

The Correlation of Age and Gender with Prevalence of Histopathological Patterns of Thyroid Diseases among Iraqi Patients

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(Submitted: 23 February 2021 – Revised version received: 19 March 2021 – Accepted: 27 April 2021 – Published online: 26 September 2021)

Abstract

Objectives: The aim of this study was to investigate the prevalence of histopathological patterns of thyroid lesions and their relation to age and gender in patients underwent total or near total and partial thyroidectomy.

Methods: 430 biopsy blocks examined for patients who had undergone total or near total and partial thyroidectomy for both non-neoplastic and neoplastic thyroid lesions, between January 2018 to December 2020 at surgical department/Medical city/Baghdad/Iraq.

Results: Out of 430 thyroidectomy specimens, 275 (64%) cases of non-neoplastic lesions, and 155 (36%) cases of neoplastic lesions were present. There were 63 males and 367 females with a male to female ratio of 1:5.6. The age ranged in males from 12 to 83 years with a mean age of 47.5 years and the age ranged in females from 10–68 years with a mean age of 39 years. In non-neoplastic lesions, the predominant lesion was the nodular hyperplasia with 233 (84.7%) cases followed by Hashimoto thyroiditis with 24 (8.7%). In neoplastic lesions, papillary carcinoma was the commonest lesion with 98 (63.2%) cases followed by follicular carcinoma with 11 (7%) cases.

Conclusion: Nodular colloid goiter was the most common non–neoplastic lesion with female predominance. Papillary carcinoma was the most frequent thyroid cancer accounting for 84.4% of thyroid cancers with micropapillary variant making 44.89% with most cases occurring in the third and fourth decade. There appears to be a slightly increased trend of papillary carcinoma diagnosis. The present study highlights the necessity for time to time assessment of neoplastic lesions in young and middle-aged female for initial detection.

Keywords: Nodular hyperplasia, thyroid, papillary carcinoma

Introduction

The thyroid is an endocrinal gland located in the neck. Its hormones are essential for the physiological function of all bodily organs. Thyroid diseases have been a global problem and lead to many other issues. These conditions include reduced (hypothyroidism) or increased (hyperactivity) activity of the thyroid gland, as well as thyroid nodules.¹ Although most undergo medical or surgical management, about 4.80% of American citizens have undiagnosed thyroid disease.¹ The possibility of malignancy is a primary concern of thyroid lesions, as well as cosmetics and appearance issues. The majority of thyroid diseases are usually non-neoplastic conditions, such as multinodular goiter, benign cystic conditions, and thyroiditis. Overall, thyroid diseases are more common among older people, in those highly exposed to radiation, and in areas with a high incidence of iodine deficiency.²

Thyroid swellings are frequent and occur in 4% of the population aged between 30 and 60 years. Most of the thyroid swellings are benign while 10% to 20% of the thyroid swellings are malignant.³ Histological classification of thyroid lesions especially neoplastic conditions is essential for further therapy and prognosis.⁴

The objective of the study is to identify the histopathological spectrum of thyroid gland lesions and find out the frequency of non-neoplastic and neoplastic thyroid lesions with respect to variables like frequency, age, sex distribution, and various histopathological patterns.

Non-Neoplastic

- Thyroid hyperplastic diseases: Dyshormogenetic Goiter, Graves disease (diffuse), Nodular hyperplasia (endemic/ sporadic goiter)

- Hashimoto's or Lymphocytic thyroiditis or Granulomatous thyroiditis

Neoplastic

- Adenoma (follicular, hurthle cell type)⁵
- Carcinomas:
 - ✓ Papillary (microcarcinoma, follicular variant): Papillary thyroid carcinoma (PTC) is the most common type of thyroid carcinoma, defined by a set of distinctive nuclear features, including: Change of nuclear size and shape: nuclear enlargement, elongation, overlapping, Chromatin characteristics: chromatin clearing, margination and glassy nuclei, Nuclear membrane irregularity: irregular nuclear contour, nuclear groove and nuclear pseudoinclusion.⁶
 - ✓ Follicular (Current World Health Organization classification proposes three subtypes of FTC: minimally invasive, encapsulated angioinvasive, and widely invasive. minimally invasive and widely invasive).⁷
 - ✓ Medullary: arises from the C cells of the thyroid, which do not accumulate radioiodine, and it secretes calcitonin (Ctn), which is used as a tumor marker. Sporadic, or isolated, MTC accounts for 75% of cases and the remaining 25% are part of multiple endocrine neoplasia type 2 (MEN2), an autosomal-dominant syndrome caused by germline-activating mutations in the RET proto-oncogene.⁸
 - ✓ Poorly differentiated,
 - ✓ Anaplastic,
 - ✓ Hurthle cell carcinoma.

- Other encapsulated follicular patterned thyroid tumours:⁵
 - ✓ Well differentiated carcinoma; N.O.S. (WDC-NOS): encapsulated follicular derived neoplasm with tumor capsular or vascular invasion and questionable nuclear features of papillary carcinoma.⁹
 - ✓ Well differentiated thyroid tumor of undetermined malignant potential (WDT-UMP): Follicular neoplasm with equivocal nuclear features of papillary thyroid carcinoma and questionable capsular or vascular invasion, most cases behave in an indolent manner and diagnosis is based on morphologic criteria.¹⁰
 - ✓ Follicular tumor of undetermined malignant potential (FT-UMP): encapsulated tumor composed of well-differentiated follicular cells with no nuclear changes of PTC and showing uncertain capsular or vascular invasion. This is a tumor indeterminate between follicular adenoma and follicular carcinoma.¹¹

Majority of clinically apparent thyroid neoplasms are primary and epithelial in origin. Traditionally, they have been divided into adenomas and carcinomas. From a histogenetic standpoint, thyroid neoplasms are divided into three major categories, depending on the cell types involved, and subdivided them into the various benign and malignant categories such as; tumors exhibiting follicular cell differentiation (95%), tumors exhibiting Ccell differentiation, and tumors exhibiting mixed follicular and C-cell differentiation. Lesions in the later two categories comprise about 5% of tumors. Fortunately, the overwhelming majority of solitary nodules of the thyroid prove to be localized, non-neoplastic conditions or benign neoplasms such as follicular adenomas. In fact benign neoplasms outnumber thyroid carcinomas by a ratio of nearly 10:1.¹²

While under 1% of solitary thyroid nodules are malignant. Although tumors of the thyroid gland account for only 1% of the overall human cancer burden, they represent the most common malignancies of the endocrine system and pose a significant challenge to pathologists, surgeons and oncologists.¹³

Materials and Methods

Subjects

This cross sectional study was conducted with 430 patients who had undergone total or near total and partial thyroidectomy for both non-neoplastic and neoplastic thyroid lesions, between January 2018 to December 2020 at surgical department/Medical city/Baghdad/Iraq.

Data including age, gender, histopathological pattern of the thyroid were obtained from electronic medical records.

All the biopsied materials were fixed in 10% formaline solution, undergone routine tissue processes, were embedded into paraffin blocks and stained with hematoxylin and eosin stains. The data were analyzed by standard statistical methods.

Results

The total number of studied cases was 430 cases. The reviewed cases were classically categorized into two main groups; Non-neoplastic (275;64%) and Neoplastic (155;36%). (Table 1).

There were 63 (14.64%) males and 367 (85.34%) females with male to female ratio 1:5.6. The age of the patients ranged from 10 to 83 years with a mean age 46.5 years (Figure 1). The mean age of male patients was 47.5 years and of the female

patients was 39 years. The peak frequency of the patients were in the fourth decade ($n = 125$;29.06%), followed by the third decade ($n = 102$;23.7%).

The young age group (≤ 20 years) and the elderly age group above 60 years constituted 3.2 and 2.7% respectively.

In this study, non-neoplastic lesions were more common found 64% ($n = 275$) cases. The most common was nodular hyperplasia and accounts for 84.7% of all nonneoplastic lesions and 54.18% of all thyroid lesions (Table 1). Of these cases 36 (15.4%) were males and 202 (86.6%) were females with male to female ratio 1:5.6. Most of the patients ($n = 193$; 82.8%) were between 21–50 years of age (Table 2). The second most common of the non neoplastic lesions was Hashimoto's thyroiditis ($n = 24$;5.5) while Graves disease was diagnosed in 3 patients with M:F ratio of 2:1. Dyshormogenetic goiter and thyroglossal duct cyst were found to make 0.4% for each with equal male and female prevalence.

Table 1. Classification of cases in percentage

Category	Number	Percentage %	M/F
Non neoplastic	275	64	41/234
Nodular hyperplasia	233	54.18	36/202
Graves disease	3	0.69	2/1
Dyshormogenetic goiter	2	0.4	1/1
Hashimoto's thyroiditis	24	5.5	2/22
Lymphocytic thyroiditis	6	1.4	1/5
Thyroglossal duct cyst	2	0.4	1/1
Neoplastic	155	36	23/132
Follicular adenoma	4	0.9	1/3
Hurthle cell adenoma	2	0.4	0/2
Papillary carcinoma	98	22.7	12/86
Follicular carcinoma	11	2.5	2/9
Medullary carcinoma	3	0.6	½
Poorly differentiated ca.	1	0.23	0/1
Anaplastic carcinoma	2	0.46	1/1
Hurthle cell carcinoma	1	0.23	0/1
W.D.C.-N.O.S.	5	1.16	0/5
WDT-UMP	16	3.7	4/12
FT-UMP	12	2.7	2/10
Total	430	100	63/367

Table 1 depicts cases into neoplastic and non-neoplastic categories, non-neoplastic was 64% while neoplastic was 36%. Cases of hyperplasia were more common in non-neoplastic while in the neoplastic lesions, papillary carcinoma cases were more common.

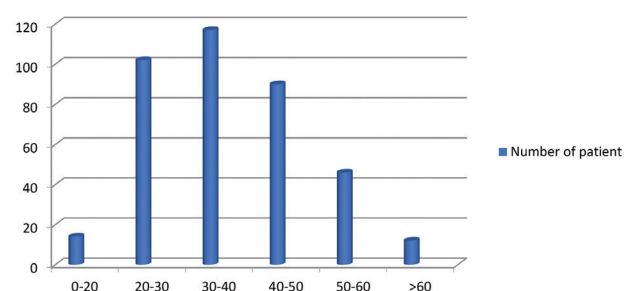


Fig. 1 Age distribution of the patient.

Table 2. Age-wise classification of non-neoplastic lesions

Age	Goiter	Hashimoto's disease	Lymphocytic thyroiditis	Graves disease	Dyshormogenetic goiter
>20	5	1	-	1	2
20-30	68	2	2	-	-
30-40	73	7	3	2	-
40-50	52	11	1	-	-
50-60	32	2	-	-	-
<60	8	1	-	-	-

Table 2 depicts cases of nodular hyperplasia was the more common in-between age group of 20–50.

Table 3. Age-wise classification of neoplastic lesions

Age	Follicular adenoma	Hurthle cell adenoma	Papillary carcinoma	Follicular carcinoma	Medullary carcinoma
>20	-	-	3	2	-
20-30	-	-	28	2	-
30-40	1	1	37	2	1
40-50	2	-	20	2	2
50-60	1	1	8	2	-
<60	-	-	2	1	-

Table 3 depicts cases of papillary carcinoma are more overseen in all age group while 30-40 age groups are more in numbers.

Neoplastic lesions were found 36% (155 cases) of thyroid diseases and seen mainly as papillary carcinomas making 22.7% of all thyroid lesion and 63.2% of the neoplastic lesions with male to female ratio of 1:7.1 (Table 3). There were variants of papillary carcinoma which were **papillary microcarcinoma** making up to 10.23% of all thyroid diseases ($n = 44; 3$ in males); and the **follicular variant** making up to 2.7% ($n = 12; 1$ in male). This is followed by follicular carcinoma making 7% of the neoplastic lesions with male to female ratio of 1:4.5.5 cases were diagnosed as minimally invasive (Table 3).

Medullary carcinoma was found in 3 cases (0.6%) with male to female ratio of 1:2.

Anaplastic carcinoma was found in 2 cases with 1:1 male to female ratio, 1 case of poorly differentiated carcinoma in a female and another female with Hurthle cell carcinoma.

Other encapsulated follicular patterned thyroid tumours comprising well differentiated carcinoma; N.O.S. (WDC-NOS) which presented 1.16% all were females, while well differentiated thyroid tumor of undetermined malignant potential (WDT-UMP) presented in 16 patients making 3.7% with M:F ratio of 1:3 and Follicular tumor of undetermined malignant potential (FT-UMP) diagnose in 12 patients making 2.7% with M:F ratio of 1:5.

Discussion

Thyroid lesions are common globally, with variations in incidence and histopathological patterns being related to age, gender, and environmental factors. There is usually a higher prevalence of thyroid lesions in females. In our series, females represented (85.34%). Similar findings were found in recent literature from different regions in neighboring countries. In a series of 845 thyroidectomy cases from Jeddah, 78.9% of female thyroid lesions were recorded.⁸ In another study from Al Madinah, 78.8% were female among 292 thyroidectomy cases.¹⁴ similar finding in the literature from

around the world literature from around the world ranging from 71.5% females in a study of 358 thyroidectomies from Pakistan^{15,16} to as high as 88.7% females from Zambia,¹⁷ 82.4% from Bangladesh¹⁸ and 84.8% from Turkey¹⁹ have also been reported in the studies from last couple of years. Within the Middle East region, 76.36% females in 110 thyroidectomy cases from Bahrain.²⁰ The possible explanation for this result is the increase need for iodine by females especially during puberty, pregnancy and lactation, and possibly the dietary iodine deficiency which is the case in many countries among which is Iraq.

The age of patients in our study ranged from 10 to 83 years (mean age = 46.5). from Saudi Arabia. a study 109 cases ranged from 11 to 70 years (mean age = 39.39).²¹ From Turkey, a study of 323 cases aged from 13 to 80 years (mean age = 42.6 years).²² A Pakistani study, of 110 thyroidectomies, had an age range between 20 and 65 years.²³

In the present series, nodular hyperplasia (most cases were multinodular colloid goiter) represented 54.18% of all thyroid lesions. These results agreed with a study from Yemen, that showed similar findings.²⁴ Another survey from Iraq reported that 59% ($N = 298$) of cases were colloid goiter.²⁵

Autoantibodies against thyroid antigens characterize Hashimoto thyroiditis (HT). In iodine-deficient areas, hypothyroidism is usually caused by HT.²⁶ In our series, 5.5% of cases were diagnosed as HT. Moreover, some of the diagnosed papillary carcinomas were in the background of HT. There is increased prevalence of HT background associated with papillary thyroid malignancy. The relation between HT and the development of PTC is not completely understood.²⁷

Within neoplastic lesions in our study, there was a predominance of malignant lesions in females. These results were in accordance with a study from India. In their cases of 204 thyroid neoplastic lesions, 78.92% were female, and 21.08% were male. They found 55 benign cases (26.9%), and 148 malignant cases (72.5%). In a Nigerian study, of 174 cases of

thyroid neoplasms, more malignant than benign lesions were found (56.3% compared to 43.7%). In the present study, papillary carcinoma accounted for 84.4% of malignant lesions. Of these 116 cases, 100 were females (86.2%) and 16 males (F:M ratio 6.25:1). benign neoplasms including follicular and Hurthle cell adenoma account only for 3.8% of the neoplastic lesions while borderline thyroid lesions made 33 case (21.2%) with female predominance.

The assessment of thyroid lesions in the educational laboratories of Baghdad medical city revealed similar findings in terms of incidence, age, and gender distribution compared to other studies. The incidence of thyroid lesions is higher in females than in males. Colloid goiter is the most common thyroid lesion. Papillary carcinoma is the most common type

of thyroid malignancy. Thyroid cancers are not common in younger age groups (<20 years).

Conclusion

Nodular colloid goiter was the most common non-neoplastic lesion with female predominance. Papillary carcinoma was the most frequent thyroid cancer accounting for 84.4% of thyroid cancers with micropapillary variant making 44.89% with most cases occurring in the third and fourth decade. There appears to be a slightly increased trend of papillary carcinoma diagnosis. The present study highlights the necessity for time to time assessment of neoplastic lesions in young and middle-aged female for initial detection. ■

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