ORIGINAL ARTICLE

Ultrasonographic findings of thyroid in patients with Hashimoto thyroiditis: overt hypothyroid and euthyroid

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ABSTRACT

Aim To compare the frequency, size, and sonographic features of thyroid nodules in overt hypothyroid and euthyroid patients with Hashimoto thyroiditis.

Methods The study included 135 overt hypothyroid (group 1) and 74 euthyroid patients (group 2) with Hashimoto thyroiditis. The two groups were compared for presence of nodule(s), nodule numbers, and nodule sizes obtained by ultrasonography.

Results Nodules were found in 48 (35.5%) patients in group 1 and in 24 (36.9%) in group 2 ($p > 0.05$). The numbers of nodules in the group 1 and group 2, respectively, were as follows: single nodule in 12 (25%) and in 9 (33.3%) patients; 2–4 nodules in 20 (41.6%) and in 13 (48.1%) patients; and > 4 nodules in 16 (33.3%) and in 5 (18.5%) patients ($p > 0.05$ for all of the results). Nodule sizes of the solitary or dominant nodule in group 1 and group 2, respectively, were as follows: < 1 cm nodules in 27 (56.2%) and in 14 (51.8%) patients; 1–2 cm nodules in 18 (37.5%) and in 7 (25.9) patients; 2–4 cm nodules in 2 (4.1%) and in 5 (18.5%) patients and > 4 cm nodules in 1 (2%) and in 1 (3.7%) patient ($p > 0.05$ for all of the results).

Conclusion Thyroid ultrasound examination of overt hypothyroid and euthyroid patients with Hashimoto thyroiditis reveals similarities in terms of frequency, number, size, and ultrasound features of the thyroid nodules.

Key words: chronic lymphocytic thyroiditis, thyroid nodule, hypothyroidism, goiter

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INTRODUCTION

Hashimoto thyroiditis is characterized by autoimmune destruction of the thyroid gland and development of clinical hypothyroidism by stages (1,2). This condition is significantly more common in women, and the female-to-male ratio is approximately 7:1 (1-3).

Thyroid nodules are defined by the American Thyroid Association as discrete lesions within the thyroid gland and are radiologically distinct from surrounding thyroid parenchyma (4). In adults, thyroid nodules are detected by palpation at a rate of nearly 4–8% and by ultrasonography, 13–67% (5). The prevalence of nodules has been reported in about 50% of autopsies (6-9). Thyroid nodules are clinically important because of the potential for malignancy and 5% of nodules are malignant (10-12).

Thyroid nodules can be detected with thyroid ultrasound examination and the characteristics of nodules have been identified (9). Thyroid ultrasound findings are important for making decisions about fine-needle aspiration biopsy, which is the best process for the differentiation of malignant and benign thyroid nodules (13,14).

Chronic lymphocytic Hashimoto thyroiditis may cause thyroid nodules (9,10). However, the prevalence of nodules is controversial in Hashimoto thyroiditis. Initially, patients with Hashimoto thyroiditis are euthyroid (3). Then, over time, overt hypothyroidism develops during the course of the disease (2,3). There is little data about the prevalence of nodules and sonographic features of nodules in overt hypothyroid and euthyroid patients with Hashimoto thyroiditis or comparison of the two groups in the literature.

The aim of this study was to compare the frequency of thyroid nodules appearance, the number of nodules, nodule sizes and sonographic features of thyroid nodules in overt hypothyroid and euthyroid patients with Hashimoto thyroiditis.

PATIENTS AND METHODS

One hundred and thirty-five overt hypothyroid patients (121 females and 14 males) (group 1) and seventy-four euthyroid patients (65 females and 9 males) (group 2) with Hashimoto thyroiditis, who visited the outpatient clinics of Internal Medicine Department of the Sakarya University Training and Research Hospital, Sakarya, Turkey during September 2011 and August 2012, were included in the retrospective study.

Serum anti-thyroid peroxidase (normal: 0–5.61 IU/mL) and/or anti-thyroglobulin antibodies (normal: 0–4.11 IU/mL) positive patients were accepted as having Hashimoto thyroiditis. Patients who were receiving levothyroxine replacement therapy were defined as overt hypothyroid. Patients who were not taking levothyroxine replacement therapy and with free T4 and thyroid-stimulating hormone with normal levels (9.01–19.04 pmol/L and 0.35–4.94 μIU/mL, respectively), were defined as euthyroid. Patients who had undergone thyroid surgery, were under 18 years of age and had other specific thyroid diseases were excluded.

Thyroid ultrasound examination was performed on all the patients. Thyroid ultrasonography exams were performed by three experienced radiologists. A high-resolution ultrasonography modality (Esaote Mylab 70 USG-Doppler) with a 7,5-MHz linear probe is used for the evaluation of thyroid nodules. If the lesion was purely demarcated or vascularized differently (less or more than native parenchyma) according to ultrasonography, it was referred to as a true nodule. If the nodule was not demarcated it was evaluated as a pseudonodule (11). We considered as thyroid nodules all the US nodular lesions ≥3 mm. Small nodules (≤3 mm) and pseudonodules were not included into the study. The groups were compared in terms of the presence of nodules, nodule numbers, nodule sizes and sonographic features of nodules in the thyroid ultrasonography findings. Institutional review board approval was obtained from the Ethics Committee of the Sakarya University Training and Research Hospital, Sakarya, Turkey prior to the initiation of the study.

The association between the qualitative variables was analyzed using a Chi-squared test. A Student's t-test was used to compare quantitative variables. Non-parametric tests were used for non-normally distributed variables. Data are given as mean ± standard deviation, and 95% confidence intervals have been calculated for quantitative variables. Qualitative variables are given as absolute numbers and percentages. A value of $p < 0.05$ was considered statistically significant.

RESULTS

Of 135 patients, 121 (89.6%) were females and 14 of 135 (10.3%) were males, and mean age was 46.7 ± 12.5 years in the group 1; 65 of 74 patients (87.8%) were female and nine (12.1 %) were male, and mean age was 32.1 ± 9.9 years in the group 2. The frequency of nodules was 35.5% (n = 48) in the group 1 and 36.9% (n = 24) in group 2 (p > 0.05) (Table 1).

Table 1. Characteristics of study population and frequency of thyroid nodule

	Overt HT (n=135)	**Euthyroid HT** (n=74)	**p**
Females/Males	121/14	65/9	0.42
Age (years)	46.7±12.5	32.1±9.9	0.045
No (%) of nodule	48 (35.5)	27 (36.9)	0.50

HT, Hashimoto thyroiditis

The number of nodules in patients with nodules in group 1 and group 2 were found as follows: single nodule, in 12 (25%) and in 9 (33.3%) patients; 2–4 nodules, in 20 (41.6%) and in 13 (48.1%) patients; and > 4 nodules, in 16 (33.3%) and in 5 (18.5%) patients respectively (p > 0.05 for all of the results) (Table 2).

Table 2. Distribution of patients according to nodule number

Number of nodules	**No (%) of patients**		**p**
	Overt HT (n=48)	**Euthyroid HT** (n=27)	
1	12 (25)	9 (33.3)	0.30
2 – 4	20 (41.6)	13 (48.1)	0.38
>4	16 (33.3)	5 (18.5)	0.13

HT, Hashimot thyroiditis

Nodule sizes of solitary or dominant nodule in patients with nodules, in group 1 and group 2 were found as follows: < 1 cm nodule, in 27 (56.2%) and in 14 (51.8%) patients; 1–2 cm nodule, in 18 (37.5%) and in 7(25.9) patients; 2–4 cm nodule, in 2 (4.1%) and in 5 (18.5%) patients and > 4 cm nodule, in 1 (2%) and in 1 (3.7%) patient respectively (p > 0.05 for all of the results) (Table 3).

Table 3. Nodule size of solitary or dominant nodule

Nodule size	**No (%) of patients**		**p**
	Overt HT (n=48)	**Euthyroid HT** (n=27)	
< 1 cm	27 (56.2)	14 (51 .8)	0.44
1 – 2 cm	18 (37.5)	7 (25.9)	0.13
2 – 4 cm	2 (4.1)	5 (18.5)	0.053
> 4 cm	1 (2.0)	1 (3.7)	0.59

HT, Hashimoto thyroiditis

Comparison of ultrasonographic features of nodules was not statistically significant in any feature in both groups (Table 4).

Table 4. Sonographic features of solitary or dominant nodule

Sonographic feature	**No (%) of patients**		**p**
	Overt HT (n=48)	**Euthyroid HT** (n=27)	
Hypoechoic	17 (35.4)	10 (37.0)	0.46
Isoechoic	19 (39.5)	12 (44.4)	0.43
Hyperechoic	9 (18.7)	4 (14.8)	0.46
Solid	37 (77.0)	18 (66.6)	0.23
Cystic	1 (2.0)	4 (14.8)	0.053
Solid and cystic	4 (8.3)	4 (14.8)	0.30
Microcalcification	3 (6.2)	1 (3.7)	0.56
Macrocalcifications	1 (2.0)	1 (3.7)	0.59
Intranodular vascularity	1 (2.0)	0	0.64
Halo sign	5 (10.4)	1 (3.7)	0.29
Irregular margins	2 (4.1)	1 (3.7)	0.70
Taller than wide shape	1 (2.0)	0 (n:0)	0.64

HT, Hashimoto thyroiditis

DISCUSSION

Hashimoto thyroiditis is an autoimmune disease, and is one of the most common causes of hypothyroidism and goitre (1–3). Thyroid nodules are fairly common in ultrasonographic evaluation with a rate of approximately 50% (12,13). Thyroid nodules should be carefully evaluated for the 4% to 6.6% risk of malignancy and to avoid unnecessary thyroid surgery for the patients with benign nodules (14–16). Hashimoto thyroiditis is significantly more common in women (2,7). The female-to-male ratio was seven to one in the first group and nine to one in the second group, which corresponds to the current literature (2,7). Isik et al found the prevalence of thyroid nodules of 24.3% in the patients with Hashimoto thyroiditis (17). Our study found the frequency of thyroid nodules of 35.5% in group 1 and 36.9% in group 2, whose rates are similar to previous studies in the normal population (5,12).

The prevalence of thyroid nodules increases with age and radiation exposure (1, 2). At least one thyroid nodule was found in about 20% to 76% of the women in general population by ultrasonography (18,19). In our study, nodules were found in 42% of women with overt hypothyroid and in 24% of women with euthyroid Hashimoto thyroiditis.

Thyroid nodule prevalence is usually higher in iodine deficient area (1,2). Our study region is the mildly iodine deficient area (average urinary iodine concentration is 92 μg/L) (19). The prevalence of thyroid nodules increases with age (1,2). There

are few data about the thyroid nodule prevalence of patients with Hashimoto thyroiditis relating to the ages (17,18). In our study, euthyroid patients were at lower age, but with higher nodule frequency (was not statistically significant). Further studies with a greater number of patients with Hashimoto thyroiditis are needed to compare these results.

Thyroid cancer usually develops from the largest nodule, but, in one third of patients it also develops from the non-dominant nodule (20,21). Therefore, it is suggested that sonographic characteristics of the nodule are decisive in deciding for nodule biopsy in multinodular goitre (22). Recently, increasing evidence shows that the presence of suspicious ultrasound findings is more sensitive than the nodule size in the prediction of malignancy (19). Based on the results of other studies, ultrasonographic features associated with an increased risk of thyroid cancer are hypoechogenicity, microcalcifications, central vascularity, irregular or microlobular limits, incomplete halo, taller than wide and the growth of the nodule compared with the previous ultrasonography (23–25). In our study, no significant differences were found between the two groups in terms of the ultrasonographic features of nodules.

Nodules generally increase in size slowly or remain stable for a long period (26). Patients with multiple nodules and patients with a single nodule have the same risk for thyroid malignancy (27,28). In an autopsy study, single nodules were found in 49.5% and multiple nodules were found in 37.3% of patients, while 35.5% of those nodules were found larger than 20 mm in diameter (29). In our study, no significant difference was found concerning the number of nodules and nodule size between the two groups.

In conclusion, there was no significant difference between overt hypothyroid and euthyroid patients with Hashimoto thyroiditis concerning the frequency of thyroid nodules, nodule numbers, nodule sizes and ultrasound features of nodules. Further studies with a greater number of patients are needed to support these results.

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Competing interests: none to declare.

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