

## Altered TSH and its Circadian Rhythm

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**Received Date:** October 18, 2024 | **Accepted Date:** December 13, 2024 | **Published Date:** December 27, 2024

**Citation:** Altin Goxharaj, (2024), Altered TSH and its Circadian Rhythm, *International Journal of Clinical Case Reports and Reviews*, 20(5); DOI:10.31579/2690-4861/585

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### Abstract:

A circadian rhythm of serum thyrotropin (TSH) has been demonstrated by measurements performed on the majority of blood from 6 healthy young adults, 3 males and 3 females. The serum TSH level decreased from 8 am to 2 pm. The difference between the morning and midday levels was very visible. There was no correlation between meals and TSH level variations. The circadian rhythm of serum TSH is not only of physiological interest but also has practical implications where collecting blood for TSH determination is best done at 11:00 a.m. when the TSH level has fallen to the daytime amount. The mechanism of decreasing TSH levels in the blood within 24 hours is still not fully studied.

**Key words:** thyroid; hormones; circadian

### Introduction

The thyroid is a very important gland for health because it acts as a control unit that regulates, through the production of hormones, the organs and functions that are essential for our body, such as metabolism, the cardiovascular system or the reproductive system. The thyroid is an endocrine gland located in the front of the neck. It is very important for psychophysical development. It produces the hormones, thyroxine (T4) and triiodothyronine (T3), which have the task of regulating the basal metabolism and therefore the essential functions of the organs of our body.

Thyroid hormones T3 and T4, through the blood, reach all the organs and systems of the body. It is therefore very important for the thyroid to function well from the moment of birth and throughout the period of growth but also into adulthood.

To understand if the thyroid is in good health and to rule out malfunctions, simple blood tests which evaluate the levels of thyroid hormones are enough. These hormones are T4 and T3 and TSH, the latter being a hormone produced by the pituitary gland and regulates the function of the gland thyroid.

The early and correct examination would enable the identification and treatment of complications and malfunctions of its functions.

Symptoms of hypothyroidism, which means an underactive thyroid, can cause many disorders such as weight gain or loss, difficulty losing weight, insomnia, nervousness, and tachycardia.

A disorder of thyroid function can also cause infertility and during pregnancy it can endanger the health of the mother and the baby.

What are the alarm bells that can make us realize that something in the thyroid is not working properly?

How to make an accurate diagnosis and what are the most appropriate therapies?

### Hypothyroidism

It is a disease that affects 2-3% of the population. It affects the female sex more often, with a ratio of 3 females to one male. At the basis of this disease is the decrease in the production of thyroid hormones which can be partial or complete.

Usually this disease is caused by chronic damage to the thyroid gland. The most common cause is chronic thyroiditis which is autoimmune based and is called Hashimoto's Thyroiditis. Other causes are damage to the thyroid caused by viruses, medications such as Codarone, Lithium, frequent surgeries, cancer of the thyroid gland where the surgery required in such cases leads to the non-production of hormones. Radioactive iodine radiation also damages it a lot, putting it at risk for lower hormone production.

This disease is more common in people over 50 years old but it can also occur in newborns. The latter is a serious condition that must be diagnosed and treated quickly, at most within the first year of life because otherwise these children will become mentally retarded or as it is otherwise known as, cretinism.

The thyroid gland is stimulated to produce its hormones from another hormone called TSH (Thyroid Stimulating Hormone). This hormone

comes from the pituitary gland. When this gland does not produce the hormone properly we have to deal with under-stimulation of the thyroid and secondary hypothyroidism. When the damage is only in the thyroid gland, we are dealing with primary hypothyroidism.

#### Signs and symptoms of hypothyroidism

The main complaints are:

- Fatigue
- Lethargy
- Feeling cold (they are very cold)
- Dry skin
- Weight gain
- Weak appetite
- Memory disorders
- Constipation
- Thickening of the voice

We may also have temporary hearing loss, joint pain and hand tremors. Memory disorders, emotional disorders, depression, stress, anxiety, etc. are more common in the elderly people. As a general sign, the thyroid of these patients is enlarged with gills, with and without nodules (swelling), but this disease can also be present in people who do not affect the thyroid

gland at all. Nowadays the diagnosis is usually made faster due to people's awareness and advanced laboratory techniques.

#### Clinical case

Near the laboratory service, DR-Altini- 2004, in the city of Gjirokastra, prefecture of Gjirokastra/Albania, 6 cases of which 3 men and 3 women aged 4-18 years were presented for routine control at different times. The blood was taken respecting the standard rules of sample collection, with a vacuum system, and the serum sample was used as the preferred sample at 8-9 a.m. The ROCH Chemiluminescence technique with the cobas 411 instrument was used to determine TSH parameters.

As a protocol followed for preliminary evaluation of thyroid function, only the TSH value was determined. After its high values were assessed (the rate is 0.4-4.2 mIU/ml), the determination of free T3, free T4, anti-TPO was carried out with the same sample which resulted in normal values in 5 of them and only 1 case resulted with anti-TPO in increased values.

The anamnesis of the patients was taken and they presented no clinical concerns. It was suggested to the patients to show up for a re-measurement of TSH values at 2 p.m.

The results were found interesting since all TSH values were presented within normal values, so we are facing a subclinical hypothyroidism that requires attention as patients can be misinterpreted and mistreated.

	Sex	T.S.H 8 a.m	T.S.H 14 p.m
K.L.	F	7.97	4.1
D.G.	M	5.4	2.2
K.K.	M	4.72	3.5
A.D.	F	6.8	3.5
N.H.	M	5.4	3.3
E.V.	F	5.21	4.2

#### Conclusion

In clinical practice, attention is paid to laboratory findings and their interpretation in order to avoid misdiagnosis and mistreatment of patients. This is especially important in the age groups that are in the growing process, where incorrect treatment would have undesirable consequences.

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**DOI:10.31579/2690-4861/585**

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