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HYPOTHYROIDISM

Body weight appears to be the main levothyroxine dose adjustment variable

BACKGROUND

Hypothyroidism is a common medical condition which causes deficiency or low level of thyroid hormone. Patients with hypothyroidism are treated by taking thyroid hormone pills on a daily basis. The majority of patients with hypothyroidism take a synthetic form of thyroid hormone called Levothyroxine. Levothyroxine structure is identical to T_4, the main hormone secreted into the blood by the thyroid gland.

The dose of the Levothyroxine for any individual patient is different; the best dose should be able to keep the level of thyroid hormone tests (T_4 and TSH) within the normal range and help to improve the symptoms of hypothyroidism. However, many patients with hypothyroidism do not take the right dose and are either over-treated or undertreated. Over-treatment may cause irregular heart beats and bone loss in elderly and under-treatment may cause symptoms like weight gain, fatigue as well as other serious health issues like higher cholesterol level, and in severe cases heart problems and even death.

In this study, the authors evaluated the effect of sex, age and body weight on the blood level of thyroid hormone in patients taking Levothyroxine.

THE FULL ARTICLE TITLE

Younis IR et al 2018 Stable isotope pharmacokinetic studies provide insight into effects of age, sex, and weight on levothyroxine metabolism. Thyroid 28:41–49. Epub 2018 Jan 2. PMID: 29212434

SUMMARY OF THE STUDY

Participants in this study were patients with hypothyroidism who were treated at Georgetown University Medical Center. A total of 33 female and 8 male patients were included - 31 were younger and 10 were older than 60 years of age. They did not have any other major medical problem. Their weight ranged from 50 to 150 Kg. Their TSH and T_4 blood test results were normal on the dose of Levothyroxine they were taking. They each took a single dose of radioactive labeled Levothyroxine after 8 hours of fasting, followed by breakfast 2 hours later. The radioactive labeled thyroid hormone made it possible for the researchers to measure and follow the blood level of the dose taken by each study subject. Patients had blood tests before taking the dose and in regular intervals up to 312 hours after the dose. The results were compared between the participants based on their sex, age and weight.

The study showed that age and sex did not affect the concentration of radioactive labeled thyroid hormone in blood but the body weight of participants did. Thus, the dose of Levothyroxine that results in normal blood levels of T_4 and TSH is most closely related to the patient's body weight.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The authors concluded that body weight should be considered when prescribing Levothyroxine and that the prescribed initial dose should be higher for patients with a heavier weight. The dose should be adjusted in regular intervals as necessary by blood test results and whenever there is a significant change in body weight.

— Shirin Haddady, MD

ATA THYROID BROCHURE LINKS

Hypothyroidism (Underactive): https://www.thyroid.org/hypothyroidism/
Older Patients and Thyroid Disease: https://www.thyroid.org/thyroid-disease-older-patient/
Thyroid Function Tests: https://www.thyroid.org/thyroid-function-tests/

HYPOTHYROIDISM, continued

ABBREVIATIONS & DEFINITIONS

Hypothyroidism: a condition where the thyroid gland is underactive and doesn't produce enough thyroid hormone. Treatment requires taking thyroid hormone pills.

Levothyroxine (T4): the major hormone produced by the thyroid gland and available in pill form as Synthroid™, Levoxyl™, Tyrosint™ and generic preparations.

Thyroxine (T4): the major hormone produced by the thyroid gland. T_4 gets converted to the active hormone T_3 in various tissues in the body.

TSH: thyroid stimulating hormone — produced by the pituitary gland that regulates thyroid function; also the best screening test to determine if the thyroid is functioning normally.