A. Mohammadi MD[1]
E. Amirazodi MD[2]
S. Masudi MSc[3]
A. Pedram MD[4]

Ultrasonographic Prevalence of Thyroid Incidentaloma in Bushehr, Southern Iran

Background/Objective: Thyroid nodule is one of the most common endocrine disorders. 5%–10% of thyroid nodules undergo malignant degeneration. The objective of this study was to determine the prevalence of thyroid incidentaloma in Bushehr, southern Iran.

Patients and Methods: A total of 1503 consecutive 15 to 65-year-old patients who were referred to Fatemeh Zahra Hospital for any ultrasonographic examination other than the thyroid gland were included in this study. All patients underwent dedicated thyroid ultrasound by a 10 MHz linear probe for detection of thyroid nodules in the supine position.

Results: The prevalence of thyroid nodules was 13.6%. The nodules were observed in 17.5% of the women and 8.5% of the men. 61.8% of the nodules were smaller than 1 cm. Thyroid nodules were more frequent in older people.

Conclusion: Bushehr has a high prevalence of thyroid nodules. The prevalence is age dependent and is higher in women than men.

Keywords: Ultrasonography, Thyroid, Nodule, Prevalence

1. Assistant Professor, Department of Radiology, Urmia University of Medical Sciences, Urmia, Iran.
2. Department of Radiology, Fatemeh Zahra Hospital, Bushehr University of Medical Sciences, Bushehr, Iran.
3. Faculty of Health, Department of Epidemiology, Urmia University of Medical Sciences, Urmia, Iran.
4. Department of Radiology, Imam Khomeini Hospital, Urmia University of Medical Sciences, Urmia, Iran.

Corresponding Author:
Afshin Mohammadi
Address: Department of Radiology, Imam Khomeini Hospital, Urmia, Iran.
Tel: +98-441-344-7113
Fax: +98-441-346-9935
Email:mohamadi_afshin@yahoo.com

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Introduction

Thyroid nodule is one of the most common diseases of the thyroid gland. The prevalence of thyroid nodule is different all over the world. The palpable thyroid nodules have a 5% prevalence in women and a 1% prevalence in men.[1-3] However, these reports are from regions without iodine deficiency.

Physical examination is the most frequently-used screening method for the detection of thyroid nodules. The detection of thyroid nodules depends on various factors such as the size and location of the nodule and the anatomy of the patient's neck. The diagnosis may be underestimated, especially when the diameter of the nodule is less than 1 cm.[1,2]

Ultrasonography is the most useful imaging modality for the evaluation of thyroid nodules, particularly for non-palpable nodules.[3] Ultrasonography can detect cystic thyroid nodules as small as two and solid thyroid nodules as small as 4 mm in diameter.[1,3]

The prevalence of thyroid nodule has been reported 19%–67%,[3] although autopsy reports give a value of 50.5%.[4] In a clinically normal thyroid gland, ultrasound can detect one or more nodules in 19%–46% of the general population.

Five to ten percent of thyroid nodules undergo malignant transformation depending on age, gender, history of radiation exposure and a family history of cancer;[5] a positive history of low dose radiotherapy (i.e., 6.5–4000 cGy) causes a 40% risk of thyroid cancer.[6]

Fifty percent of apparent thyroid nodules detected in sonography cannot be palpated on physical examination, but they have the same risk of malignancy as palpable nodules.[7]

The objective of this study was to identify the sonographic prevalence of

thyroid nodule in the 15 to 65-year-old general population of Bushehr, southern Iran. There are few previously published studies which have evaluated the ultrasonographic prevalence of thyroid nodule in our country in the general population.[2,8]

Patients and Methods

This cross-sectional study was conducted during a five-month period from April to August 2005 in Bushehr, southern Iran. One thousand five hundred and three invited patients agreed to participate and underwent sonographic examination in Fatemeh Zahra hospital of Bushehr.

Sonographies were performed with a 10 MHz linear probe by a Siemens Sonoline Adara ultrasound device (Germany). Patients were examined in the supine position with their neck hyper-extended and a small pillow placed under their shoulders in a way that the superior part of their neck could be observed. Longitudinal and transverse views of both lobes of the thyroid were obtained for complete evaluation of the thyroid gland (Fig. 1).

All the sonographies were performed by one radiologist to prevent intra-observer variability. The size, number, and echogenicity of thyroid nodules were evaluated in each examination.

Statistical analysis was carried out using SPSS version 13. Chi square and Mann Whitney U tests were used to compare frequencies between men and women and age subgroups. The tests were considered significant if p value was 0.05 or less. A logistic regression model was fitted for multivariate analysis. As the final sample tended to be older than the reference population, the age standardized prevalence rate was calculated for men and women separately, based on the population of Bushehr in 2006 census as the standard population.

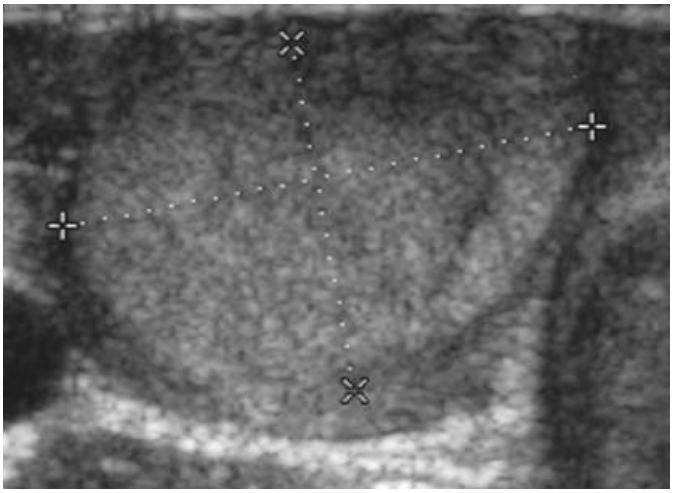

Fig. 1. A 38-year-old woman with a palpable thyroid nodule.
Transverse sonogram of the right lobe of the thyroid shows a well-defined hyperechoic nodule with homogenous texture, without calcification or cystic formation.

This study was in accordance with the ethical standards of Bushehr University of Medical Sciences Committee on Human Experimentation and the 3rd edition of Guidelines on the Practice of Ethics Committees in Medical Research issued by the Royal College of Physicians of London.

Results

The study consisted of 1503 patients, with 857 (57%) being females and 643 (43%) males; the mean age was 39.2 and 37.1 years, respectively. The mean±SD age of the participants was 38.4±12.1 (range: 15–65) years. The prevalence of thyroid nodule was 13.6% (95% CI: 11.9%–15.4%) (Table 1).

The prevalence was 17.5% (95% CI: 14.9%–20.0%) in women and 8.5% (95% CI: 6.3%–10.7%) in men (Table 1). According to the population of Bushehr in 2006, based on the information from the Statistical Center of Iran as the standard population, the overall age standardized prevalence was 9.8% (95% CI: 8.5%–11.5%)—5.1% (95% CI: 4.0%–6.2%) for men and 13.3% (95% CI: 11.6%–15.0%) for women. The association between female sex and prevalence of thyroid nodule was significant (OR: 2.6, 95% CI: 2.5–2.7).

In this study, the prevalence of thyroid nodules in both genders increased with age; that of the 45-65 year old age group was 2.7 times greater than the 15-45 year old age group. Regardless of gender, the highest prevalence was observed in 55–64 year-old patients (Table 1).

Using logistic regression analysis, women had a 2.8 times higher odds of developing a thyroid nodule irrespective of age. When we included both the age and sex in the analysis, we found that both variables had association with the prevalence of thyroid nodules. We entered age as covariate in the analysis and found that the prevalence of thyroid nodule was

higher in women after adjusting for age (OR: 2.8) (Table 2).

Most (44.9%) of the observed thyroid nodules were hypo-echoic. Hyper-echoic nodules were the second most common (21%) type; heterogeneous and cystic nodules with a prevalence of 19% and 15.1%, respectively were the least prevalent types.

Regarding the size of nodules, 61.8% (n=125) of participants had a nodule smaller than 1 cm, 33.9% (n=65) had a nodule larger than 1 cm and 6.3% (n=15) had nodules of both sizes. Considering the number of nodules, 69.6% of the patients had one nodule and 30.4% had more than one nodule; some suffering from multinodular goiter and others suffering from discrete nodules.

Discussion

The sonographic prevalence of thyroid nodule is different from place to place, as it has been reported in 14% of the sonographies performed in Germany.[9] On the other hand, the prevalence was reported 17% in Brazil,[10] 19% in Belgium,[11] 27% in Finland,[12] and 67% in USA.[13] The prevalence of thyroid nodules in our study was similar to the previous studies.[9-11]

The prevalence of thyroid nodules increases by age. As was expected, similar to previous studies,[12-14] age should also be considered a risk factor for developing thyroid nodules. In a study, 30% of individuals who were 19–50 years old, had a thyroid nodule which was diagnosed by sonography; 50% of the nodules were found in people who were older than 60 years.[6]

In this study, multiple nodules were observed in 30.4% of the patients which is higher than some similar studies. In Taipei, it was 3%[11] and in the Gdansk, Sopot and Gdynia agglomeration, it was 12%.[10] However, it was lower than the 48% rate reported from Turkey.[13]

Sonography is a delicate and exact method for diagnosing and examining thyroid nodules. It can identify 2-mm cystic lesions and 3-mm solid lesions in the thyroid gland.[1] Moreover, it can inspect the whole superior part of the neck including the lymph nodes. Despite the fact that sonography cannot differentiate benign from malignant nodules, the existence of solidity, hypoechogenecity, an irregular border, microcalcification and absence of the 'Halo sign' and having a central blood flow gives the highest apprehension about the nature of the nodule.[14]

As we know, the prevalence of thyroid nodule is higher in those regions with iodine deficiency.[10] Although according to reports from the WHO Eastern Mediterranean Regional Office in 2000 Iran is not known to have iodine deficiency,[15] the prevalence of thyroid nodules is comparable to countries acknowledged to have such problems. This problem may be the result of the fact that in our country the effort for finding a solution for iodine deficiency has been

Table 1. Age and Sex-Specific Prevalence of Thyroidal Nodules

	Men		Women		Total	
Age (years)	All (n)	Patients with thyroid nodules n (%)	All (n)	Patients with thyroid nodules n (%)	All (n)	Patients with thyroid nodules n (%)
15–24	99	2 (2%)	176	11 (6.3%)	275	13 (4.7%)
25–34	129	4 (3.1%)	201	22 (10.9%)	330	26 (7.9%)
35–44	179	11 (6.2)	238	40 (16.8%)	417	51 (12.2%)
45–54	124	17 (13.7%)	134	35 (26.1%)	258	52 (20.2%)
55–64	115	21 (18.3%)	108	42 (38.9%)	223	63 (28.3%)
Total	646	55 (8.5%)	857	150 (17.5%)	1503	205 (13.6%)

Table 2. Logistic Regression Results Adjusted for Age and Sex

	Coefficient	SE	P Value	OR
Age	0.058	0.006	<0.001	1.057
Male Sex	-1.040	0.174	<0.001	0.354
Constant	-2.734	0.334	<0.001	0.066

started since 1989 and that producing iodine salt has been obligated since 1994. However, Iran was one of the regions which had iodine deficiency from the 1970s. With a statistical look, it is obvious that the prevalence of thyroid nodule in people who are older than 45 years, is about three times higher than those who are 15–45 years old. As a result, this three-fold prevalence rate might be the consequence of iodine deficiency from the early 1970s.

The sex- and age-specific prevalence rates found in our study were the same as others studies.[9-11] However, on account of the fact that clinical examination is not reliable for nodules smaller than 1 cm[1] and considering that in this study, it has been clarified that 61.8% of the nodules were smaller than 1 cm and also due to the fact that danger of malignancy in nodules smaller than 1 cm is the same as in larger nodules,[3] use of sonography, as one of the most reliable methods for diagnosing such nodules, is strongly suggested.

Factors such as a positive family history of thyroid cancer and a childhood history of head and neck irradiation increase the risk of malignant thyroid nodules up to 30%–50%.

In Marzeion et al.'s study, the maximum prevalence of a hypo-echoic feature in thyroid nodules was 52.5%;[16] in this study, the prevalence of hypo-echoic nodules was 44.9%. The result of our study was similar to a previous study from Italy.[17]

In a Cohort study performed on 100,000 patients, only 15 had thyroid cancer, and this study did not explain the clarification of sonography for malignant nodules.[18] The American Thyroid Association does not recommend sonography for routine examination.

For the time being, because of the absence of a study following thyroid nodules by fine needle aspiration (FNA) in Iran, we suggest sonography as well for examination of high-risk patients, and we suggest the use of sonography instead of clinical examination for such patients.

One limitation of this study was that this research was carried out on patients who were referred to our center for sonographic examination, and the results of this study, thereby, may not show the true prevalence of thyroid incidentaloma in the general population of Iran.

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