

Prevalence of Thyroid Incidentaloma Detected by High-Resolution Ultrasound and Their Potential Risk of Malignancy in Healthy Individuals in Basrah Province

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Abstract

Background: This study conducted to define the prevalence and potential risk of malignancy of thyroid incidentaloma in a healthy population using high-resolution ultrasound. **Patients and Methods:** A cross-sectional prospective study between December 2017 and March 2018, included 1200 asymptomatic adults participants (1000 women aged 15–70 years and 200 men aged 19–65 year). The prevalence of thyroid incidentaloma, their distribution according to age and sex, nodule size, ultrasound characteristics, and risk stratification of malignancy using Thyroid Imaging Reporting and Data System (TI-RADS) grade were studied. Fine-needle aspiration cytology (FNAC) examination was done for some specific patients. **Results:** The prevalence of thyroid incidentaloma was 27.3%. Thyroid incidentaloma were more prevalent in females and elderly people in both sexes mainly in 60–75-year-old peoples. Nodules were solitary in 244 (74.4%) and multiple in 84 (25.6%) patients. The size of 186 nodules (45.1%) were <5 mm, 112 incidentaloma (27.2%) were 5–10 mm, and 114 (27.6%) were more than 10 mm in size. Thyroid incidentaloma were cystic in 228 (55.3%), solid in 133 (32.3%), and complex in 51 (12.4%). Most solid nodules were hyperechoic (84/133, 63.2%), 29 (21.8%) isoechoic, and 20 (15%) were hypoechoic. 92.9% (171/184 solid and mixed nodules) were have well-defined and regular borders and only 13 nodules (7.1%) have irregular and ill-defined borders. Furthermore, 90.7% of solid and mixed nodules have wider than taller diameters. Microcalcifications were seen in three and macrocalcifications in two solid nodules. Of 412 incidentaloma, 258 were TI-RAD 2 score, 136 TI-RAD 3, and 18 nodules were classified TI-RAD 4. TI-RAD nodules 5 were not detected. Suspicious incidentalomas of TI-RAD 4 score were sent for FNAC examination. Papillary carcinoma detected in four nodules and follicular tumor in eight nodules, three of them proved to be follicular carcinoma. The rate of malignancy in thyroid incidentaloma was 1.7%. **Conclusion:** Thyroid incidentaloma is relatively common, and the majority are benign. Ultrasound characteristics and size of nodule could be a reliable screening tool for malignant potential of the thyroid nodule.

Keywords: High-resolution ultrasound, incidentaloma, prevalence, thyroid nodule

INTRODUCTION

Thyroid incidentaloma is small clinically nonpalpable thyroid nodules discovered during imaging evaluation for nonthyroid-related conditions or during routine checkup of asymptomatic individuals. The prevalence of thyroid incidentaloma ranges from 5% to 67% depending on imaging modality used such as ultrasound, computed tomography scan, and magnetic resonance imaging.^[1] High-resolution US examination recorded a prevalence of thyroid nonpalpable nodules ranging from 19% to 50% in the general population. Thyroid incidentalomas are usually <10 mm and sometimes reach up to 15 mm in diameter when located in the posteromedial aspect of the gland.^[1,2] These nodules are more

common in females and increases with age. They are also more common in iodine-deficient areas and after exposure to external radiation. Most thyroid incidentalomas are benign lesion, and the associated risk of cancer is very low and ranges from 0.5% to 10%.^[3] Clinical features such as nodules discovered in childhood and adolescence, male patient, history of radiation

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Submission: 11-05-2019 **Accepted:** 12-08-2019 **Published Online:** 25-09-2019

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How to cite this article: Al-Rikaby HH, Al-Subaiee IF. Prevalence of thyroid incidentaloma detected by high-resolution ultrasound and their potential risk of malignancy in healthy individuals in Basrah province. *Med J Babylon* 2019;16:252-5.

Access this article online

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DOI:
10.4103/MJBL.MJBL_31_19

exposure during childhood, nodule more than 1.0–1.5 cm, and family history of medullary carcinoma of thyroid are considered as risk factors for thyroid cancers in these nonpalpable nodules. Since the overall incidence of thyroid cancers is relatively low, the evidence from several epidemiological studies revealed that the probability of an incidentaloma to harbor malignancy is very low. The main purposes in investigating individuals with thyroid incidentaloma are to identify patients with differentiated thyroid microcarcinoma (occult) who particularly need treatment and avoiding unnecessary investigation and management.^[4]

The French proposal of a thyroid ultrasound imaging and database system (TI-RAD) which is a five-tire system includes a standardized report and a quantified cancer risk assessment helps to select the suspicious nodules that should be sent for fine-needle aspiration cytology (FNAC).^[3,5] Thus, this imaging technique is useful in guidance of biopsies and therapeutic procedures.

The aim of this study was to record the rate of thyroid incidentaloma among healthy volunteers and population presented for nonthyroidal ultrasound examination and to detect the rate of malignancy in these nodules using TI-RAD grading system for cancer risk assessment and stratification.

MATERIALS AND METHODS

This is a cross-sectional prospective control study carried out between December 2017 and March 2018. Included 1200 consecutive individuals (1000 females aged 15–70 years, mean 45.7 ± 9 and 200 males aged 19–65 year, mean 51.3 ± 2 to detect impalpable nodule in an outpatient private clinic. Patients were either healthy volunteers or, presenting for ultrasound examination other than for the thyroid, with negative history or clinical signs of thyroid disease. Verbal informed consents after full explanation about the examination and agreement to participate freely were obtained.

Ultrasound examination was done using Mindray Dc-T6 machine (Mindray Int. Co. Ltd., 2016) with 7–11 MHz linear probes including color Doppler. The examination and interpretation of images for all participants were done by same specialist ultrasonist with more than 10-year experience in neck ultrasound examination. The prevalence of thyroid incindantalom, their distribution according to age and sex, thyroid volume, nodule size and numbers, ultrasound characteristics of thyroid nodules including echogenicity, borders, presence of microcalcifications, longitudinal and transverse diameters, and risk stratification of each incidentaloma using TI-RADS grade system.

The data were collected and analyzed statistically using SPSS version 16 (IBM Corp, Armonk, Newyork, USA). The incidence of thyroid incidentaloma between both sexes and among age groups was studied and compared using Chi-square test with $P \leq 0.05$ considered statistically significant.

FNAC was done for some patients depending mainly on size (nodules more than 1 cm) and ultrasound risk stratification

(TI-RAD 4 and 5 score). Rate of malignancy in the incidental thyroid nodules was recorded.

RESULTS

The overall incidence of thyroid incidentaloma was 27.3% (328 out of 1200 individuals with a total of 412 nodules. Thyroid incidentaloma observed in 275 (27.5%) women and 53 (13.25%). Thyroid incidentalomas were prevalent in females and elderly people in both sexes with highest incidence in 60–75-year-old peoples [Table 1].

Nodules were solitary in 244 (74.4%) and multiple (2 or more) in 84 (25.6%) patients. The distribution of the nodules was 209 (50.7%) in the right lobe, 178 (43.2%) in the left lobe and 25 (6.1%) located in the isthmus.

The size of 186 nodules (45.1%) were <5 mm and 112 incidentaloma (26.6%) were 5–10 mm and thyroid incidentaloma were cystic in 228 (55.3%), solid in 133 (32.3%), and complex in 51 (12.4%).

Most solid nodules were hyperechoic (84/133, 63.2%), 29 (21.8%) isoechoic, and 20 (15%) were hypoechoic. 92.9% (171/184 solid and mixed nodules) were have well-defined and regular borders and only 13 nodules (7.1%) have irregular and ill-defined borders. Furthermore, 90.7% of solid and mixed nodules have wider than tall diameters. Microcalcifications were seen in three and macrocalcifications in two solid nodules.

Of 412 incidentaloma, 258 were TI-RAD 2 score, 136 TI-RAD 3, and 18 nodules were classified Ti-RAD 4. TI-RAD 5 nodules were not detected in this study. Cervical lymphadenopathy was not observed in all individuals. Suspicious incidentalomas of TI-RAD 4 score (18 nodules) were sent for FNAC examination and malignancy of papillary type were detected in four nodules and follicular tumor found in eight nodules, three of them proved to be follicular carcinoma after lobectomy. Thus, the rate of malignancy in thyroid incidentaloma in this study was 1.7% [Table 2].

DISCUSSION

The lesions termed thyroid incidentaloma referred to small asymptomatic and clinically nonpalpable nodules or tumor that accidentally discovered on an imaging investigation or during

Table 1: Distribution of thyroid incidentalomas among patients

Age (years)	Incidentaloma		
	Female, n (%)	Male, n (%)	Total, n (%)
15-25	4/23 (17.4)	5/18 (27.7)	9/41 (21.9)
26-35	11/38 (28.9)	7/22 (31.8)	18/60 (30)
36-45	14/189 (7.4)	4/28 (14.3)	18/217 (8.3)
46-55	32/288 (11.1)	8/47 (17)	30/335 (8.9)
56-66	71/237 (29.9)	8/55 (14.5)	71/292 (24.3)
≥66	143/225 (63.5)	21/30 (70)	164/255 (64.3)
Total	275/1000 (27.5)	53/200 (26.5)	328/1200 (27.3)

Table 2: Ultrasound characteristics of thyroid incidentalomas

Thyroid incidentaloma	Cystic	Solid	Mixed	Total
Size (mm)				
<5	68	93	25	186
5-10	74	34	4	112
>10	67	44	3	114
Distribution				
Right lobe	183	26	0	209
Left lobe	27	100	51	178
Isthmus	18	7	0	25
Echogenicity				
Hyperechoic	Echoic free	84		
Isoechoic		29	51	-
Hypoechoic		20		
Margin				
Well defined	228	129	42	-
Ill-defined or irregular		4	9	
Axis				
Wider than tall	228	124	44	-
Taller than wide		9	7	
Calcifications				
Macro	0	2	0	
Micro	0	3	0	-
No				
Halo				
Present	0	128	0	-
Absent		4		
Cervical LAP	0	0	0	0
TI-RAD				
2	215	38	5	258
3	13	121	2	136
4	0	15	3	18
Total	228	133	51	412

TI-RAD: Thyroid Imaging Reporting and Data System, LAP: Lymphadenopathy

an operation unrelated to the thyroid gland.^[6-8] Ultrasound examination is considered the best imaging modality for detection and characterization of such nodules. The prevalence rate of thyroid incidentaloma ultrasonographically detected varies among populations with estimated range between 14% and 67%.^[8] The prevalence of thyroid incidentaloma in our study was 27.3% which is similar to previous studies.

The overall prevalence of thyroid incidentaloma in this study among asymptomatic patients attended at private clinic for nonthyroidal ultrasound examination was 27.3% with the majority of these incidentaloma being cysts of TIRAD 2 classification. Our findings were comparable with similar studies by Karaszewski *et al.*^[9] and Moifo *et al.*^[10] who reported the prevalence rate of 27% and 28.3%, respectively, and higher than that reported by Kamran *et al.*,^[11] Mohammadi *et al.*,^[12] and Olusola-Bello *et al.*^[13] whose prevalence were 21%, 13.6%, and 22.4%, respectively. Guth *et al.*^[14] recorded a thyroid incidentaloma prevalence of 68% in their study which is higher than ours. This difference in the prevalence of thyroid incidentaloma could be explained by variation with age

and sex of the patients, availability and deficiency of iodide, type of ultrasound used to detect these incidentalomas, and experience of operator.

Although nodular thyroid diseases including thyroid incidentaloma are more common among female patients than male, the prevalence of incidentaloma among females and males in this study were comparable (27.5% and 26.5%, respectively). The female-to-male ratio among our populations was 5:1. This result might be explained by small sample of males compared with females. Moifo *et al.*^[10] reported that the prevalence of thyroid incidentaloma was significantly higher in females (33.3%) than males (18.45%), $P < 0.001$. Similar findings were observed by Mohammadi *et al.*^[12] and Olusola-Bello *et al.*^[13]

Thyroid nodules increase with age. The high prevalence of thyroid nodules in this study was more with increasing age in patients elder than 60 years in both sexes. These results were also observed by Kamran *et al.*^[11] and Tramalloni and Wemeau.^[15] These findings could be explained by degenerative changes that occurred in the thyroid gland as a result of aging process, thus age is a risk factor for developing thyroid nodules. It has been reported that more than 50% of thyroid nodules detected by ultrasonography were found in individual older than 60 years and 30% of the nodules were in people who were 19–50 years old.^[16]

The distribution of thyroid incidentaloma among the participants in this study was slightly more on the right lobe (50.7%) than the left lobe (43.2%) with only small percentage located in the isthmus (6.1%). These findings were consistent with previous observations by Papini *et al.*^[17] and Moifo *et al.*^[10] The predominance of right lobe incidentaloma could be explained by difference in the size of both lobes that is the right lobe is usually larger than the left in most individuals by 1.2 times.

Our results showed that the size of 186 incidentalomas (45.1%) were <5 mm, 112 nodules (27.2%) were 5–10 mm size, and 114 nodules (27.7%) were more than 10 mm size. The size of the nodules in our series was similar to the size of the nodules observed by Liebeskind *et al.*^[18] and lower than the size of the nodules in the series by Karmen *et al.*^[11] and Kim *et al.*^[19] who reported 43% and 66.5% of their incidentaloma were more than 10 mm, respectively.

Solitary incidentalomas were observed in 244 participant (74.4%) and multiple nodules were detected in 84 individual (25.6%) which is similar to that observed by Mohammadi *et al.*^[12] who observed multiple nodules in 30.4% of the patients included in their study. Dean and Gharib^[7] in their similar study reported multiple incidentaloma rate of 48%. However, other studies^[8,12] reported lower multiple nodules that ranged from 3% to 12%.

More than half of thyroid incidentaloma in this study were cystic (55.3%). Solid nodules were observed in 32.3% and only 12.4% of the nodules were mixed type. Our findings

were consistent with results reported by other authors.^[10,15,20] Regarding the solid nodules, most of them 84 (63.2%) were hyperechoic, 29 (21.8%) were isoechoic, and hypoechoic was observed in 20 (15%). Most of the solid incidentalomas in similar studies by other authors also found a predominance of hyperechoic or isoechoic nodules.^[12,17,19,21]

The majority of incidentaloma in our series were of TI-RAD 2 and 3 (258 and 136, respectively) represented 95.6% of the nodules and TI-RAD 4 were detected in 18 nodules only. TI-RAD 5 nodules were not detected in our study. Similar prevalence of the nodules according to TI-RAD classification was observed in similar studies.^[10,13,16] All the TI-RAD 4 incidentalomas were solid and hypoechoic.

The majority of thyroid incidentaloma are benign. However, still there is small potential risk for malignancy. The incidence of occult thyroid cancer (microcarcinoma) in these impalpable nodules ranges from 0.4% to 13%.^[12,17,21] The incidence of occult thyroid carcinoma in this study was 1.7% (7 nodules) which lower than the average range. We found that there is also association between the size and solidity of the nodules and the risk of malignancy since all malignant incidentalomas in our study were solid and more than 10 mm size. Besides, most of the malignant nodules (4 nodules, 57%) were taller than wide, with ill-defined borders and microcalcifications were observed in three nodules proved by histopathological exam to harbor foci of papillary carcinoma. Cervical lymphadenopathy was not observed in our series.

CONCLUSION

Thyroid incidentaloma is relatively common among population, especially in female population and increase with age. Most thyroid incidentaloma are benign and <1 cm in size. Malignancy is infrequent finding in thyroid incidentaloma. Ultrasound characteristics using TI-RAD grading and size of nodule are good and reliable screening tool for malignant potential of incidental thyroid nodule.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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