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Incidence of Malignancy in Solitary Thyroid Nodule, Baghdad, Iraq

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ABSTRACT:

Background: Presence of Thyroid nodule in a society depends on many factors: - age, sex, diet, iodine deficiency, environmental and therapeutic radiation exposure. they are representing a multitude of thyroid diseases.

Aim of the study: - Identifying incidence of malignancy in single thyroid nodule.

Patients and Method: - 70 patients (55 females & 15males), (mean age of 38.10 years S.D +/- 11.90) with solitary thyroid nodule (size 1cm and more) by physical examination or ultra-sound study were included in this prospective study at the specialized center for endocrinology and diabetes and Alkarama teaching hospital in Baghdad city from May 2020 to September 2024. Informed consent from all patients was taken. All patient's demographic features (age, sex, and residency), medical history, physical examination and hormonal assessment with fine needle aspirate cytology were recorded. All the patients had thyroidectomy under general anesthesia by same surgical team and the specimens fixed in formalin and send for Histopathological assessment.

Results: - Females are more affected by nodule (78.57%) than males with ratio of 3.66 /1 (55 females &15 males). 81.42% of the patients presented as mass in the neck, 35.71% of the patients have nodule for less than one year, 50% of the patients have the nodule in the right lobe and 48.57% the nodule located in the left lobe. Fine needle aspiration was positive in 82.85% and non-conclusive in 10%. The histopathology of the nodules was 52.85% as colloid hyper plastic, 7.14% as thyroiditis, 18.57% as benign thyroid adenoma and 20% was malignant thyroid nodule.

Conclusion: - 20% of single thyroid nodule is of malignant origin.

INTRODUCTION: -

Solitary thyroid nodule is defined clinically as the localized thyroid enlargement with apparently normal rest of the gland.

⁽¹⁾thyroid nodule prevalence within a population depends on many factors (age, sex, diet, iodine deficiency, environmental and therapeutic radiation exposure). The prevalence rate of thyroid nodules in radiation-exposed patients increases significantly, 16-31% relative to the general population. Nodules are more common in females throughout all age groups and representing a variety of thyroid diseases. ^(2, 3) True solitary thyroid nodule occurs in 0.22-1.5% of pediatric population and 4-7% of adult population. Medical history, physical examination, and epidemiology of thyroid diseases can help primarily to reach a clinical diagnosis of thyroid nodule.

Currently a variety of diagnostic imaging studies, serological & cytogenetic testes with histopathological techniques exist for the evaluation of thyroid nodule. Cooperation of general practitioner, head and neck surgeon, radiologist, pathologist and endocrinologist can lead to accurate management of solitary thyroid nodule^(2,3)

Patients & methods: -

This is prospective study conducted on 70 patients (55 females & 15 males, age range between 17-63 years) (mean age 38.10 years S.D 11.90) out of 280 goiterous patients having thyroid surgery at the specialized center for endocrinology and diabetes and Alkarama teaching hospital in Baghdad city from 1st of May 2020 to 20th of September 2024) with solitary thyroid nodule. The inclusion criteria were: - both sexes with age more than 15 years, presenting with single thyroid nodule by physical examination or ultrasound sound study.

All patients participated in the study provided Informed consent and their personal information's like age, sex, contact telephone number and address for follow up purpose

All patients had undergone thorough medical history and physical examination of symptoms and signs of thyroid diseases with routine hematological, biochemical, T3, T4, TSH. Levels, radiological, cardiac, and ultrasound of the neck with fine needle aspiration for cytology

Thyroidectomy under general anesthesia performed by same surgical team using electro surgery as hemostatic procedure, all the excised thyroid tissue preserved in formalin and send for Histopathological study.

RESULTS

Females are more affected by solitary thyroid nodules than males with ratio of 3.66 /1 (55 females &15 males) as shown in table (1).

Table (1) shows patients distribution according to gender.

Gender	Number	Percent
Female	55	78.57 %
Male	15	21.42%
Total	70	99.99%

81.43% of the patients presented as mass in the neck, 11.42% as feeling of choking and 7.14% with palpitation. As shown in table (2)

Table (2) shows distributions according to the chief complain.

Complain	Female	Male	Total	Percent
Neck Mass	46	11	57	81.43%
Choking	6	2	8	11.42%
Palpitation	3	2	5	7.14%
Total	54	15	70	99.99%

❖ 40% of the patients having nodule for 1-3 years, 35.71% for less than one year and 24.28 % the duration of the nodule is more than 3 years as shown in table (3).

Table (3) shows the distribution of the duration of the nodule.

Duration of nodule	Female	Male	Total	Percent
Few months	21	4	25	35.71%
1-3 years	21	7	28	40.00%
4years & up	13	4	17	24.28%
Total	55	15	70	99.99%

50% of the patients have the nodule in the right lobe, 48.57% the nodule located in the left lobe and 1.42% the location is in the isthmus as shown in table (4).

Table (4) showing the nodule location by examination or ultrasound.

Site of nodule	Female	Male	Total	Percent
RT lobe	31	4	35	50.00%
LT lobe	24	10	34	48.57%
Isthmus	0	1	1	1.42%
Total	55	15	70	99.99%

The ultrasound features of the nodule are: - The nodule size is more than 3cm in 51.42% of patients, while in 48.57 % the nodule size is 1-3 cm, Isoechoic in texture in 61.42% and hypoechoic in 22.85% and calcification is noticed in 21.42 as shown in table (5).

Table (5) showing ultrasound features of the nodule.

U/S of nodule	Size 1-3cm	Size >3cm	Isoechoic	Hypoechoic	Calcification
Female	25	30	35	12	9
Male	9	6	8	4	6
Total	34	36	43	16	15
Percent	48.5%	51.42%	61.4%	22.85%	21.42%

Fine needle aspiration is positive 82.85% and non-conclusive in 10% as shown in table (6).

Table 6 showing the results of fine needle aspiration cytology.

FNAC finding	Female	Male	Total	Percent
Normal follicular cell	39	8	47	67.1%
Hurthel cell	3	0	3	4.28%
Papillary CA.	4	4	8	11.4%
False positive	0	0	0	0
False negative	5	0	5	7.14%

Non conclusive	4	3	7	10.0%
Total	55	15	70	99.9%

❖ The histopathology of the nodule is colloid hyper plastic nodule in 54.28%, benign thyroid adenoma in 18.57%, thyroiditis in 7.14% and malignant thyroid nodule (papillary carcinoma) in 20% as shown in table (7).

Table (7) showing the histopathology of the nodule.

Histopathology	Female	Male	Total	Percent %
Colloid goiter	30	8	38	54.28%
Thyroiditis	5	0	5	7.14%
Adenoma	10	3	13	18.57%
Papillary CA.	10	4	14	20.00%
Total	55	15	70	99.99%

Females with solitary thyroid nodule are more affected with carcinoma than males (ratio Female: male 2.5:1) and at younger age (Female median age 32.9 years while male median age is 47.5 **years**) with less incidence of lymph-node metastasis (40% in female and 60% in male) RT lobe affected by malignancy in 57.14% {6 females + 3 males} while the left lobe is affected by 42.85% {4 females + 1 male} as shown in table (8).

Table (8) showing demographic features of patients with solitary thyroid nodule caused by thyroid malignancy.

Papillary carcinoma	RT Lobe	Lt Lobe	Total	Median age-years	NO of Nodal Metastasis
Females	6	4	10	32.9	2
Males	3	1	4	47.5	3
Total	9	5	14	37.07	5
Percent	64.28%	35.71%	100%		35.71%
Ratio F: M			2.5		

DISCUSSION:

Thyroid nodule is not a specific disease but it is a clinical feature of a wide range of different diseases, the total number of thyroid solitary nodules cases increases with age, diagnosis of nodules occurs at a rate of 0.08% per year from childhood to old age.

Adolescent females with nodular thyroid are 6 times more common compared to males of the same age, in the US palpable thyroid nodule found in 6% of adult female and 2% of adult male. Ultrasound examinations of thyroid gland. ⁽²⁾ show 33% of female and 20% of male have small nodules in their glands.

Women are four times more liable to develop thyroid nodules than in men ⁽⁴⁾ it is 3.66 in our study, this is attributed to the sensitivity of females to hormonal changes estrogen and progesterone [during adolescents, pregnancy and in multiparity] with their effect on hypothalamic pituitary axis on TSH secretion in comparison to males ⁽⁵⁾.

Pregnancy tends to make nodules increase in size, and to cause development of new nodules.

Most thyroid nodules are asymptomatic and benign at time of presentation, careful history regarding time of the appearance of the nodule, rate of growth, features of hyperthyroidism or hypothyroidism, tenderness and features of local neuropathy can assist physician in determining the nature of the nodule ^(6, 7, 8). In our study 81.48% of patients presented with painless mass in the neck, and 7.14% presented with features of thyroid toxicity. Ultrasonography is highly sensitive and is the most cost-effective imaging procedure, in assessing nodule number, size and its location. The main ultrasound criteria of thyroid malignancy are hypo echogenicity, solid texture, heterogeneous internal echoes, distorted shape, irregular borders, micro calcification, an anteroposterior / transverse diameter ratio (A/T) >1, infiltration into nearby structures, suspicious regional lymph nodes and absence of a halo ⁽⁸⁾

Regarding the location of the nodule in our study it is 50% in the right lobe and 48.57% in the left lobe and only one patient the isthmus was the site of the nodule which is identical to Uchekwu C. Megwalu et al ⁽⁹⁾, Regarding the size of the nodule, 48.56 % of the nodules were less than 3 cm in diameter and 51.42 % of the nodules their diameter is more than 3cm. 90% of nodules were of well-defined border, 61.42% were of isoechoic textures, 38.57% shows hypo-echoic texture. Fine calcification noticed in 21.42 % of the nodules (15 nodules 5 of them shows papillary carcinoma by histopathology). The study of Taki S, Terahata S et al ⁽¹⁰⁾ shows different pattern of calcification (Micro calcification; macrocalcification, intranodal and peripheral calcification) in malignant nodules.

Fine needle aspiration is very useful procedure in the assessment of nodular cellularity, colloid content, acinar or papillary formation, intranuclear grooves and intranuclear cytoplasmic inclusion, various inflammatory cells and hurthel cell with any cellular atypia ⁽¹¹⁾. It is positive in 82.85% of our patients (showing normal follicular cells in 67.14% of the patients, papillary carcinoma in 11.43% and hurthel cells in 4.28% of our patients) and it is un conclusive in 10% of nodules which can be explained by the fact that FNAC sampling error increase when the nodule is cystic in nature and with increasing size of the nodule, it has been reported 17% false negative rate for solid thyroid nodules 3cm and over in size and 30% in cystic nodules 3cm and larger in size. ^(2,12,13,14)

The histopathology of the nodule in our study is benign in 80% of the nodules (colloid hyperplasia in 54.28%, adenoma in 18.57%, thyroiditis in 7.14%) and 20% is of malignant origin (papillary carcinoma).

Hyperplastic colloid nodules consist of colloid, excessive cellularity, acinar formation, marginal vacuoles and papillary formation.

Adenoma arises from follicular cells, they are homogenous well capsulated benign tumors of thyroid gland, classification of follicular adenoma depends on the amount of colloid, cellularity and their cellular architecture.

Some types of follicular adenomas like fetal, embryonal, and hurthle cell adenoma have micro invasive potential while colloid adenoma type doesn't show any potential for micro invasion

In our study we have 18.57% of nodules are of follicular adenoma, one patient with fetal adenoma, one with hyalinizing trabecular adenoma and 10 patients with macro follicular (colloid) adenoma.

Around fifth of patients with follicular adenoma have oncogene mutation like N-RAS and K-RAS and that may lead adenoma to change to follicular carcinoma (15, 16, 17)

Papillary carcinoma is the cause of 20% of the solitary nodule in our study with female to male ratio 2.5:1 (71.4%/28.57%). Their median age is 37.07 years [the female age ranging between 17-43 years with median of 32.9 years while male age ranging between 42-63 years with median of 47.5 years]. The right lobe affected in 64.28% (9 patients 6 females and 3 males) while the left lobe is the site of malignancy in 35.71% (5 patients 4 females and one male). 75% of affected males presented with lymph node metastasis while 20% of affected females presented with lymph node metastasis. Adding iodide to diet has reduced the incidence of thyroid follicular cancer and relative increase of papillary thyroid cancer

On reviewing the literatures, we found that our results are near to the results of other studies as shown in the table (9).

Table (9) is showing the comparison between literatures results and our study result.

Solitary thyroid nodule	Our study	Egypt (22)	India ⁽²¹⁾	Iran ⁽²³⁾	Saudi Arabia ⁽²⁴⁾	Iran ⁽²⁵⁾
Mean age years	38.10 ± 11.90	----	36.8 ± 13.3	44.6 ± 12.3	-----	41.56 ± 13.24
Female: male ratio	3.6 / 1	7.8 / 1	3.4 / 1	3 / 1	4.7 / 1	10.9 / 1
Percent of malignancy	20.00%	22%	46.2%	18%	13.9%	17.72%
Percent of Benign	80%	78%	53.8%	81.9%	86.1%	82.28%
Female: Male ratio	2.5 / 1	1.7 / 1	1.9 / 1	2.3 / 1	-----	-----

CONCLUSION:

20% of solitary thyroid nodules are of malignant origin with female to male ratio of 2.5:1 irrespective of the size of the nodule; male patient's is more liable for lymph-node metastasis in papillary carcinoma than female.

Recommendation:

For better assessment of solitary thyroid nodule in our medical centers we need good cooperation between Sonologist by identifying the features of the nodules which suggest malignancy, cytologist following Bethesda grading in reporting the results of FNAC and surgeon by choosing the most suitable operative procedure to decrease the morbidity of thyroid surgery.

Author's contribution:

Dr Ali Hussein Mutar & Dr Mohanad Hamed Abdulla participate in patient's management, review of manuscript, final editing & statistical analysis

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