

Interrelationship between Thyroid Nodularity and TSH Level

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Abstract

Background: The pathophysiological role of thyroid-stimulating hormone (TSH) in the development of goiter is controversial. The aim of this study was to examine the relationship between thyroid nodularity and serum TSH levels in clinically and biochemically euthyroid patients with non-endemic multinodular goiter.

Methods: We surveyed 44 of our endocrine clinic patients with multinodular goiter. Twenty-five patients with suppressed TSH levels or positive antithyroid antibodies were excluded. The remaining 19 patients were included (group 1). The 19 study subjects were compared with 19 age- and sex- matched controls without any thyroid disease or goiter (group 2). TSH levels in both groups were checked by review of their medical records.

Results: In group 1, TSH ranged from 0.68–3.68 IU/mL (normal: 0.4–6.0 IU/mL), with a mean of 1.45 ± 0.29 . In group 2, TSH ranged from 0.38–1.88 IU/mL, with a mean of 1.08 ± 0.1 . The differences of these values, analyzed by paired t test ($p=0.22$), were not statistically significant.

Conclusions: These data suggest that TSH levels in euthyroid patients with multinodular goiter are not significantly different from those in normal controls.

Key Words: Thyroid nodularity, thyroid-stimulating hormone, goiter.

Introduction

THE TERM “NONTOXIC GOITER” refers to diffuse or nodular thyroid gland enlargement that is not associated with hyperthyroidism or hypothyroidism. In the United States, nontoxic goiter affects more than 5% of the population (1). In the geographic regions where nontoxic goiter affects more than 10% of the population (e.g., areas with iodine deficiency or environmental goitrogens), the term “endemic goiter” is used (1).

The pathophysiological role of thyroid-stimulating hormone (TSH) in the development of goiter is controversial. Some studies report *in-vitro* stimulatory effects of TSH on thyroid cell growth (2). Other studies suggest that TSH is not a growth factor for

human thyroid cells in culture (3, 4). The aim of this study was to examine whether or not there is a relationship between TSH level and nodularity in euthyroid, non-endemic multinodular goiter patients.

Patients and Methods

A retrospective survey of 44 consecutive patients with multinodular goiter (30 women and 14 men) attending our endocrine clinic was conducted (“multinodular goiter” was defined as the thyroid gland having two or more nodules). Thyroid nodularity by palpation was confirmed by ultrasonography. Twenty-five patients who had either decreased TSH or positive antithyroid antibodies were excluded from the study. The remaining 19 patients (12 women and 7 men) were included and their TSH levels were recorded from their medical records. These values were compared to TSH levels obtained from chart reviews of 19 age- and sex-matched control subjects without thyroid disease or goiter.

Results

The serum TSH concentration in the patient group with multinodular goiter ranged from 0.68–3.68 IU/mL (normal: 0.4–6.0 IU/mL), with a mean of 1.45 ± 0.29 . In the control group, the range of

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TSH was 0.38–1.88 IU/ml, with a mean of 1.08 ± 0.1 . These values were analyzed using a paired t test ($p=0.22$). The difference was not statistically significant (Table).

Discussion

Non-endemic goiter has been attributed to thyroid-stimulating immunoglobulin, hereditary defects in the biosynthesis of thyroid hormone, exposure to radiation, nutritional defects, excessive iodine intake from drugs or food, and environmental goitrogens (1).

We demonstrated that TSH levels in euthyroid patients with non-endemic multinodular goiter are not significantly different from those of controls. Our clinical observations suggest that the pathophysiological role of TSH in goitrogenesis may be less important than has been assumed so far. In fact, some of the *in-vitro* studies of human thyroid follicular cells in tissue culture indicate that TSH is not a growth factor and indeed may inhibit cellular proliferation (3, 4). In a study by Gharib et al. (5), the efficacy of levothyroxine therapy in reducing the size of colloid thyroid nodules was not apparent within six months, despite effective suppression of TSH, suggesting that TSH is not the cause of the nodular goiter. Weber et al. (6) found that mean 24-hour serum TSH levels and the nocturnal surge of TSH levels were not different in a group of 11 patients with multinodular goiter and 11 healthy controls. Furthermore, TSH levels decrease

with age in humans, but the presence of goiter increases with age (7).

Wahner and colleagues (8) found that goiter in Cauca Valley, a forest in Colombia, was not dependent on increased TSH levels. However, an increased sensitivity to normal levels of TSH induced by the action of a goitrogen may exist.

Bray (9) proposed the hypothesis that the explanation for normal TSH levels in the presence of goiter is that the iodine-deficient gland is more sensitive to the goitrogenic properties of TSH (10, 11). Our observations also do not support the assumption that increased TSH levels correlate with goiter. However, some studies suggest a correlation between increased TSH levels and multinodular goiter. Though goiter in Cauca Valley was not dependent on increased TSH, the microscopic study of the excised thyroid of a 14-year-old girl from there, who was killed in an accident, suggested TSH stimulation of the gland (8). Young et al. found high TSH levels in 42% of 51 patients with idiopathic euthyroid goiter (12). In another study, in the iodide-deficient desert of New Valley, Egypt, TSH levels were higher in goitrous young men compared to nongoitrous young men who drank water with higher iodine concentration (13), showing that TSH is a contributing factor in endemic goiter (14).

Circulating TSH might be the main factor responsible for goiter in patients with Hashimoto's thyroiditis and clinical hypothyroidism (15). Bucker-Davis et al. (16) reported the presence of goiter in 80% of 25 patients with TSH-secreting tumors of the pituitary. Thyroid nodules were detected in 64% of the cases, either clinically or by ultrasonography.

TABLE 1

The Comparison of TSH Levels between the Multinodular Goiter Patient Group and the Control Group.

TSH levels in the multinodular goiter patient group (IU/mL)	TSH levels in the control group (IU/mL)
1.19	1.77
0.93	1.887
1.39	0.54
0.68	0.57
2.46	0.99
0.7	1.11
0.99	0.621
1.43	1.007
3.25	1.16
0.99	1.41
3.68	1.64
0.85	1.403
0.89	1.3
0.73	0.79
1.27	1.38
1.042	0.66
1.19	0.38
3.06	0.795
0.83	1.08
Range: 0.68-3.68 Mean: 1.45 ± 0.29	Range: 0.38-1.88 Mean: 1.08 ± 0.1

Conclusion

Our study indicates that TSH levels in euthyroid patients with non-endemic multinodular goiter are not significantly different from those in normal controls. Since the published studies on the role of TSH and the cause of nodularity in the thyroid gland are inconclusive, more studies are needed to confirm these findings, and to investigate and detect other factors that may be involved in the causation of multinodular goiter.

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