

## Correlation Study of Fine Needle Aspiration Cytology of Thyroid Lesions With Thyroid Profile and Ultrasonography

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### Abstract

**Introduction:** Fine needle aspiration cytology (FNAC) of thyroid is a minimally invasive, cost-effective and an easy to perform outpatient procedure. FNAC along with thyroid function test (TFT) and ultrasonography (USG) helps in proper preoperative assessment, changes clinical management and improves patient outcome.

### Objectives:

1. To study the cytological features of thyroid lesions using FNAC using. The Bethesda System for Reporting Thyroid Cytology.
2. To correlate thyroid cytology with thyroid hormonal status and USG.

**Materials/Methods:** The study was conducted in the Department of Pathology from January 2020 to December 2020 and included 50 patients with thyroid lesions who underwent FNAC, thyroid function tests and USG. Lesions were evaluated cytologically and categorized according to Bethesda System of classification and correlated with Thyroid profile and USG.

**Results:** Out of 50 cases, females were most affected (92%). Most affected age group was middle aged (21-50 yrs). Bethesda Category I to VI cases were 4%, 82%, 2%, 4%, 2% and 6% respectively. Colloid goitre was the most common among non-neoplastic lesions. Majority of the benign and all malignant lesions were euthyroid. Hypothyroidism was mostly seen in Hashimoto thyroiditis. In 92% of the cases, USG and FNAC diagnosis correlated well.

**Conclusion:** FNAC is a simple diagnostic modality for thyroid lesions with high specificity. The study showed that cytological analysis in conjunction with thyroid profile and USG helps to make accurate diagnosis and determine the course of therapy in effective management of patients with thyroid lesions.

**Keyword:** Fine Needle Aspiration Cytology (FNAC); Thyroid; Thyroid Function Test; The Bethesda System for Reporting Thyroid Cytology (TBSRTC); USG.

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### Introduction

Fine needle aspiration cytology (FNAC) of thyroid is an easy to perform, minimally invasive, widely accepted as the most accurate outpatient procedure. FNAC is helpful in differentiating neoplastic from non-neoplastic lesions which can be useful in preventing unnecessary thyroidectomies, take correct management decisions, reduce the number of patients undergoing thyroid surgeries and

decrease the cost of health care.<sup>1</sup> FNAC along with hormonal functional tests and USG helps in proper preoperative assessment, changes the clinical management, and improves patient outcome.<sup>2</sup> Apart from cytology, ultrasonography (USG), thyroid function tests (TFTs) help in understanding of thyroid nodules under evaluation. Lesions of thyroid can be categorized as hypothyroid, euthyroid or hyperthyroid condition based on the evaluation of the level of T3, T4 and TSH.<sup>2</sup>

Though USG features alone cannot predict malignancy or benignity, but techniques that combine USG features and FNA cytology are most effective and very accurate for predicting malignancy.<sup>3</sup>

The use of FNAC has resulted in decrease in the number of patients who underwent surgical treatment by 25-50% and increased the percentage of malignant results in the operated group of patients. The incidence of malignancy at thyroidectomy has increased from 5 to 10% to 30 to 50% in the recent years.<sup>3</sup>

#### AIMS AND OBJECTIVE

- To study the cytological features of FNAC of thyroid lesions and categorize according to The Bethesda system for reporting thyroid cytology.
- To correlate thyroid cytology with thyroid hormonal status and USG.

#### MATERIAL AND METHODS

The present study was conducted in the Department of Pathology from January 2020 to December 2020. Fifty patients with thyroid lesions who underwent FNAC, thyroid function tests and USG were included. Lesions were evaluated cytologically and categorized according to the Bethesda System of classification and correlate with Thyroid profile and USG.

The Bethesda System 2017 for reporting thyroid cytopathology (TBSRTC): recommended diagnostic categories were followed while reporting

- Category I - Nondiagnostic or unsatisfactory
- Category II - Benign
- Category III - Atypia of Undetermined Significance (AUS) or Follicular Lesion of Undetermined Significance (FLUS)
- Category IV - Follicular neoplasm or suspicious for follicular neoplasm (FN/SFN)

- Category V - Suspicious for malignancy (SFM)
- Category VI - Malignancy

For biochemical correlation, results were categorized as euthyroid, hypothyroid and hyperthyroid and findings were correlated with cytological diagnosis. For radiological correlation, features of benign and malignancy were noted.

#### Procedure

Age, sex, clinical history, local examination, USG report, thyroid profile report was collected.

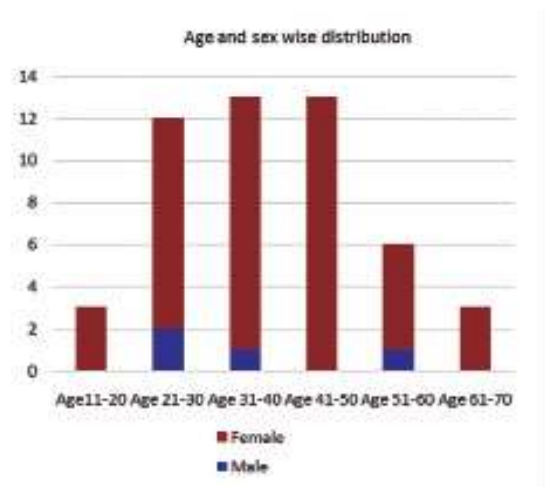
#### Sampling technique:

- Patient is kept in supine position with pillow under neck.
- Gland is fixed against trachea by one hand and aspiration done without local anaesthesia by moving needle back & forth for several times for short distance in one channel and maintain a negative pressure, until material appears at the cone of needle.
- Smears are then made from aspirated material.
- Immediately wet smears are fixed in 95% alcohol, stained with PAP and H&E, and for MGG stain smears are air dried.<sup>4</sup>

#### RESULTS

Total 50 cases of thyroid lesions were evaluated.

Age and sex wise distribution of the thyroid lesions was as shown in the following graph:



The patient's age range was 11-70 years. Most common affected age group was 21-50 with 76% cases. Total females were 46(92%) and males were

04 (08%). Female to male ratio was 11.5:1.

In present study, FNAC reporting of thyroid lesions was carried out according to TBSRTC as shown in Table 1. In present study most lesions

were in category II comprising of 41 cases out of 50 cases (82%).

Out of 50 cases studied, 2 cases were non diagnostic (4%) which belonged to Category I.

**Table 1:** FNAC reporting of thyroid lesions was carried out according to TBSRTC

Bethesda Categories	Number of cases
I - Non diagnostic or unsatisfactory	2
II - Benign	41
III - AUS or FLUS	1
IV - Follicular neoplasm or suspicious for follicular neoplasm	2
V - Suspicious for malignancy	1
VI - Malignant	3

Category II (Benign) were 82% of which colloid goitre being the commonest.

Category III (AUS) comprised of one case (2%).

Category IV (FN/SFN) constituted 2 cases(4%).

Category V (SFM) constituted one case (2%).

Category VI (Malignant) constituted 3 cases (6%).

The pattern of distribution of cases according to Thyroid hormonal status was as given in Table 2. Majority of patients (29 cases) were in euthyroid state followed by hypothyroid (14 cases) and hyperthyroid state (7). Colloid goitre and Nodular goitre were most common in Category II with majority of them being euthyroid (9 cases each).

In the present study, USG diagnosis was

**Table 2:** Distribution of thyroid lesions according to Thyroid hormonal status

Bethesda Categories	Cyodiagnosis	Euthyroid	Hyperthyroid	Hypothyroid	Total
I	Non diagnostic or unsatisfactory	-	1	1	2
II	Colloid goitre	9	3	1	13
	Nodular goitre	9	2	1	12
	Lymphocytic thyroiditis	2	1	3	6
	Hashimoto thyroiditis	3	0	7	10
III	AUS/FLUS	1	-	-	1
IV	Follicular neoplasm or suspicious for follicular neoplasm	2	-	-	2
V	Suspicious for malignancy	1	-	-	1
VI	Papillary carcinoma	2	-	1	3

**Table 3:** Distribution of thyroid lesions according to USG diagnosis compared with TBSRTC

USG diagnosis	No.of cases	Category I	Category II	Category III	Category IV	Category V	Category VI
Benign	45	2	41	-	2	-	-
Indeterminant	1	-	-	1	-	-	-
Malignant	4	-	-	-	-	1	3

compared with FNAC diagnosis as shown in Table 3.

Among 45 cases of benign lesions diagnosed on USG, 41 cases had similar diagnosis on cytology, remaining 2 cases were non diagnostic and 2 cases were in Category IV on cytology. One case had Indeterminant category both on cytology and USG. Among four malignant lesions on USG, one case was categorized in Category V and other 3 cases in Category VI.

The six TBSRTC categories along with their sub-categories are as below:<sup>8</sup>

**Category I - Non diagnostic or Unsatisfactory**

1. Cyst fluid only
2. Virtually acellular specimen
3. Other (obscuring blood, clotting artifact, etc.)

**Category II - Benign**

1. Consistent with a benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc.)
2. Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context
3. Consistent with granulomatous (subacute) thyroiditis
4. Other

**Category III - Atypia of Undetermined Significance or Follicular Lesion of Undetermined Significance**

**Category IV - Follicular Neoplasm or Suspicious for a Follicular Neoplasm**

1. Specify if Hürthle cell (oncocyctic) type

**Category V - Suspicious for Malignancy**

1. Suspicious for papillary carcinoma

2. Suspicious for medullary carcinoma
3. Suspicious for metastatic carcinoma
4. Suspicious for lymphoma
5. Other

**Category VI - Malignant**

6. Papillary thyroid carcinoma
7. Poorly differentiated carcinoma
8. Medullary thyroid carcinoma
9. Undifferentiated (anaplastic) carcinoma
10. Squamous cell carcinoma
11. Carcinoma with mixed features (specify)
12. Metastatic carcinoma
13. Non-Hodgkin lymphoma
14. Other

**DISCUSSION**

In present study, 50 cases of thyroid lesions were evaluated by FNAC in correlation with USG findings and TFT. We have correlated results of our study with several other studies.

In our study, out of 50 cases, maximum number of cases were between 21 to 50 years (76%) of age group, youngest being 11 years old and the oldest 70 years old. This was comparable with other studies done by Ranbhat et al.<sup>2</sup>, Rathod et al.<sup>5</sup> and was lower than Paudel et al.<sup>7</sup>

In our study, out of 50 cases, 46 patients were females and 4 were males. The female to male ratio was 11.5:1. So, females were more commonly affected than males. This was comparable with the studies done by Paudel et al.<sup>7</sup> and Suhani et al.<sup>4</sup> Both

**Table 4:** Comparison of Age group with other studies

Studies	Most Common Age Group (21- 50 Years)
Ranbhat et al. <sup>2</sup>	76%
Paudel et al. <sup>7</sup>	86%
Rathod et al. <sup>5</sup>	75%
Present Study	76%

**Table 5:** Comparison of Sex distribution with other studies

Studies	Male	Female
Paudel et al. <sup>7</sup>	14%	86%
Suhani et al. <sup>4</sup>	14%	86%
Present Study	8%	92%

the studies showed higher percentage of females and lower percentage of males who developed thyroid lesions.

In our study, out of 50 cases, 29 cases were in Euthyroid state constituting 58%. This was comparable with study done by Suhani et al.<sup>4</sup> which had 56% of euthyroid cases.

The thyroid lesions according to Bethesda categories of the present study were compared with Thakor et al.<sup>1</sup> and Suhani et al.<sup>4</sup> Out of 50 cases studied, 2 cases were non diagnostic (4%) which belonged to Category I. Category II (Benign) were 82% of which colloid goitre being the commonest. Category III (AUS) comprised of 2%. Category IV (FN/SFN) constituted 4%. Category V (SFM) constituted 2%. Category VI (Malignant)

constituted 6%.

Category I in the present study showed incidence of 4%, little lower than Thakor et al.<sup>1</sup> and higher than study done by Suhani et al.<sup>4</sup>

Category II showed incidence of 82% and was comparable to study done by Thakor et al.<sup>1</sup> and lower than study done by Suhani et al.<sup>4</sup>

Category III showed incidence of 2% and was comparable with both the studies.

Category IV showed incidence of 4%, in comparison with both the studies.

Category V showed incidence of 2% comparable to Suhani et al. <sup>4</sup> and lower than Thakor et al.<sup>1</sup>

Category VI showed incidence of 6% higher than

**Table 6:** Comparison of Distribution of cases according to TBSRTC

Bethesda Categories	Thakor et al. <sup>1</sup> (%)	Suhani et al. <sup>4</sup> (%)	Present Study (%)
I	6.4	0	4
II	80	92	82
III	2.4	1	2
IV	4	3	4
V	4	2	2
VI	3.2	2	6

**Table 7:** Comparison of Thyroid lesions according to cytological diagnosis

Studies	Non diagnostic (%)	Benign (%)	Indeterminant (including FLUS/ Suspicious of follicular Neoplasm) (%)	Malignant (including suspicious for malignancy) (%)
Kotasthane et al. <sup>3</sup>	6.4	75.6	10.3	7.7
Rathod et al. <sup>5</sup>	0	91	3	6
Present study	4	82	6	8

studies done by Thakor et al.<sup>1</sup> and Suhani et al.<sup>4</sup>

In our study, according to cytological diagnosis, benign lesions were more accounting for about 82%, This was higher than studies done by Kotasthane et al.<sup>3</sup> & lower than the study done by Rathod et al.<sup>5</sup>.

In our study, according to USG diagnosis, incidence of benign lesion was the most common and was 90%, This was higher than study done by Rathod et al.<sup>5</sup> and lower than the study done by Chittawadagi et al.<sup>6</sup>

**Table 8:** Comparison of distribution of Thyroid lesions according to USG diagnosis

Studies	Benign (%)	Indeterminant(%)	Malignant(%)
Rathod et al. <sup>5</sup>	73	23	4
Chittawadagi et al. <sup>6</sup>	94	4	2
Present study	90	2	8

**Table 9:** Discussion on Correlation between USG and Cytological diagnosis

Studies	Correlation (%)
Kotasthane et al. <sup>3</sup>	81.03
Present study	92

In total, 46 cases (92%) out of 50 cases had concordance between USG and cytological diagnosis. This was higher than compared to the other study.

**CONCLUSION**

Cases of thyroid lesions were more common in females. On FNAC, Benign lesions were more common than malignant lesions. Among benign lesions, predominant lesion was colloid goitre. Most of the thyroid lesions were euthyroid on evaluation by TFT. On USG, benign lesions were

more common than malignant lesions and 92% of them correlated with FNAC findings.

Thus, FNAC is an important diagnostic modality for evaluation of thyroid lesions. FNAC along with USG finding & TFT is helpful in making accurate diagnosis and for further planning of management of thyroid lesions.

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