



Histopathological Study of Thyroid Lesions and its Correlation with Cytopathology and Imaging from a Tertiary Care Center

Dr. Het Patel¹, Dr. Ashwini Shukla^{2*}, Dr. Himali Makwana³, Dr. Niketa Roy⁴, Dr. Suchigodhani⁵, Dr. Nehapandya⁶

¹Third Year Resident M.D Pathology, Surat Municipal Institute of Medical Education and Research (SMIMER), Bombay Market Rd, Near Umarwada, Sahara Darwaja, Umarwada, Surat, Gujarat 395010, India

²Professor M.D Pathology, Surat Municipal Institute of Medical Education and Research (SMIMER), No. 5 Vidyavihar Society, Near Jamnagar Society, Ghoddod Road Surat, Gujarat 395001, India

³Third Year Resident M.D Pathology, Surat Municipal Institute of Medical Education and Research (SMIMER), Bombay Market Rd, Near Umarwada, Sahara Darwaja, Umarwada, Surat, Gujarat 395010, India

⁴Associate Professor M.D Pathology, Surat Municipal Institute of Medical Education and Research (SMIMER), Bombay Market Rd, Near Umarwada, Sahara Darwaja, Umarwada, Surat, Gujarat 395010, India

⁵Assistant Professor M.D Pathology, Surat Municipal Institute of Medical Education and Research (SMIMER), Bombay Market Rd, Near Umarwada, Sahara Darwaja, Umarwada, Surat, Gujarat 395010, India

⁶Tutor DCP Pathology, Surat Municipal Institute of Medical Education and Research (SMIMER), Bombay Market Rd, Near Umarwada, Sahara Darwaja, Umarwada, Surat, Gujarat 395010, India

OPEN ACCESS

*Corresponding Author Dr. Ashwini Shukla

Professor M.D Pathology,
Surat Municipal Institute of
Medical Education and
Research (SMIMER), No. 5
Vidyavihar Society, Near
Jamnagar Society, Ghoddod
Road Surat, Gujarat 395001,
India

Received: 15-05-2024

Accepted: 23-07-2024

Available online: 25-07-2024



©Copyright: IJMPR Journal

ABSTRACT

Introduction: Thyroid diseases are major health problems in society, which are manifested by alteration in hormone secretion, enlargement of the thyroid gland, or both. This study was designed to evaluate different patterns of thyroid lesions in surgically resected specimens and biopsies received at department of pathology and correlate it with Fine needle aspiration cytology findings and radiology reporting. We also evaluated discordant cases and analyzed them. **Materials and Methods:** 29 patients with thyroid nodule who underwent thyroidectomy and biopsy taken for an observational study from July 2022 to June 2023 at SMIMER Medical College, Surat. Cytological findings and radiological imaging were correlated with histopathological diagnosis. Patients who only underwent FNAC were excluded. **Results:** Histocytological correlation was done in 29 cases, amongst them 21 benign cases and 08 malignant lesions were diagnosed. The mean age of presentation of cases was 40.4 years with male: female ratio of 1:8.67. Malignancy was diagnosed among (66.67%) male and (23.08%) females. Histological patterns were nodular goiter (44.83%), thyroglossal cyst (6.9%), thyroiditis (10.34%), adenoma (10.34%), (Non Invasive Follicular Thyroid Neoplasm with papillary like nuclear features) NIFTP (10.34%), Hurthle cell carcinoma (3.45%), papillary carcinoma (13.8%). Concordance and discordance was noted in 82.15%, 17.85% cases respectively with radiology and cytology. **Conclusion:** Nodular goiter is most prevalent thyroid disease, while papillary thyroid carcinoma is most frequent cancer seen in this study. Taking into consideration of our study having discordant rate of 17.85% with radiology and cytology findings, we conclude histopathology report as a gold standard method for diagnosis of thyroid lesions.

Keywords: Histopathology, Bethesda system for reporting thyroid cytopathology, TIRADS (Thyroid Imaging Reporting and Data System).

INTRODUCTION

Thyroid diseases are major health problems, that manifested by alteration in hormone secretion, enlargement of the thyroid gland (goiter), or both.

The most prevalent thyroid diseases are Nodular goiter, thyroiditis, and neoplasms. The incidence and prevalence of thyroid diseases in a community are variables which depends on various factors [1, 2].

Thyroid cancers represent approximately 1% of diagnosed new cancer cases each year.

The incidence of thyroid malignancies is three times higher in women than men, and the incidence of thyroid cancer peaks in the third and fourth decades of life. Thyroid cancers are divided into papillary carcinomas, follicular carcinomas, and medullary thyroid carcinomas (MTCs), anaplastic carcinomas, primary thyroid lymphomas, and primary thyroid sarcomas [3, 4].

To diagnose different kinds of thyroid disease, complete clinical examination in addition to hormonal assays, radiological study and FNAC should be done. In the end, Histopathologic examination provides a definitive diagnosis [5, 6].

This retrospective study was conducted to identify thyroid disease histopathological patterns in patients who underwent thyroid surgeries in our hospital and correlate it with cytological and radiological findings.

Objectives

The objective of the study was as follows:

1. To study the spectrum of thyroid lesions
2. To correlate the histopathology findings with FNAC and radiological findings of excised specimens.
3. To study the radiological, FNAC and histopathological concordance discordance in thyroid lesions.

Materials and Methods

Our study is a retrospective analysis of 29 cases of thyroid nodules over a period of 1 years from July 2022 to June 2023 at SMIMER Medical College, Surat. Histopathology and FNAC slides were reviewed, double-blinded and reported by two independent observers. These data along with Imaging findings were documented and analyzed.

Inclusion Criteria: Patients with Thyroid nodule who underwent thyroidectomy and biopsy taken from July 2022 to June 2023 at SMIMER Medical College, Surat.

Exclusion Criteria: Patients who only underwent FNAC were excluded.

METHODS

Slides were retrieved from the archives of the department of pathology.

All histopathology specimens were formalin-fixed and paraffin wax processed tissues. The specimens were fixed in 10% formalin and then processed. Tissue sections of 5-micron thickness were obtained and stained with Hematoxyline and eosin and special stains wherever necessary.

For the majority of patients, thyroid FNA procedure was performed under ultrasound guidance by the diagnostic radiologists after detailed ultrasonographic examination. Thyroid smears were reported by pathologists using the six-tiered diagnostic categories proposed by The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC).

All thyroid FNA were prepared by conventional methods with air-dried smears stained by a Romanowsky-type stain and/or Ethanol-fixed smears stained by Papanicolaou stain.

Study Method: Retrospective study.

RESULTS

Histocytological correlation was done in 29 cases, amongst them 21 benign cases and 08 malignant lesions were diagnosed. The mean age of presentation of thyroid nodule was 40.4 years. The youngest patient was 2 years old and oldest was 75 years. Females were mostly affected by thyroid diseases (89.66%) than males (10.34%) with female to male ratio of 8.67:1.

Malignancy was diagnosed among (66.67%) male and (23.08%) females. Histological patterns were nodular goiter (44.83%), thyroglossal cyst (6.9%), thyroiditis (10.34%), adenoma (10.34 %), (Non Invasive Follicular Thyroid

Neoplasm with papillary like nuclear features) NIFTP (10.34%), Hurthle cell carcinoma (3.45%), Papillary carcinoma (13.8%).

In our study in our study, papillary thyroid cancer represents the most common thyroid cancer, representing about 4 cases (50%) out of 8 total malignant cases. Concordance and discordance was noted in 82.15%, 17.85% cases respectively with radiology and cytology.

Table 1: Histopathology spectrum of diseases

Type of Lesion	Histopathology Diagnosis	Total No of Cases	Mean Age (years)	Male	Female
Non Neoplastic (18 cases) 62.07%	Nodular goiter	13(44.83%)	41.54	00	13
	Thyroglossal Cyst	02(6.9%)	42.5	01	01
	Thyroiditis	03(10.34%)	23.33	00	03
Neoplastic (11cases) 37.93%	Adenoma	03(10.34%)	55.33	00	03
	NIFTP	03(10.34%)	34	01	02
	Hurthle Cell Carcinoma	01(3.45%)	50	01	00
	Papillary Carcinoma	04(13.8%)	40	01	03
	Total	29	40.44 years	04	25

Table 2: Cytohistological correlation in the six-tiered Bethesda system for reporting thyroidcytology

Bethesda Cytological Diagnosis	All FNAC with Surgical follow-up N(%) total	Benign Histology N(%)	Malignant Histology N(%)	Risk of Malignancy according to Bethesda System (%)
Cat-I Non Diagnostic or Unsatisfactory	03(10.71%)	01(33.33%)	02(66.67%)	5-20%
Cat-II Benign	16(57.52%)	15(93.75%)	01(6.75%)	2-7%
Cat-III Atypia of Undetermined Significance	02(7.14%)	02(100%)	00	13-30%
Cat-IV Follicular Neoplasm or Suspicious for follicularneoplasm	06(21.04%)	03(50%)	03(50%)	23-34%
Cat-V Suspicious for Malignancy	01(3.59%)	00	01(100%)	67-83%
Cat-VI Malignant	00	00	00	97-100%
Total	28	21(75%)	07(25%)	

Table 3: Comparison between the proportions of malignancies in our study and those predicted by ACR-TIRADS classification

EU-TIRADSScore	No of Patients	Benign Histology	Malignant Histology	Risk of malignancy	Risk of Malignancy Predicted by ACRTI-RADS
2	15	13	02	13.33%	1.5%
3	05	04	01	20%	4.8%
4	06	04	02	33.33%	9.1%
5	03	00	03	100%	35%
Total	29	21	08		

Scoring and Classification

- TR1: 0 points (benign)
- TR2: 2 points (not suspicious)
- TR3: 3 points (mildly suspicious)
- TR4: 4-6 points (moderately suspicious)
- TR5: ≥7 points (highly suspicious)

Table 4: Clinicopathological profile of the thyroidlesions

Histopathology Diagnosis	No of Cases	Percentage
Benign	21	(72.42%)
Malignant	08	(27.58%)
Total	29	(100%)

Sex	No of Cases	Benign (%)	Malignant (%)
Male	03(10.34%)	01(33.33%)	02(66.67%)
Female	26(89.66%)	20(76.92%)	06(23.08%)
Total	29(100%)	21(72.42%)	08(27.58%)

Table 5: Concordance Discordance

	Radiology	Cytology
Concordance	23(82.15%)	23(82.15%)
Discordance	5(17.85%)	5(17.85%)

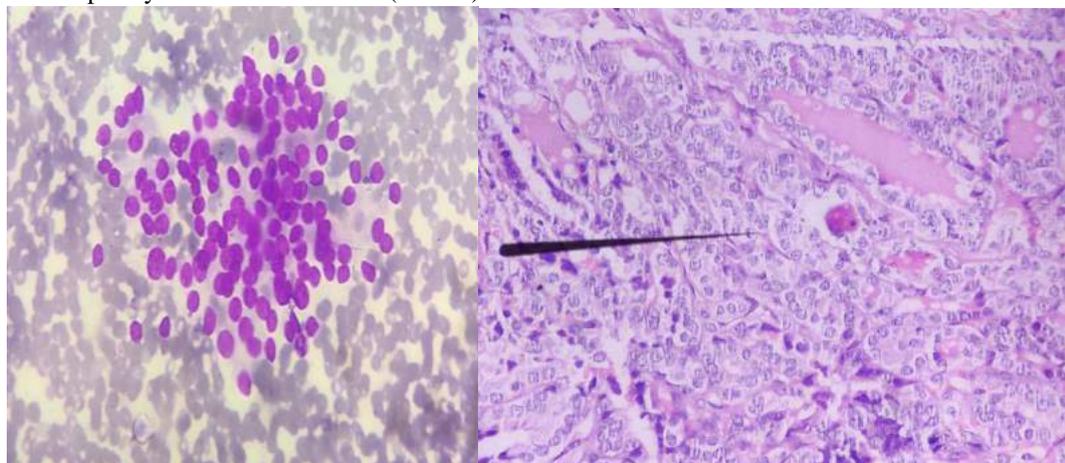
Table 6: Discordant Cases

Age/Sex	Radiological diagnosis	FNAC diagnosis	Histopathological diagnosis
48/F	TIRADS-III (Mildly suspicious)	Category-IV follicularneoplasmHurthle cell type	Hashimoto's thyoroiditis
28/F	TIRADS-IV (Moderately suspicious)	Category-II Benign Follicular Nodule	Multinodular Goiter with degenerative changes
35/M	TIRADSIIP/O Colloidnodule	Category II Colloidnodule	Non Invasive Follicular Thyroidneoplasm with Papillary like nuclear features (NIFTP)
32/F	USG- Left lobe-TIRADSI (Mildly suspicious) Right Lobe-TIRADSI	Not Done	Left Lobe-Nodular Goiter Right lobe-Colloid Goiter with Non Invasive Follicular Thyroidneoplasm with Papillary like Nuclear features
18/F	USG- TIRADSI(Moderately suspicious)	Category IV Neoplasm/Suspicious for Follicular Neoplasm	Papillary Carcinoma of Thyroid-Solid Variant
20/F	USG-Neoplastic etiology TIRADSI	Category-II Benign Follicular Nodule	Multinodular Goiter with Autoimmunethyroiditis
62/F	P/O TIRADS-III (Mildly suspicious)	Category-IN on Diagnostic: Cystfluid only	Papillary Carcinoma of thyroid
40/F	P/O TIRADS-IV (Moderately suspicious)	Category-IN on Diagnostic: Cystfluid only	Follicular variant of Papillary Carcinoma

DISCORDANCE CASES

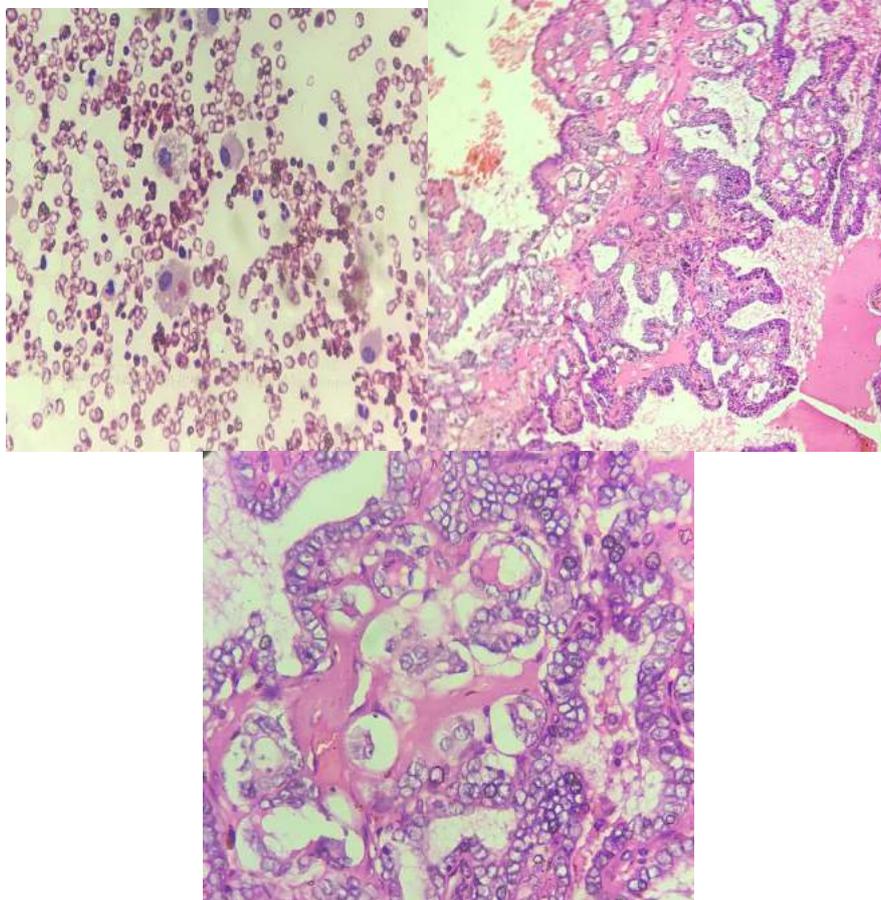
CASE-1

40 years male presented with swelling in front of neck since 2 years. USG (left lobe): Possibility of colloid nodule. FNAC: Category II Colloid Nodule. Histopathological diagnosis was Non Invasive Follicular Thyroid neoplasm with Papillary like nuclear features (NIFTP).



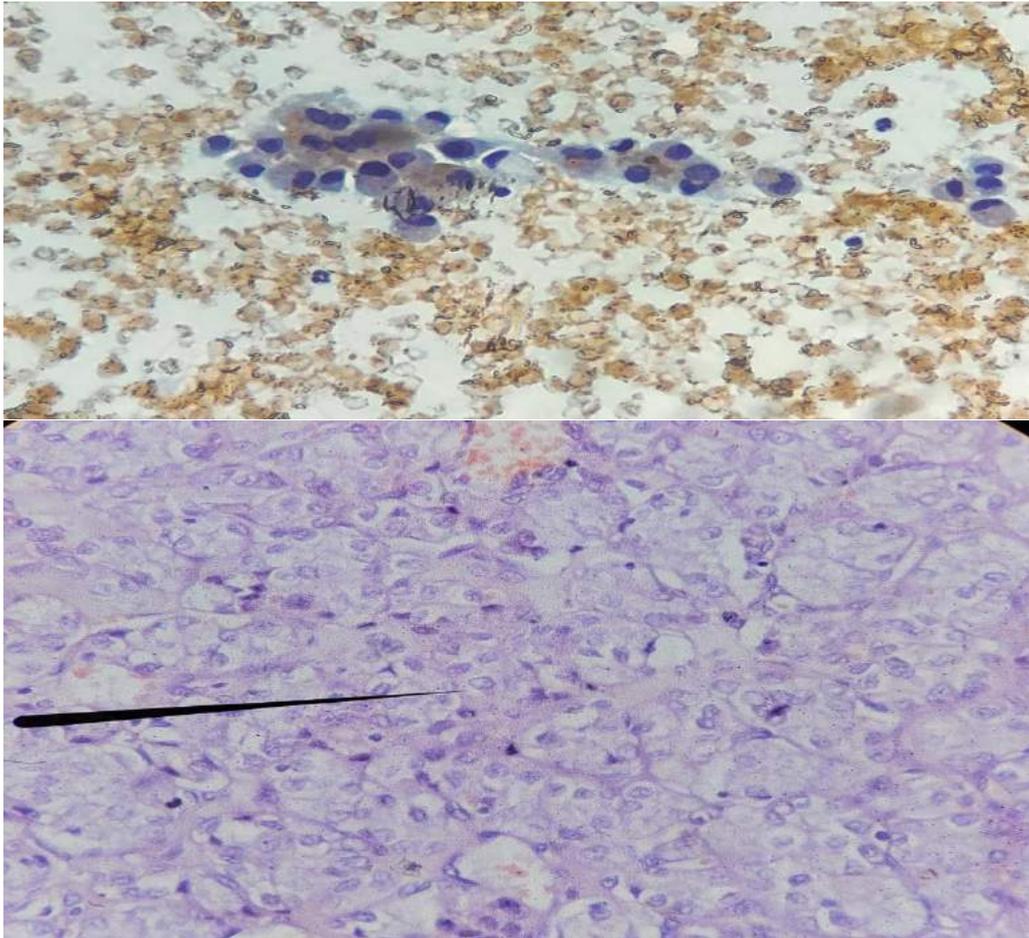
CASE-2

62 years female presented with swelling in front of neck since 5 years. USG (left lobe): 2.9cm x 2.8cm well defined, solid mixed with cystic lesion with macro calcification noted –possibility of: TIRADS III. FNAC suggested a Bethesda category-I Non Diagnostic Cyst fluid only. Histopathological diagnosis was papillary carcinoma of thyroid.



CASE-3

40 years female presented with swelling in front of neck since 2 years. USG (left lobe): 3.9cm x 2.1cm sized heterogenous lesion with 2.8cm x 1.8cm cystic changes with foci of calcification noted -possibility of: TIRADS IV. FNAC suggested a Bethesda category-I Non Diagnostic Cyst fluid only. Histopathological diagnosis was follicular variant papillary carcinoma of thyroid.



DISCUSSION

It is well-known that thyroid lesions are most common in middle-age females, similar to the observation in our study [3]. Thyroid lesions usually present with an asymptomatic swelling in the anterior part of the neck. It can present as a solitary nodule, multinodular or as a diffuse swelling. The vast majority of these nodules are non-neoplastic lesions or benign neoplasms [3].

The general protocol for the investigation of a thyroid nodule includes clinical examination, imaging modalities such as ultrasound, biochemical analysis including thyroid function tests with antibodies levels followed by FNAC diagnosis using The Bethesda system of reporting.

In the case of a Bethesda IV category, surgical lobectomy is performed, Bethesda V category lesions are managed with a near total thyroidectomy and Bethesda VI category lesions are managed with total thyroidectomy with or without neck dissection [4].

FNAC of thyroid lesions is a safe, cost-effective, minimally invasive, simple out-patient procedure, hence considered as a gold standard for pre-operative assessment of patients with thyroid nodules.

Sampling error may be the reason for discordance in papillary carcinoma. The occurrence of a cystic change with underlying malignancy in thyroid lesions is a common diagnostic pitfall in FNAC [7, 8]. Papillary Thyroid Carcinoma tend to undergo hemorrhagic and degenerative changes. Sampling of this area will result in a lesser number of cells and false interpretation of it to be a benign cyst [9, 10]. Any recurrent cystic lesion should raise a strong suspicion for malignancy and should be treated accordingly. In such cases, USG-guided FNAC is suggested to accurately locate the lesion for a better diagnostic yield.

Non-invasive follicular thyroid neoplasm with papillary like nuclear features (NIFTP) is an encapsulated or clearly delimited, non-invasive neoplasm with a follicular growth pattern and nuclear features of PTC. It is considered as a premalignant lesion in patients with RAS mutation. The diagnosis of NIFTP is made after complete resection of the lesion by the defined criteria [11].

CONCLUSION

Solitary thyroid nodules are more common in females (89.66%) but more worrisome in males (66.67%) due to the increased incidence of malignancy. Nodular goiter is the most prevalent thyroid disease, while papillary thyroid carcinoma is the most common cancer seen in this study. FNAC is considered only as a screening tool and particular attention should be given to minimize the false positive and negative diagnosis. The Bethesda system of reporting should be followed to minimize these errors. Histopathological evaluation of thyroid nodules provides the most accurate method of diagnosis. Occurrence of cystic change in thyroid lesions is a common diagnostic pitfall in cytology. Hence, the possibility of neoplastic etiology should be considered in cystic lesions and these cases require USG-guided FNAC to ensure cellular adequacy, thus, preventing a sampling error.

In suspicious cases, repeat FNAC/core biopsy is suggested for a confirmatory diagnosis. Taking into consideration of our study a benign FNAC diagnosis should be followed up with excision in case of imaging and pathology discordance. Our retrograde correlation study having discordant rate of 17.85% with radiology and cytology findings, we conclude histopathology report as a gold standard method for diagnosis of thyroid lesions.

REFERENCES

1. Tsegaye, B., &Ergete, W. (2003). Histopathologic pattern of thyroid disease. *East African medical journal*, 80(10), 525-528. doi:10.4314/eamj.v80i10.8755
2. Wortofsky, L. (1998). Diseases of the thyroid in Fauci, A. S., Braunwald, E. ed: Principles of internal medicine. 14th edition; 2, 2012–2035.
3. Davies, L., Morris, L. G., Haymart, M., Chen, A. Y., Goldenberg, D., Morris, J., ...& Randolph, G. (2015). American Association of Clinical Endocrinologists and American College of Endocrinology disease state clinical review: the increasing incidence of thyroid cancer. *Endocrine Practice*, 21(6), 686-696.doi: 10.4158/EP14466. DSCR
4. Gelmini, R., Franzoni, C., Pavesi, E., Cabry, F., &Saviano, M. (2010). Incidental thyroid carcinoma (ITC): a retrospective study in a series of 737 patients treated for benign disease. *AnnaliItaliani di Chirurgia*, 81(6), 421-427.
5. Bayliss, R. I. S., Tunbridge, W. M. G. (1998). *Thyroid Disease: The Facts*. USA: Oxford University Press.
6. Fama, F., Sindoni, A., Cicciu, M., Polito, F., Piquard, A., Saint-Marc, O., &Benvenga, S. (2018). Preoperatively undiagnosed papillary thyroid carcinoma in patients thyroidectomized for benign multinodulargoiter. *Archives of Endocrinology and Metabolism*, 62, 139-148. doi:10.20945/2359-3997000000017
7. Sukumaran, R., Kattoor, J., Pillai, K. R., Ramadas, P. T., Nayak, N., Somanathan, T., ...& Sebastian, P. (2014). Fine needle aspiration cytology of thyroid lesions and its correlation with histopathology in a series of 248 patients. *Indian journal of surgical oncology*, 5, 237-241.
8. Bamanikar, S., Soraisham, P., Jadhav, S., Kumar, H., Jadhav, P., &Bamanikar, A. (2014). Cyto-histology and clinical correlation of thyroid gland lesions: A 3 year study in a tertiary hospital. *Clinical cancer investigation Journal*, 3(3-2014), 208-212.
9. Shere, S. K., Kulkarni, A. S., Phulgirkar, P. P., Anjum, S., Patil, S. P., &Bindu, R. (2013). Correlation of fine needle aspiration cytology with histopathology in diagnosis of thyroid lesions. *Journal of evolution of medical and dental sciences*, 2(26), 4826-4832.
10. Bagga, P. K., &Mahajan, N. C. (2010). Fine needle aspiration cytology of thyroid swellings: How useful and accurate is it?. *Indian Journal of cancer*, 47(4), 437-442.
11. Baloch, Z. W., Seethala, R. R., Faquin, W. C., Papotti, M. G., Basolo, F., Fadda, G., ... & Mandel, S. J. (2016). Noninvasive follicular thyroid neoplasm with papillary-like nuclear features (NIFTP): a changing paradigm in thyroid surgical pathology and implications for thyroid cytopathology. *Cancer cytopathology*, 124(9), 616-620.