

# The Importance of TSH Testing and Adjusted Reference Ranges in Pregnant and Pregnancy-Planning Women: A Case Study

Eden Amiel\*

Tel Aviv University, Israel.

## \*Correspondence:

Eden Amiel, Tel Aviv University, Israel.

Received: 20 Apr 2024; Accepted: 25 May 2024; Published: 01 Jun 2024

**Citation:** Eden Amiel. The Importance of TSH Testing and Adjusted Reference Ranges in Pregnant and Pregnancy-Planning Women: A Case Study. *Gynecol Reprod Health*. 2024; 8(3): 1-3.

## ABSTRACT

Thyroid function is critical during pregnancy, as thyroid hormones play a significant role in the development of the fetal brain and nervous system. Thyroid Stimulating Hormone (TSH) testing is an essential tool in monitoring thyroid function. This case study highlights the importance of TSH testing in women who are pregnant or planning to become pregnant. It discusses the impact of thyroid dysfunction on pregnancy outcomes and underscores the need for routine TSH screening to ensure maternal and fetal health. This case study emphasizes that pregnancy panel labs should highlight the need for altered reference ranges for TSH in women planning to conceive, ensuring results above 2.5 mIU/L are flagged for follow-up and potential treatment. By adjusting the reference ranges and providing timely intervention, better pregnancy outcomes can be achieved, safeguarding both maternal and fetal health.

## Keywords

Thyroid Stimulating Hormone (TSH), Pregnancy, Fetal health.

## Introduction

Thyroid hormones, produced by the thyroid gland, are critical for metabolism and the regulation of various bodily functions. During pregnancy, thyroid hormones are especially important for the development of the fetal brain and nervous system [1]. Thyroid dysfunction, particularly hypothyroidism, can lead to serious complications for both the mother and the fetus, including miscarriage, preterm birth, low birth weight, and developmental disorders in the child [2,3]. Thyroid Stimulating Hormone (TSH) is a key marker of thyroid function, and its levels are commonly measured to diagnose thyroid disorders. During pregnancy, the demand for thyroid hormones increases, and the thyroid gland must adapt to these changes to maintain euthyroid status [2]. The American Thyroid Association (ATA) recommends that women planning to conceive or who are pregnant should have their thyroid function closely monitored to prevent and manage thyroid dysfunction effectively [4,5]. It is well established that there are separate TSH goals for pregnant and non-pregnant adults [4]. The recommended range for pregnancy is based

on data associating TSH levels  $>2.5$  mIU/L with pregnancy complications, such as miscarriage, preterm delivery, and potential impaired fetal neurologic development [2,4]. Furthermore, it has been demonstrated that clinical outcomes are improved when TSH is kept  $\leq 2.5$  mIU/L during early pregnancy [5], which is a notably stricter TSH goal than that of non-pregnant individuals ( $<4.12$  mIU/L) [7].

This case study presents a detailed account of a patient whose thyroid function was assessed and managed during her journey from pre-conception to pregnancy. It illustrates the importance of early TSH testing, the need for adjusted reference ranges for TSH in women planning to conceive, and appropriate management strategies to ensure optimal pregnancy outcomes.

## Case Presentation

### Patient Profile

Age: 27

Gravida 1, Para 0

Medical History: Irritable Bowel Syndrome (IBS), managed with a FODMAP diet. Prior history of iron deficiency W/O anemia treated with iron supplements.

---

**Initial Presentation:** The patient, a 27-year-old woman, presented to her gynecologist with a desire to conceive. She had a medical history of IBS, which was well-managed with a FODMAP diet, and reported regular menstrual cycles. Six months before conceiving, her TSH level was 4.6 mIU/L and free T4 was 12.6 pmol/L. Despite this, no immediate action was taken as her levels were within the broader population's reference range.

### Laboratory Findings (gestational age 6 weeks)

TSH: 4.2 mIU/L (Reference range: 0.55-4.78 mIU/L)

As a result, a broader endocrine panel was ordered and taken 4 days later.

### Laboratory Findings (gestational age 6.5 weeks)

TSH: 5.6 mIU/L (Reference range: 0.55-4.78 mIU/L)

Free T4: 10.6 pmol/L (Reference range: 11.5-22.7 pmol/L)

Free T3: 4.6 pmol/L (Reference range: 3.5-6.5 pmol/L)

Anti-thyroid peroxidase antibodies (TPOAb): Negative

Thyroglobulin Ab: Negative

### Diagnosis

Subclinical hypothyroidism.

### Management

The initial treatment of subclinical hypothyroidism began after confirming an embryo heartbeat on ultrasound, at which time her TSH was 5.6 mIU/L. The patient, weighing 80 kg, was started on levothyroxine 50 mcg/day (350 mcg per week) with an initial tapering regimen of 50 mcg every other day for the first week. Treatment commenced at a gestational age (GA) of 6.5 weeks, with a recommendation for monthly follow-up labs until euthyroidism was achieved.

### Follow-Up and Adjustments

The patient's treatment and follow-up regimen involved several adjustments to her levothyroxine dosage to stabilize her TSH levels within the desired range for pregnancy. The management timeline is detailed below:

#### Initial Treatment

**GA 6.5 weeks:** The patient began treatment with levothyroxine 50 mcg/day (350 mcg per week), with an initial tapering regimen of 50 mcg every other day for the first week.

#### Follow-Up

**GA 8.5 weeks:** After 2 weeks of treatment, the follow-up lab showed a TSH level of 3.0 mIU/L. The dosage was increased by an additional 100 mcg per week, totaling 450 mcg per week.

**GA 12.5 weeks:** After 1 month, TSH returned to 2.1 mIU/L, within the normal and desired range. Despite the achieved levels, an additional increase was made to a final dose of 465 mcg per week.

**GA 16 weeks:** Follow-up labs indicated an increase in TSH to 3.1 mIU/L. The dosage was further increased to 525 mcg per week.

**GA 20 weeks:** One month later, the TSH level remained at 3.1 mIU/L. The dosage was increased again to 585 mcg per week.

**GA 24 weeks:** Subsequent labs showed TSH of 2.2 mIU/L. The

levothyroxine dose was increased to 650 mcg per week for the remainder of the pregnancy.

**GA 28 weeks:** TSH was recorded at 1.3 mIU/L, indicating successful management within the desired range.

**GA 32 weeks:** TSH was 1.6 mIU/L, confirming continued stability of thyroid function.

### Outcome

The patient successfully maintained euthyroid status with appropriate adjustments in levothyroxine dosage for the remainder of the pregnancy.

### Discussion

This case highlights several key points about the importance of TSH testing in pregnancy planning and during pregnancy:

#### Early Detection of Thyroid Dysfunction

Routine TSH screening before conception can identify subclinical hypothyroidism, which might otherwise go unnoticed but could lead to adverse pregnancy outcomes if left untreated. In this case, although the patient had a TSH level of 4.6 mIU/L six months before conception, it was not addressed until after pregnancy was confirmed, delaying optimal management.

#### Timing of Treatment

This case demonstrates that TSH should be treated before a positive HCG result as achieving a TSH level below 2.5 mIU/L takes time—time that is critical for the fetus. Delayed treatment in this patient resulted in prolonged suboptimal thyroid function during early pregnancy, a crucial period for fetal development, especially the first 16 weeks.

#### Adjusted Reference Ranges

The standard reference range for TSH (0.55-4.78 mIU/L) should be adjusted for women planning to conceive. TSH levels higher than 2.5 mIU/L, even if within the normal range for the general population, warrant intervention to optimize maternal and fetal health outcomes. This patient's TSH of 4.2 mIU/L was above the recommended threshold for pregnancy planning, highlighting the need for revised guidelines.

#### Dosage Recommendations

An initial dose of 1.6 mcg per kg should be administered rather than a default of 50 mcg per day regardless of body weight. In this case, the patient needed significant dose adjustments to reach the target TSH level. For a woman weighing 80 kg, an initial dose of approximately 128 mcg per day might have been more appropriate, potentially normalizing TSH levels more rapidly.

#### Impact on Pregnancy Outcomes

Proper management of thyroid function reduces the risk of complications such as miscarriage, preterm birth, and neurodevelopmental issues in the child. In this case, timely intervention and careful management led to a healthy pregnancy, but the delay in treatment underscores the need for early and appropriate intervention.

---

## Pregnancy Panel Labs

Family physicians and obstetricians can utilize comprehensive Pregnancy Panel labs, which include TSH testing among other essential screenings. It is crucial that these panels highlight the need for altered reference ranges for TSH in women planning to conceive, ensuring results above 2.5 mIU/L are flagged for follow-up and potential treatment. This proactive approach could prevent delays in treatment and improve pregnancy outcomes.

## Conclusion

TSH testing is a vital component of pre-conception and prenatal care. This case study demonstrates how early detection and management of thyroid dysfunction can significantly improve pregnancy outcomes. Routine TSH screening should be standard practice for all women planning to conceive and those who are pregnant, with adjusted reference ranges to ensure prompt diagnosis and treatment. Moreover, the appropriate initial dosing of levothyroxine based on body weight is essential for effective management.

## References

1. Thorpe-Beeston JG, Nicolaidis KH, Felton CV, et al. Maturation of the secretion of thyroid hormone and thyroid-stimulating hormone in the fetus. *N Engl J Med.* 1991; 324: 532-536.
2. Casey BM, Dashe JS, Wells CE, et al. Subclinical hypothyroidism and pregnancy outcomes. *Obstet Gynecol.* 2005; 105: 239-245.
3. Lazarus JH. Thyroid function in pregnancy. *Br Med Bull.* 2011; 97: 137-148.
4. Stagnaro-Green A, Abalovich M, Alexander E, et al. Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. American Thyroid Association Taskforce on Thyroid Disease During Pregnancy and Postpartum. *Thyroid.* 2011; 21: 1081-1125.
5. Alexander EK, Pearce EN, Brent GA, et al. Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Disease During Pregnancy and the Postpartum. *Thyroid.* 2017; 27: 315-389.
6. Negro R, Schwartz A, Gismondi R, et al. Universal screening versus case finding for detection and treatment of thyroid hormonal dysfunction during pregnancy. *J Clin Endocrinol Metab.* 2010; 95: 1699-1707.
7. Garber JR, Cobin RH, Gharib H, et al. Clinical practice guidelines for hypothyroidism in adults: cosponsored by the American Association of Clinical Endocrinologists and the American Thyroid Association. *Endocr Pract.* 2012; 18: 988-1028.