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Original Article

Clinical and Cyto-Histological Co-Relation in Thyroid Lesions at A Tertiary Care Hospital

Dr. K. Sunil Kumar[1], Dr. S. Chaitanya Vani[2], Dr. B. Vamsi Krishna[3]

[1]Associate Professor, Department of Pathology, State Cancer Institute, Kurnool Medical College, Kurnool.
[2]Associate Professor, Department of Surgical Oncology, State Cancer Institute, Kurnool Medical College, Kurnool.
[3]Assistant Professor, Department of Pathology, State Cancer Institute, Kurnool Medical College, Kurnool.

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Corresponding Author:

Dr. K. Sunil Kumar
Associate Professor,
Department of Pathology, State Cancer Institute, Kurnool Medical College, Kurnool.
Email Id: sunilkatari@gmail.com

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ABSTRACT

Background: Thyroid malignancies present significant diagnostic and therapeutic challenges. With increasing global incidence, specific demographic data is vital to optimize management protocols. This study aims to correlate the clinical diagnosis, cytological opinions and histological confirmational diagnosis after surgical interventions in a tertiary care hospital.

Material and Methods: This retrospective study was conducted over a six years period from 2018 to 2024. 102 patients with histologically confirmed differentiated thyroid lesions were included. Data on demographics, clinical diagnosis, cyto-histological diagnosis were analysed.

Results: Among thyroid lesions, the majority of the lesions were colloid goitre (28.4%) and colloid nodular goitre (15.6%) followed by adenomatous goitre (11.7%), papillary carcinomna thyroid (11.7%), multinodular goitre (8.8%), follicular carcinoma (7.8%), hurthle cell neoplasm (6.8%), follicular variant of papillary carcinoma (2.9%), hashimoto thyroiditis (1.96%), medullary carcinoma (0.98%), autoimmune thyroiditis (0.98%), follicular adenoma (0.98%), and toxic nodular goitre (0.98%). Clinical evaluation of thyroid lesion and their histopathological diagnosis showed overall Sn-sensitivity of 94.4%, Sp-specificity of 83.3%, Positive Predictive Value - PPV – 93.1%, Negative Predictive value - NPV-86.2%. Cytological and their histopathological diagnosis showed overall Sn-sensitivity of 98.5%, Sp-specificity of 53.3%, Positive Predictive Value - PPV – 82.7%, Negative Predictive value - NPV-94.1%.

Conclusion: The purpose of this study was to compare the results of FNAC using Bethesda system with the final histological diagnosis and the initial clinical diagnosis in order to determine the accuracy of the diagnosis of thyroid lesions. The study findings reinforce the significance of comprehensive preoperative evaluation, definite treatment and long-term follow-up in differentiated thyroid cancers.

Keywords: Thyroid carcinoma, Colloid goitre, Papillary thyroid cancer, Follicular thyroid cancer, Hurthle cell carcinoma, Neck swelling, Total thyroidectomy.

INTRODUCTION

Thyroid lesions are commonly found in general population and encountered in the clinical practice at both medical and surgical departments. The American Thyroid Association defines a TN as a "discrete lesion in the thyroid gland that is distinct radiologically from the surrounding thyroid parenchyma" [1]. Thyroid nodules can affect the health of the population which can turn into complications like pressure symptoms, thyroid cancer, hemorrhage and thyroid storm. The prevalence of thyroid nodules in each region depends on the screening methods and population demographics. The risk factors prone to increase the thyroid problems in people are advancing age, being a female, iron deficiency anaemia, diet high in goitrogenic substances and history of exposure to thyroid radiation [2]. The most frequently observed cases of TNs include colloid nodules, Hashimoto's thyroiditis, subacute thyroiditis, cysts, follicular adenomas, and thyroid cancer.

Along with the thorough clinical evaluation many inventions in advanced medical field to diagnose thyroid lesions have developed. Needleless diagnostic procedures such as ultrasound of thyroid, PET scan, MRI and CT are competing with Fine needle aspiration cytology and confirmatory procedures such as core biopsies and excision biopsies. Every diagnostic test has advantages and disadvantages of their own and accuracy varies; the ultimate diagnostic test should distinguish the benign and malignant. A physical examination alone may reveal 5-7% prevalence. However, ultrasound screenings show a higher prevalence of 20-76%, which aligns with autopsy findings [3].

Thyroid cancer is the most common endocrine cancer. The incidence of this disease has dramatically increased worldwide, at higher rate than any other cancer [1]. The global spectrum of thyroid cancers has significantly risen in the past couple of decades, owing not only to genuine changes in incidence but also to the latest advancements in diagnostic techniques like high-resolution ultrasonography and fine-needle aspiration cytology (FNAC), which have enhanced the detection of subclinical and early-stage disease [2]. Specifically, thyroid carcinomas like papillary thyroid carcinoma (PTC) and follicular thyroid carcinoma (FTC), account for more than 90% of all thyroid cancers, usually carry a good prognosis with early diagnosis and appropriate management [6].

This study mainly focused on the Clinical and Cyto-histological correlation in Thyroid lesions in State Cancer Institute, Kurnool.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of Surgery, Kurnool Medical College, Kurnool and Department of Pathology, State Cancer Institute, Kurnool considering a period of six years from January 2018 to December 2024 with a sample size of 102. The objective was to analyse the clinical and Cyto-histopathological features in patients with thyroid lesions at this tertiary care centre. Ethical approval was obtained from the Institutional Ethics Committee prior to the commencement of the study.

102 adult individuals with swelling in the thyroid region who underwent both thyroid FNAC and Biopsy after surgery were included in this study. Patients, who were previously treated for thyroid lesions elsewhere, were excluded from the study. Additionally, cases with incomplete clinical records and those unwilling to provide informed consent were excluded.
FNAC specimens were performed by the pathologist either direct aspiration of specimen from dominant nodule or USG guided aspiration. After assessing the adequacy of specimen, those specimen flooded slides are fixed with methanol for half an hour and then stained with H & E stain. Results of FNAC were available on the day of examination. Thyroid cytology was reported according to the Bethesda System 2017 as non-diagnostic or unsatisfactory (Bethesda I), benign (Bethesda II), atypia of undetermined significance or follicular lesion of undetermined significance (Bethesda III), follicular neoplasm or suspicious for a follicular neoplasm (Bethesda IV), suspicious for malignancy (Bethesda V), and malignant (Bethesda VI) [7].

Biopsy specimens were received after surgery in 10% diluted formalin. On receiving to department of pathology, the gross features such as type of specimen, size, weight, nodularity, capsulation, and secondary changes like hemorrhage, calcification, and cyst were noted. Grossing was done about 2-3 millimetres thickness and those sections were further processed by blocking and staining with H&E as per the standard protocols. All the smears were examined by experienced pathologists. If require the blocks were processed for special stains and IHC to find the ultimate diagnosis.

A true positive (TP) case was one in which a definitive histological diagnosis of cancer followed a cytological diagnosis of malignancy or suspected malignancy. True negative (TN) cases were defined as those with negative cytological diagnoses and benign histological findings. A non-neoplastic lesion that often does not need surgical intervention is referred to as a false negative (FN) diagnostic when it is applied to a malignant lesion. When a non-neoplastic lesion is mistakenly diagnosed as a neoplasm and surgical removal is necessary, this is called a false positive (FP) cytological diagnosis [8].
Data Collection: Data collection began with a detailed clinical history, radiological reports and probable clinical diagnosis for all cases, secondly, FNAC procedure reports and finally histopathological reports of all the patients included in the study were reviewed.

Statistical analysis: A continuous qualitative variables were expressed as frequency and percentage. Positive predictive value (PPV), negative predictive value (NPV), specificity, correctness of FNA to the final histology result, and sensitivity were the parameters that were calculated.

RESULTS

All the 102 cases were analysed for the age wise and sex wise distribution of thyroid lesions and the results were recorded as per table 1. The predominant age group was observed in 21-60 years age group persons which were 92.1%, very less percentage around 8% was distributed in children and elderly age population. 86.2% of female predominance was noted.

Table 1. Age wise and sex wise distribution of thyroid lesions

Age Range	Male	Female	Total
0-10	0	0	0
11-20	0	0	0
21-30	1	20	21
31-40	4	23	27
41-50	2	30	32
51-60	4	10	14
61-70	3	2	5
71-80	0	2	2
81-90	0	1	1
TOTAL	14	88	102

Out of 102 thyroid abnormalities diagnosed cases 31 were malignant neoplasm, 1 benign neoplasm, 3 thyroiditis and 67 goitre were identified. Majority of Goitre and malignant neoplasm were identified in the age group of 21-50 years. Malignant neoplasms were also observed in >60 years of aged population who were all female (Table 2).

Table 2. Predominant diagnosis of thyroid lesions was distributed age and sex wise.

	Goitre (n=67)		Thyroiditis (n=3)		Benign Neoplasm (n=1)		Malignant Neoplasm (n=31)	
Age in years	Female	Male	Female	Male	Female	Male	Female	Male
21-30	15	0	0	0	1	0	4	1
31-40	17	3	0	0	0	0	6	1
41-50	19	1	3	0	0	0	8	1
51-60	8	2	0	0	0	0	2	2
>60	1	1	0	0	0	0	4	3
Total	60	7	3	0	1	0	24	8

As Histopathology remains the gold standard for Thyroid lesions, the Histopathological Diagnoses in 102 cases were recorded as per table no. 3. Among thyroid lesions, the majority of the lesions were colloid goitre (28.4%) and colloid nodular goitre (15.6%).

Table 3. Histopathological Diagnosis of studied population

Sl. No.	Histopathological Diagnosis	Number of Cases	Predominant Age Group
1.	Colloid Goitre	29 (28.4%)	30-50 yrs
2.	Colloid Nodular Goitre	16 (15.6%)	31-40 yrs
3.	Adenomatous Goitre	12 (11.7%)	21-30 yrs
4.	Papillary Carcinoma Thyroid	12 (11.7%)	30-40 yrs
5.	Multi Nodular Goitre	9 (8.8%)	40-50 yrs
6.	Follicular Carcinoma	8 (7.8%)	40-50 yrs
7.	Hurthle Cell Neoplasm	7 (6.8%)	40-50 yrs
8.	Follicular Variant of Papillary Carcinoma	3 (2.9%)	30-40 yrs
9.	Hashimoto Thyroiditis	2 (1.96%)	40-50 yrs
10.	Medullary Carcinoma	1 (0.98%)	55 Male
11.	Autoimmune Thyroiditis	1 (0.98%)	48 Female
12.	Follicular Adenoma	1 (0.98%)	21 Female
13.	Toxic Nodular Goitre	1 (0.98%)	35 Female

Clinical evaluation of thyroid lesion and their histopathological diagnosis were analysed statistically considering histopathology as a gold standard, showed overall Sn-sensitivity of 94.4%, Sp-specificity of 83.3%, Positive Predictive Value - PPV – 93.1%, Negative Predictive value - NPV-86.2% (Table 4 &5).

Cytological and their histopathological diagnosis were analysed statistically considering histopathology as a gold standard, showed overall Sn-sensitivity of 98.5%, Sp-specificity of 53.3%, Positive Predictive Value - PPV – 82.7%, Negative Predictive value - NPV-94.1% (Table 4 & 5).

Table 4. Statistical correlation of Clinical evaluation and Cytological diagnosis

	Histopathology		Cytopathology		Clinical evaluation	
	True Positive	Sn	True positive	Sn	True positive	Sn
Benign	71	100%	67	98.5%	68	94.4%
Malignant	31	100%	16	84.2%	25	86.2%

Table 5. Statistical correlation of Clinical evaluation and Cytological diagnosis

	Histopathology		Cytopathology		Clinical evaluation	
	True negative	Sp	True negative	Sp	True negative	Sp
Benign	31	100%	25	83.3%	16	53.3%
Malignant	72	100%	69	83.13%	68	93.15%

The thyroid lesions which were probably diagnosed as per clinical evaluation were finally diagnosed by histopathological lesions which were enlisted in the table 6.

Table 6. Histopathological diagnosis and clinical evaluation findings correlation

	Adenomatoid goitre	Autoimmune thyroiditis	Colloid goitre	Colloid Nodular goitre	Follicular adenoma	Follicular carcinoma	Mulitnodular goitre	Toxic nodular goitre	Hurthle cell neoplasm	Papillary carcinoma	Follicular variant of papillary carcinoma	Medullary carcinoma	Total
Solitary thyroid nodule	11	1	28	8	1	1	1	1	0	0	0	0	52
Multinodular goitre	0	0	1	8	0	1	7	0	3	1	0	0	21
Carcinoma thyroid	1	2	0	0	0	6	1	0	4	11	3	1	29
Total	12	3	29	16	1	8	9	1	7	12	3	1	102

The thyroid lesions which were probably diagnosed as per clinical evaluation were also diagnosed by cytological lesions which were enlisted in the table 7.

Table 7. Cytological diagnosis and clinical evaluation findings correlation

	Adenomatoid goitre	Autoimmune thyroiditis	Colloid goitre	Colloid Nodular goitre	Follicular adenoma	Follicular carcinoma	Hurthle cell neoplasm	Noidular goitre with colloid cyst	Follicular variant of papilary carcinoma	Toxic nodular goitre	Papillary carcinoma	Medullary carcinoma	Total
Solitary thyroid nodule	10	0	32	5	1	3	0	0	0	1	0	0	52
Multinodular goitre	3	0	8	8	0	0	1	1	0	0	0	0	21

Carcinoma thyroid	0	3	2	3	4	2	3	0	1	2	8	1	29
Total	13	3	42	16	5	5	4	1	1	3	8	1	102

The thyroid lesions which were probably diagnosed as per cytology were finally diagnosed by histopathological lesions which were enlisted in the table 8.

Table 8. Cytological and histopathological findings correlation

	Adenomatoid goitre	Autoimmune thyroiditis	Colloid goitre	Colloid Nodular goitre	Follicular adenoma	Follicular carcinoma	Multinodular goitre	Hurthle cell neoplasm	Follicular variant of papilary carcinoma	Toxic nodular goitre	Papillary carcinoma	Medullary carcinoma	Total
Adenomatoid goitre	10	0	1	0	0	0	0	1	0	0	0	0	13
Autoimmune thyroiditis		1					0				1		3
Colloid goitre			27	8			7						42
Colloid Nodular goitre			1	8		2		1		1	2	1	16
Follicular adenoma		1			1	1		2					5
Follicular carcinoma	1					4							5
Hurthle cell neoplasm								3			1		4
Noidular goitre with colloid cyst											1		1
Follicular variant of papilary carcinoma									1				1
Toxic nodular goitre		1				1	1				1		3

Papillary carcinoma									2		6		8
Medullary carcinoma	1												1
Total	12	3	29	16	1	8	9	7	3	1	12	1	102

DISCUSSION

Our study also confirmed the well-known female preponderance in thyroid lesions, with a female-to-male ratio of 16:1 while thyroid carcinomas sex ratio was 4:1 which is in line with population-based data from the Surveillance, Epidemiology, and End Results (SEER) Program in the United States, which shows a female-to-male ratio of 3:1 to 4:1 in DTCs [9].

In the present study out of 102 thyroid abnormalities diagnosed cases 31 were malignant neoplasm, 1 benign neoplasm, 3 thyroiditis and 67 goitre were identified. Majority of Goitre and malignant neoplasm were identified in the age group of 21-50 years. Malignant neoplasms were also observed in >60 years of aged population who were all female. Santosh UP et al showed maximum number of patients in 21–30 years (37.4%) [10]. Kumari et al also showed incidence was more in 30's and 40's of life age ranging from 31-40 years in about 44.4% patients [11].

The lack of awareness to risk factors such as prior radiation or strong family history in our study population correlates with the findings from Indian studies where sporadic cases are the norm, and familial or radiation-associated thyroid cancers are rare [12].

The accelerated detection of incidental thyroid nodules and cancers pose challenges regarding over-diagnosis and over management, an issue being discussed in global literature [13].

Among thyroid lesions, the majority of the lesions were colloid goitre (28.4%) and colloid nodular goitre (15.6%) followed by adenomatous goitre (11.7%), papillary carcinomna thyroid (11.7%), multinodular goitre (8.8%), follicular carcinoma (7.8%), hurthle cell neoplasm (6.8%), follicular variant of papillary carcinoma (2.9%), hashimoto thyroiditis (1.96%), medullary carcinoma (0.98%), autoimmune thyroiditis (0.98%), follicular adenoma (0.98%), and toxic nodular goitre (0.98%). Out of this papillary Carcinoma Thyroid (including follicular variant of papillary carcinoma) cases were 15 amounting to 50% of thyroid malignancies which correlates with the literature [9] followed by Follicular carcinoma with 8 cases and Hurthle cell neoplasms 6 cases. Padmawar et al [14] which shows their findings, they had 51 cases (89.47%) which were classified as benign, while 6 cases (10.52%) were identified as malignant from total of 57 patient studied. Jena et al [15] involving 162 patients, the histopathological diagnoses shows 77 patients (52.7%) to have nodular goitre, 10 (6.8%) were showing to have Hashimoto's thyroiditis, 1 (0.7%) with toxic goitre, follicular carcinoma in 9 (6.3%), papillary carcinoma in 46 (31.5%), and medullary carcinoma in 3 (2.1%). Of the 146 patients with papillary carcinoma, 15 had the follicular variant. Borgohain [16] reported 18% patients with nodular goitre, 5% showed to have Hashimoto's thyroiditis follicular carcinoma was seen in about 4%, papillary carcinoma in 10%, and only 3% showed to have medullary carcinoma of thyroid.

Clinical evaluation of thyroid lesion and their histopathological diagnosis were analysed statistically considering histopathology as a gold standard, showed overall Sn-sensitivity of 94.4%, Sp-specificity of 83.3%, Positive Predictive Value - PPV – 93.1%, Negative Predictive value - NPV-86.2%. Cytological and their histopathological diagnosis were analysed statistically considering histopathology as a gold standard, showed overall Sn-sensitivity of 98.5%, Sp-specificity of 53.3%, Positive Predictive Value - PPV – 82.7%, Negative Predictive value - NPV-94.1%. FNAC demonstrated a sensitivity of 90%, specificity of 93.9%, positive predictive value of 90%, negative predictive value of 93.94%, and an overall diagnostic accuracy of 92.45% when compared to histopathological diagnosis by None SR et al [17]. Saudi Arabia by Alshahrani et al [18] demonstrated FNAC sensitivity and specificity of 88.6% and 94.3%, respectively.

The cytological and histopathological correlation was observed with good sensitivity which is better compared to the clinical correlations mainly due to variations in the diagnosing a condition by clinical picture and the Bethesda system correlations [19,20].

In FNAC a thin, fine needle is inserted into the lump or mass. The needle is typically attached to a syringe, which creates a vacuum to draw a small sample of tissue and cells into the needle. FNAC may have higher rates of inconclusive or inadequate samples, sometimes requiring follow-up with a biopsy. Biopsy is a broader term that encompasses various

methods of obtaining tissue samples for examination. Biopsies can be performed using various techniques, including needle biopsies (such as core needle biopsy), surgical biopsies (such as incisional or excisional biopsy), and endoscopic biopsies. This study highlights the clinico-cytohistopathological correlation of thyroid lesions diagnoses in State Cancer Institute Kurnool, under Kurnool Medical College, Kurnool for a period of six years, reflecting both global patterns and region-specific variations. The predominance of papillary thyroid carcinoma over other subtypes aligns well with existing literature, which consistently reports papillary carcinoma as the most common thyroid malignancy, constituting around 80–85% of all cases [21,22].

CONCLUSION

This study reaffirms the female preponderance in thyroid lesions and that papillary carcinoma thyroid is the predominant thyroid malignancy in the Indian population with a peak incidence in the third and fourth decades of life. Definitely a notable gap is observed between the clinical and the cytohistological correlation in diagnoses which needs to be reduced in view of the latest diagnostic procedures both radiologically and pathologically as prompt early diagnosis and accurate management can reduce the morbidity and mortality**.**

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