarian axis, influencing follicular development, ovulation, and corpus luteum function². Women with hypothyroidism often present with menstrual irregularities, anovulation, and luteal phase defects, which contribute to subfertility³. The prevalence of hypothyroidism among infertile women is reported to be higher than in the general population, necessitating routine thyroid function assessment in reproductive-age women seeking infertility treatment⁴. Untreated

hypothyroidism is associated with increased serum levels of thyroid-stimulating hormone (TSH) and decreased levels of free thyroxine (FT4) and free triiodothyronine (FT3), leading to altered gonadotropin secretion and impaired reproductive function⁵. Additionally, thyroid dysfunction affects estrogen metabolism, further disrupting the reproductive cycle⁶. Studies have shown that levothyroxine therapy can restore normal thyroid function, improve ovulatory function, and enhance fertility outcomes in hypothyroid women⁷. Early intervention with levothyroxine not only corrects thyroid hormone levels but also regulates menstrual cycles and promotes successful conception⁸. Research indicates that hypothyroid women undergoing levothyroxine therapy experience significant improvements in ovulatory function and endometrial receptivity, increasing their chances of conception⁹. However, despite levothyroxine

treatment, some women may still experience subfertility due to additional factors such as ovarian reserve status, insulin resistance, and autoimmune thyroid disease¹⁰. Thus, comprehensive management of hypothyroid infertile women should include regular thyroid function monitoring and individualized treatment plans. This study aimed to evaluate the thyroid status of hypothyroid infertile women and assess their treatment responses following levothyroxine therapy. The findings will provide valuable insights into the effectiveness of thyroid hormone replacement therapy in improving reproductive outcomes and highlight the importance of thyroid screening in infertility management.

METHODOLOGY

This hospital-based observational study was conducted at the Department of Medicine, Community Based Medical College, Bangladesh, from January 2023 to July 2023. A total of 63 hypothyroid infertile women were selected using a convenient purposive sampling technique. Inclusion criteria included women aged 18–40 years with primary or secondary infertility and diagnosed hypothyroidism based on elevated thyroid-stimulating hormone (TSH) and altered free thyroxine (FT4) levels. Patients with other endocrine disorders, structural reproductive abnormalities, or chronic illnesses affecting fertility were excluded. Baseline thyroid function was assessed by measuring serum TSH, FT4, and free triiodothyronine (FT3) using standard laboratory methods. All participants received levothyroxine therapy with dose adjustments based on follow-up TSH and FT4 levels. Clinical responses were evaluated by monitoring menstrual cycle regularity, ovulation (confirmed by ultrasound or biochemical markers), and pregnancy occurrence over 12 months. Data were collected using a structured questionnaire and hospital records. Statistical analysis was performed using SPSS version 23.0. Descriptive statistics summarized baseline characteristics, while paired *t*-tests and chi-square tests assessed treatment effects. A *p*-value <0.05 was considered statistically significant.

RESULT

The study included 63 hypothyroid infertile women with a mean age of 30.4 ± 4.2 years. The majority of participants (65.1%) were within the age range of 26–35 years. Among them, 71.4% had primary infertility, while 28.6% had secondary infertility. The mean duration of infertility was 4.6 ± 2.1 years. Baseline thyroid function tests revealed an elevated mean TSH level of 8.6 ± 2.1 µIU/mL and reduced FT4 levels in all participants. Following six months of levothyroxine therapy, 81% of participants achieved euthyroid status with normalized TSH and FT4 levels. Menstrual cycle regularity improved in 76% of cases, and ovulation was confirmed in 68% of women. Pregnancy was achieved in

43% of participants within one year of therapy initiation. Among those who conceived, 77.8% had successful ongoing pregnancies, while 22.2% experienced early pregnancy loss. Body mass index (BMI) was evaluated, showing that 38.1% of participants were overweight, and 15.9% were obese. Women with higher BMI had a delayed response to treatment, with a lower rate of ovulation and pregnancy success. A comparison between primary and secondary infertility cases revealed no significant difference in treatment response. However, women with lower baseline TSH levels (<10 µIU/mL) showed a faster restoration of thyroid function and better reproductive outcomes.

Table 1: Baseline characteristics of cases

Variable	Mean ±SD / n (%)
Age (years)	30.4 ± 4.2
Age group (years)	
18-25	19 (30.2%)
26-35	41 (65.1%)
>35	3 (4.7%)
Infertility type	
Primary	45 (71.4%)
Secondary	18 (28.6%)
Infertility duration (years)	4.6 ± 2.1
BMI (kg/m²)	
Normal	29 (46.0%)
Overweight	24 (38.1%)
Obese	10 (15.9%)

Table 2: Baseline thyroid function parameters

Parameter	Mean ± SD
TSH (µIU/mL)	8.6 ± 2.1
FT4 (ng/dL)	0.76 ± 0.14
FT3 (pg/mL)	2.1 ± 0.5

Table 3: Treatment response following levothyroxine therapy

Response Outcome	n (%)
Achieved euthyroid status	51 (81.0%)
Improved menstrual regularity	48 (76.2%)
Confirmed ovulation	43 (68.3%)
Pregnancy achieved	27 (42.9%)
Ongoing pregnancy	21 (77.8%)
Early pregnancy loss	6 (22.2%)

Table 4: Treatment response based on baseline TSH levels

TSH Level (µIU/mL)	AE (%)	n (%)
<10	90.0%	52.0%
≥10	65.0%	34.0%

AE: Achieved Euthyroid

Table 5: Effect of BMI on treatment response

BMI status	E (%)	O (%)	P (%)
Normal	86.2%	75.9%	55.2%
Overweight	79.2%	62.5%	37.5%
Obese	60.0%	40.0%	20.0%

E: Euthyroid, O: Ovulation, P: Pregnancy

DISCUSSION

This study aimed to evaluate the thyroid status and treatment responses of hypothyroid infertile women undergoing levothyroxine therapy. Our findings suggest that levothyroxine significantly improves thyroid function, menstrual regularity, and fertility outcomes in these women, emphasizing the importance of thyroid optimization in infertility management. Hypothyroidism has long been recognized as a significant factor contributing to female infertility. Thyroid hormones influence the ovarian function, menstrual cycle, and endometrial receptivity, which are essential for successful conception¹¹. Previous studies have shown that hypothyroidism impairs ovulation and luteal phase function, resulting in irregular menstrual cycles and anovulation¹². Our study corroborates these findings, with 76.2% of participants showing improved menstrual regularity and 68.3% experiencing ovulation following levothyroxine therapy. These improvements are consistent with other studies that report increased ovulatory function after thyroid hormone replacement therapy in hypothyroid women¹³. The role of thyroid hormones in maintaining a healthy pregnancy is well documented. Inadequate thyroid function during pregnancy can lead to complications such as miscarriage, preterm birth, and developmental issues in the fetus¹⁴. Our study found that 42.9% of women achieved pregnancy following treatment, with 77.8% of these pregnancies resulting in ongoing pregnancies. These results are similar to those of other studies that report improved fertility outcomes and reduced miscarriage rates in hypothyroid women who undergo levothyroxine therapy⁶. It is essential that hypothyroid women receive timely treatment to reduce the risks associated with untreated thyroid dysfunction during pregnancy. In this study, we also observed that baseline thyroid function levels influenced treatment responses. Women with lower baseline TSH (<10 μ IU/mL) had a faster restoration of normal thyroid function and better reproductive outcomes. This is in line with previous research suggesting that mild thyroid dysfunction may respond more readily to levothyroxine therapy, resulting in improved fertility outcomes⁵. However, women with higher baseline TSH levels may require longer treatment durations to achieve optimal thyroid function, as suggested by our findings. Body mass index (BMI) is another important factor influencing the success of fertility treatments in hypothyroid women. We observed that women with normal BMI had better treatment

responses, with higher rates of ovulation and pregnancy success compared to overweight and obese women. This is consistent with studies that have shown that obesity negatively affects fertility outcomes in hypothyroid women. Obesity is associated with hormonal imbalances, including insulin resistance, which can exacerbate thyroid dysfunction and impair ovulatory function¹⁵. Therefore, weight management should be an essential part of the treatment plan for hypothyroid infertile women. While levothyroxine therapy significantly improves fertility outcomes, it is important to acknowledge that not all hypothyroid women will achieve pregnancy, even with optimized thyroid function. Factors such as ovarian reserve, age, and the presence of other underlying conditions may also influence fertility outcomes⁸. Therefore, a comprehensive approach that includes thyroid hormone replacement, lifestyle modifications, and management of other fertility-related issues is crucial for optimizing reproductive health in hypothyroid women.

Limitations:

This study has limitations, including its small sample size and single-center design, which may affect the generalizability of findings. Additionally, factors such as ovarian reserve, age, and other underlying conditions were not extensively explored. Long-term follow-up and larger studies are needed for more comprehensive conclusions.

CONCLUSION

Levothyroxine therapy significantly improves thyroid function and fertility outcomes in hypothyroid infertile women. A majority of women achieved euthyroid status, with improvements in menstrual regularity and ovulation. Pregnancy rates increased, particularly among those with lower baseline TSH levels and normal BMI. These findings underscore the importance of timely thyroid optimization in enhancing fertility outcomes and improving reproductive health in hypothyroid women undergoing infertility treatment.

Recommendations:

It is recommended that hypothyroid infertile women receive timely thyroid function assessment and levothyroxine therapy to optimize fertility outcomes. Additionally, addressing BMI through lifestyle modifications and weight management should be integrated into treatment plans. Regular monitoring of thyroid levels is essential to ensure effective treatment and improve reproductive health.

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