Clinicopathological study of thyroid gland cancer among selected sample Basrah province between 2019-2022

By Oula Fouad Hameed

WORD COUNT 2073
TIME SUBMITTED 20-MAR-2024 11:28AM
PAPER ID 107700171

Clinicopathological study of thyroid gland cancer among selected sample Basrah province between 2019-2022

Oula Fouad Hameed[1], Zainab Abdulkareem Maktoof[1], Muntaha Awad ALdeewan[2]*

[1]Department of oral diagnosis, college of dentistry, University of Basrah, Basrah, Iraq

[2]Pathology senior Head of department of pathology, Ports teaching hospital, Basrah, Iraq

Corresponding

za4389452@gmail.com

Abstract

Background. Thyroid cancer (TC) is the most prevalent cancer within the endocrine system and the head and neck region. Its incidence has been on the rise in Iraq over the past few decades, primarily owing to papillary thyroid carcinoma. This study's objective is to explore the pathological variants, frequency, and demographic characteristics of TC in a sample of Basrah's population and subsequently compare these elements with data from other regions in Iraq and globally.

Methods. This study is a single-institutional retrospective review conducted at the Department of Pathology within Ports Teaching Hospital in Basrah, Iraq. We analyzed slides of thyroid tumors stained by Hematoxylin and Eosin (H&E) and biometric data gathered from histopathological reports. The cases for this study were identified between 2019 and 2022.

Results. In this study, 51 cases were examined, comprised of six males and 45 females. The average age and histopathology patterns were analyzed, finding that the most common type of TC was the classic form of papillary thyroid carcinoma, as seen in 16 cases. The study noted a predominant female presence, accounting for 88.2% of the cases, while males comprised 11.8%. The median age among all subjects was 38 years.

Conclusions: A review of all slides featuring thyroid tumors stained with H&E, combined with biometric data from histopathological reports, shows an increasing incidence of TC in Basrah City, Iraq. Predominantly, cases of papillary thyroid carcinoma outnumber those of follicular carcinoma.

Keywords: thyroid tumor, follicular TC, papillary TC, Hematoxylin and Eosin stains

Introduction

Thyroid cancer (TC) is the most common type of endocrine system and head and neck cancer. In 2020, the Global Cancer Statistics reported 586,202 new cases and 44,000 deaths from TC. Notably, differentiated thyroid carcinoma (DTC) is experiencing a rapidly increasing incidence rate [1].

The rise in instances of TC over recent decades has been attributed to advancements in diagnostic tools such as fine-needle aspiration cytology techniques and imaging. However, recent epidemiological studies suggest a genuine annual increase in incidence by 3% [2].

DTC comprises 85–95% of all TCs, originating from the thyroid follicular cells, including the papillary and follicular types. Meanwhile, Hürthle cells TC and poorly differentiated TC account for 2–5% of cases, with an additional 3–5% attributed to medullary thyroid cancer that develops from para-follicular C cells of neuroendocrine origin. The proportion of anaplastic TC stands at 1.7% [3].

Thyroid tumors are more common in females, ranking as the fifth most common cancer. In contrast, it ranks 15th in males. However, previous studies have indicated that males have a 0.78-fold risk of developing malignant thyroid nodules, often with a worse prognosis. These studies also suggested that tumor sizes tend to be larger in males, with accompanying lymphatic metastasis and extra-thyroid invasiveness [4].

This article examines the types, prevalence, and demographic characteristics of TC in the Basrah population, comparing these findings with data from other regions in Iraq and worldwide.

Methods

This single-institutional retrospective study was carried out in the Department of Pathology at Basrah's Ports Teaching Hospital in Iraq. It involved the review of H&E-stained slides of thyroid tumors and the collection of biometric data from histopathological reports. The cases under review were diagnosed between 2019 and 2022. All collected data were analyzed using SPSS software version 30, with the Kruskal Wallis Test applied at a P value of <0.01.

Results

In this study, 51 cases were examined, comprised of six males and 45 females. The average age and histopathology patterns were analyzed, finding that the most common type of TC was the classic form of papillary thyroid carcinoma, as seen in 16 cases. The study noted a predominant female presence, accounting for 88.2% of the cases, while males comprised 11.8%. The median age among all subjects was 38 years. (Table 1 and 2)

Table 1. Thyroid tumor incidence according to the histopathological pattern

Diagnosis	No.	%
Papillary thyroid carcinoma follicular variant	13	25.5
Papillary thyroid carcinoma classic type	16	31.4
Follicular carcinoma	6	11.8
Follicular adenoma	16	31.4
Total	51	100.0

Table 2. Frequency of thyroid tumor according to age

Age		
Papillary thyroid carcinoma follicular variant	No.	13
	Mean± SD.	39.85±10.01
Papillary thyroid carcinoma classic type	No.	16
	Mean± SD.	37.88± 8.89
Follicular carcinoma	No.	6
	Mean± SD.	39.33± 12.96
Follicular adenoma	No.	16
	Mean± SD.	40.94±13.92

Discussion

The prevalence of thyroid tumors is skyrocketing globally, with existing data showing that TC comprises approximately 1–1.5% of all newly diagnosed cancer cases. Interestingly, these instances are higher in females, but males often face poorer prognoses [5]. This female predominance was also evidenced in our study, representing 88.2% of the participants, compared to a smaller male presence, at 11.8%. The median age of the subjects in our collection was 38 years. These findings align with those of Niazi et al. [6], who observed that TC patients in their study ranged from 8–90 years of age, with the most prominent occurrences in individuals during their 20s, 30s, and 40s.

The microscopic examination in this research categorized thyroid tumors into four primary types: follicular variant of papillary thyroid carcinoma, classic papillary thyroid carcinoma, follicular carcinoma, and follicular adenoma.

In this study sample, the follicular variant of papillary thyroid carcinoma accounted for 25.5%, which is substantially higher than the 0–4.7% incidence observed in other Asian countries. However, this figure aligns with the 13.6–25% seen in Western nations. The large discrepancy has not been sufficiently studied or explained, but it might stem from differing classification systems used in Asian countries where this specific variant of papillary thyroid carcinoma may not be recognized. As a result, tumors that would fall under this category are often diagnosed either as follicular adenoma or as noninvasive follicular thyroid neoplasm with papillary-like nuclear features [7].
In this study, the classic type of papillary thyroid carcinoma accounted for 31.4%, aligning with the findings of Fathimabeebi et al. [8]. We identified 474 (93.5%) cases of papillary TC and 27 (5.32%) of follicular TC.

Follicular carcinoma accounts for 11.8% of TC incidences, a slightly higher percentage as compared to the 10% reported by Hong et al. [9]. This type of cancer is more prevalent in women over the age of 50. De Crea et al. [10] highlighted that follicular carcinoma ranks second to papillary thyroid carcinoma in terms of commonality. However, these proportions show pronounced disparities across different global regions, possibly due to variations in dietary iodine content. Recently, there has been a decline in the incidence of follicular thyroid carcinoma, likely attributable to

advancements in histological examinations and more accurate diagnosis, which helps in distinguishing this type of carcinoma from atypical follicular adenoma [10].

Badulescu [11] reported that follicular thyroid carcinoma (FTC) tends to occur after papillary thyroid carcinoma (PTC) (Figure 1 and 2), most commonly when the patient is in their 30s to 50s. This condition appears to be more prevalent in females, which may be attributed to the expression of estrogen receptors.

Distinguishing benign from malignant follicular thyroid neoplasms is challenging due to its dependence on the presence or absence of a capsule and vascular invasion. This challenge arises particularly when these features are ambiguous, leading to an incomplete capsular penetration or equivocal vascular invasion. Consequently, around 20–25% of thyroid biopsies yield indeterminate results [12]. In a study by McHenry and Phitayakorn [13], diagnosis of adenoma, based on the detection or non-detection of capsule and vascular invasion, was found in 31.4% of the examined cases.

This study did not estimate other histological types of TC due to a few limitations. The main constraint was the small sample size remaining after excluding patients with incomplete histological data. Furthermore, the study was based only on a single institute's experience and the rarity of other thyroid cancer types.

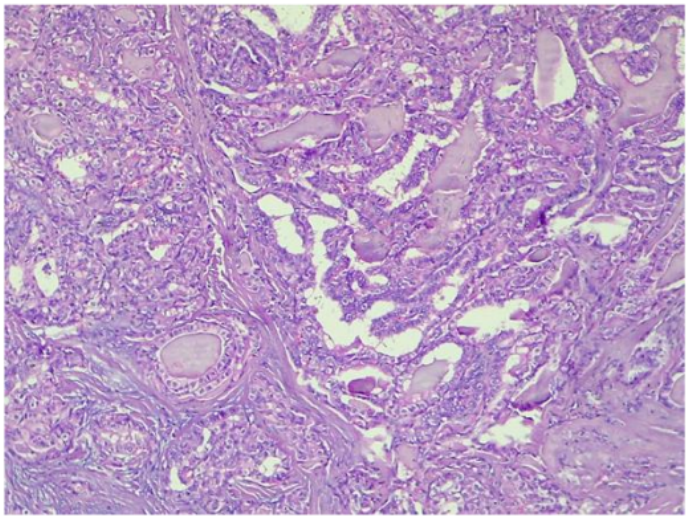

Figure 1: power 10x. Papillary thyroid carcinoma, classic (conventional) type: Section from thyroid nodule show complex papillary architecture with well-developed vascular

cores, the papilla lined by cells show nuclear stratification, elongation, nuclear chromatin clearing (Orphan Annie nuclei), intra nuclear groove.

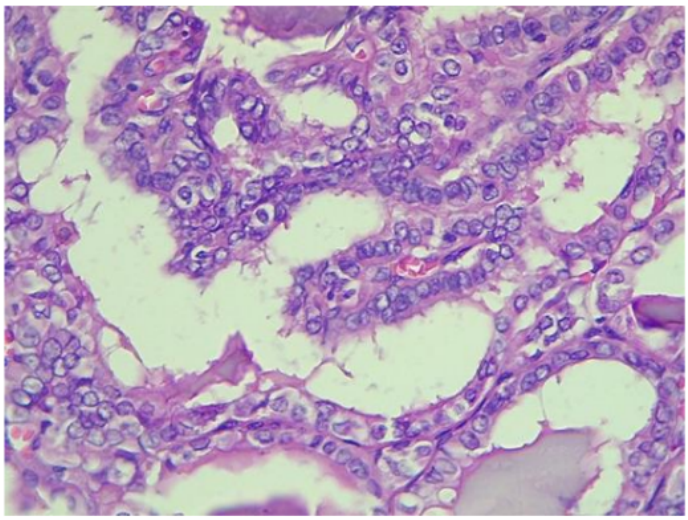

Figure 2: power 40x.Papillary thyroid carcinoma, classic (conventional) type: Section from thyroid nodule show complex papillary architecture with well-developed vascular cores, the papilla lined by cells show nuclear stratification, elongation, nuclear chromatin clearing (Orphan Annie nuclei), intra nuclear groove.

Conclusions

A review of all thyroid tumor slides stained with H&E stains and biometric data gathered from histopathological reports suggests an increased incidence of thyroid cancer in Basrah City, Iraq. This trend could be due to increased disease awareness and various other factors, including genetic susceptibility, diet, iodine deficiency or excess, radiation exposure, and specific geographical locations. The prophylactic use of iodine in the diet may contribute to the higher frequency of papillary carcinoma compared to follicular carcinoma. Therefore, it is suggested that the iodine content in both food and water be estimated as part of future disease control and prevention strategies.

Declarations

None

Ethical Approval

Approved by IRB committee of Department of oral diagnosis, college of dentistry, University of Basrah (No.606/2021).

Funding

None

Availability of data and materials

On request

References

1. Zhu, J., Sun, K., Wang, J., He, Y., Li, D., Liu, S., Huang, Y., Zhang, M., Song, B., Liao, X., Liang, H., Zhang, Q., Shi, M., Guo, L., Zhou, Y., Lin, Y., Lu, Y., Tuo, J., Xia, Y., … Wei, W. (2022). Clinicopathological and surgical comparisons of differentiated thyroid cancer between China and the USA: A multicentered hospital-based study. Frontiers in Public Health, 10. https://doi.org/10.3389/fpubh.2022.974359
2. Samargandy, S., Qari, R., Aljadani, A., Assaqaf, D., Etaiwi, A., Alghamdi, D., Marzouki, H., Alhozali, A., Merdad, M., & Al-Hajeili, M. (2020). Clinicopathological Characteristics of Thyroid Cancer in a Saudi Academic Hospital. Cureus, 12(5), 8–15. https://doi.org/10.7759/cureus.8044
3. Elia, G., Patrizio, A., Ragusa, F., Paparo, S. R., Mazzi, V., Balestri, E., Botrini, C., Rugani, L., Benvenga, S., Materazzi, G., Spinelli, C., Antonelli, A., Fallahi, P., & Ferrari, S. M. (2022). Molecular features of aggressive thyroid cancer. Frontiers in Oncology, 12(December), 1–10. https://doi.org/10.3389/fonc.2022.1099280
4. Yan, H. X., Pang, P., Wang, F. L., Tian, W., Luo, Y. K., Huang, W., Yang, G. Q., Jin, N., Zang, L., Du, J., Ba, J. M., Dou, J. T., Mu, Y. M., & Lyu, Z. H. (2017). Dynamic profile of differentiated thyroid cancer in male and female patients with

thyroidectomy during 2000-2013 in China: A retrospective study. Scientific Reports, 7(1), 1–8. https://doi.org/10.1038/s41598-017-14963-z

5. Ricarte-Filho, J., Ganly, I., Rivera, M., Katabi, N., Fu, W., Shaha, A., Tuttle, R. M., Fagin, J. A., & Ghossein, R. (2012). Papillary thyroid carcinomas with cervical lymph node metastases can be stratified into clinically relevant prognostic categories using oncogenic BRAF, the number of nodal metastases, and extra-nodal extension. Thyroid, 22(6), 575–584. https://doi.org/10.1089/thy.2011.0431
6. Niazi, S., Arshad, M., & Bukhari, M. H. (2011). A Clinicopathological Study of Thyroid Cancers at King Edward Medical University / Mayo Hospital , Lahore. 17(3).
7. Hirokawa, M., Higuchi, M., Suzuki, A., Hayashi, T., Kuma, S., & Miyauchi, A. (2020). Prevalence and diagnostic significance of noninvasive follicular thyroid neoplasm with papillary-like nuclear features among tumors previously diagnosed as follicular adenoma: A single-institutional study in Japan. Endocrine Journal, 67(10), 1071–1075. https://doi.org/10.1507/endocrj.EJ20-0198
8. Fathimabeebi, P., Noor Al, B., & Hilal Al, M. (2017). Epidemiology of Thyroid Cancer in Oman. Annals of Endocrinology and Metabolism, 1(1), 11–17. https://doi.org/10.36959/433/561
9. Hong, Z. L., Huang, H. J., Chen, S., Yang, J. C., & Wu, S. S. (2023). Case Report: A tortuous diagnosis and successful multimodal treatment of thyroid follicular carcinoma with pelvic metastasis. Frontiers in Oncology, 13(May), 1–7. https://doi.org/10.3389/fonc.2023.1048485
10. De Crea, C., Raffaelli, M., Sessa, L., Ronti, S., Fadda, G., Bellantone, C., & Lombardi, C. P. (2014). Actual incidence and clinical behaviour of follicular thyroid carcinoma: An institutional experience. The Scientific World Journal, 2014. https://doi.org/10.1155/2014/952095
11. Badulescu, C. (2020). Follicular Thyroid Carcinoma - Clinical and Diagnostic Findings in a 20-Year Follow Up Study. Acta Endocrinologica (Bucharest), 16(2), 170–177. https://doi.org/10.4183/aeb.2020.170
12. D'Avanzo, A., Treseler, P., Ituarte, P. H. G., Wong, M., Streja, L., Greenspan, F. S., Siperstein, A. E., Duh, Q. Y., & Clark, O. H. (2004). Follicular Thyroid

Carcinoma: Histology and Prognosis. Cancer, 100(6), 1123–1129. https://doi.org/10.1002/cncr.20081

13. McHenry, C. R., & Phitayakorn, R. (2011). Follicular Adenoma and Carcinoma of the Thyroid Gland. The Oncologist, 16(5), 585–593. https://doi.org/10.1634/theoncologist.2010-0405