

# Evaluation of the Incidence of Thyroid Cancer among Patients with Thyroid Nodules Attending to Suez Canal University Hospital

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## Abstract

**Background:** Thyroid cancer is the most common endocrine carcinoma, as it accounts for almost 90% of all endocrine malignancies. Our objective was to determine prevalence of thyroid cancer in patients underwent thyroidectomy in Suez Canal University Hospital. **Patients and Methods:** Cross-sectional descriptive study was conducted on 81 patients attending to our surgical oncology outpatient who were candidate for total thyroidectomy or hemithyroidectomy. Patients were subjected to clinical examination including multinodular goiter or solitary nodule, complaint of patient: pressure manifestations, cosmetic disfigurement and thyrotoxicosis and cervical lymphadenopathy. Neck ultrasonography was done for cervical lymphadenopathy, solitary nodule or multi nodular, assessment by TI-RADS and size of nodule. Specimens were sent to our pathology department. **Results:** Mean age of the patients was  $48.83 \pm 11.01$  years. 75% were females. The chief complaint was neck lump (46.9%) and pressure symptoms (45.7%). Fifty percent of the patients had thyroid nodular size 1–4cm and 69.2% of were multi-nodular. 69.2% of the patients had total thyroidectomy while 30.8% had hemi-thyroidectomy. Incidence of thyroid carcinoma was 26% as: papillary (18.5%), follicular carcinoma (3.7%), medullary carcinoma (2.5%) and anaplastic (1.2%). Thyroid carcinoma was associated with solitary nodule (55%), in the left lobe (42.8%), cervical lymph node (30%) and TIRADS 5 (42.8%). **Conclusion:** Incidence of thyroid carcinoma in Suez Canal University hospital is 26%. The most frequent histopathology type is papillary carcinoma. Females were the most affected. The pressure symptom was the most complaint in benign nodules while neck lump was the most common in malignant nodules. TIRADS 5 was the most frequent in all malignant nodules.

**Keywords:** Thyroid carcinoma; Thyroid nodules; Suez Canal University Hospital

## Introduction

The prevalence of incidental thyroid cancer (ITC) in multinodular goiter (MNG) has been previously estimated to be 5–10%<sup>(1)</sup>, however, recent studies have reported higher ITC prevalence rates, ranging from

8.6 to 22%<sup>(2)</sup>. The risk of malignancy in multinodular goiter should not be underestimated as majority of the patients with thyroid cancers present with multinodular goiter. Dominant nodule in multinodular goiter should be considered as significant as solitary nodule in an otherwise normal

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gland<sup>(3)</sup>. Surgical treatment has been regarded as an acceptable and appreciated method of nontoxic multinodular goiter management<sup>(4)</sup>. The current guidelines and meta-analysis recommend total thyroidectomy for both toxic and NTMNG<sup>(5)</sup>. Most thyroid nodules do not cause symptoms. Often, thyroid nodules are discovered incidentally during a routine physical examination or on imaging tests like CT scans or neck ultrasound done for completely unrelated reasons<sup>(6)</sup>. Thyroid nodule is a discrete lesion in the thyroid gland that is radiological distinct from the surrounding thyroid parenchyma. Nodules in the thyroid gland are a common entity and are detected in approximately 5% to 7% of the adult population by physical examination alone<sup>(7)</sup>. Although more than 90% of detected nodules are insignificant benign lesions, thyroid nodules are clinically important as they may represent thyroid cancer in approximately 4.0% to 6.5% of cases<sup>(8)</sup>. Differentiated thyroid cancer (DTC), which includes papillary and follicular cancer, comprises the vast majority (>90%) of all thyroid cancers<sup>(9)</sup>. Incidence of incidental thyroid carcinoma has increased in our patients who were presented with multinodular goiter or solitary nodules. The objective of this study was to evaluate the incidence of thyroid carcinoma in patients with nodular goiter who are undergoing total thyroidectomy or hemithyroidectomy in Suez Canal University Hospital.

## Patients and Methods

*Study design:* A cross-sectional descriptive study.

*Study population:* Patients attending to Suez Canal University hospital from January 2019 to June 2020 with preoperative diagnosis of nodular goiter who were candidate for total thyroidectomy or hemithyroidectomy

*Inclusion criteria:* Both sexes of any age who were previously diagnosed as benign nodular goiter and become candidate for surgery: 1) Clinical and radiological suspicion of malignancy regardless of FNAC, 2) Repeatedly non-diagnostic cytology, 3) Indeterminate or follicular cytology, 4) Toxic nodule, 5) Pressure or obstructive symptoms

*Exclusion criteria:* patients with thyroid cancer, unfit for surgery or previous exposure to radiation were excluded from the study.

*Methods:* All patients were subjected to the followings:

### 1. Preoperative assessment

A- Full clinical assessment: 1) Age, gender, family history of thyroid cancer, presentation of patients, multinodular goiter, or solitary nodule. 2) Complaint of patient: pressure manifestations, cosmetic disfigurement. 3) Enlarged cervical lymph nodes.

B- Routine laboratory studies: All hematological parameters (CBC, RBS, PT, PTT, INR).

C- Thyroid profile: free T<sub>3</sub>, free T<sub>4</sub>, TSH.

D- Neck ultrasonography: was done for: 1) Detection of gland texture, retrosternal extension, cervical lymphadenopathy, solitary nodule or multi nodular goiter. 2) Assessment of nodule by TI-RADS. And 3) assessment of size of nodule.

E- Chest X ray was done for detection of any tracheal deviation or compression, retrosternal extension and for lung assessment before anesthesia.

G- Referral to ENT specialist for indirect laryngoscopy to determine the mobility of the vocal cords.

Also, patients were informed about all the possible complications of total thyroidectomy or hemithyroidectomy: i.e., Recurrent laryngeal nerve damage leads to a weak breathy voice and poor cough, Hypocalcemia, Hematoma, Wound infection and poor cosmesis.

## 2. Operative technique

All patients had total thyroidectomy or hemithyroidectomy by expert surgeon from our department. The procedure was carried out under general anesthesia.

### Steps of Hemi/Total Thyroidectomy

Positioning, painting draping and incision skin crease sub platysma flap, incising investing layer of deep cervical fascia and muscle retraction. Division of middle thyroid vein & superior pedicle management. Recurrent laryngeal nerve and parathyroid glands are identified. Inferior thyroid vessel management, thyroid dissection from bed and repeat procedure in contralateral side. Adequate hemostasis and drain placement. Finally wound is closed<sup>(10)</sup>. Intraoperative photos of specimens were taken confidentially.

### 3-Histopathological results

Specimens were sent to our Suez Canal University pathology laboratory and stored confidentially.

## Statistical analysis

Data was imported into Statistical Package for the Social Sciences (SPSS version 20) software for analysis. According to the score of data, the following tests were used to test differences of significance; P-value and Student T-test were used to test the significance of relations between different variables, Data was presented in the form of tables and figures using Microsoft word computer package.

## Results

Our study showed baseline characteristics of the studied sample. Mean age of the patients was  $48.83 \pm 11.01$  years, where about 60% of the patients were between 41 and 59 years old. About 75% of them were females and 25% were males. The chief com

plaint among our sample was neck lump (46.9%) followed by pressure symptoms (45.7%). 92.6% of our patients was euthyroid and 7.4% was with hyperthyroidism (table 1). The clinical and radiological characteristics of the studied sample. About half of the patients had thyroid nodule size ranged from 1-4 cm and about 69.2% of the goiters were multi-nodular. Moreover, about 69% of the patients had bilateral nodules. Nearby cervical lymph nodes involvement was present in seven patients (8.6%). According to TIRADS score 24.6%, 37%, 25.9% and 12.3% of our sample had score 2, 3, 4 and 5 respectively. Meanwhile, 69.2% of the patients had performed total thyroidectomy while 30.8% had hemi-thyroidectomy (table 2). Final histopathology showed that incidence of thyroid carcinoma in nodular goiter patients attending to Suez Canal University hospital was 26%. The most common carcinoma was papillary (18.5%), followed by follicular carcinoma (3.7%), medullary carcinoma (2.5%) and finally anaplastic (1.2%) (table 3). The relationship between baseline characteristics of the patients and thyroid nodule type. It was found that malignant nodular goiter was significantly associated with female gender ( $p=0.014$ ). Moreover, more than half of the patients with malignant goiter presented with neck lump (55%) and about one third of them presented with pressure symptoms (35%). and 10% presented with hyperthyroidism (table 4). Relationship between radiological characteristics of the patients and thyroid nodule pathological type showed that malignant thyroid nodule was significantly associated with solitary goiter ( $p<0.001$ ), being in the left lobe ( $p<0.001$ ), cervical lymph node involvement ( $p<0.001$ ) and TIRADS score (4) and (5) on neck ultrasonography ( $p=0.023$ ). patients who had hemithyroidectomy and with malignant pathology for completion total thyroidectomy (table 5).

**Table 1.** Demographic and clinical characteristics of patients

Variables	n= 81
Age (years)	
mean $\pm$ SD	48.83 $\pm$ 11.01
median (range)	48 (22 – 72)
Age of groups, n (%)	
22 – 40	20 (24.7)
41– 59	47 (58)
$\geq$ 60	14 (17.3)
Gender, n (%)	
Male	20 (24.7)
Female	61 (75.3)
Complaint, n (%)	
Toxic symptoms	6 (7.4)
Neck lump	38 (46.9)
Pressure symptoms	37 (45.7)
Thyroid status, n (%)	
Hyperthyroidism	6 (7.4)
Hypothyroidism	0
Euthyroid	75 (92.6)

Data are presented as number (%) or mean (SD).

Relationship between baseline characteristics and thyroid carcinoma type showed that females formed the majority of patients in all forms of thyroid cancers. Neck lump formed 33.3%, 60% and 100% of the chief complaint of patients with follicular, papillary and anaplastic carcinoma, respectively. Meanwhile, hyperthyroidism manifestation presented in half of the patients with medullary carcinoma and 25% of the patients with follicular carcinoma as shown in table 6. By analysis of radiological characteristics of thyroid nodules and type of thyroid carcinoma we found that all patients with follicular and anaplastic carcinoma were multi-nodular, whereas 66.7% and 50% of the papillary and medullary nodules were solitary. The majority of malignant masses had size 1-4 cm. Cervical lymph nodes were radiologically positive among patients with papillary (33.3%) and anaplastic (100%) carcinoma. The most frequent TIRADS score among thyroid carcinoma was TIRADS 5 as shown in table 7.

**Table 2.** Clinical and radiological characteristics of patients

Variables	n= 81
Nodularity, n (%)	
Solitary	25 (30.8)
Multi-nodular	56 (69.2)
Size, n (%)	
< 1 cm	29 (35.8)
1 – 4 cm	41 (50.6)
> 4 cm	11 (13.6)
Site, n (%)	
Rt. Lobe	15 (18.5)
Lt. lobe	10 (12.3)
Bilateral	56 (69.2)
LNS involvement	
Absent	74 (91.4)
Present	7 (8.6)
TIRADS scoring	
TIRADS 1	0 (0)
TIRADS 2	20 (24.6)
TIRADS 3	30 (37)
TIRADS 4	21 (25.9)
TIRADS 5	10 (12.3)
Operation	
Total thyroidectomy	56 (69.2)
Hemi- thyroidectomy	25 (30.8)

Data are presented as number (%) or mean (SD).

**Table 3:** Types of thyroid goiter according to histopathological nodular type

Variables	N (%)
Benign	60 (74)
Malignant	21 (26)
▪ Papillary carcinoma	15 (18.5)
▪ Follicular carcinoma	3 (3.7)
▪ Medullary carcinoma	2 (2.5)
▪ Anaplastic carcinoma	1 (1.2)

Data are presented as number (%) or mean (SD)

## Discussion

Our study aimed at evaluating the incidence of thyroid carcinoma in patients with nodular goitre who underwent total thyroidectomy or hemi-thyroidectomy; besides determining clinical factors and histopathological types. In our study, mean age

of the patients was 48.83±11.01 years, where about 60% of the patients were between 41 and 59 years old. 75% of them were females and 25% were males. It was found that malignant nodules were significantly associated with female gender. A recent study, Walczak<sup>(11)</sup> reported similar

data with a high incidence of malignancy in women. On the other hand, Paul et al<sup>(12)</sup> reported that the incidence of malignancy is higher in men. In Egypt, El-Gammal et al<sup>(13)</sup> showed the same results of ours. Difference in the incidence of thyroid malignancy between men and women was found.

**Table 4:** Relationship between baseline characteristics of the patients and thyroid nodule pathological type

Clinical characteristics	Score of thyroid nodules		test value	P-value
	Benign (n= 60)	Malignant (n= 21)		
Age (years), mean ± SD	49.75 ±11.2	46.0 ±10.1	35.6	0.169
Gender, n (%)				
Male	18 (31.1)	2 (9.5)	5.53	<b>0.014<sup>b</sup></b>
Female	42 (68.9)	19 (90.5)		
Complaint, n (%)				
Toxic symptoms	3 (6.6)	3 (10)	1.5	0.56 <sup>b</sup>
Neck lump	27 (44.3)	11 (55)		
Pressure symptoms	30 (49.2)	7 (35)		
Thyroid status, n (%)				
Hyperthyroidism	3 (6.6)	3 (14.3)	0.26	0.63 <sup>b</sup>
Euthyroid	57 (93.4)	18 (85.7)		

<sup>b</sup> p-values are based on Fisher's Exact test. Statistical significance at P < 0.05

This difference between studies may be due to the geographic differences and the number of populations studied. In our study 55% of the patients with malignant pathology presented with neck lump and 35% of them presented with pressure symptoms. In Merchant<sup>(14)</sup> study, the most common presentation of study participants was neck swelling/mass which was present in 98% patients followed by weight loss in 62%. According to nodularity in our study showed that out of 81 patients there were 56 patients with multinodular goiter and 25 patients with solitary nodule. Out of 56 patients, there were 10 patients with malignant nodules. Out of 25 patients with solitary nodule, there were 11 patients with malignant nodules. Thyroid carcinoma was significantly associated with solitary nodule as 55% of solitary nodules were malignant. Similar results were found in Frates

et al<sup>(15)</sup>. On the other hand, in El-Gammal et al<sup>(13)</sup> study showed that patients with multinodular goiter had higher incidence of thyroid carcinoma. Cervical Lymph nodes were present in ultrasonography in 7 patients of our study. 6 cases of them were with malignant nodules. thyroid carcinoma is significantly associated with cervical lymphadenopathy in ultrasound assessment. In the study, there was no relationship between the size of nodules and the histopathological results and 60% of malignant nodules had size ranged from 1–4cm, 30% were less than one centimeter and 10% were more than 4 cm. In Allison Cavallo et al<sup>(16)</sup> study showed that the size of nodules is inversely related to malignancy risk, as larger nodules have lower malignancy rates. Postoperatively, our patients had 6.2% of complications .2.5% had recurrent laryngeal nerve, 1.2% had hypocalcaemia,

1.2% had hematoma and 1.2% had wound infection. Our study showed that incidence of thyroid carcinoma in nodular goiter patients Suez Canal University hospital was 26%. The most frequent carcinoma was papillary 18.5%, followed by follicular

carcinoma 3.7% and medullary carcinoma 2.5% and finally anaplastic 1.2%. Mustafa et al<sup>(17)</sup> study showed malignant cases found in 14% of patients, 64% were papillary carcinoma, 21% were follicular carcinoma and 14% were anaplastic carcinoma.

**Table 5:** Relationship between radiological characteristics of the patients and thyroid nodule type

Clinical characteristics	Score of thyroid nodules		test value	P-value
	Benign (n= 60)	Malignant (n= 21)		
Nodularity, n (%)				
Solitary	14 (23)	11 (55)	6.15	<b>0.013<sup>*b</sup></b>
Multi-nodular	46 (77)	10 (45)		
Size, n (%)				
< 1 cm	23 (37.7)	6 (30)	0.66	0.72 <sup>b</sup>
1 – 4 cm	29 (47.5)	12 (60)		
> 4 cm	8 (14.8)	3 (10)		
Site, n (%)				
Rt. lobe	13 (21.4)	2 (14.4)	24.5	<b>&lt;0.001<sup>*b</sup></b>
Lt. lobe	1 (1.6)	9 (42.8)		
Bilateral	46 (77)	10 (45)		
LNS involvement				
Absent	59 (98.4)	15 (70)	15.3	<b>&lt;0.001<sup>*b</sup></b>
Present	1 (1.6)	6 (30)		
TIRADS score				
TIRADS 1	0 (0)	0 (0)	7.51	<b>0.023<sup>*b</sup></b>
TIRADS 2	20 (33.3)	0 (0)		
TIRADS 3	26 (43.3)	4 (19)		
TIRADS 4	13 (21.6)	8 (38.5)		
TIRADS 5	1 (1.6)	9 (42.8)		

<sup>b</sup> p-values are based on Fisher's Exact test. Statistical significance at P < 0.05

It shows a clear predominance of papillary over follicular and anaplastic carcinoma. In EL-Sayed et al<sup>(18)</sup> study showed that the final histopathological examination was benign 80%, malignant 20%. The histopathological reports of studied patients were 10% papillary carcinoma, 3% follicular carcinoma and 3% medullary carcinoma. Our incidence was slightly higher than a study was conducted by Ghadhban in Iraq which showed that 21.7% of patients with nodular goiter had thyroid carcinoma<sup>(19)</sup>. Our frequency finding is also close to the frequency of

differentiated thyroid carcinoma among nodular goiter found by Al-Salamah et al<sup>(20)</sup> study in Saudi Arabia of 21.3% that was detected by FNA and confirmed with histopathology. According to location, 77% of benign thyroid nodules have bilateral site, 42.8% of malignant nodules were located in the left lobe and 45% of malignant one was in both lobes. thyroid carcinoma is significantly associated with left lobe. We find that malignant affection found more with unifocal disease in comparison to benign which usually multifocal or bilateral.

Another study Ramundo et al<sup>(21)</sup> showed that the risk of thyroid malignancy was found to be significantly higher for mid-lobe nodules. Thyrotoxicosis were found in 6 cases of our sample, 50% of them had malignant pathology. Out of 75 euthyroid cases, 18 patients had malignant pathology

and 57 cases with benign. out of 18 patients, there were 14 cases with papillary carcinoma, two were follicular and one case for both medullary and anaplastic carcinoma. In Varadharajan et al<sup>(22)</sup> showed that the mean overall rate of malignancy was 8.5% (range 0.8%-32.4%).

**Table 6:** Relationship between baseline characteristics and thyroid carcinoma type

Clinical characteristics	Score of thyroid carcinomas				P-value
	Follicular (n=3)	Papillary (n= 15)	Medullary (n= 2)	Anaplastic (n=1)	
Age (years), mean (SD)	49.0 ± 1.4	43.8 ± 9.1	54.6 ± 15.5	57.5 ± 0.0	0.23 <sup>a</sup>
Gender, n (%)					0.250 <sup>b</sup>
Male	0 (0)	1 (6.7)	1 (50)	0 (0)	
Female	3 (100)	14 (93.3)	1 (50)	1 (100)	
Complaint, n (%)					0.023* <sup>b</sup>
Toxic symptoms	1 (33.3)	1 (6.7)	1 (50)	0 (0)	
Neck lump	1 (33.3)	9 (60)	0 (0)	1 (100)	
Pressure symptoms	1 (33.3)	5 (33.3)	1 (50)	0 (0)	
Thyroid status, n (%)					0.211 <sup>b</sup>
Hyperthyroidism	1 (25)	1 (6.7)	1 (50)	0 (0)	
Euthyroid	2 (75)	14 (93.3)	1 (50)	1 (100)	

<sup>a</sup> p-values are based on Kruskal Wallis test. Statistical significance at P < 0.05

<sup>b</sup> p-values are based on Fisher's Exact test. Statistical significance at P < 0.05

The mean rates based on histological subtype were as follows: papillary thyroid cancer, 3.1% (range 0-13.2%); micropapillary carcinoma 5.1% (range 0-16.9%); and follicular thyroid cancer, 0.8% (range 0-4.4%). According to TIRADS score in our study, there were 20 patients, 30 patients, 21 patients and 10 patients with TIRADS score 2,3,4 and 5 respectively. There were 4 malignant nodules with score 3, 8 malignant nodules with score 4 and 9 malignant nodules with score 5. TIRADS score 5 was the most frequent score in all pathological types of thyroid carcinoma. In Macedo et al<sup>(23)</sup>, all patients with malignant nodules were classified in the categories 4 or 5 of TI-RADS and in the intermediate or high suspicion risk.

## Conclusion

The incidence of differentiated thyroid

carcinoma among nodular goitre patients in Suez Canal University hospital was high. The most frequent histopathology type was papillary carcinoma. Female patients were the most affected. The pressure symptom was the most complaint in benign nodules while neck lump was the most common in malignant nodules. TI-RADS score 5 was the most frequent in all malignant nodules.

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**Table 7:** Relationship between clinical and radiological characteristics and thyroid carcinoma type

Clinical characteristics	Score of thyroid carcinomas				P-value
	Follicular (n=3)	Papillary (n= 15)	Medullary (n=2)	Anaplastic (n=1)	
Nodularity, n (%)					
Solitary	0 (0)	10 (66.7)	1 (50)	0 (0)	0.619
Multi-nodular	3 (100)	5 (33.3)	1 (50)	1 (100)	
Size, n (%)					
< 1 cm	1 (25)	5 (33.3)	0 (0)	0 (0)	0.617
1 – 4 cm	2 (75)	8 (60)	1 (50)	1 (100)	
> 4 cm	0 (0)	2 (6.7)	1 (50)	0 (0)	
Site, n (%)					
Rt. lobe	1 (33.3)	1 (6.7)	0 (0)	0 (0)	0.427
Lt. lobe	1 (33.3)	8 (53.3)	0 (0)	0 (0)	
Bilateral	1 (33.3)	6 (40)	2 (100)	1 (100)	
LNS involvement					
Absent	3 (100)	10 (66.7)	2 (100)	0 (0)	0.789
Present	0 (0)	5 (33.3)	0 (0)	1 (100)	
TIRADS score					
TIRADS 1	0 (0)	0 (0)	0 (0)	0 (0)	0.348
TIRADS 2	0 (0)	0 (0)	0 (0)	0 (0)	
TIRADS 3	0 (0)	4 (26.6)	0 (0)	0 (0)	
TIRADS 4	1 (25)	6 (40)	1 (50)	0 (0)	
TIRADS 5	2 (75)	5 (33.4)	1 (50)	1 (100)	

p-values are based on Fisher's Exact test. Statistical significance at  $P < 0.05$

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