



HISTOPATHOLOGICAL STUDY OF VARIOUS NEOPLASTIC AND NON NEOPLASTIC LESIONS OF THYROID GLAND- A RETROSPECTIVE STUDY.

Dr. Deepali Shukla

M.D.Pathology, Senior Resident, Department of pathology, Government medical college surat, Gujarat-India.

Dr. Komal Patel

M.D.Pathology, Assistant Professor, Department of pathology, Government medical college surat, Gujarat-India.

Dr. Shruti Mavani*

M.D.Pathology, Senior Resident, Department of pathology, Government medical college surat, Gujarat-India. *Corresponding Author

ABSTRACT

Aims and Objectives: To study the spectrum of histopathology of various non neoplastic and neoplastic thyroid lesions with correlation of histomorphology with cytopathological findings whenever available.

Background: The thyroid gland plays a key physiological role in the body and is responsible for maintaining homeostasis and body integrity. Recent advances in diagnosis help in early detection of the thyroid lesion and facilitate planning in treatment.

Method: All thyroidectomy specimens were included in the study from period of January 2016 to June 2020. A total of 90 specimens were studied by routine paraffin processing and hematoxylin eosin stain. Detailed histopathological study was done and correlated with age, sex & clinical presentation and cytological findings where available. **Result:** Out of 90 cases, 57 were of non neoplastic and 33 were of neoplastic lesions. Out of 57 Non neoplastic thyroid lesions, 28 cases were of Adenomatoid goiter. Among 33 neoplastic thyroid lesions 24 were of malignant neoplasm. Female to male ratio for non neoplastic lesion was 13:1 and for neoplastic lesion it was 10:1. Correlation of histological diagnosis with cytological findings was possible in 29 cases out of 90 thyroid lesions. **Conclusion:** The present study highlighted the importance of histopathological examination in diagnosis and categorisation of various non neoplastic and neoplastic thyroid lesions based on their morphological pattern and diagnostic criteria.

KEYWORDS : Thyroid lesion, non neoplastic, neoplastic, papillary carcinoma.

INTRODUCTION:

The thyroid gland, largest endocrine organ has been recognised since ancient times. It plays a key physiological role in the body and is responsible for maintaining homeostasis and body integrity.[1] [2]

Thyroid gland is unique among the endocrine glands in having a wide spectrum of diseases ranging from functional enlargements, immunologically mediated enlargements to non neoplastic and neoplastic lesions.[3] [4] Disorders of thyroid manifest as enlargement of thyroid gland (goiter) or alterations in its hormonal levels or both.[5]

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. [6]

From a histogenetic standpoint, thyroid neoplasms are divided into three major categories, depending on the cell types involved, tumors exhibiting follicular cell differentiation (95%), tumors exhibiting C-cell differentiation, and tumors exhibiting mixed follicular and C-cell differentiation.[7] Lesions in the later two categories comprise about 5% of tumors. Thyroid tumors are also subdivided into various benign and malignant categories. In fact, benign neoplasms outnumber thyroid carcinomas by a ratio of nearly 10:1. While under 1% of solitary thyroid nodules are malignant.[8][9]

The study was undertaken to examine the histopathological spectrum of various non neoplastic and neoplastic lesions of thyroid gland and correlate them in reference to age, sex, gender, histomorphological pattern and with cytopathological findings whenever available.

MATERIAL AND METHODS:

The retrospective and prospective study of Histopathological spectrum of Thyroid gland was conducted from January 2016 to June 2020 at Department of pathology, Government medical college, surat.

All patients undergone thyroidectomy were included in present study. Poorly preserved specimen where morphology is compromised are excluded from the study. Total 90 thyroid specimen were studied.

A detailed clinical history including age, sex, clinical presentation, examination findings, radiological and biochemical investigations and cytology data were also collected whenever available.

Following fixation, the tissues were processed, embedded in paraffin and section was cut and stained with Hematoxylin and Eosin for morphological assessment.

RESULT:

In the present study, out of total 90 cases, non neoplastic thyroid lesions were found in 57 (63.33%) cases while neoplastic lesions were found in 33(36.66%) cases. Non neoplastic lesions were more common compared to neoplastic lesions.

Table-1 Histological Spectrum Of Non Neoplastic Thyroid Lesions: (n=57)

Non neoplastic lesions	No of cases	Frequency
Adenomatoid Goiter	28	49.12%
Colloid Goiter	25	43.85%
Hashimoto Thyroiditis	3	5.26%
Grave's Disease	1	1.75%
Total	57	100%

Table - 2 Histological Spectrum Of Neoplastic Thyroid Lesions (n=33)

Neoplastic lesion	Type of lesion	No of cases	Frequency
Benign thyroid lesion	Follicular adenoma	7	21.21%
Non Invasive follicular thyroid neoplasm with papillary like nuclear features		2	6.06%
Malignant lesion	Papillary thyroid carcinoma	18	54.54%

	Follicular carcinoma	4	12.12%
	Medullary carcinoma	1	3.03%
	Anaplastic carcinoma	1	3.03%
Total		33	100%

Thyroid non neoplastic disease affected all age group ranging from 11 year to 70 years with peak age incidence between 21-30 years and for neoplastic thyroid lesions commonest age group affected was 51-60 years. The cases of benign neoplastic lesions (follicular adenoma) were distributed between 21 to 60 years. Maximum cases of Papillary thyroid carcinoma were in age group of 41-50 years, while for follicular carcinoma 51-60 years.

All the non neoplastic thyroid lesions including goiter, hashimoto thyroiditis and grave's disease were found more in female. Out of 57 non neoplastic thyroid lesions 53 were found in female (92.98%) and 4 were in males (7.01%). Female to male ratio for non neoplastic thyroid lesions was 13:1. Out of 33 neoplastic thyroid lesions 30 (90.90%) were female and 3 (9.09%) were male. Female to male ratio for neoplastic thyroid lesion was 10:1. Female predominance was noted in both neoplastic and non neoplastic thyroid lesions.

Table-3 Variants Of Papillary Thyroid Carcinoma: (n=18)

Variants	No. of cases	Frequency
Conventional	14	77.77%
Follicular	3	16.66%
Papillary microcarcinoma	1	5.55%
Total	18	100%

In present study out of 18 cases of papillary thyroid carcinoma 14 (77.77%) cases were of conventional variant presented with classical features of Papillary thyroid carcinoma. 3 (16.66%) cases were of Follicular variant of papillary thyroid carcinoma showed follicular pattern with papillary like nuclear features and one case(5.55%) histologically showed features of adenomatoid goiter with papillary microcarcinoma.

Table-4 Correlation Between Cytodiagnosis And Histodiagnosis:

Cytological diagnosis	Histological diagnosis	No of cases
Benign Follicular Nodule	Colloid goiter	5
Benign Follicular Nodule	Adenomatoid goiter	6
Benign Follicular nodule	Grave's disease	1
Colloid goiter	Colloid goiter	3
Colloid goiter	Adenomatoid goiter	3
Cystic colloid goiter	Colloid goiter with cystic changes	1
Hyperplastic nodule	Adenomatoid goiter	1
Suspicious for malignancy Medullary carcinoma	Medullary Thyroid carcinoma	1
Suspicious for malignancy Papillary carcinoma	Papillary thyroid carcinoma	2
Follicular Neoplasm	Follicular variant of Papillary thyroid carcinoma	1
Suspicious for Follicular Neoplasm	Follicular variant of Papillary thyroid carcinoma	1
Cystic colloid goiter	Adenomatoid goiter with papillary microcarcinoma	1
Atypia of Undetermined significance	Papillary Thyroid carcinoma	1
Papillary thyroid carcinoma	Papillary thyroid carcinoma	1

Histological finding correlation with previous cytology records were possible in 28 cases out of total 90 thyroid lesions. Out of these 28 cases discordant findings were noted in 4 cases. Two cases of Follicular variant of papillary thyroid carcinoma were reported on cytology as follicular neoplasm and suspicious of follicular neoplasm each. One case of papillary thyroid carcinoma was diagnosed on cytology as Atypia of Undetermined significance. Another case of papillary microcarcinoma with adenomatoid goiter diagnosed on histology was reported as colloid goiter on cytology

DISCUSSION:

The overall frequency of non neoplastic thyroid lesions in this study was 63.33% as compared to 36.66% of neoplastic lesions. This finding is consistent with many other studies like Haque WS et al reported 72.67% for non neoplastic lesion and 27% for neoplastic thyroid lesions. Sheela K M et al study showed 82.09% for non neoplastic and 17.90% for neoplastic thyroid lesions.

Table-5 Comparision Of Histopathological Spectrum Of Non Neoplastic Lesions In Thyroid Specimens With Other Studies:

Name of study	Total no Non neoplastic of cases	No of Adenomatoid goiter	No of Colloid goiter	No of Hashimoto thyroiditis	No of Grave's disease	Frequency (%) of Adenomatoid goiter
V Prabha et al[10]	100	43	29	9	0	43%
MPadmavati et al[11]	211	55	46	53	5	26.06%
Present study	57	28	25	3	1	49.12%

Table- 6 Comparision Of Histological Spectrum Of Neoplastic Thyroid Lesions With Other Studies:

Name of the study	Total number of neoplastic lesions	Total no of benign neoplasm	Total number of malignant neoplasm	Frequency (%) of malignant neoplasm
Abdulkader et al[8]	81	9	72	88.8%
Beigh et al[11]	204	56	148	72.55%
Sheela K M et al[12]	111	24	87	78.37%
Present study	33	7	26	78.78%

Table-7 Comparison Of Age Wise Distribution Of Non Neoplastic And Neoplastic Thyroid Lesions With Other Studies:

Study conducted by	Total no of cases	Non neoplastic lesions			Neoplastic lesions		
		comm on age group	Cases	Frequency (%) in non neoplastic lesion	Comm on age group	Cases	Frequency (%) in neoplastic lesion
S Gole et al[13]	246	21-30	63	35.79%	21-30	22	31.42%
Dr. Kinara et al[14]	91	21-30	38	56.71%	41-50	4	16.67%
Sheela et al[12]	620	30-39	107	21.02	40-49	26	23.42%
Present study	90	21-30	19	33.33%	51-60	10	30.30%

Table-8 Comparison Of Gender Wise Distribution Of Non Neoplastic And Neoplastic Thyroid Lesions With Other Studies:

Study conducted by	Total no of cases	Non neoplastic lesions		Neoplastic lesions	
		Cases in female	Frequenc y (%) in female	Cases in female	Frequenc y (%) in female
S Gole et al[13]	246	154	87.5%	51	72.85%
Dr. Kinara et al[14]	91	64	95.52%	18	75%
Raheem et al[15]	302	215	87.04	40	72.72%
Present study	90	53	92.98%	30	90.90%

A histo-cytological correlation was done in present study which revealed 4 discordant cases out of 28 cases. The cause for this discordance may be because of position of the needle outside the nodule or the smaller size of the carcinoma, especially in multinodular lesions, leading to inappropriate sampling during fine needle aspiration. [16]

While some cases, the tumor is partially or entirely cystic or is surrounded by a thick fibrous capsule which causes inappropriate interpretation. FNAC is a reliable test having high sensitivity and specificity in differentiating benign from malignant nodules thyroid swelling. [17]

Discordant findings in few cases of adenomatoid goiter vs follicular neoplasm and papillary carcinoma are also reported in some studies. The main reason behind this is that follicular patterned lesions of thyroid could present with a varied morphology as a hyperplastic nodule, a follicular adenoma or follicular carcinoma or Follicular variant if papillary thyroid carcinoma which all contain micro or macro follicular pattern. Thus, for Follicular lesion cytology is a screening tool rather than a diagnostic test. Nevertheless, histopathological analysis remains essential to distinguish follicular adenoma from follicular carcinoma, which coheres to our observation.[18][19]

Images:

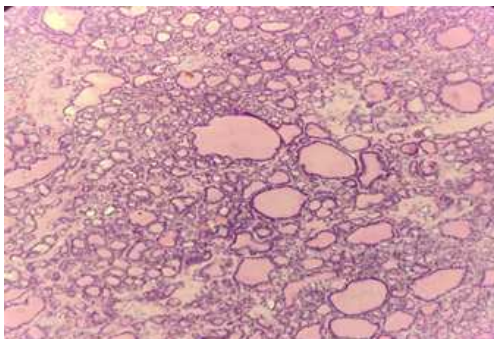
**Fig-1 Adenomatoid Goiter (H&E Stain 10x view)**

Image showing Varying sized thyroid follicles distended with colloid, lined by flattened follicular epithelial cells

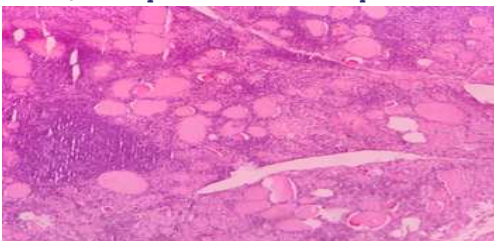
**Fig-2 Hashimoto thyroiditis (H&E Stain 10x view)**

Image showing Lymphocytic infiltration of stroma and oxyphilic change of follicular epithelium with cracking space due to lymphatic channel.

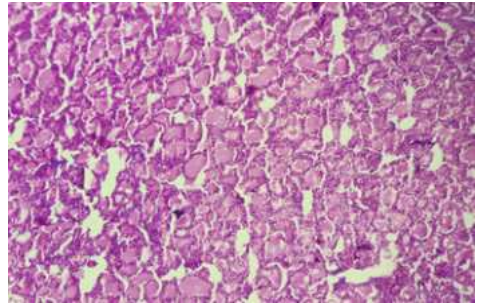
**Fig-3 Follicular Adenoma (H&E Stain 10x view)**

Image showing homogenous architecture of tumour cells with micro and macro follicular pattern.

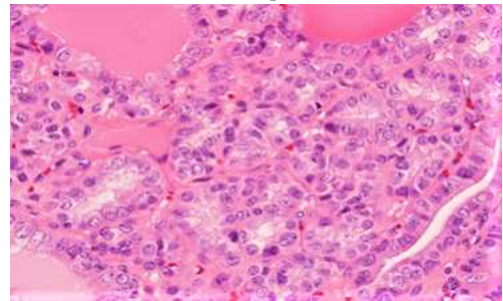
**Fig-4 Non Invasive Follicular Thyroid neoplasm with Papillary like nuclear features (H&E Stain 40x view)**

Image showing follicular pattern with typical nuclear features of Papillary thyroid carcinoma

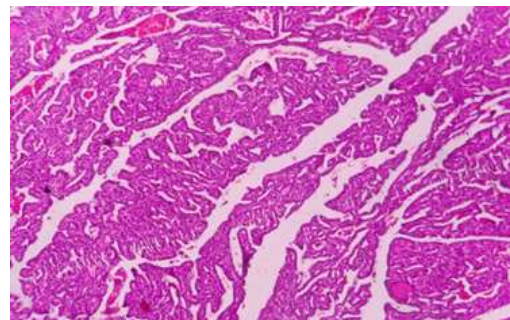
**Fig-5 Papillary Thyroid Carcinoma (H&E Stain 10x view)**

Image showing Tumor cells arranged in branching papillary pattern with typical nuclear features like orphan annie eye nuclei, nuclear grooving, pseudoinclusion.

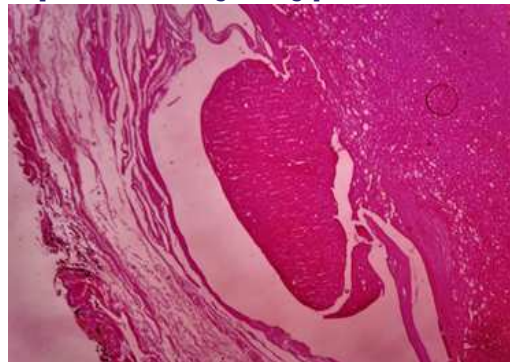
**Fig-6 Capsular invasion in Follicular Thyroid Carcinoma (H&E Stain 10x view)**

Image showing Capsular invasion in case of FTC.

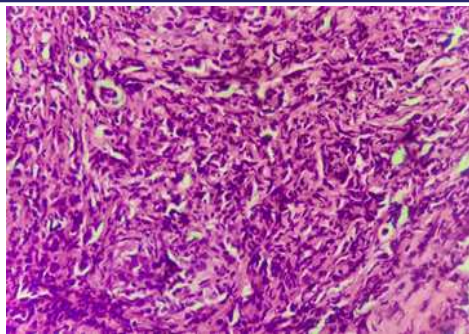


Fig-7 Anaplastic carcinoma(H&E Stain 40x view)

Image showing Spindle shaped tumour cells with high N:C ratio, irregular nuclear membrane and nuclear hyperchromasia.

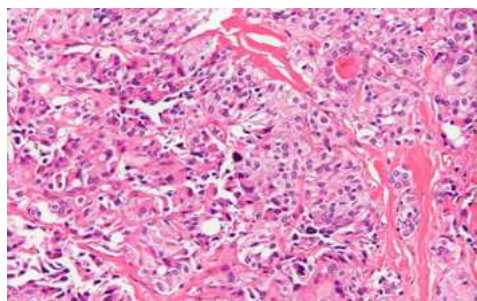


Fig-8 Medullary Thyroid Carcinoma (H&E Stain 40x view)

Image showing round or polygonal cells with granular amphophilic cytoplasm separated by vascular stroma and hyalinised collagen.

CONCLUSION:

Lesions of thyroid gland are fairly common and have wide spectrum of diseases ranging from functional, immune mediated to neoplastic lesions.

The present study revealed that among the varied histomorphological spectrum of thyroid lesion, goiter was the commonest. Among neoplastic thyroid lesions, Follicular Adenoma was the commonest benign neoplasm and Papillary Thyroid Carcinoma being the commonest malignant neoplasm followed by Follicular Carcinoma. Female predominance noted for both neoplastic and non neoplastic thyroid lesions.

Microscopic pattern of various thyroid lesions differ from case to case and prognosis differs accordingly. Thorough gross and microscopic examination of thyroidectomy specimen is mandatory even for non neoplastic lesions as they sometimes harbour neoplasms. The study highlighted the importance of histopathological examination in diagnosis and categorisation of various non neoplastic and neoplastic thyroid lesions based on their morphological pattern and diagnostic criteria.

Source Of Funding: None

Conflict Of Interest: Nil

Acknowledgement: None

REFERENCES:

- [1] Khatawkar A V, Awati SM. Thyroid gland - Historical aspects, Embryology, Anatomy and Physiology. *Int Arch Integr Med*; 2.
- [2] Ricardo V, Lloyd JR et al. Tumors of Thyroid gland. In: *World health organisation classification of Tumors of Endocrine organs*. 2017, pp. 65–144.
- [3] Benvenega S, Tuccari G, Ieni A, et al. Thyroid gland: Anatomy and physiology. In: *Encyclopedia of Endocrine Diseases*. 2018. Epub ahead of print 2018. DOI: 10.1016/B978-0-12-801238-3.96022-7.

- [4] Khan YS, Farhana A. *Histology, Thyroid Gland*. 2020.
- [5] Carlé A, Krejbjerg A, Laurberg P. Epidemiology of nodular goitre. Influence of iodine intake. *Best Practice and Research: Clinical Endocrinology and Metabolism*. Epub ahead of print 2014. DOI: 10.1016/j.beem.2014.01.001.
- [6] Urmiladevi P, Sravani P, Atla B, et al. Original Research Article CLINICO-HISTOPATHOLOGICAL STUDY OF THYROID LESIONS IN A TERTIARY CARE CENTER OVER A PERIOD OF ONE YEAR Original Research Article. 2018; 5: 4–9.
- [7] Sushel C, Khanzada TW, Zulfikar I, et al. Histopathological pattern of diagnosis in patients undergoing thyroid operations. *Rawal Med J* 2009; 34: 14–16.
- [8] Albasri A, Sawaf Z, Hussainy AS, et al. Histopathological patterns of thyroid disease in Al-Madinah region of Saudi Arabia. *Asian Pacific J Cancer Prev*. Epub ahead of print 2014. DOI: 10.7314/APJCP.2014.15.14.5565.
- [9] Salabè GB. Pathogenesis of thyroid nodules: Histological classification? *Biomedicine and Pharmacotherapy*. Epub ahead of print 2001. DOI: 10.1016/S0753-3322(00)00010-X.
- [10] V Prabha MGB. A Study of Histopathological Spectrum of Thyroid lesions. *Int J Sci Study*; 7, <http://dx.doi.org/10.31782/IJCRR.2019.0107> (2019).
- [11] Al AB et. Histopathological study of thyroid neoplastic lesions in a tertiary care hospital - A 5 year study. *Int J Contemp Med Res*; 5.
- [12] M. SK, R. SA. Histopathological analysis of thyroid lesions: an institutional experience. *Int J Adv Med* 2018; 5: 1217.
- [13] Gole S, Satyanarayana V, Gole G, et al. Interesting Cases[]: A Hospital Based 12 Year Longitudinal Study. 2013; 14: 1–12.
- [14] Patel KA. FNAC & Histopathology correlation of various thyroid esions. *IOSR J Dent Med Sci Ver II* 2015; 14: 2279–861.
- [15] Raheem N, Ahmed SA, Samaila MO. Histopathological pattern of thyroid diseases in Zaria: A 10-year review. *Niger Postgrad Med J*. Epub ahead of print 2018. DOI: 10.4103/npmj.npmj_185_17.
- [16] Abdullahi IM, Yasin NA, Dirken ES, et al. Comparative study of fine needle aspiration cytology and histopathology in thyroid nodules at a tertiary care hospital: First report from Somalia. *Asian J Surg* 2023; 46: 4202–4207.
- [17] Kanyakumari M, Pushpalatha K. Cytological evaluation of thyroid lesions and its correlation with histopathology in a teaching hospital. *Indian J Pathol Oncol* 2018; 5: 625–630.
- [18] Kumar A, Bhadouriya SKS, Narain P et al. Comparative study of FNAC and histopathology of thyroid swellings, diagnostic accuracy and role in its management. *Int J Otorhinolaryngol Head Neck Surg*. Epub ahead of print 2017. DOI: 10.18203/issn.2454-5929.ijohns20174183.
- [19] Zhu Y, Song Y, Xu G, et al. Causes of misdiagnoses by thyroid fine-needle aspiration cytology (FNAC): Our experience and a systematic review. *Diagn Pathol* 2020; 15: 1–8.