ORIGINAL ARTICLE

Frequency of neoplastic and non-neoplastic lesions of the thyroid gland in tertiary care Hospitals of Lahore

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ABSTRACT

Background and Objective: Thyroid lesions stand as the predominant endocrine disorders witnessing a substantial global surge in the incidence over recent decades. This study was designed to assess the frequency of neoplastic and non-neoplastic thyroid lesions, focusing on variations across age groups and genders within two tertiary care hospitals in Lahore, Pakistan.

Methods: This retrospective cross-sectional study was conducted at the Pathology Departments of Combined Military Hospital Lahore and Sheikh Zayed Hospital Lahore from the year 2017 to 2021. Histopathological data of 1,217 patients was assessed, with 333 patients having thyroid lesions. The lesions were classified into neoplastic and non-neoplastic. Statistical analysis was performed using the Chi-square test.

Results: Among the 1,217 patients, 333 (27.3%) were diagnosed with thyroid-related lesions, of which 303 (90.9%) were neoplastic and 30 (9.0%) were non-neoplastic. Neoplastic lesions included multinodular goiter (41.4%), adenomatous colloid goiter (32.7%), papillary carcinoma (10.2%), and follicular adenoma (6.6%). Non-neoplastic lesions comprised Hashimoto's thyroiditis (8.1%) and thyroglossal cysts (0.9%). The frequency of thyroid lesions was significantly higher in males (56.6%) ($p = 0.001$). There was a statistically significant variation in the distribution of lesion types across different age groups ($p < 0.001$).

Conclusion: Papillary carcinoma emerged as the sole malignant thyroid lesion identified, highlighting its prominence within the study population. These findings underscore the necessity for region-specific epidemiological research to better understand thyroid pathology and inform targeted screening and management strategies.

Keywords: Thyroid, histopathology, lesions, neoplastic, non-neoplastic.

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Introduction

Thyroid lesions encompass a wide spectrum of pathologies including neoplastic and non-neoplastic lesions. Neoplastic lesions include both benign entities such as follicular adenoma, adenomatous colloid goiter, and multinodular goiter, as well as malignant tumors like papillary carcinoma, follicular carcinoma, medullary carcinoma, and anaplastic carcinoma.[1] Non-neoplastic lesions primarily involve inflammatory conditions, with Hashimoto's thyroiditis being the most prevalent, alongside congenital anomalies like thyroglossal duct cysts.[2]

Among endocrine malignancies, thyroid cancer (TC) is the most common, with a global incidence that has been steadily increasing over recent decades. This rise is attributed to several factors including enhanced diagnostic techniques, increased exposure to environmental carcinogens, and potential genetic predispositions.[3] The incidence of cold nodules reaches a notable increase from 4% to 15.6% in different studies.[4,5] In studies reported from Pakistan, Saudi Arabia, and the United Arab Emirates, more frequency of thyroid nodules has been seen in females.[6-8] Multinodular goiter and papillary carcinoma are the leading benign and malignant lesions, respectively, in the local population.[9]

In Pakistan, studies have indicated an upward trend in TC incidence, particularly in urban centers such as Karachi and Quetta. In Karachi, papillary carcinoma was reportedly the most frequent malignancy, predominantly in females with most patients in their fourth decade of life.[10] In Quetta, Balochistan, TC was more common in females than males, with

papillary carcinoma being the most common malignancy.[11] In Hyderabad, Pakistan, 7.6% of the multinodular goiter had malignancy with papillary carcinoma.[12] Determining the incidence of thyroid carcinoma in Pakistan is challenging due to the lack of comprehensive population-based data.[10]

The study aimed to determine the frequency of both neoplastic and non-neoplastic thyroid lesions presenting in leading tertiary care hospitals of Lahore, Pakistan, while analyzing and comparing their distribution across various age groups and genders.

Methods

This research was conducted as a cross-sectional study where retrieval and analysis of existing histopathological data collected over the past 4 years, i.e., 2017–2021 was done from the Pathology Departments of Combined Military Hospital (CMH) Lahore and Sheikh Zayed Hospital**,** Lahore, after the approval of the Ethical Committee of CMH Lahore Medical College, Lahore, Pakistan. Histopathological departments at these institutes maintain an up-to-date record including clinical history and pathology reports. From this dataset, lesions associated with the thyroid gland were identified and categorized into neoplastic and non-neoplastic types. Key demographic and clinical details, including age, sex, and the histopathological classification of each lesion, were meticulously documented alongside the corresponding biopsy diagnosis. The inclusion criteria comprised patients of any age presenting with a solitary lesion (benign, malignant, or inflammatory) located in the thyroid region exclusively. In contrast, the exclusion criteria were lesions exhibiting normal histology, as well as lesions lacking definitive pathology or having insufficient data.

The study population was divided into having neoplastic and non-neoplastic lesions of the thyroid according to the World Health Organization Classification of Tumors of the Thyroid Gland, 2022 Edition.[13]

Neoplastic lesions included: Benign: Follicular Adenoma, Adenomatous Colloid Goiter, Multinodular Goiter, and Malignant: Papillary carcinoma. Non-neoplastic lesions included Thyroiditis: Hashimoto's Thyroiditis, Cysts such as thyroglossal cyst etc.

The study categorized the patient ages into five distinct groups to better analyze the distribution of thyroid lesions by sex and age. These groups were: Group 1, encompassing ages 1-18 years; Group 2, including individuals aged 19-35 years; Group 3, for ages 36-50 years; Group 4, comprising ages 51-70 years; and Group 5, for those aged 70 years and above. This classification allowed for a detailed examination of how the frequency of thyroid lesions varied across different age ranges and between genders.

Statistical analysis

Data analysis was conducted utilizing the Statistical Package for Social Sciences software, version 17.0, designed for Windows. The relative frequencies of different histological types of thyroid lesions were calculated and tabulated. The chi-square test was employed to assess variations in histological types across gender and age groups. Statistical significance was established at *p* values less than or equal to 0.05.

Results

A total of 1,217 patients who presented with lesions in the neck region in the Department of Pathology, Sheikh Zayed Hospital, and CMH, Lahore, 333 patients were diagnosed with thyroid-related abnormalities. The neoplastic lesions consisted of multinodular goiter, adenomatous colloid goiter, follicular adenoma, and papillary carcinoma. The non-neoplastic lesions consisted of the thyroglossal cyst and Hashimoto's thyroiditis.

The frequency of different types of thyroid lesions is tabulated in Table 1. Among the 333 evaluated thyroid lesions, the findings revealed 138 (41.4%) cases of Multinodular Goitre and 109 (32.7%) cases of Adenomatous Colloid Goitre.

The gender-wise distribution of thyroid lesions is shown in Tables 2 and 3. There was a significant difference in the scores for males (4.96 ± 1.94) and females (4.53 ± 2.33); (χ^2 = 3.46, p = 0.001). The most common abnormality in males was adenomatous colloid goiter (n = 77, 40.9%), whereas multinodular goiter was most frequent in females (n = 75, 51.7%) (Tables 2 and 3).

The age-wise distribution of neoplastic and non-neoplastic thyroid lesions is shown in Table 4. The study revealed a statistically significant difference between age groups and the distribution of various thyroid lesions (χ^2 = 65.687, p < 0.001) (Table 5). This table shows that the highest frequency of the lesions (42%) was seen in the age group of 19-35 years (p < 0.01).

Discussion

In this study, a total of 27.3% patients were diagnosed with thyroid-related abnormalities, and of these, the majority (91%) were neoplastic. This high frequency of neoplastic lesions aligns with the global trends.[14,15] Moreover, previous studies conducted in other regions of Pakistan such as Karachi, Balochistan, and Peshawar reported a higher incidence of neoplastic lesions and most of them were benign compared to malignant ones.[11,16,17] The predominance highlights the significant burden of benign thyroid disorders, which, while not malignant, require clinical attention to prevent complications such as compressive symptoms and potential malignant transformation.[15,17] The high proportion of neoplastic lesions emphasizes the necessity for targeted diagnostic and therapeutic strategies to manage these conditions effectively.[3,14]

Table 1. *Frequency of different types of thyroid lesions during the study period.*

Lesions		*n*	%
Neoplastic	Multinodular goiter	138	41.4
	Follicular adenoma	22	6.6
	Papillary carcinoma	34	10.3
	Adenomatous colloid goiter	109	32.7
Non- neoplastic	Hashimoto's thyroiditis	27	8.1
	Thyroglossal cyst	3	0.9

Table 2. *Gender-wise distribution of thyroid lesions.*

Gender	Neoplastic				Non- neoplastic		Total
	Multinodular goiter	Follicular adenoma	Papillary carcinoma	Adenomatous colloid goiter	Hashimoto's thyroiditis	Thyroglossal cyst	
Male	63 (33.5)	14 (7.4)	16 (8.6)	77 (40.9)	17 (9.1)	1 (0.5)	188 (56.5)
Female	75 (51.7)	8 (5.6)	18 (12.4)	32 (22.1)	10 (6.9)	2 (1.3)	145 (43.5)
Total	**138 (41.4)**	**22 (6.7)**	**34 (10.2)**	**109 (32.7)**	**27 (8.1)**	**3 (0.9)**	**333 (100)**

Table 3. *Gender-wise comparison of thyroid lesions.*

Gender	*n* (%)	Mean±SD	χ^2	*p*-value*
Male	188 (56.5)	4.96 ± 1.943	3.463	0.001
Female	145 (43.5)	4.53 ± 2.334		

*Chi-square test

Table 4. *Age-wise distribution of thyroid lesions.*

Age (Years)	Thyroid						Total
	Neoplastic				Non-neoplastic		
	Multinodular goiter	Follicular adenoma	Papillary carcinoma	Adenomatous colloid goiter	Hashimoto's Thyroiditis	Thyroglossal cyst	
1-18	6 (1.8)	2 (0.6)	2 (0.6)	1 (0.3)	1 (0.3)	0 (0)	12 (3.6)
19-35	64 (19.2)	5 (1.5)	16 (4.8)	42 (12.6)	11 (3.3)	2 (0.6)	140 (42.0)
36-50	52 (15.6)	11 (3.3)	11 (3.3)	28 (8.4)	12 (3.6)	0 (0)	114 (34.2)
51-70	16 (4.8)	3 (0.9)	4 (1.2)	32 (9.6)	3 (0.9)	1 (0.3)	59 (17.7)
70+	0 (0)	1 (0.3)	1 (0.3)	6 (1.8)	0 (0)	0 (0)	8 (2.4)
Total	**138 (41.5)**	**22 (6.6)**	**34 (10.2)**	**109 (32.7)**	**27 (8.1)**	**3 (0.9)**	**333 (100)**

In the current study, among the neoplastic thyroid lesions, multinodular goiter was the most prevalent, accounting for 41.4% of cases, followed by adenomatous colloid goiter at 32.7%, papillary carcinoma at 10.2%, and follicular adenoma at 6.6%. This distribution is consistent with international findings, where multinodular goiter is recognized as the most common benign thyroid disorder.[14,18,19] Similar studies in other parts of Pakistan have reported multinodular goiter as the leading thyroid neoplasm, reinforcing the consistency of this trend.[10,11,20]

The current study reports a higher frequency of thyroid lesions in males compared to females, with adenomatous colloid goiter being the most common lesion occurring in males and multinodular goiter being more frequent in females. This male predominance contrasts with global epidemiological patterns, especially in countries such as Saudi Arabia and the United States where thyroid disorders, including cancers, are generally more prevalent in females.[4,7,9,21,22]. This discrepancy may be influenced by regional factors such as occupational exposures, lifestyle differences, or genetic, hormonal, and autoimmune predispositions.[20,21] Further investigation into these gender-specific etiological factors is essential to understand the underlying causes.

The age-wise distribution of thyroid lesions in our study demonstrates a significant variation with multinodular

Table 5. *Age-wise comparison of thyroid lesions.*

Age (Years)	*n* (%)	χ^2	*p*-value*
1-18	12 (3.6)	24.36	<0.001*
19-35	140 (42.0)		
36-50	114 (34.2)		
51-70	59 (17.7)		
70+	8 (2.4)		
Total	333 (100)		

*Chi-square test

goiter, papillary carcinoma, adenomatous colloid goiter, and thyroglossal cysts most frequently occurring in the 19-35 years age group, while Hashimoto's thyroiditis was more commonly diagnosed in individuals aged 36-50 years. This younger demographic trend is not consistent with the global data, which typically shows a higher incidence in middle-aged populations.[23,24] The younger age distribution may reflect regional differences in genetic factors, environmental exposures, or healthcare access. In addition, the significant prevalence of Hashimoto's thyroiditis in the 36-50 years age group aligns with global observations linking autoimmune thyroiditis with middle-aged populations, reflecting the chronic nature of autoimmune disorders and their progression over time.[5,16,25] The significant variation in lesion prevalence across different age groups underscores the dynamic nature of thyroid pathology and its association with age-related physiological changes[26].

The predominance of papillary carcinoma as the sole malignant thyroid lesion in the current study emphasizes the need for targeted screening and early diagnostic strategies. Given its high prevalence prognosis, early detection can significantly improve patient outcomes and reduce mortality.[3,4]

Limitations of the Study

This study is limited by its retrospective design and reliance on data from only two tertiary care hospitals, which may not represent the broader population and may affect the generalizability of the findings. In addition, the absence of detailed information on potential confounding factors such as family history, environmental exposures, and lifestyle factors limits the ability to draw definitive conclusions about causative relationships.

Future prospective studies with larger, more diverse populations are recommended to validate these findings and explore the underlying genetic, environmental, and lifestyle factors contributing to the high prevalence of thyroid lesions in Pakistan. Moreover, establishing a centralized thyroid registry in Pakistan would enhance the accuracy of epidemiological data and facilitate more comprehensive research on thyroid pathology.

Conclusion

The findings of the study reveal a predominance of thyroid lesions in males, especially in younger adults while neoplastic lesions being more common than the non-neoplastic conditions in the local population. Papillary carcinoma emerged as the sole malignant thyroid lesion, highlighting its significance within the study population.

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List of abbreviations

CMH Combined Military Hospital

Conflicts of interest

None to declare.

Grant support and financial disclosure

None to disclose.

Ethics approval

The study was approved by the Institutional Review Board of Combined Military Hospital Medical and Dental College, Lahore, vide Letter No: Case#.631/ERC/CMH/LMC dated 25-9-2021.

Authors contributions

RYS: Conception and design, Critical revision of the manuscript for important intellectual content, Methodology, Investigation, Draft preparation.

NM: Conception and design, Analysis and interpretation of the data, Drafting of the article, Statistical analysis, Data collection, Draft preparation.

AS: Conception and design, Critical revision of the article for important intellectual content**,** Drafting of the manuscript, Data collection.

MQ: Collection and assembly of data, Drafting of the manuscript, Data analysis, Interpretation of results.

FY: Literature search, Critical revision of the manuscript for important intellectual content, Data interpretation, Proofreading.

HZR: Literature search, Critical revision of the manuscript for important intellectual content, Drafting of the manuscript.

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