

**ORIGINAL RESEARCH**

# Cytomorphology of thyroid lesions & its correlation with thyroid function tests

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**ABSTRACT**

**Introduction** - FNAC of thyroid is minimally invasive, cost effective, simple and outpatient procedure. FNAC along with USG and Serum T3, T4, and TSH is the effective way to evaluate Thyroid lesions. According to the guidelines put forth by American Thyroid association, Serum TSH should be a part of initial assessment of thyroid lesions. **Methods** - It was a prospective study. 135 cases of thyroid lesions had undergone for FNAC and blood sample was taken for serum estimation of T3, T4, and TSH. Results were categorised using Bethesda system of reporting thyroid cytopathology 2023 and correlated with Serum T3, T4 and TSH. **Results** - Majority of cases were of colloid goitre (60%) followed by lymphocytic thyroiditis (14.8%). Thyroid lesions on FNAC were also classified on the basis of TBSRTC -2023. Out of 135 cases, 107 cases were from Category 2 (Benign) followed by Category 1 (non diagnostic - 11) and category 6 (Malignant - 7). Thyroid function status of 135 cases were also done and compared with Cytological findings. Out of 135 cases, majority of cases were Euthyroid (68.8%) followed by Hypothyroid (21.5%) and Hyperthyroid (9.7%). Maximum number of euthyroid cases were of colloid goitre followed by adenomatoid nodule. Majority of cases of lymphocytic thyroiditis were hypothyroid. None of the malignant cases were hyperthyroid. **Conclusion**- FNAC along with Thyroid function tests can be used for early and accurate diagnosis of thyroid lesions avoiding unnecessary surgical interventions. Thyroid nodules usually show euthyroid status but in order to rule out biochemical euthyroidism, free T3 and T4 should be assessed.

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**INTRODUCTION**

Thyroid disorders are very common cause of endocrinal disturbances<sup>1</sup>. Thyroid swelling is a common presentation of various disorders of thyroid. Majority of swellings are non-neoplastic and do not always require surgical intervention. Less than 5% of thyroid nodules are malignant<sup>2</sup>. The prevalence of thyroid swelling ranges from 4% to 7% in general adult population and from 0.2% to 1.8% in children<sup>3</sup>. Thyroid lesions may cause signs and symptoms of hypothyroidism or hyperthyroidism and also have malignant potential<sup>4</sup>. Thyroid fine needle aspiration cytology (FNAC) was introduced in 1950 and became popular worldwide in 1980<sup>5</sup>. Fine needle aspiration cytology (FNAC) is a widely accepted screening procedure in diagnosis of diffuse and solitary thyroid nodules. FNAC of thyroid is a simple, minimally invasive, cost-effective, readily available, reliable, time saving and easy to perform outpatient procedure. FNAC of thyroid is a widely accepted most accurate procedure to differentiate neoplastic from non-neoplastic lesions which can lead to correct management decisions and to prevent unnecessary thyroidectomies<sup>6</sup>. Widespread use of FNAC has reduced number of patients requiring surgery by more

than 50%. FNAC not only prevents unnecessary thyroid surgery for benign nodules but also has increased malignancy rate in resected nodules from 14% to 50%<sup>7</sup>. The Bethesda system for reporting thyroid cytopathology reporting (TBSRTC) is a six category scheme of thyroid cytopathology reporting. These include nondiagnostic /unsatisfactory, benign, Atypia of undetermined significance (AUS/FLUS), suspicious for follicular neoplasm (SFN), suspicious for malignancy (SM), and malignant. Each category has cancer risk ranges from 0% to 3% for benign category to virtually 100% for the malignant category<sup>8,9</sup>. Thyroid lesions can also be classified on the basis of hormonal profile as hyperthyroid, euthyroid and hypothyroid. So the use of FNAC in conjunction with thyroid hormonal profile helps in assessing the stage of disease and deciding the treatment option for the patient.

**MATERIALS & METHODS**

This is a prospective study of thyroid lesions carried out at cytopathology section of Pathology department of GMC Jammu over a period of one year from 2022 to 2023. Patients from ENT OPD and Medicine OPD with complaints of thyroid swelling were taken for FNAC.

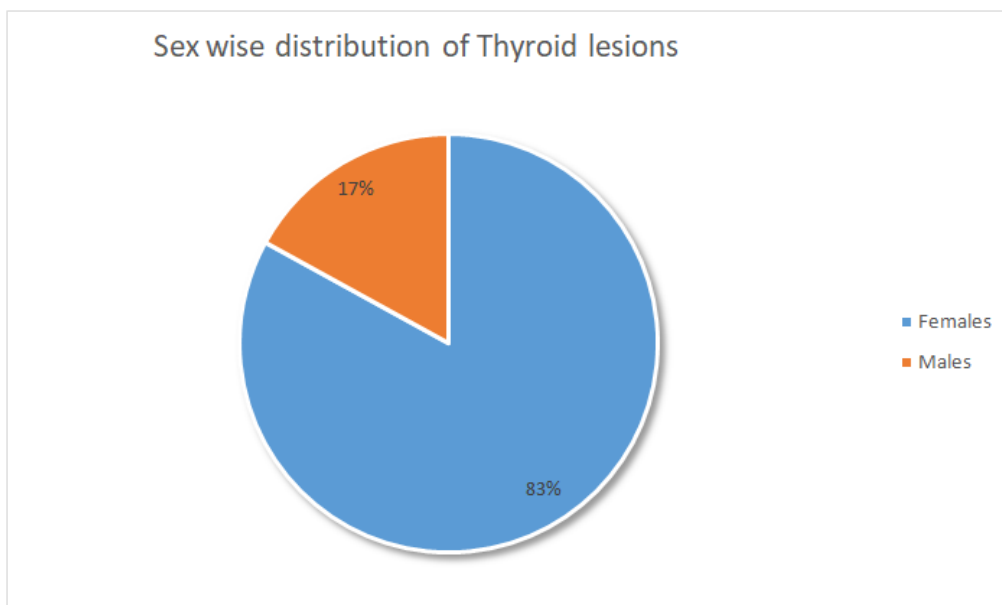
135 FNAC were performed during this period irrespective of age and gender. Detailed clinical history about duration, site, sex, age, size and clinical examination of thyroid gland was performed. Findings of thyroid function test (T3,T4,TSH) were also recorded. Details of procedure were explained to patients and informed consent was taken prior to procedure. Following standard procedure under a aseptic precautions, FNAC was done with 23 gauge needle. Wet and dry smears were made and stained with Pap and Giemsa stain respectively. Wet smears were fixed with 95% methanol prior to staining. Using light microscopy, Cytological details were recorded and categorised using TBSRTC. Findings of Thyroid function tests were categorised into euthyroid, hypothyroid and hyperthyroid and its findings were

correlated with cytological findings of thyroid lesions. The permission from ethical committee has been taken.

**RESULTS**

Among the 135 thyroid FNA cases studied irrespective of their age and gender referred from ENT / Medicine / Surgery OPD of GMC Jammu. Out of 135 patients, 112 patients (83%) were females and 23 patients (17%) were males. Male: Female ratio was 1: 4.9. The patients presented in the present study were in the age group ranges from 11 yrs to 80 years . Majority of patients were in the age group of 31- 40 yrs( 29.6%) followed by 41 - 50 years ( 20.7%) and 51-60 years ( 19.2%) .

Age group ( in years)	Number of males	Number of females	Total number of patients
0 - 10	0	0	0
11 - 20	01	07	08
21 - 30	03	18	21
31 - 40	09	31	40
41 - 50	03	24	27
51 - 60	04	22	26
61 - 70	02	08	10
71 - 80	01	02	03
<b>Total number</b>	<b>23 ( 17% )</b>	<b>112 (83% )</b>	<b>135 (100%)</b>



Majority of cases were of colloid goitre ( 60 % ) followed by lymphocytic thyroiditis ( 14.8 % ) .

S.no	Cytological Diagnosis	No. of cases	Percentage
1	Non diagnostic	11	8.1%
2	Colloid goitre / Multinodular goitre	81	60%
3	Adenomatoid nodule	06	4.4%
4	Lymphocytic thyroiditis	20	14.8%
5	Granulomatous thyroiditis	0	00%
6	Atypia of undetermined significance	0	00%

1	Follicular neoplasm	04	2.9%
2	Hurthle cell neoplasm	02	1.4%
3	Suspicious for malignancy	04	2.9%
4	Anaplastic carcinoma	01	0.7%
5	Papillary carcinoma	06	6%
	TOTAL	135	100%

Thyroid lesions on FNAC were also classified on the basis of TBSRTC -2023. Out of 135 cases, 107 cases were from Category 2 (Benign ) followed by Category 1( non diagnostic - 11) and category 6 (Malignant - 7)

TBSRTC category	Number of cases	Percentage
Cat. 1 ( Nondiagnostic)	11	8.2
Cat. 2 (Benign)	107	79.3
Cat.3 (AUS)	0	0
Cat.4 (FN ,FN-OFN)	06	4.4
Cat.5 (SFM)	04	2.9
Cat.6 (Malignant)	07	5.2
Total	135	100

Thyroid function status of 135 cases were also done and compared with Cytological findings. Out of 135 cases, majority of cases were Euthyroid (68.8 %) followed by Hypothyroid (21.5%) and Hyperthyroid (9.7%). Maximum number of euthyroid cases were of colloid goitre followed by adenomatoid nodule. Majority of cases of lymphocytic thyroiditis were hypothyroid. None of the malignant cases were hyperthyroid.

Cytological Diagnosis	Euthyroid	Hypothyroid	Hyperthyroid	Total
Inadequate	07	03	01	11
Colloid goitre / multinodular goitre	69	08	04	81
Adenomatoid nodule	05	01	00	06
Lymphocytic thyroiditis	02	12	06	20
Granulomatous thyroiditis	0	0	0	0
Atypia of undetermined significance	0	0	0	0
Follicular neoplasm	02	0	02	04
Hurthle cell neoplasm	02	0	0	02
Suspicious for malignancy	02	02	0	04
Anaplastic carcinoma	0	01	0	01
Papillary carcinoma	04	02	00	06
Total	93	29	13	135

## DISCUSSION

Most common FNA cytological diagnostic result in our study was colloid goiter (60%) followed by lymphocytic thyroiditis (14.8%) and inadequate smears (8.1%). Similar findings were reported in the study conducted by Sang et al. in which (83.3%) cases were reported as nodular goiter. In our study majority of cases with nodular goiter were euthyroid (77%), which is comparable to the study conducted by Sang et al. similar results were reported by study conducted by Jayaram et al. In our study out of 135 patients 93(68%) of the patients were euthyroid which was concordant with the clinical findings but they had biochemical euthyroidism i.e. Increased total T3 and T4 levels. This was attributable to thyroxin binding globulin (TBG), which can lead to anomalous results. T4 levels may be elevated when TBG concentration is increased as in pregnancy, hepatitis, congenital TBG excess and administration of estrogen or oral contraceptives. However free T3 and T4 levels were normal. Conversely Total T3 and T4 may be reduced when TBG concentration is decreased in certain conditions as nephrosis, hepatic failure,

congenital TBG deficiency, administration of androgens, glucocorticoids and some drugs like salicylates and fenclofenac. 4 out of 69 patients of Nodular goiter had hormonal profile of hyperthyroidism but did not show clinical symptoms of hyperthyroidism, which could be attributed to Autonomous functioning thyroid nodules (AFTN's which are TSH independent). AFTN's are usually accompanied by a euthyroid clinical picture in 80% of cases, only 20% of cases exhibit hyperthyroidism. Subclinical hypothyroidism is usually diagnosed during routine examination and defined as an elevation in TSH above the upper limit of the reference range with normal serum T4 and T3. In our study 3% of the patients had increased TSH with normal T3 and T4 levels. Similarly subclinical hyperthyroidism is defined biochemically as normal serum T4 and T3 and decreased TSH concentration and 5.2% patients were classified as such. Similar findings of subclinical hypo and hyper thyroidism were noted in a study conducted by Sang et .al

In our study 6% cases were reported as papillary carcinoma, followed by follicular neoplasm and suspicious of malignancy accounting for 2.9% each.

Out of 6 patients of papillary carcinoma, 4 patients were euthyroid and 2 patients were hypothyroid. Similarly out of 4 patients diagnosed as follicular neoplasm, 2 were euthyroid and 2 were hyperthyroid. Almost similar findings were noted in a study conducted by Sang et al. Viz. an abnormal TSH, T3 and T4 determination decreases the suspicion but does not eliminate the possibility of malignancy in a thyroid nodule. In our study 20 cases of lymphocytic thyroiditis were studied, out of which 2 cases of euthyroidism, 12 cases of hypothyroidism and 6 cases of hyperthyroidism were noted. Chronic lymphocytic thyroiditis is a common autoimmune disease which is characterized by marked lymphoid infiltrate destroying the thyroid follicles. Follicular architecture is completely destroyed and replaced by fibrosis in

cases of long duration of disease. Active phase of disease is transient with clinical manifestation of thyrotoxicosis while evolution and destruction phase manifest with subclinical or overt hypothyroidism.

FNAC smears were characterized by cellular aspirate with numerous dispersed heterogeneous lymphoid cells and few follicular cells. The diagnosis is established by correlating clinical findings with cytological and serological test results. Similar findings were related by the study conducted by Bhatia et al. and Singh et al. It was concluded in the above studies that lymphocytic infiltrate of thyroid follicles is pathognomonic of lymphocytic thyroiditis and emphasized upon it as gold standard. Our study correlated well with the studies conducted by Bhatia et al. and Singh et al. Typical patient with hypothyroidism secondary to autoimmune thyroiditis will have elevated TSH, decreased FT4. However in early stages of disease TSH may be normal.

Diagnostic category	Yassa L et al (2007) <sup>15</sup>	Yang J et al (2007) <sup>16</sup>	Jo VY et al (2010) <sup>17</sup>	Mondal SK et al (2013) <sup>3</sup>	Vaishali jain et al (2017)	Present study (2023)
Cat. 1	7%	10.4%	18.5%	1.2%	10.9%	8.2%
Cat. 2	66%	64.6%	59%	87.5%	69.1%	79.3%
Cat. 3	4%	3.2%	3.4%	1%	1.8%	0%
Cat. 4	9%	11.6%	9.7%	4.2%	10.9%	4.4%
Cat. 5	9%	2.6%	2.3%	1.4%	1.2%	2.9%
Cat. 6	5%	7.6%	7%	4.7%	6.1%	5.2%

## CONCLUSION

FNAC along with Thyroid function tests can be used for early and accurate diagnosis of thyroid lesions avoiding unnecessary surgical interventions. Thyroid nodules usually show euthyroid status but in order to rule out biochemical euthyroidism, free T3 and T4 should be assessed.

Papillary carcinoma and follicular neoplasm and cases reported as suspicious of malignancy with abnormal TFT (thyroid function tests) determination decreases the suspicion but does not eliminate the possibility of malignancy in a thyroid nodule. In cases of autoimmune thyroiditis, patients have increased TSH, decreased FT4. However in early stages TSH may be normal.

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