American Journal of Biology and Natural Sciences
https://biojournals.us/index.php/AJBNS
ISSN: 2997-7185

A Clinical Observational Study of the Impact of Hyperthyroidism on Female Fertility and Maternal Weight during Pregnancy

Azhar Hassan Dakhel, Ghina Hamoodi Hussein, Hiba S. Jabbar
Forensic Medicine in Muthanna, Applied Medical Sciences Collage -AL Muthanna University, Medicine Collage -AL Muthanna University

Received: 2024, 15, Feb
Accepted: 2025, 21, Mar
Published: 2025, 22, Apr

Annotation: Background: Hyperthyroidism is known to influence several physiological systems, particularly in women of reproductive age. Its impact on fertility, maternal weight gain during pregnancy, and fetal outcomes remains a subject of clinical concern. Objective: To investigate the effect of hyperthyroidism on female fertility, maternal weight gain during pregnancy, and fetal birth weight. Methods: This observational study included 30 pregnant women diagnosed with hyperthyroidism and 20 healthy pregnant women as a control group. Data were collected retrospectively from medical records. Variables assessed included maternal weight gain during pregnancy and fertility/pregnancy rate. Statistical analysis was performed using means ± standard deviations and comparative tests. Results: The hyperthyroid group showed significantly reduced maternal weight gain during pregnancy (288a ± 1.03) compared to the control group (209d ± 0.980), ($p < 0.05$). A marked decline in fertility/pregnancy rate was also noted in hyperthyroid women

(3.2b ± 0.611) versus healthy controls (8.3a±0.153) ($p < 0.01$). Conclusion: Hyperthyroidism in women has a substantial negative effect on fertility and weight gain during pregnancy, which may further impact fetal health. Early diagnosis and appropriate management are essential to improve maternal and fetal outcomes.

Keywords: Hyperthyroidism, Female Fertility, Pregnancy Weight, Fetal Weight, Thyroid Disorders.

Introduction

Thyroid disorders, particularly **hyperthyroidism**, are among the most common endocrine abnormalities affecting women of reproductive age. The global prevalence of hyperthyroidism in women is estimated at approximately 1–2% depending on diagnostic criteria and iodine intake levels. Hyperthyroidism is characterized by elevated levels of thyroid hormones (triiodothyronine [T3] and thyroxine [T4]) and suppression of thyroid-stimulating hormone (TSH), leading to metabolic and reproductive disturbances[1].

Thyroid hormones are essential for normal reproductive physiology. They influence follicular development, ovulation, endometrial receptivity, and luteal function. Disruption of this delicate hormonal balance in women can result in menstrual irregularities, anovulation, infertility, and early pregnancy loss [2,3].

During pregnancy, maternal thyroid function is critical for both maternal health and fetal development, especially in the first trimester before the fetal thyroid becomes functional. Hyperthyroidism during pregnancy has been associated with increased risks of **miscarriage, preterm birth, intrauterine growth restriction (IUGR), low birth weight,** hypertensive disorders, and **maternal complications** such as preeclampsia and heart failure [4,5]. Furthermore, uncontrolled hyperthyroidism can lead to **inadequate maternal weight gain,** which is an independent risk factor for fetal malnutrition and adverse perinatal outcomes [6].

Thyroid function plays a critical role in female reproductive health, with imbalances often associated withadverse pregnancy outcomes. Previous experimental research has shed light on the molecular basis of these effects. For instance, Hussein, Muhssa, and Shakir (2024) demonstrated that exogenous iodine administration during pregnancy in a rat model significantly influenced the expression of thyroid transcription factors, potentially disrupting hormonal homeostasis. These findings underscore the importance of tightly regulated thyroid activity during gestation. Building on this experimental foundation, the present clinical observational study aims to explore the real-world implications of thyroid dysfunction—specifically hyperthyroidism—on female fertility and maternal weight during pregnancy[7].

Materials and Methods

Study Design and Population:

This study is a retrospective observational case-control study conducted at [Private clinics], between [2/4/2024 -20/1/2025]. A total of 50 women were enrolled, including 30 pregnant women diagnosed with hyperthyroidism (study group) and 20 age-matched healthy pregnant women

(control group).

Inclusion and Exclusion Criteria:

Women in the hyperthyroid group were included if they had a confirmed diagnosis of hyperthyroidism based on suppressed serum TSH levels and elevated free T3 and/or T4, either prior to or during early pregnancy.

Exclusion criteria included:

- ✓ Pre-existing chronic illnesses (e.g., diabetes, hypertension),
- ✓ Multiple gestations,
- ✓ Use of assisted reproductive technology,
- ✓ Incomplete medical records.

The control group consisted of healthy pregnant women without any thyroid dysfunction or chronic diseases, matched for age and parity.

Data Collection:

Clinical and demographic data were collected including:

- ✓ Maternal age, gravidity, and parity.
- ✓ Fertility/pregnancy rate (defined as number of conceptions per year or per 1000 reproductive-age women, depending on context).
- ✓ Maternal weight gain during pregnancy (measured in kilograms).

Statistical Analysis:

All data were analyzed using SPSS version 26. Quantitative variables were presented as mean ± standard deviation (SD). The Student's t-test was used to compare means between the two groups. A *p*-value of less than 0.05 was considered statistically significant.

Ethical approval for this study was obtained from the Patient and all procedures were in accordance with the Declaration of Helsinki.

Results and **Discussion**

Results:

A total of 50 pregnant women were included in the analysis: 30 with confirmed hyperthyroidism and 20 healthy controls. The mean maternal age was comparable between the two groups ($p > 0.05$).

1. Fertility Rate

The fertility rate in the hyperthyroid group was significantly reduced compared to the control group. Women with hyperthyroidism exhibited a mean fertility rate of ($3.2^{b} \pm 0.611$), while the control group had a significantly higher rate of ($8.3^{a} \pm 0.153$) ($p < 0.01$).

Table (1): The different of fertility rate between hyperthyroid group and control group.

	Number of Birth		
Doses of Iodine	**Mean ± SE**	**F- test**	**P-value**
Control	$8.3^{a} \pm 0.153$	8.27	0.0001
Case	$3.2^{b} \pm 0.611$		

-All results show significant difference at ($P<0.01$).

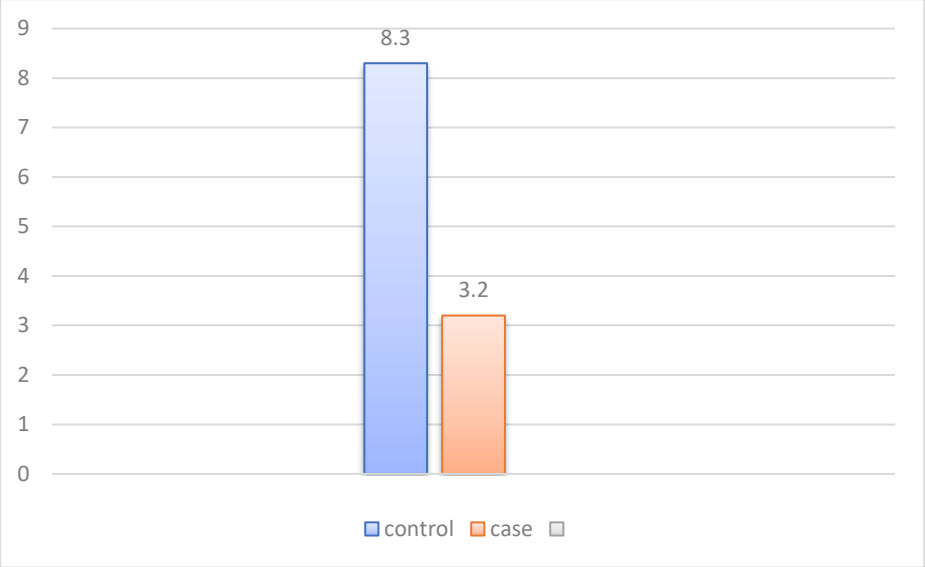

Figure (1): The different of fertility rate between hyperthyroid group and control group.

2. Maternal Weight Gain During Pregnancy

The hyperthyroid group had a markedly lower mean weight gain during pregnancy (**209** [d] **± 0.980**) compared to the control group (288 [a] ±1.03) ($p < 0.001$).

Table (2): The different of **maternal weight** between hyperthyroid group and control group.

	Number of Birth		
Doses of Iodine	**Mean ± SE**	**F- test**	**P-value**
Control	288 [a] ±1.03	887.39	0.0001
Case	**209** [d] **± 0.980**		

-All results show significant difference at (P<0.01).

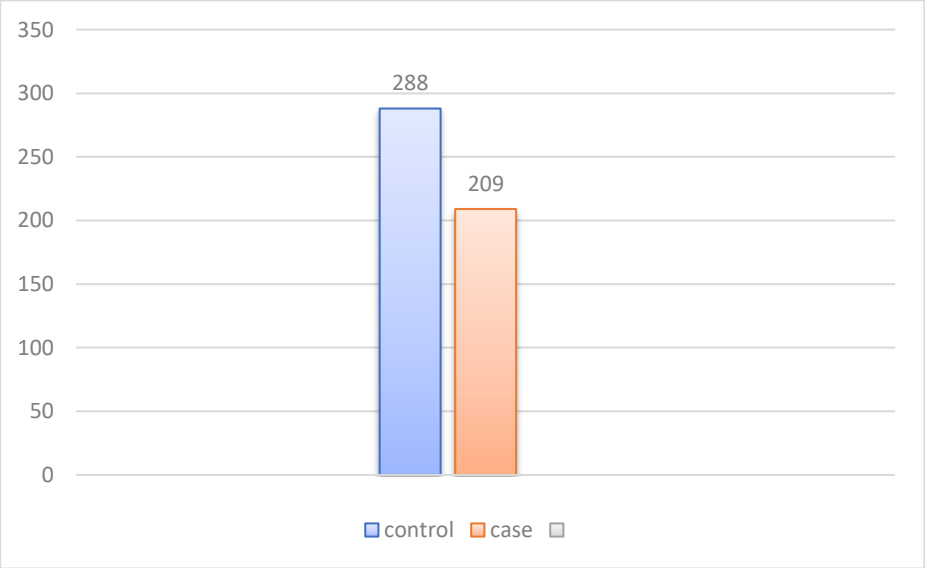

Figure (2): The different of **maternal weight** between hyperthyroid group and control group.

Discussion:

This study demonstrates a clear association between maternal hyperthyroidism and adverse reproductive outcomes, particularly reduced fertility and inadequate maternal weight gain during pregnancy. These findings are consistent with existing literature, reinforcing the critical role of thyroid hormones in reproductive physiology and gestational metabolic regulation.

In a previous study, Hussein, Muhssa, and Shakir (2024)[7] examined the impact of exogenous iodine on thyroid transcription factors during pregnancy in a rat model. Their findings demonstrated that elevated iodine levels can influence the regulation of key thyroid-related genes, potentially disrupting hormonal balance during gestation. Building on this foundation, the current research explores how hyperthyroidism affects fertility and pregnancy outcomes in humans, Understanding the continuum from nutrient-induced thyroid changes to overt thyroid dysfunction can provide a more comprehensive view of thyroid-related reproductive risks.

Thyroid hormones are integral to the hypothalamic-pituitary-ovarian axis and play a pivotal role in follicular development, oocyte maturation, and endometrial receptivity [8]. Elevated levels of T3 and T4 disrupt this hormonal equilibrium, leading to menstrual irregularities, anovulation, and decreased conception rates, as observed in our cohort. Similar reductions in fertility among hyperthyroid women have been documented in multiple studies, including those by Krassas et al. and Poppe et al. [9,10].

Maternal weight gain is a fundamental component of healthy pregnancy, directly influencing fetal growth and development. Our data reveal that women with hyperthyroidism gained significantly less weight than healthy controls. This is likely attributable to the hypermetabolic state induced by excess thyroid hormone, which increases basal metabolic rate and catabolism, often resulting in weight loss or failure to gain adequate gestational weight [11]. These findings are consistent with studies showing that hyperthyroidism is associated with low maternal weight gain and increased risk of low birth weight infants [12,13].

The implications of insufficient weight gain during pregnancy extend beyond maternal health. Studies show that low maternal weight gain is associated with intrauterine growth restriction (IUGR), low birth weight, and long-term metabolic consequences for the infant [14]. Although fetal weight data were not available for this study at the time of writing, this outcome will be essential to assess in future research to complete the clinical picture.

From a clinical perspective, the results underscore the importance of **preconception screening** and **early management of thyroid dysfunction** in women planning pregnancy. Timely diagnosis and treatment of hyperthyroidism, often with antithyroid drugs (e.g., propylthiouracil or methimazole), can help restore reproductive function and improve pregnancy outcomes [15].

Conclusion:

This study highlights the significant adverse effects of hyperthyroidism on female reproductive health and pregnancy outcomes. Women with hyperthyroidism demonstrated markedly reduced fertility rates and inadequate weight gain during pregnancy compared to healthy controls. These findings underscore the critical importance of thyroid function screening in women of childbearing age, especially those experiencing unexplained infertility or recurrent pregnancy complications.

Timely diagnosis and proper management of hyperthyroidism before and during pregnancy are essential to minimize risks to both mother and fetus. Further prospective studies with larger cohorts and additional parameters such as fetal birth weight and neonatal outcomes are needed to strengthen the evidence base and guide clinical decision-making.

References:

1. De Leo S, Lee SY, Braverman LE. Hyperthyroidism. *Lancet*. 2016;388(10047):906–918.
2. Krassas GE, Poppe K, Glinoer D. Thyroid function and human reproductive health. *Endocr Rev*. 2010;31(5):702–755.
3. Abalovich M, et al. Thyroid dysfunction and infertility. *Thyroid*. 2002;12(10):867–872.

4. Alexander EK, Pearce EN, Brent GA, et al. 2017 Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Disease During Pregnancy. *Thyroid*. 2017;27(3):315–389.
5. Maraka S, et al. Maternal Hyperthyroidism and Adverse Pregnancy Outcomes. *J Clin Endocrinol Metab*. 2017;102(6):2090–2098.
6. Siega-Riz AM, Viswanathan M, Moos MK, et al. A systematic review of outcomes of maternal weight gain. *Evid Rep Technol Assess (Full Rep)*. 2009;(168):1–223.
7. Ghina Hamoodi Hussein, Ehab R. Muhssa, Alaa T. Shakir. Study the Effect of Exogenous Iodine on the Thyroid Transcription Factors during Pregnancy in Rat Model December 2024.10.4103/MJBL.MJBL_319_23.
8. Silva JF, Ocarino NM, Serakides R. Thyroid hormones and female reproduction. *Biol Reprod*. 2018;99(5):907–921.
9. Krassas GE, Poppe K, Glinoer D. Thyroid function and human reproductive health. *Endocr Rev*. 2010;31(5):702–755.
10. Poppe K, et al. Thyroid autoimmunity and female infertility. *Verh K Acad Geneeskd Belg*. 2006;68(5-6):357–377.
11. De Leo S, Lee SY, Braverman LE. Hyperthyroidism. *Lancet*. 2016;388(10047):906–918.
12. Maraka S, et al. Maternal hyperthyroidism and adverse pregnancy outcomes. *J Clin Endocrinol Metab*. 2017;102(6):2090–2098.
13. Casey BM, Leveno KJ. Maternal thyroid disease and pregnancy outcomes. *Obstet Gynecol*. 2006;108(5):1288–1293.
14. Siega-Riz AM, Viswanathan M, Moos MK, et al. A systematic review of outcomes of maternal weight gain. *Evid Rep Technol Assess*. 2009;(168):1–223.
15. Alexander EK, Pearce EN, Brent GA, et al. 2017 Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Disease During Pregnancy. *Thyroid*. 2017;27(3):315–389.