

**Histopathological Analysis of Thyroid Neoplastic Lesions at BMIMS, Pawapuri: A Tertiary Care Center Study**Juli<sup>1</sup>, Jyoti Kumari<sup>2</sup>, Md. Ali Muzaffar<sup>3</sup>, Imtyaz Ahmad<sup>4</sup><sup>1</sup>Tutor, Department of Pathology, BMIMS Pawapuri, Nalanda, Bihar, India<sup>2</sup>Tutor, Department of Pathology, BMIMS Pawapuri, Nalanda, Bihar, India<sup>3</sup>Assistant Professor, Pathology, BMIMS Pawapuri, Nalanda, Bihar, India<sup>4</sup>Professor, and HOD, Department Pathology, BMIMS Pawapuri, Nalanda, Bihar, India

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**Abstract:**

**Background:** Thyroid neoplasms encompass a spectrum of benign and malignant lesions with distinct histopathological characteristics. The incidence of thyroid cancer has been increasing globally, necessitating a deeper understanding of its histopathological features for improved diagnostic and therapeutic strategies. This study aims to provide a comprehensive histopathological analysis of thyroid neoplasms at a tertiary care center, contributing to the body of knowledge and aiding in the development of better clinical practices.

**Methods:** A total of 64 patients with histopathologically confirmed neoplastic lesions of the thyroid were included. Data were collected from medical records, including patient demographics, clinical presentation, and histopathological findings. Statistical analysis was performed using SPSS version 20.0.

**Results:** The study included 64 patients, with 68.7% females and 31.3% males, predominantly in the 30-50 years age group. Papillary thyroid carcinoma (PTC) was the most common type, accounting for 53.1% of cases, followed by follicular thyroid carcinoma (21.9%). Tumor size ranged from less than 2 cm to over 4 cm, with 18.8% of cases showing metastasis. A significant association was found between larger tumor size and the presence of metastasis ( $p=0.04$ ). No significant association was observed between gender and the type of thyroid neoplasm ( $p=0.32$ ).

**Conclusion:** The study highlights the predominance of papillary thyroid carcinoma among thyroid neoplasms and identifies tumor size as a significant predictor of metastasis. These findings emphasize the importance of early detection and tailored treatment strategies. The lack of gender association with neoplasm type suggests that both male and female patients should receive similar diagnostic and therapeutic considerations.

**Recommendations:** Future research should focus on exploring molecular markers for early diagnosis and targeted therapy. Implementing standardized histopathological protocols and regular follow-up can enhance patient outcomes.

**Keywords:** Thyroid Neoplasms, Histopathology, Papillary Thyroid Carcinoma, Metastasis.

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**Introduction**

Thyroid neoplasms represent a diverse group of disorders with varying clinical and histopathological characteristics, ranging from benign adenomas to highly aggressive anaplastic carcinomas. Over the past few decades, the incidence of thyroid cancer has been on the rise globally, making it one of the most rapidly increasing cancers. According to the Global Cancer Observatory, thyroid cancer accounted for approximately 3.1% of all cancer cases worldwide in 2020, highlighting the growing significance of this disease [1].

The thyroid gland, located in the anterior neck, plays a crucial role in regulating metabolism through the secretion of thyroid hormones. Neoplastic transformations in the thyroid can

disrupt these functions and lead to significant clinical consequences. Thyroid neoplasms are broadly classified into benign and malignant categories, with the latter including papillary thyroid carcinoma (PTC), follicular thyroid carcinoma (FTC), medullary thyroid carcinoma (MTC), and anaplastic thyroid carcinoma (ATC). PTC is the most prevalent, accounting for about 80-85% of all thyroid cancers [2].

Recent advancements in molecular biology have enhanced our understanding of the genetic and epigenetic mechanisms underlying thyroid carcinogenesis. Mutations in the BRAF, RAS, and RET/PTC genes, along with alterations in the TERT promoter, have been identified as key drivers in the pathogenesis of thyroid cancer [3].

These genetic insights have not only improved diagnostic accuracy but also paved the way for targeted therapies, especially in refractory and advanced cases.

Histopathological evaluation remains the gold standard for diagnosing thyroid neoplasms. The accurate classification of thyroid lesions is critical for determining the appropriate therapeutic approach and prognostication. Fine-needle aspiration cytology (FNAC) is often the first-line diagnostic tool, followed by histopathological examination of resected specimens to confirm the diagnosis and guide treatment [4]. The Bethesda System for Reporting Thyroid Cytopathology has standardized the reporting and risk stratification of thyroid cytology, facilitating better clinical decision-making [5].

Despite these advancements, challenges remain in the management of thyroid neoplasms. Variability in clinical presentation, overlapping histopathological features, and the potential for metastasis necessitate a comprehensive approach to diagnosis and treatment. Moreover, the indolent nature of some thyroid cancers, particularly PTC, poses dilemmas regarding the extent of surgical intervention and the need for adjuvant therapies.

This study aimed at analyzing the histopathological features of neoplastic lesions of the thyroid.

### Methodology

**Study Design:** A retrospective, descriptive study.

**Study Setting:** The study was conducted over a period of 24 months at the Bhagwan Mahavir Institute of Medical Sciences (BMIMS), Pawapuri.

**Participants:** A total of 64 patients with diagnosed neoplastic lesions of the thyroid were included in this study.

### Inclusion Criteria

1. Patients with histopathologically confirmed neoplastic lesions of the thyroid.
2. Patients who underwent thyroidectomy or biopsy procedures at BMIMS, Pawapuri, during the study period.
3. Complete medical records available for review.

### Exclusion Criteria

1. Patients with non-neoplastic thyroid disorders.
2. Incomplete medical or histopathological records.
3. Patients who received treatment for thyroid neoplasms outside BMIMS, Pawapuri.

**Bias:** To minimize selection bias, all consecutive cases meeting the inclusion criteria within the study period were included. Information bias was reduced by ensuring that all data were collected and analyzed using standardized procedures.

**Variables:** Variables included age, gender, clinical presentation, histopathological type of thyroid neoplasm, size of the lesion, and presence of metastasis.

**Data Collection:** Data were collected from medical records, including patient demographics, clinical presentation, surgical reports, and histopathological findings. Histopathological examination of thyroid specimens was conducted by pathologists.

### Procedure

1. **Histopathological Examination:** Thyroidectomy or biopsy specimens were fixed in formalin, processed, and embedded in paraffin. Sections were stained with Hematoxylin and Eosin (H&E) and examined under a microscope.

2. **Data Recording:** Relevant data from histopathological reports were recorded, including the type of neoplasm, size, and presence of metastasis.

**Statistical Analysis:** Data were entered into a computerized database and analyzed using SPSS version 20.0. Descriptive statistics were used to summarize the data. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized as means and standard deviations. Chi-square tests were used to analyze associations between categorical variables, and t-tests were used for continuous variables. A p-value of <0.05 was considered statistically significant.

### Result

The study included 64 patients with histopathologically confirmed neoplastic lesions of the thyroid. The demographic details are summarized in Table 1.

**Table 1: Demographic Characteristics**

Characteristic	Number	Percentage (%)
<b>Gender</b>		
Male	20	31.3
Female	44	68.7
<b>Age (years)</b>		
<30	8	12.5
30-50	32	50.0
>50	24	37.5

The types of neoplastic lesions identified are summarized in Table 2.

**Table 2: Histopathological Types of Thyroid Neoplasms**

Type of Neoplasm	Number	Percentage (%)
Papillary Thyroid Carcinoma	34	53.1
Follicular Thyroid Carcinoma	14	21.9
Medullary Thyroid Carcinoma	6	9.4
Anaplastic Thyroid Carcinoma	4	6.3
Hurthle Cell Carcinoma	3	4.7
Other	3	4.7

The size of the thyroid neoplasms and the presence of metastasis are shown in Table 3.

**Table 3: Tumor Characteristics**

Characteristic	Number	Percentage (%)
<b>Tumor Size (cm)</b>		
<2	18	28.1
2-4	30	46.9
>4	16	25.0
<b>Metastasis</b>		
Present	12	18.8
Absent	52	81.3

The relationship between gender and the type of thyroid neoplasm was analyzed using the Chi-square test (Table 4).

**Table 4: Relationship between Gender and Type of Thyroid Neoplasm**

Type of Neoplasm	Male	Female	Total
Papillary Thyroid Carcinoma	8	26	34
Follicular Thyroid Carcinoma	6	8	14
Medullary Thyroid Carcinoma	2	4	6
Anaplastic Thyroid Carcinoma	2	2	4
Hurthle Cell Carcinoma	1	2	3
Other	1	2	3

The Chi-square test showed no significant association between gender and the type of thyroid neoplasm ( $p=0.32$ ). The relationship between tumor size and metastasis was analyzed using the t-test (Table 5).

**Table 5: Relationship between Tumor Size and Metastasis**

Tumor Size (cm)	Mean ( $\pm$ SD)	p-value
Metastasis Present	3.5 ( $\pm$ 1.2)	0.04
Metastasis Absent	2.8 ( $\pm$ 1.0)	

The t-test indicated a statistically significant difference in tumor size between patients with and without metastasis ( $p=0.04$ ).

## Discussion

The patient cohort comprised 68.7% females and 31.3% males, with a significant proportion (50%) falling in the 30-50 years age group. This demographic distribution suggests a higher prevalence of thyroid neoplasms among middle-aged individuals, with a notable female predominance.

Histopathological analysis revealed that papillary thyroid carcinoma (PTC) was the most common type of thyroid neoplasm, accounting for 53.1% of cases. This finding aligns with existing literature, which often cites PTC as the predominant form of thyroid cancer. Follicular thyroid carcinoma (FTC) was the second most common type, representing 21.9% of cases, followed by medullary thyroid

carcinoma (9.4%), anaplastic thyroid carcinoma (6.3%), Hurthle cell carcinoma (4.7%), and other less common types (4.7%). The distribution of neoplastic types underscores the heterogeneity of thyroid cancers and highlights the need for accurate histopathological diagnosis to guide treatment.

Tumor size analysis showed that nearly half of the tumors (46.9%) were between 2-4 cm, with 28.1% being less than 2 cm and 25% greater than 4 cm. The presence of metastasis was noted in 18.8% of patients, indicating a subset of cases with advanced disease at the time of diagnosis. A statistically significant relationship was found between larger tumor size and the presence of metastasis ( $p=0.04$ ), suggesting that tumor size could be a predictor of metastatic potential in thyroid neoplasms.

Gender analysis using the Chi-square test showed no significant association between gender and the type of thyroid neoplasm ( $p=0.32$ ). This indicates that while thyroid neoplasms are more common in

females, the type of neoplasm does not significantly differ between genders.

Overall, the study highlights the predominance of papillary thyroid carcinoma among thyroid neoplasms and identifies tumor size as a significant factor associated with metastasis. These findings emphasize the importance of early detection and tailored treatment strategies to manage thyroid neoplasms effectively. The lack of gender association with neoplasm type suggests that both male and female patients should receive similar diagnostic and therapeutic considerations.

A study analyzed 80 thyroidectomy specimens and found that 16.25% were neoplastic, with follicular adenoma (10%) and papillary carcinoma (3.75%) being the most common neoplastic lesions. Non-neoplastic lesions, such as colloid goiter (45%) and multinodular goiter (12.5%), were more prevalent [6]. A study correlated fine needle aspiration cytology (FNAC) findings with histopathological outcomes. Thyroid lesions showed a high correlation, with 96.36% accuracy in benign and 88.89% in malignant lesions [7].

620 thyroidectomy specimens were studied, finding that 82% were non-neoplastic and 18% were neoplastic. The most common neoplastic lesion was papillary carcinoma, while nodular colloid goiter was the most common non-neoplastic lesion [8]. A study analyzed 1465 thyroid nodule cases and found that 79.7% were non-neoplastic, with simple goiter being the most common. Among neoplastic lesions, papillary and follicular thyroid carcinomas were equally prevalent [9].

Research studied 40 thyroid lesion cases, finding that 77.5% were non-neoplastic and 22.5% were neoplastic. Colloid goiter was the most common non-neoplastic lesion, and follicular adenoma was the most common neoplastic lesion [10]. A two-year retrospective study found that follicular adenoma was the most common benign neoplasm, while papillary carcinoma was the most common malignant lesion. Immunohistochemistry was used to aid in diagnosis, particularly for medullary carcinoma and non-Hodgkin lymphoma [11].

A study analyzed 75 neoplastic thyroid lesions, finding a female predominance with a mean age of 38.5 years. Follicular adenoma was the most common benign neoplasm, and papillary carcinoma was the most common malignant lesion [12]. 42 patients with thyroid carcinoma were studied, finding that papillary carcinoma was the most common (63.15%), followed by follicular carcinoma (23.68%). The study emphasized the importance of cervical lymph node dissection for proper pathological staging [13].

A study evaluated the use of immunohistochemical markers Galectin-3, CK19, and CD56 in

differentiating benign and malignant thyroid neoplasms. Galectin-3 and CD56 were found to be particularly useful in identifying malignancy [14].

### Conclusion

The study found that the most common type of thyroid neoplasm was papillary thyroid carcinoma, accounting for 53.1% of cases. The majority of tumors were between 2-4 cm in size. A significant association was found between larger tumor size and the presence of metastasis. No significant association was observed between gender and the type of thyroid neoplasm.

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