

A Spectrum of Histopathological Changes in Different Thyroid Lesions and their Correlation with Age and Gender

Hanan M Garalla, MBChB, PhD¹, Nabeia A Gheryani, MBChB, PhD²

^{1,2}Department of Pathology, Faculty of Medicine, Benghazi University, Libya

Abstract: ***Background:** Thyroid diseases are the most common endocrine disorders, which range from non-neoplastic to neoplastic lesions. The incidence and pattern of thyroid lesions depend on various factors which include sex, age, and geographical patterns. Majority of thyroid lesions are non-neoplastic and only a small percentage are neoplastic. The aim of this study was to characterize a range of histopathological patterns in different thyroid lesions and to evaluate their frequency in terms of age and sex of the patients. **Methodology:** A total number of 157 patients who were underwent thyroidectomy specimens were retrospectively evaluated from January, 2016 to December, 2017. Detailed histopathological study correlated with age, and sex was done. **Results:** One hundred and fifty-seven (157) thyroidectomy specimens were analyzed. Age wise, 139 (88.5%) were females and 18 (11.5%) were males giving a female: male ratio of 8:1. The age of the patients ranged from 16 to 80 years with a mean age of 42.4 year. One hundred and ten (110) (70.1%) cases were found to be non-neoplastic and 47(30%) cases were neoplastic. For non-neoplastic group, colloid goiter accounted for 78 (49.7%), Hashimoto's thyroiditis accounted for 29(18.5%), and lymphocytic thyroiditis accounted for 3(1.9%). Neoplastic lesions form 47(29.5%) out of the total cases. Benign lesions, consisted of adenomas, were as following, 5(10.6%) for follicular adenoma and 2(4.2%) for pure hurthle cell adenoma. For malignant lesions, papillary thyroid carcinoma was the commonest malignant tumor accounting for 27(57.4%) of all thyroid cancer, followed by follicular carcinoma, and anaplastic carcinoma. **Conclusion:** Non-neoplastic thyroid lesions were more common than neoplastic ones. Colloid goiter was the commonest non-neoplastic lesion. Follicular adenoma was the most common benign neoplasm while papillary carcinoma was the commonest malignant tumor of all thyroid cancer. Also female during 3rd and 4th decades are commonly affected by thyroid lesions and commonly present with neck swelling*

Keywords: Colloid goiter, Hashimoto thyroiditis, Follicular adenoma, Papillary thyroid carcinoma.

1. Introduction

Thyroid disorders are common clinical problems all over the world. The enlargement of thyroid gland, the goiter, may be presents as small to large, single or multi-nodular, unilateral or bilateral slowly growing painless swellings (1). Thyroid lesions could be developmental, inflammatory, hyperplastic or neoplastic (2). The incidence varies depending upon different factors including age, sex, diet and radiation exposure. Thyroid nodules are a common clinical finding, affecting more frequently women, and elderly population (3).

Thyroid lesions range from non-neoplastic to neoplastic ones (4). Non-neoplastic multinodular goiter is the commonest cause of thyroid enlargement followed by thyroid tumors (5). Thyroid cancer is a relatively infrequent malignancy, representing only 1.5% of all cancers (6). However, it is the commonest endocrine cancer accounting for 92% of all endocrine malignancies. Papillary carcinoma is the most widely recognized thyroid cancer followed by follicular carcinoma, medullary carcinoma, anaplastic carcinoma and lymphoma (7). Very rarely the thyroid gland can also be the site of metastasis with renal cell carcinoma as most common metastasizing tumor to thyroid (8). Thyroid cancer is reported to be female predominant while male patients have more aggressive behaviors and worse prognosis compared with female (9). The expanding rate of thyroid carcinoma allows the increase in gathering of more information about its demographic and clinical profile. The present study aims to evaluate the different histopathological patterns of thyroid

enlargement in surgically resected specimens and their frequency in relation to age and sex of the patients

2. Materials and Methods

This was a retrospective study of thyroid specimens received at the surgical pathology laboratory in Benghazi university from January 2016 to December 2017. All patients presenting with thyroid enlargement, who underwent any type of thyroid operation (i.e. lobectomy, subtotal thyroidectomy, or total thyroidectomy) were included in this study. Demographic data including patients' age, sex and the histopathologic diagnosis were collected from pathology reports. Specimens were studied by routine paraffin processing and hematoxylin and eosin stain. The thyroid diseases were divided based on histological pattern into: non-neoplastic and neoplastic lesions. The quantitative variable like, age is expressed as mean \pm S.D (standard deviation) and qualitative variables like, histopathological diagnosis are represented by frequencies and percentages.

3. Result

A total of 157 thyroidectomy specimens were analyzed. There were 139 (88.5%) females and 18 (11.5%) (Figure 1) males giving a female: male ratio of 8:1. The age of the studied cases ranged from 16 to 80 years with a mean age 42.4 years (Figure 2). The majority of the thyroid diseases (n=120; 76.4%) were seen in the age group 20-50 years. The young age group (≤ 20 years) and the elderly age group above 60 years constituted 3.2% and 12.7% respectively.

In this study, non-neoplastic lesions were 70.1% (n=110) cases (Figure 3). Non-neoplastic group revealed that colloid goiter was the most common pathologic entity, representing 49.7% of cases (78 cases out of 157) followed by Hashimoto's thyroiditis, 18.5% of cases (29 cases out of 157), and lymphocytic thyroiditis (3 cases out of 157) 1.9% of cases as shown in (Figure 4A). Neoplastic lesions were found in 30% (47 cases out of 157) (Figure 3) of thyroid diseases and seen mainly as adenomas and papillary carcinomas (Figure 4B)

were, 7 cases (4.5%) of follicular variant of papillary carcinoma, 4 (2.5%) follicular carcinomas and one case (0.6%) of anaplastic carcinoma. one case (0.6%) of papillary carcinoma was associated with Hashimoto's thyroiditis and was classified as carcinoma on top of chronic thyroiditis. No cases of lymphoma (Hodgkin/non-Hodgkin), and medullary carcinoma were seen in our study. Representative images from different lesions were illustrated in (Figure 5)

The histopathological pattern of benign neoplastic lesions consisted of 5 cases of follicular adenoma which form 10.6% of the neoplastic category and 3.2% of all studied cases, and two cases of Hurthle cell adenoma. The age of the cases ranged from 25 to 48 years and they were, 5 females and 2 males.

Forty cases of malignant neoplasms were found, representing 85% of the neoplastic category and 25.5% of all thyroid lesions.

Microscopic examination of thyroid carcinomas, mainly revealed conventional (classic) type of papillary carcinoma which was the commonest malignant tumor in this study and was seen in 27 (17.2%) divided as 21 females and 6 males. The female to male ratio was 7:2 and most of the patients were between 16-50 years of age. The other carcinoma cases

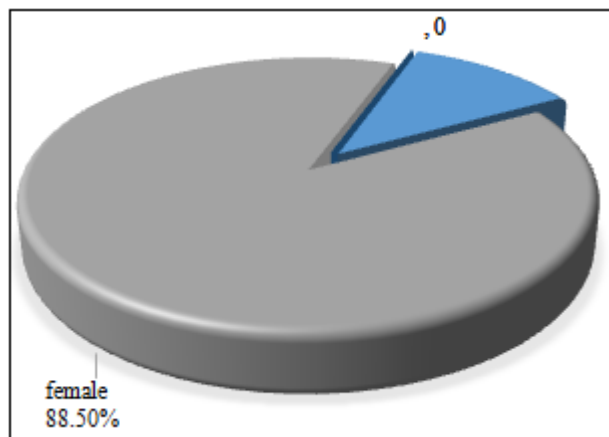


Figure 1: Percentage of thyroid lesions based on gender

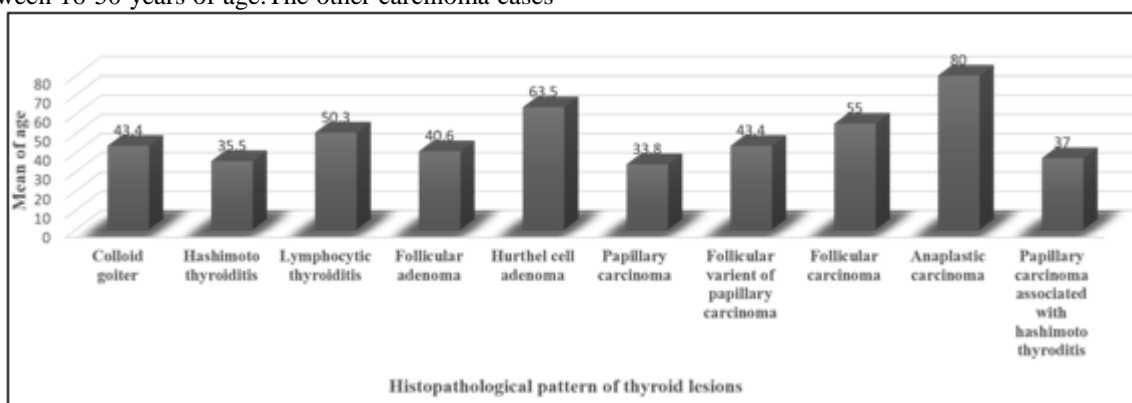


Figure 2: Thyroid lesion incidence trends by age, and histopathological pattern. The bar graph showing that the patients with Hurthle cell adenoma and anaplastic carcinoma were generally older than the rest of the histological types

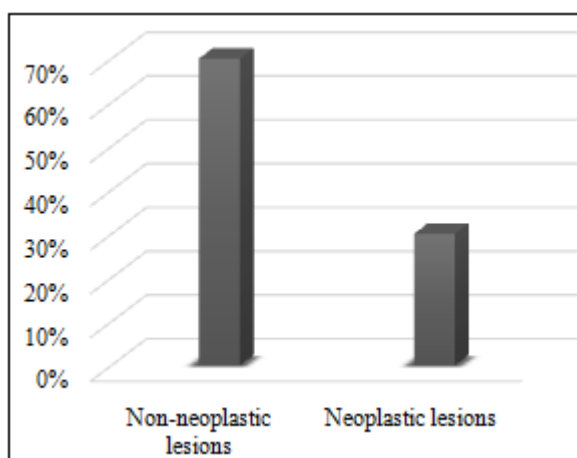


Figure 3: Percentage of non-neoplastic and neoplastic lesions. Non-neoplastic diseases accounted for 70%, whereas the neoplastic lesions accounted for 30%

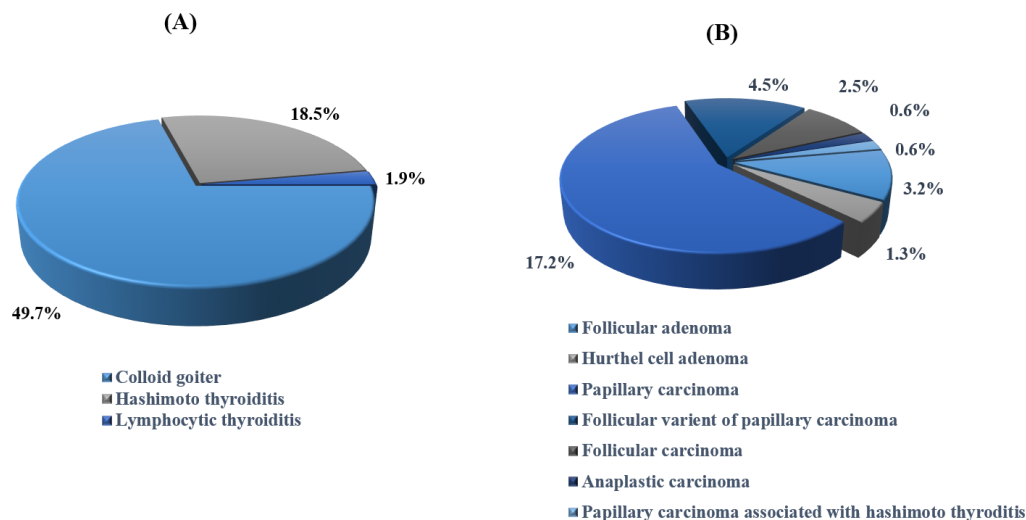


Figure 4: Distribution patterns of thyroid diseases. A) Pie-chart showing the percentage of the Non-neoplastic diseases. B) Pie chart presenting the neoplastic thyroid lesions percentage in each benign and malignant tumor type

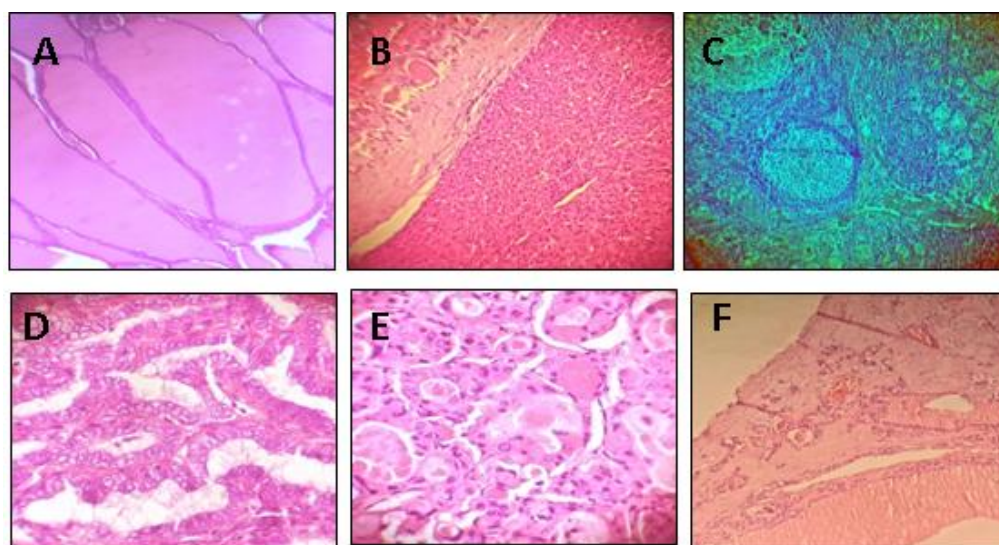


Figure 5: A selected representative lesion seen in thyroidectomy specimens. A) Colloid goiter showing thyroid follicles of varying sizes containing colloid (H&E, x100). B) Follicular adenoma showing small uniform follicles, compressing surrounding follicles, and intact capsule (H&E, x100). C) Hashimoto's thyroiditis showing hürthle cell metaplasia and lymphoid follicles with reactive germinal centers. D) Papillary carcinoma showing optically clear nuclei (H&E, x100). E) Follicular variant of papillary thyroid carcinoma showing malignant follicles with clear nuclei (H&E, x100). F) Follicular carcinoma showing small malignant follicles invading the thick capsule (H&E, x100)

4. Discussion

Akram, et al.: Age and gender correlation with subtypes of primary lung cancer

The diseases of thyroid gland either of non-neoplastic or neoplastic in origin usually present clinically as nodular or diffuse goiter. Their monitoring is fundamental clinically as most are well treated by medicine or surgery. In the present study we have analyzed the distribution of histological subtypes among different age groups and gender to find out predominance of any specific pattern relating to age and gender.

There were 88.5% female cases and 11.5% male cases in our study with a female: male ratio of 8:1, similar results have been found in the studies conducted by Gupta A *et al* 2016, and Beighet *al* 2018 (10, 11). It is due to fact that thyroid

disorder is female prone due to the existence of estrogen receptors in the thyroid tissue (12). In a study by Rangaswamy M, *et al* 2013, were 585 cases were analyzed, the age range was 11-70 years, mean age was 40.57 years. Where as in a study by Veyseller *et al.* 2009 from Turkey, in 323 thyroidectomy specimens they found an age range of 13 to 80 years with a mean age of 42.6 years (13,14). Our study also showed the same result, the mean age of the patients was 42.4 years and age range was 16-80 years.

The non-neoplastic lesions are common in 3rd to 5th decades of life in females as compare to males. The commonest non-neoplastic lesion in this study was colloid goiter which constituted 49.7% of the thyroid specimens. This is similar to studies by Rahman *et al.* 2013, and Tsegaye & Ergete 2003 (15,16). The next common non-neoplastic lesion was Hashimoto's lesion comprised of 18.5% of total cases, all being females. One case of

Hashimoto's thyroiditis associated with papillary carcinoma support the fact that Hashimoto's thyroiditis is a risk factor for the papillary carcinoma development, as reported in other studies Sulimani 1996, and Tamimi 2002 (17, 18).

In this study thyroid neoplastic lesions accounted for 47 cases (29.5%). Follicular adenoma (3.2%) was most common benign neoplasm. Papillary carcinoma was the most common thyroid malignancy (17.2%) with female predominance as seen in previous studies of Wang *et al.*, 2013, and Ariyibiet *al.*, 2013 (19,20). The second most common type was follicular carcinoma (2.5%). None of papillary carcinoma showed distant metastasis at the time of presentation, whereas two cases of follicular carcinoma were presented with distant metastasis to skeletal muscles and bones

5. Conclusion

The thyroid gland diseases are formed of a range of benign and malignant lesions. Thyroidectomy may have both therapeutic and diagnostic value. In conclusion, females accounted for 88.5% of patients with thyroid lesions with incidence peaked at third to fifth decade. Non-neoplastic disorders (colloid goiter) were very common among middle aged female. For neoplastic lesions, malignant thyroid lesions were more common than benign lesions. Follicular adenoma was the commonest benign tumor whereas papillary carcinoma and its follicular variant were the commonest thyroid cancer among females in their thirties followed by follicular carcinoma. Anaplastic carcinoma as also provide by many researches is a malignancy of old age group. Further studies regarding risk factor for thyroid lesion such as pregnancy, diet and other environmental factors is recommended

Akram, et al.: Age and gender correlation with subtypes of primary lung cancer

References

- [1] Medeiros-Neto, G. (2016). Multinodular goiter. In *Endotext [Internet]*. MDText. com, Inc.
- [2] DeGroot, L. J., & Pacini, F. (2000). Thyroid Nodules. [Updated 2012 Mar 10]. *Endotext [Internet]*. South Dartmouth (MA): MDText. com, Inc.
- [3] Lechner, M. G., & Hershman, J. M. (2018). Thyroid Nodules and Cancer in the Elderly. In *Endotext [Internet]*. MDText. com, Inc.
- [4] Bisi, H., Ruggeri, G. B., Filho, A. L., Asato de Camargo, R. Y., Fernandes, V. S., & Abdo, A. H. (1998). Neoplastic and non-neoplastic thyroid lesions in autopsy material: historical review of six decades in Sao Paulo, Brazil. *Tumori Journal*, 84(4), 499-503.
- [5] Vanderpump, M. P. (2011). The epidemiology of thyroid disease. *British medical bulletin*, 99(1).
- [6] Anil, G., Hegde, A., & Chong, F. V. (2011). Thyroid nodules: risk stratification for malignancy with ultrasound and guided biopsy. *Cancer Imaging*, 11(1), 209.
- [7] Sushel, C., Khanzada, T. W., Zulfikar, I., & Samad, A. (2009). Histopathological pattern of diagnoses in patients undergoing thyroid operations. *Rawal Med J*, 34(1), 14-6.
- [8] Iain J, Nixon., Andrés Coca-Pelaz., Anna I. Kaleva., Asterios Triantafyllou., Peter Angelos., Randall P. Owen., Alessandra Rinaldo., Ashok R. Shaha., Carl E. Silver., & Alfio Ferlito. (2017). Metastasis to the Thyroid Gland: A Critical Review. *Ann Surg Oncol*, 24(6): 1533–1539.
- [9] Robbins, J., Merino, M. J., Boice, J. D., Ron, E., Ain, K. B., Alexander, H. R., ... & Reynolds, J. (1991). Thyroid cancer: a lethal endocrine neoplasm. *Annals of internal medicine*, 115(2), 133-147.
- [10] Gupta, A., Jaipal, D., Kulhari, S., & Gupta, N. (2016). Histopathological study of thyroid lesions and correlation with ultrasonography and thyroid profile in western zone of Rajasthan, India. *Int j res med sci*, 4(4), 1204-1208.
- [11] Beigh, A., Amin, J., Junaid, S., Wani, L. A., Farooq, S., & Farooq, S. (2018). Histopathological study of thyroid neoplastic lesions in a tertiary care hospital-a 5-year study. *International Journal of Contemporary Medical Research*, 5(4), D4-D7.
- [12] Ashraf, S. A., Matin, A. S. M., & MR, A. (1994). Review of thyroid diseases in Bangladesh. *Journal of BCPS*, 2, 5-10.
- [13] Rangaswamy, M., Narendra, K. L., Patel, S., Gururajprasad, C., & Manjunath, G. V. (2013). Insight to neoplastic thyroid lesions by fine needle aspiration cytology. *Journal of Cytology/Indian Academy of Cytologists*, 30(1), 23.
- [14] Veyseller, B., Aksoy, F., Demirhan, H., Yildirim, Y. S., Ertas, B., Açikalin, R. M., ... & Bayraktar, G. İ. (2009). Total thyroidectomy in benign thyroid diseases. *Kulak burunbogaz ihtisas dergisi: KBB= Journal of ear, nose, and throat*, 19(6), 299.
- [15] Rahman, M. A., Biswas, M. A., Siddika, S. T., Sikder, A. M., Talukder, S. I., & Alamgir, M. H. (2013). Histomorphological pattern of thyroid lesions. *Dinajpur Med Col J*, 6(2), 134-40.
- [16] Tsegaye, B., & Ergete, W. (2003). Histopathologic pattern of thyroid disease. *East African medical journal*, 80(10), 525-528.
- [17] Sulimani, R. A. (1996). Thyroid cancer coexisting with Hashimoto's thyroiditis at King Khalid University Hospital, Saudi Arabia. *East African medical journal*, 73(11), 767-768.
- [18] Tamimi, D. M. (2002). The association between chronic lymphocytic thyroiditis and thyroid tumors. *International Journal of Surgical Pathology*, 10(2), 141-146
- [19] Wang, S. F., Zhao, W. H., Wang, W. B., Teng, X. D., Teng, L. S., & Ma, Z. M. (2013). Clinical features and prognosis of patients with benign thyroid disease accompanied by an incidental papillary carcinoma. *Asian Pac J Cancer Prev*, 14(2), 707-11.
- [20] Ariyibi, O. O., Duduyemi, B. M., Akang, E. E., & Oluwasola, A. O. (2013). Histopathological patterns of thyroid neoplasms in Ibadan Nigeria: a twenty year retrospective study. *Int J Trop Disease Health*, 3, 148-56. op of Form Bottom of Form