

## Original Research Article

## Study of Thyroid Lesions in a Teaching Hospital with Cytopathology and Histopathology Correlation

Seetha Vijayalakshmi<sup>1</sup>, Swathi Sreesailam<sup>2</sup>, Kanya Kumari<sup>3</sup><sup>1,2</sup>Assistant Professor, <sup>3</sup>Associate Professor, Department of Pathology, Mamata Academy of Medical Sciences, Bachupally, Hyderabad, Telangana 500090, India.

## Abstract

**Introduction:** Thyroid lesions are common globally and also in India. Most of the lesions are non-neoplastic or benign but still there are chances of malignancy and hence most of the patients undergo initial FNAC test to ascertain the nature of lesion. Based on the FNAC report the necessity for surgery and extent of surgery are planned. **Aim of the study:** To study thyroid lesions on cytology and histopathology and also to study the correlation on cytology and histopathology. **Materials and Methods:** This was a prospective hospital based study. FNAC/thyroid cytology was done and studied in 143 patients. Out of 143 cases, histopathology examination was done in 63 cases and the findings were correlated. **Results:** For cytology, the patient age ranged from 12 years to 71 years and the male to female ratio was 0.3:1. Nodular/colloid goitre was the most common diagnosis reported on cytology. Cyto-histological correlation yielded sensitivity of 82.4% and the specificity of 91%. The positive predictive value and negative predictive value of cytology to detect thyroid malignancy was 88.6% and 85.9% respectively. **Conclusion:** Thyroid lesions are more common in the young adults and have a female preponderance. Cytology/FNAC study of thyroid has good sensitivity and specificity for determining the nature of lesions. FNAC procedure is rapid, simple, inexpensive tool and gives quicker diagnosis than the histopathology.

**Keywords:** Thyroid FNAC; Histopathology of thyroid; Thyroid cytology and histopathology correlation.

## Corresponding Author:

Swathi Sreesailam, Assistant Professor,  
Department of Pathology, Mamata Academy  
of Medical Sciences, Bachupally, Hyderabad,  
Telangana 500090, India.

E-mail: swathi191083@gmail.com

Received on 05.07.2019,

Accepted on 16.08.2019

## How to cite this article:

Seetha Vijayalakshmi, Swathi Sreesailam, Kanya Kumari. Study of Thyroid Lesions in a Teaching Hospital with Cytopathology and Histopathology Correlation. Indian J Pathol Res Pract. 2019;8(5):655-660.

## Introduction

Goitre is a common public health and clinical problem in many parts of the world and is common

in India too which is endemic for iodine deficiency. The prevalence of goitre in India is as high as 40%.<sup>1</sup> Most of the thyroid swellings are non-neoplastic or are benign. But the prevalence of malignancy

among the solitary nodule goitre is approximately 10% which is quite high.<sup>2</sup> Of all the endocrine organs, thyroid is most likely to get affected by malignancy accounting for more than 90% of all the endocrine cancers.

FNAC is a simple, minimally traumatic, speedy, safe, cost-effective and an accurate technique being used worldwide. FNAC in present clinical practice is commonly used for evaluation of thyroid swellings due to its many advantages.<sup>3</sup>

Despite the many advantages of FNAC the histopathological study is considered superior to FNAC because scanty or inadequate samples, blood-rich samples, variation in sampling technique and skill of the performing expert and as well as the experience of pathologist in interpretation of the smears, all influence the final FNAC report.<sup>4</sup>

In the present study we attempted to look at the spectrum of thyroid lesions on FNAC and their correlation with the histopathology in our population.

#### *Aim of the Study*

To study thyroid lesions on cytology and histopathology and also to study the correlation on cytology and histopathology

#### **Materials and Methods**

No ethical issues were involved in the study. Informed consent was taken from all patients undergoing Fine Needle Aspiration Cytology (FNAC).

This was a prospective study, done in the department of Pathology at Mamata Academy of Medical Sciences, Bachupally, Telangana State, India. A prospective analysis of cases and slides was done on material collected over a period of nine months from August 2018 to April 2019. A total of 140 cases were included. The clinical details and provisional diagnosis were noted from the test requisition forms. Findings of Ultrasound neck were also noted from the test requisition forms and patient reports wherever available. Patients for thyroid FNAC were referred to our department from General Medicine, General Surgery and ENT OPDs.

#### *Inclusion criteria*

1. Patients in all age groups and both the genders

2. Ultrasound guided FNA material sent from department of Radiodiagnosis was also included
3. Euthyroid, hypothyroid, hyperthyroid and hormone status unknown, all were included.

#### *Exclusion criteria*

1. Inadequate samples
2. For those patients who had a repeat second FNA during the study period, the attempt with inadequate material was excluded.

FNAC thyroid was done in all 140 cases under aseptic precautions. Histological confirmation was available in 63 cases only. The cases which had both modalities of reporting were considered for correlation.

The FNA procedures were done by the pathologist in the laboratory/FNAC room as an outpatient procedure. The material was collected by aspiration with the patient in supine or sitting position with the neck in an extended position so as to make the thyroid swelling appear prominent. FNAC was done by using a 2.5 cm long, 23–25 gauge needle attached to a 5cc or 10cc disposable syringe. Ultrasound guided FNA was done in a few cases where the procedure was performed by the radiologist.

The material was collected, smears were made and immediately wet fixed in Coplin's jar with isopropyl alcohol for hematoxylin and eosin staining and Papanicolaou staining. Air dried smears were stained with Giemsa stain. The smears that had at least 6 clusters, with 10–15 cells per cluster were considered as adequate for cytological study.

Subsequently, some of the patients underwent surgery for hemithyroidectomy, subtotal or total thyroidectomy. These thyroid specimens were grossed and submitted for histopathological examination. Histopathology and cytology results were correlated and analyzed. Sensitivity, specificity, efficacy, positive and negative predictive values for neoplasms and malignancies were calculated.

#### **Results**

A total of 140 patients had thyroid cytology and a total of 63 patients had cytology and histopathology diagnosis available. For cytology, the patient age ranged from 12 years to 71 years and the male to female ratio was 0.3:1.

**Table 1:** Age-wise distribution of the patients

Age (in years)	No. of cases	Percent (%)
0-10	-	
11-20	7	05%
21-30	42	30%
31-40	46	32.85%
41-50	26	18.57%
51-60	18	12.85%
61 and above	1	0.71%
<b>Total</b>	<b>140</b>	<b>100%</b>

Majority (62.8%) of the patients were in the 21 to 40 years age groups (Table 1).

There was female preponderance with 75% of female patients and the male to female ratio was 1:3 (Table 2).

**Table 2** Gender-wise distribution of the cases

Age (in years)	No. of cases	Percent (%)
Males	35	25%
Females	105	75%
<b>Total</b>	<b>140</b>	<b>100%</b>

Majority of the patients (66%) presented with goiter/thyroid enlargement (Table 3)

Nodular goiter was the most common (63%) diagnosis rendered on cytology (Table 4).

**Table 3:** Distribution of cases based on clinical features

Clinical presentation	No. of cases	Percent (%)
Neck swelling/Diffuse or nodular goitre	93	66%
Neck pain	05	04%
Neck discomfort	27	19%
Dysphagia and/ or hoarseness of voice	15	11%
<b>Total</b>	<b>140</b>	<b>100%</b>

**Table 4:** Cytological diagnosis

Microscopy diagnosis	No. of cases	Percent (%)
Nodular goitre	88	63%
Colloid goitre	12	08%
Colloid nodule	15	11%
Follicular neoplasm	06	04%
Hashimoto's thyroiditis	17	12%
Acute supportive thyroiditis	01	01%
Suspicious of malignancy	01	01%
<b>Total</b>	<b>140</b>	<b>100%</b>

Out of 140 cases of FNAC, histopathology was available in 63 cases and both modalities of reporting were correlated (Table 5)

Correlation between the results of Cytology and Histopathology was done (Table 6).

*Sensitivity, specificity, PPV and NPV of Cytology for detecting thyroid lesions:* The sensitivity was 82.4% and the specificity was 91%. The positive predictive value and negative predictive value of cytology to detect thyroid malignancy was 88.6% and 85.9% respectively.

**Table 5:** Histopathological diagnosis

Microscopy diagnosis	No. of cases	Percent (%)
Adenomatous goitre	36	57.14%
Follicular adenoma	04	6.34%
Hashimotos thyroiditis	10	15.87%
Papillary carcinoma of thyroid	2	11.7%
Hurthle cell adenoma	02	3.17%
Colloid nodule	03	4.76%
Colloid goitre	06	9.5%
<b>Total</b>	<b>63</b>	<b>100%</b>

**Table 6:** Cytology and histopathology correlation

Cytological diagnosis (FNAC)	Histopathological diagnosis	Remarks
Colloid nodule (8)	Colloid goitre (3)	True positive
	Colloid nodule (3)	
	Nodular goitre (1)	
Nodular goitre (32)	Follicular adenoma (1)	False negative
	Nodular goitre (26)	True positive
	Hashimotos thyroiditis (4)	False negative
Colloid goitre (7)	Follicular adenoma (2)	True positive
	Colloid goitre (3)	
	Nodular goitre (3)	
Hashimotos thyroiditis (10)	Fibrous thyroiditis (1)	False negative
	Hashimotos thyroiditis (6)	True positive
	Nodular goitre (4)	False positive
Follicular neoplasm (6)	Follicular adenoma (1)	True positive
	Hurthle cell adenoma (1)	
	Nodular goitre (2)	
	PTC (2)	False negative

## Discussion

An enlarged thyroid often leads to a battery of investigations to rule out the possibility of a neoplasm. Patients with goitre are advised to undergo ultrasound (US) examination, thyroid function tests, thyroid scan, serum antibody level testing and lastly FNAC as it is a relatively invasive procedure. The main purpose of FNAC is to segregate the patients who would require surgical management from those who would require medical management.<sup>5</sup>

Though thyroid fine-needle aspiration cytology (FNAC) was introduced long back in 1950, it gained popularity became popular worldwide in 1980.<sup>6</sup>

In the present study a total of 147 thyroid lesions were studied on cytology/FNAC.

**Sample size:** Gupta *et al.* studied<sup>7</sup> a total of 75 patients with solitary thyroid nodule in their series. Susmitha *et al.*<sup>8</sup> studied a total of 378 FNACs of thyroid of which 107 cases presented with solitary

thyroid nodule. In the study by Hathila *et al.*<sup>9</sup> a total of 60 cases of thyroid lesions were evaluated. Chaudhari *et al.*<sup>10</sup> performed FNACs in 136 patients.

**Age distribution:** In our study majority (62.8%) of the patients were in the 21 to 40 years age groups. In the study by Gupta *et al.*<sup>7</sup> 42/75 patients (56%) patients were in the 20 to 40 years age group. Susmitha *et al.*<sup>8</sup> studied cytology in 107 patients of which in 40 cases the cyto-histological correlation was available. In the study by Hathila *et al.*<sup>9</sup> most of the cases presented in 31–50 years age group. Chaudhari *et al.*<sup>10</sup> observed that most of the patients (70/136, 51%) were in the age group of 20–40 years. In the study by Kumara Rama *et al.*<sup>11</sup> 51% patients were in the 25 to 40 years age group.

**Gender distribution:** In our study there was a definite female predominance with a male to female ratio of 1:3. Various studies have reported female predominance in thyroid lesions with the male to female ratio of 1:11.5,<sup>7</sup> 1:10,<sup>8</sup> 1:9,<sup>11</sup> 1:22.<sup>12</sup> Our findings compare well with the above studies.

**Clinical features:** In our study the most common clinical presentation was of thyroid enlargement either diffuse or nodular. In the study by Gupta *et al.*<sup>7</sup> the most common presentation in 80% (60/75) patients was of neck swelling. Chaudhari *et al.*<sup>10</sup> observed that the most common presenting symptom in their study was of painless solitary nodule. Patients can sometimes also present with symptoms of hypothyroidism or hyperthyroidism or with cough, dysphagia and hoarseness of voice or in rare instances as cervical lymphadenopathy in occult thyroid malignancies.

**Cytological diagnosis:** Colloid or nodular goitre with or without secondary changes is the most common diagnosis given on cytology. In our study, nodular goitre was the most common diagnosis rendered in 63% cases. Kumara Rama *et al.*<sup>11</sup> in their study observed goitre (colloid and adenomatous) in 78% cases. Susmitha *et al.*<sup>8</sup> observed colloid and nodular goitre in 71.6% cases. Ramteke *et al.*<sup>13</sup> observed colloid goitre in 71.5% cases on FNAC. Chaudhari *et al.*<sup>10</sup> observed nodular goitre in 55.8% cases in their study. Susmitha *et al.*<sup>8</sup> observed colloid goiter with secondary changes in 6.5%, Nodular colloid goiter with cystic change (21.5%), Nodular colloid goiter with adenomatous hyperplasia (14.7%), Hashimoto's thyroiditis (3.7%), Follicular neoplasm in 8.4% of total cases. Papillary

carcinoma, medullary carcinoma and anaplastic carcinoma accounted for 3.7%, 1.9% and 0.9% respectively in their study. The most common neoplasm was Follicular neoplasm and the commonest malignancy was papillary carcinoma. In our study on FNAC there was only one case that was suspicious of malignancy.

In Gupta, *et al.*<sup>7</sup> study FNAC results revealed 39 (52%) cases as colloid nodular goitre, 12 (16%) as follicular neoplasm, 9 (12%) as papillary carcinoma, 6 (8%) as Hurthle cell lesions, 6 (8%) as benign cystic lesions, and 3 (4%) cases as suspected of malignancy. A wide range of lesions can be picked up on FNAC. Chaudhari *et al.*<sup>10</sup> observed among 136 patients, 81.6% were non-neoplastic, and 18.4% were neoplastic on cytology.

**Cytology and histopathology correlation:** In our study in 63 cases, cytology and histopathology correlation was available. The sensitivity was 82.4% and the specificity was 91%. The positive predictive value and negative predictive value of cytology to detect thyroid malignancy was 88.6% and 85.9% respectively.

All the above studies have reported a good correlation between the cytological and histological findings. Our study compares well with the above authors (Table 7).

Table 7 Comparative studies for sensitivity and specificity

Studies	Year of study	Sensitivity	Specificity
Harsoulis <i>et al.</i> <sup>14</sup>	1986	89.4	95.4
Hawkins F <i>et al.</i> <sup>15</sup>	1987	86.3	95.3
Afroze N <i>et al.</i> <sup>16</sup>	2002	80.9	99.3
Aramani <i>et al.</i> <sup>17</sup>	2015	96.3%	100%
Pandey <i>et al.</i> <sup>18</sup>	2012	57.1%	90%
Gupta <i>et al.</i> <sup>7</sup>	2010	80%	86%
Hathila <i>et al.</i> <sup>9</sup>	2016	87.5%	96.1%
Ramteke <i>et al.</i> <sup>13</sup>	2017	92.3%	97.0%
Chaudhari <i>et al.</i> <sup>10</sup>	2015	90%	96%
<b>Present study</b>	2019	82.4%	91%

## Conclusion

Thyroid lesions are more common in the young adults and have a female preponderance. Cytology/FNAC study of thyroid has good sensitivity and specificity for determining the nature of lesions. FNAC procedure is rapid, simple, inexpensive tool and gives quicker diagnosis than the histopathology. By adopting FNAC for preoperative evaluation of thyroid lesions, near exact categorization of lesions can be done and unnecessary thyroid surgeries for benign lesions can be avoided.

## References

1. Agarwal S. Diagnostic accuracy and role of fine needle aspiration cytology in management of thyroid nodules. *J Surg Oncol.* 1995;58:168-72.
2. Rojeski MT, Gharib H. Nodular thyroid disease: Evaluation and management. *New Eng J Med.* 1985;313:428-36
3. Orell SR, Sterrett GF, Whitaker D. Thyroid in Fineneedle aspiration cytology, 4<sup>th</sup> ed, Philadelphia: Churchill Livingstone; 2005. pp.125-64.

4. Shere SK, Kulkarni AS, Phulgirkar PP, *et al.* Correlation of fine needle aspiration cytology with histopathology in diagnosis of thyroid lesions. *J Evolution Med Dent Sci.* 2013;2(26):4826-31.
5. Caruso P, Muzzaferri EL. Fine needle aspiration biopsy in the management of thyroid nodules. *Endocrinology.* 1991;1:194-202
6. Tabaqchali MA, Hanson JM, Johnson SJ, *et al.* Thyroid aspiration cytology in Newcastle: A six year cytology/histology correlation study. *Ann R Coll Surg Engl.* 2000;82:149-55.
7. Gupta M, Gupta S, Gupta VB. Correlation of Fine Needle Aspiration Cytology with Histopathology in the Diagnosis of Solitary Thyroid Nodule. *Journal of Thyroid Research* 2010, Article ID 379051, 5 pages.
8. Susmitha MS, Veena S, Babau RK. Fine Needle Aspiration Cytology of Solitary Thyroid Nodule with Histopathology Correlation. *Annals of Pathology and Laboratory Medicine.* 2017;4(6):A755-760.
9. Hathila R, Patel S, Vaghela P, *et al.* Cytology findings of the thyroid lesions with the histopathology findings correlation. *Int J Med Sci Public Health.* 2016;5:642-646.
10. Chaudhari S, Hatwal D, Bhat P, *et al.* Cytological Evaluation of Thyroid Lesions and its Correlation with Histopathology: A Prospective Study. *Int J Sci Stud.* 2015;3(8):132-35.
11. Kumara Rama BS, Raju R, Radhakrishnan S. Correlation of Fine Needle Aspiration Cytology with Histopathology in the Diagnosis of Thyroid Swellings. *Bengal Journal of Otolaryngology and Head Neck Surgery.* 2016;24(2):54-59.
12. Kanyakumari M, Pushpalatha K. Cytological evaluation of thyroid lesions and its correlation with histopathology in a teaching hospital. *Indian J Pathol Oncol.* 2018;5(4):625-630.
13. Ramteke DJ, Mulay PS. Cyto-histopathological correlation of thyroid lesions. *Int J Res Med Sci.* 2017;5:1425-9.
14. Harsoulis P, Leontsini M, Economou A, *et al.* Fine needle aspiration biopsy cytology in the diagnosis of thyroid Cancer: comparative study of 213 operated patients. *Br J Surg.* 1986;73:461-4.
15. Hawkins F, Bellido D, Bernal C, *et al.* Fine needle aspiration biopsy in the diagnosis of thyroid cancer and thyroid disease. *J Cancer.* 1987;59:1206-9.
16. Afroze N, Kayani N, Hasan S. Role of fine needle aspiration cytology in the diagnosis of palpable thyroid lesions. *Indian J pathol Microbiol.* 2002;45(3):241-6.
17. Aramani SS, Gururajaprasad C. A cytohistopathological correlation of thyroid lesions with critical evaluation of discordant cases: an experience at a tertiary care hospital. *Annals of Pathology and Laboratory Medicine (APALM).* 2017;4(3):A243-48.
18. Pandey P, Dixit A, Mahajan NC. Fine needle aspiration of the thyroid: A cytohistologic correlation with critical evaluation of discordant cases. *Thyroid Research and Practice.* 2012;9(2):32-39

