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Prevalence of Incidental Thyroid Nodules Diagnosed by Ultrasound in an Iranian Population

Background/Objective: Since Iran is an endemic region for iodine deficiency, we conducted this study to determine the prevalence of incidental thyroid nodules in our university-affiliated hospitals.

Patients and Methods: Four hundred and ten consecutive patients who attended our center for color Doppler ultrasound of carotid or other sites of the neck—other than the thyroid gland—from September 2005 to May 2006 were included in this study. All patients underwent dedicated thyroid ultrasound for detection of thyroid nodules.

Results: We found one or more nodules in 210 (51.2%) of our patients. The mean (\pm SD) age of patients with incidental thyroid nodules was 62.9 ± 13.1 (range: 14-100) years. The nodules were unilateral in 56.5% and bilateral in 43.5% of the patients. Incidental thyroid nodules were detected in 46.9% of men and 58.8% of women ($P=0.017$). Among our patients, 61% had only one nodule. The mean (\pm SD) largest diameter of nodules among those with only one nodule was 10.6 mm while it was 14.2 mm among those with more than one nodule ($P=0.03$).

Conclusion: The prevalence of thyroid incidentalomas in the population we studied was higher than many other studies. This may be due to iodine deficiency in our country.

Keywords: thyroid nodule, incidental findings, ultrasonography

Introduction

Thyroid nodules are common. The prevalence of palpable thyroid nodules is around 3.2–4.2%.¹ Palpation is the most frequently-used screening method for detection of thyroid nodules. Development in technology has increased the accuracy and sensitivity of many imaging modalities, resulting in the diagnosis of subclinical nodules in the adrenal, pituitary, and thyroid glands.²⁻⁴

Ultrasonography is the most useful imaging modality for the evaluation of thyroid glands.⁵ The discovery of nonpalpable thyroid nodules is increasing due to the widespread use of ultrasound evaluation of the neck.^{6,7}

About 5% of the adult population in western countries has a palpable thyroid nodule.⁸ Thyroid incidentalomas are newly diagnosed focal thyroid mass lesions detected in imaging study.⁹ In a clinically normal thyroid gland, ultrasound can detect one or more nodules in 19–46% of the general population, especially in those older than 50 years.^{6,7,10,11} The risk of malignancy in these nodules is 1.5–10%.¹¹

Since Iran is an endemic region for iodine deficiency, we conducted this study to determine the prevalence of incidental thyroid nodules in our referral general university-affiliated hospital in Tehran, Iran.

Patients and Methods

Four hundred and ten consecutive patients who attended our center for color

Doppler ultrasound of carotid or other sites of the neck—other than the thyroid gland—from September 2005 to May 2006 were included in this study. Informed written consent was obtained from all patients.

After performing the requested ultrasound examinations, all patients underwent dedicated thyroid ultrasound for detection of incidental thyroid nodules. Ultrasound examinations were done with a commercially available scanner (Hitachi 525, Japan, Model 2003), equipped with a linear transducer operating at 7.5 MHz. The size, number, and echogenicity of masses were also reported if any nodules were discovered during the examination.

Patients were positioned on their back with their neck slightly extended over a pillow.

Statistical analyses were performed by SPSS ver. 11.5 (Chicago, Ill, USA). We used chi-square and t test for our analyses. Statistical significance was set at p value less than 0.05.

Results

The mean (\pm SD) age of the studied patients was 62.5 ± 13.2 (range: 14–100) years. Among these, 228 (55.6%) were male and 182 (44.4%) were female. Family history of thyroid disease was reported in 44 (10.7%) of patients.

Among 410 patients, 355 patients were referred for evaluation of carotid arteries (86.6%); the remaining were referred for sonographic evaluation of their neck organs other than the thyroid and carotid arte-

ries. Totally, 211 (51.5%) patients were hospitalized; the remaining were outpatient. Among all patients, 210 (51.2%) had one or more nodule(s).

Among patients referred for carotid evaluation, 49.9% had nodule while among patients referred for evaluation of neck organs other than carotid, 64% had nodule ($P=0.06$). The mean (\pm SD) age of patients with thyroid nodules was 63.3 ± 12.9 (range: 14–100) years while in patients without a nodule it was 61.7 ± 13.6 (range: 14–83) years ($P=0.25$).

The nodules were seen in only one lobe (either in isthmus, right or left lobes) in 109 patients (51.9%); these included 66 patients with nodule(s) only in the right lobe (31.4%), 39 patients with nodule(s) only in the left lobe (18.6%) and four patients with nodule(s) only in isthmus (1.9%). In 101 (48.1%) patients, nodules were found in more than one location; for example, 35 (16.7%) patients had nodule(s) in all locations (Fig. 1).

Incidental thyroid nodules were detected in 46.5% (106 out of 228) of men and 57.1% (104 out of 182) of women ($P=0.032$).

Among 410 patients, 285 (70%) aged more than 60 years. In those older than 60 years, 52.3% had incidentalomas (149 out of 285); in patients less than 60 years, 48.8% had incidentalomas (61 out of 125) ($P=0.52$).

The mean (\pm SD) largest diameter of nodules was 13.7 ± 10.3 mm. It was 13 ± 10.2 and 14.3 ± 10.4 mm in men and women, respectively ($P=0.37$). The data regarding total number of nodules was available in 150 patients; 91 had one nodule while the remaining had more than one nodule. (Fig. 2)

The mean (\pm SD) largest diameter of nodules among those with only one nodule was 10.6 ± 7.9 mm while it was 14.2 ± 11 mm among those with more than one nodule ($P=0.03$).

The data on the echogenicity of nodules were available for 131 patients; 96 (73.3%) had hypoechoic nodule, 31 (23.7%) had hyperechoic and three (3.1%) had both hypo- and hyperechoic nodules. The mean (\pm SD) largest diameter of nodules among patients with hypoechoic nodules was 9.4 ± 6.3 mm while it was 13.5 ± 8.8 mm among those with hyperechoic nodules ($P=0.026$) (Fig. 3).

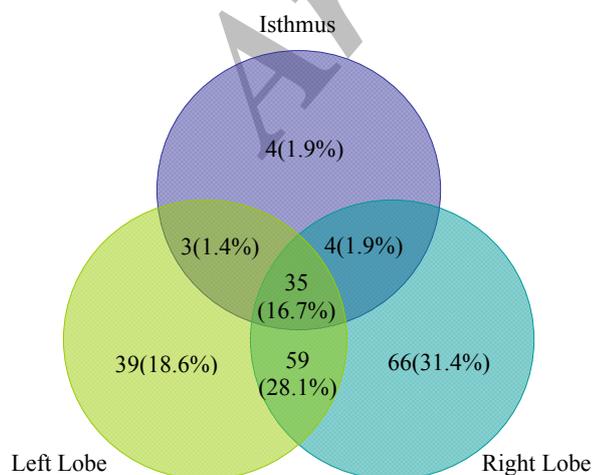


Fig. 1. Local distribution of nodules among patients

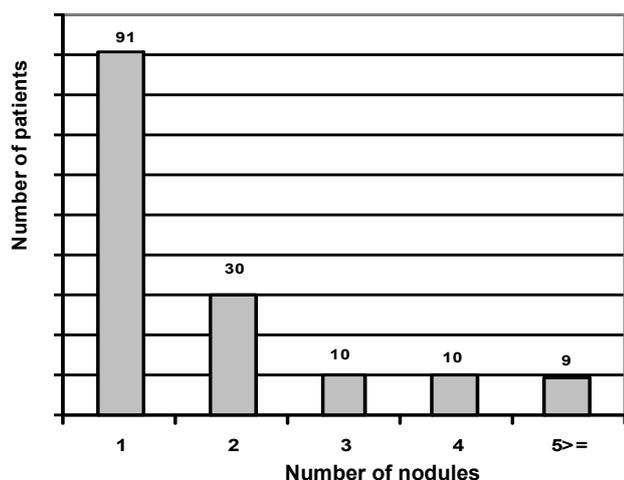


Fig. 2. Number of nodules in patients.

Discussion

Physical examination is not sensitive for detection of thyroid nodules, as well as measuring their size, and estimating their malignant potential.^{6,12} On the other hand, high-resolution ultrasonography is the most useful imaging tool for the evaluation of thyroid gland.⁵

The most common incidental finding in head and neck imaging are thyroid nodules.

Because of the widespread use of ultrasonography and its high sensitivity, many small and non-palpable thyroid nodules may be found incidentally during carotid, parathyroid, or other ultrasound examinations of the neck. Indeed, Doppler ultrasonography of

the carotid arteries as well as sonography of parotids, cervical lymph nodes and salivary gland may diagnose nodular thyroid diseases.¹

In report of Karaszewski, et al, the prevalence of thyroid gland nodules detected by ultrasound was 14.8%.¹³ In Steele, et al, study, incidental thyroid abnormalities were seen in 9.4% of patients.¹⁴ Tomimori, et al, noted incidentalomas in 17% of patients studied in Brazil.¹⁵ Carroll reported incidentalomas in 13% of patients who had carotid ultrasonography.¹⁶ Horlocker, et al, found abnormal thyroid findings in 46.2% of patients who were suspected of having parathyroid disease.¹⁷ Stark, et al, also reported the prevalence of incidental thyroid nodules in 40% of patients who had hyperparathyroidism.¹⁸ The prevalence of 52.5% of thyroid nodules in our patients was higher than all the above reports. We think that this difference may be due to the fact that iodine deficiency is common in Iran. Genetic and demographic factors are probably other reasons.

Ross, et al, reported that thyroid nodules could be found in 30–50% of population using ultrasound, and that less than 5–6.5% of these nodules are malignant.¹

In one study performed by Ezzat et al, the prevalence of incidentalomas detected by ultrasound was 67% which was higher than the rate we found; among 67 patients who had thyroid nodules in their study, 30 (45%) had more than one nodule and 15 (22%) had a solitary nodule.⁶

We did not find any differences between the mean

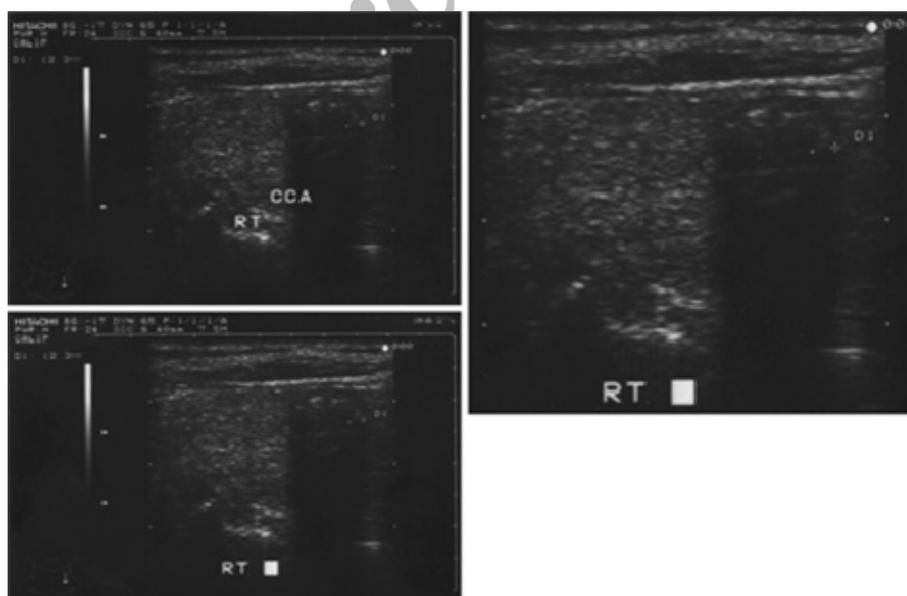


Fig. 3. Ultrasonography of a 70- year-old man who was referred for carotid Doppler before coronary artery bypass graft. The image shows an incidental hyperechoic nodule with posterior shadow.

age of patients with and without nodule, and there was no difference between the patients aged less and higher than 60 years, regarding the prevalence of nodules which is in contrast to similar studies. Previous studies reported that the incidence of incidentalomas tends to increase with age.^{13, 14, 19, 20}

In the study carried out by Liebeskind and his colleagues, the mean age of patients with incidentalomas was significantly higher than the normal group (61 vs 51 years, $P=0.007$). Nevertheless, in their report, advanced age was not associated with higher rate of malignancy.²⁰

In our study, the prevalence of incidentalomas in women was significantly higher than men, which was in keeping with many other studies.^{1, 6, 13}

In the study of Steele et al, unilateral incidentalomas were seen in 50.6%, and bilateral were observed in 49.4% of patients, which were close to our observations.¹⁴

Previous studies reported that most asymptomatic thyroid nodules are benign.²¹

The results of autopsy and ultrasound findings revealed that less than 5% of asymptomatic nodules may be malignant.²¹

Liebeskind and his colleagues, in their study, unexpectedly found a high rate of malignancy in incidentalomas and suggested that these nodules should be followed with ultrasound and fine-needle aspiration.²⁰

Factors such as family history of thyroid cancer, a childhood history of head and neck irradiation, nodule size larger than 1.5 cm in diameter; increase the incidence of malignant thyroid nodules up to 30%–50%.²¹⁻²³

Three sonographic features increase susceptibility for malignancy in thyroid nodules: irregular margins, intra-nodular vascular patterns, and microcalcifications.¹

Most incidentalomas do not require immediate treatment and must be followed with palpation and ultrasound. Biopsy should be taken when the nodules become palpable.²¹

The data indicate that thyroid abnormalities are very common incidental findings, emphasizing the need for accurate evaluation of such lesions by a radiologist in patients who were referred for neck ultrasonography. The clinician comments are necessary

for an appropriate follow-up plan.

One limitation of this study was that the mean age of our patients was higher than normal population. Another limitation was that we have no data on pathology or follow-up of our patients.

In conclusion, the prevalence of incidentalomas in our study was higher than many other studies, especially those conducted in western countries where iodine deficiency is uncommon. This difference may be due to the fact that in our country iodine deficiency is an endemic problem.

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