

SPECTRUM OF THYROID LESIONS ON FNAC IN A TERTIARY CARE CENTRE OF NORTHERN INDIA

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ABSTRACT

In surgical practice, thyroid abnormalities are frequently encountered, and Fine Needle Aspiration Cytology (FNAC) is frequently employed as the preliminary diagnostic test. By classifying thyroid lesions as inflammatory, benign, or malignant, FNAC helps doctors decide which treatments-such as surgery or medicine-are best for their patients. This study attempted to determine the diagnostic accuracy in patients with thyroid gland swelling, as well as the morphology of thyroid lesions by FNAC and their distribution by age and sex. A one-year retrospective study was carried out in a tertiary care center's Department of Pathology from July 2022 to June 2023. Using a data collection tool, the age, gender, and diagnosis of 152 patients who had Fine Needle Aspiration procedures were identified from their medical records. 138 (90.7%) of the 152 patients were men, and 14 (9.3%) were women. The average age was 39.78 ± 12.6 . Lesion types comprised 92.7% non-neoplastic lesions and 7.3% malignant lesions. Goiter accounted for 62.5% of all non-neoplastic lesions. The majority of patients (29.6%) experienced hypothyroidism symptoms in addition to thyroid gland hypertrophy. Additionally, there was one case of papillary carcinoma (0.6%). Twenty-third-century individuals exhibited the majority of thyroid lesions (26.3%). In the fourth and fifth decades of life, goiter would manifest. In the third decade, Hashimoto's and lymphocytic thyroiditis were most frequently observed. With an AUC of 0.93, FNAC further revealed high accuracy in evaluating lesions, with true positive cases being 89%, specificity of 98%, PPV of 97%, and NPV of 95%. The study emphasize the need for evacuation of palpable thyroid lesions by FNAC as it can prove to be indispensable tool for early diagnosis of malignancy.

KEYWORDS: FNAC, Goiter, Benign Thyroid lesions, Cytology, Thyroiditis.

INTRODUCTION

A total of 4-12% people report with palpable thyroid enlargements, and many more have impalpable nodules. Thyroid lesions are a common occurrence. (1) People following goitrogenic diets are more likely to have these nodules. An accurate diagnosis is crucial for preventing invasive procedures and guaranteeing the right course of therapy. (2)

Thyroid lesions encompass a wide spectrum of disorders, from such as goitre and thyroiditis to malignancies, including papillary, follicular and anaplastic carcinomas. Globally, the prevalence of thyroid diseases is on the rise, and in India, the incidence is particularly high due to factors such as deficiency of iodine, environmental influences and genetic predispositions. Approximately 42 million people in India are affected by thyroid disorders, with

women being more susceptible. (2,3)

The common thyroid lesions in India include multinodular goiter, Hashimoto's thyroiditis, and various neoplasms. Although benign conditions like colloid goiter are more frequent, distinguishing them from malignant thyroid nodules can be challenging due to overlapping clinical and radiological features. In this context, FNAC plays an important role in the diagnostic process. (2)

FNAC is globally favoured for its affordability, low complication rates, and high diagnostic accuracy, FNAC is used to classify lesions into inflammatory, benign, or malignant categories, helping clinicians determine the next steps in treatment. (4)

The accuracy of diagnosing through FNAC is compared to histopathology, the gold standard for confirming thyroid lesions following surgical

excision. While FNAC provides an initial diagnosis, histopathology offers more detailed structural information. Studies show FNAC's diagnostic accuracy ranges from 85% to 95%, depending on factors like the pathologist's expertise and the sample quality. FNAC's ability to detect malignancies early allows for timely surgical intervention, making it a pivotal tool.(5,6)

Aim of this study is to evaluate the morphology of thyroid lesions by FNAC in patients with swelling of thyroid gland and to determine the distribution of thyroid lesions according to age and sex.

MATERIAL AND METHOD

Study Design

This was a retrospective study in nature, based on the medical records of patients who sought treatment at a Northern Indian tertiary care center's Department of Pathology between July 2022 and June 2023 for palpable thyroid enlargement.

Study participants

152 patients who have undergone FNAC for thyroid lesion at our centre over the study period.

Data Collection

Medical record of 152 patients were taken ,their age, gender and diagnosis were collected using a data gathering tool. Lesions of FNAC were noted and classified as benign and malignant. Lesions were classified on the basis of Bethesda Classification. Distribution on the basis of age and gender was also done. The histopathology reports of these patients were obtained from the records and were compared with diagnostic accuracies of FNAC.

STATISTICAL ANALYSIS

Data collection was done and SPSS software (IBM) version 24.0 was used for analysis. The results were presented in the form of frequency and percentage. Chi-square was done. A P value of <0.05 was considered significant. Receptor operator Curve was constructed for FNAC accuracy as compared to histopathology report and area under the curve, sensitivity, specificity, NPV and PPV was estimated analyzing the final histopathology report.

RESULTS

Patients were of the average age - 39.77 ± 12.6 years. The range of ages was 17–69. A total of 138 (90.7%) of the 152 patients, were women & 14 (9.3%) were men (Fig 1) The remaining lesions (7.3%, 11) were cancerous, while 92.7% (141) were non-neoplastic. Goitre was the most frequent non neoplastic lesion (53, 34.8%). FA (10, 6.6%) was the most common neoplastic lesion. (Table 1) Most of the lesions on

FNAC were Bethesda grade 2 (92.2%) (Table 2)

The majority of patients presented with an enlarged thyroid gland and had features of hypothyroidism (29.6%) followed by thyroid tenderness in 23% patients. 1 patient also had features of hyperthyroidism. (Fig. 2)

The age group in which the thyroid lesions were most commonly seen was 30-40 years (26.3%) followed 20-30 years (25%) and 40-50 (23.6%). The common age-group for colloid goitre was 40-50 years. Nodular goitre, Hashimoto thyroiditis and lymphocytic thyroiditis was 20-30 years. Follicular Adenoma was seen mostly in patients of fifth and sixth decade. In patients of 10-20 age group , colloid goitre and thyroiditis were the lesions observed. In men colloid goitre (50%) was the commonest observed thyroid abnormality followed by nodular goiter (35.7%) and cystic nodule in 14.2% (Table 3)

FNAC showed a high sensitivity of 89%, while its specificity of 98% highlighted its strength in accurately excluding true negatives. The test's PPV of 97% implied that majority of individuals who tested positive truly had the condition, and its negative predictive value (NPV) of 95% indicated that most individuals who tested negative were indeed free from the condition. With an overall diagnostic accuracy of 90.6%, FNAC reliably classified a large portion of cases correctly. The ROC curve, showed area under the curve of 0.93, confirmed FNAC's excellent ability to distinguish between positive and negative cases, further supporting its robustness as a diagnostic tool. These results suggested that FNAC was highly effective in diagnosing the condition, making it a reliable method for both detecting and ruling out cases with minimal errors. (Table 4)

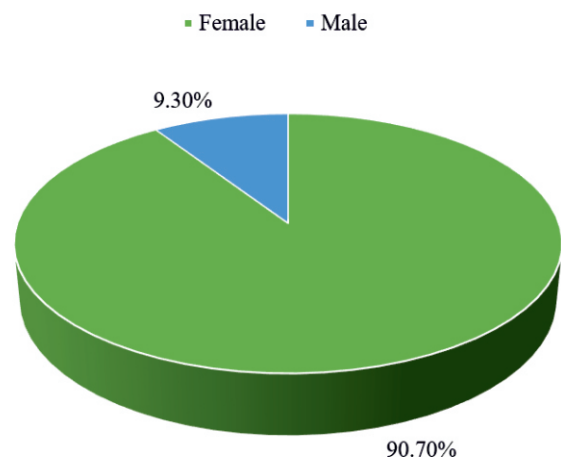


Fig. 1: Distribution of study participants on the basis of Gender

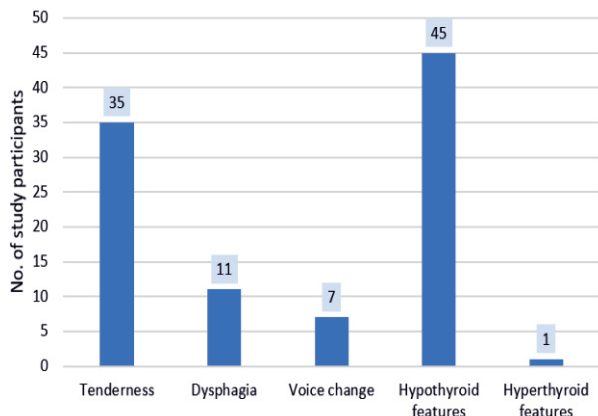


Fig. 2- Clinical Features of the study participants

Lesions on FNAC (N=152)	N (%)
Nodular Goitre	42 (27.7%)
Colloid Goitre	53 (34.8%)
Hashimoto Thyroiditis	13 (8.6%)
Lymphocytic Thyroiditis	18 (11.8%)
Cystic Nodule	10 (6.6%)
Follicular Adenoma	10 (6.6%)
Papillary Carcinoma	1 (0.6%)
Adenomatoid Goitre	5 (3.3%)

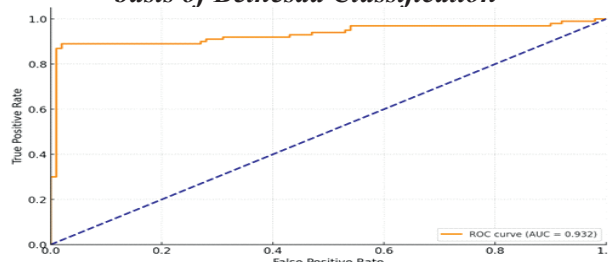
Table 1: Distribution of Study Participants on the

FNAC	Values
Sensitivity	89%
Specificity	98%
Positive predictive value	97%
Negative Predictive value	95%
Diagnostic Accuracy	90.6%

Table 4: Diagnostic Accuracy of FNAC in Evaluating Thyroid Nodules

Bethesda Classification	N (%)
1	0
2	141 (92.7%)
3	0
4	10 (6.6%)
5	0
6	1 (0.7%)

Table 2: Distribution of FNAC findings on the basis of Bethesda Classification



Lesions on FNAC	Age Category						Gender	
	10-20	20-30	30-40	40-50	50-60	>60	Male	Female
Nodular Goitre (42)	0	14 (36.8%)	12 (30%)	10 (27.7%)	4 (16.6%)	2 (25%)	5 (35.7%)	37 (26.8%)
Colloid Goitre (53)	2 (33.3%)	6 (15.7%)	10 (25%)	19 (52.7%)	12 (50%)	4 (50%)	7 (50%)	46 (33.3%)
Hashimoto Thyroiditis (13)	2 (33.3%)	7 (18.4%)	4 (8.3%)	0	0	0	0	13 (9.4%)
Lymphocytic Thyroiditis (18)	2 (33.3%)	8 (21.0%)	6 (15%)	2 (5.5%)	0	0	0	18 (13.04%)
Cystic Nodule (10)	0	0	6 (15%)	4 (11.1%)	0	0	2 (14.2%)	8 (5.7%)
Follicular Adenoma (10)	0	0	0	0	8(33.3%)	2 (25%)	0	10 (7.2%)
Papillary Carcinoma (1)	0	1 (2.6%)	0	0	0	0	0	1 (0.7%)
Adenomatoid Goitre (5)	0	2 (5.2%)	2 (5%)	1 (2.7%)	0	0	0	5 (3.6%)
Total (152)	6	38	40	36	24	8	14	138
P value	0.036						0.002	

Table 3: Distribution of Study Participants on the Basis of Age, Gender and Thyroid Lesions on FNAC

DISCUSSION

In clinical practice, it is essential to accurately differentiate the few number of thyroid malignancies from the benign lesions in order to definitively schedule the necessary operation and provide pertinent patient counseling. (6) Regarded as the most precise and economical method, FNAC is a standard diagnostic technique used to identify thyroid abnormalities. (8)

It was noted that females were more affected with a F to M ratio being 9.5:1. Study by Akshatha N et al., (9) in 101 cases where the M:F ratio was 1:7.41 (Females = 89, Males = 12). Handa U et al. (10) and Bahaj AS et al. (11) also reported a comparable observation, showing a distinct female predominance. The distribution of age within the study population was also analyzed. Manzoor F et al., (12) also observed 3.65 times more females than males with thyroid lesion in their study. Manzoor F et al. (12), who observed the highest prevalence in the 20-29 age group-which was the second most prevalent age group in our analysis after the 30-40 age group-consistently corroborated our findings. Similarly, in the 30- to 40-year-old age group, Oberoi JS et al. (7) reported a significant prevalence of thyroid lesions (28.75%).

Thyroiditis manifested clinically in a variety of ways in the patients. Tenderness was detected in 23% of the cases, pressure symptoms such as dysphagia and voice abnormalities in 2.6% and 7.2% of the cases, respectively. Symptoms of hypothyroidism were present in 29.6% of cases, while hyperthyroidism features were observed in only one case (0.99%). Similar presentations were documented in other Indian studies as well (7, 9, 10).

Benign lesions were 92.7% and 7.3% were malignant lesions. In a study by Esmaili HA et al., (1) there were 1054 (64.3%) benign, 128 (7.8%) malignant. Other studies showed varied percentages of cancerous and non cancerous lesions due to the difference in incidence of these lesions in their country, however benign lesions were almost 2/3rd of the total lesions observed. (7,9,10,11,13)

Thyroiditis was the second most common non-neoplastic lesion seen in Indian investigations, after goiter. The most common neoplastic lesion found was follicular adenoma (7, 9, 10, 13, 14). There was only one instance of papillary carcinoma documented, although other South Asian investigations found that the disease affected 4% to 9% of cases (7, 13-16).

Compared to other studies, our FNAC findings were generally superior. Bahaj et al. reported lower sensitivity (79.8%), PPV (74.77%), NPV (84.91%), and diagnostic accuracy (81.2%), suggesting their

FNAC results were less reliable. (11) Sengupta et al. reported slightly higher results in some areas, with sensitivity 90%, specificity 100%, and accuracy 98.3%, but our study showed more balanced performance across all metrics like our study findings. (17) Roy et al. (18), Gupta et al. (19), Kessler et al. (20) also reported lower diagnostic values than our study, particularly in sensitivity and PPV, confirming that our FNAC results were more effective at accurately identifying and managing thyroid nodules. Overall, our study confirms FNAC as a highly reliable tool for diagnosing thyroid lesions, with more consistent and balanced performance compared to other studies.

As this study was retrospective in nature, complete clinical information of patients were unavailable for a few cases. Retrospective studies are inherently limited by their design, relying on chart reviews that were not originally intended for research purposes, which may result in incomplete data collection.

CONCLUSION

Thyroid lesions showed definite female preponderance, with maximum number of cases occurring in patients of 30 to 40 years age. The lesion that was most frequently seen was Colloid Goiter. Most of the neoplastic lesions were diagnosed in the fifth and sixth decade and all were in females. The study emphasizes the need for evaluation of palpable lesions of thyroid by FNAC as it can prove to be an indispensable tool for early diagnosis of malignancy. Our study demonstrates, FNAC is a reliable diagnostic tool for evaluating lesions of thyroid, with an overall diagnostic accuracy of 90.6%.

REFERENCES

1. Esmaili HA, Taghipour H. Fine-needle aspiration in the diagnosis of thyroid diseases: An appraisal in our institution. *International Scholarly Research Notices*. 2012;2012.
2. JI J. Disorders of the thyroid gland. *Harrison's principles of internal medicine*. 2005;2104-13.
3. Yeung MJ, Serpell JW. Management of the solitary thyroid nodule. *The oncologist*. 2008 Feb 1;13(2):105-12.
4. Dharrao SS, Mahajan SV. DFNAC study of various thyroid lesions and its clinical correlation in a tertiary health care center-a prospective study. *MVP J Med Sci*. 2017;4(2):152-155.
5. Goswami D, Agrawal P, Shinde P. Accuracy of fine needle aspiration cytology (FNAC) in comparison to histopathological examination for the diagnosis of thyroid swellings. *Int J Med Sci Public Health*. 2017;6(1):6-11.

6. Raina UK, Suri J, Bhardwaj S, et al. Diagnostic Efficacy of Fine Needle Aspiration Cytology and Cell Block Technique in Thyroid Lesions: A Hospital-based Study. *Journal of Clinical & Diagnostic Research*. 2020 Nov 1;14(11).
7. Oberoi DrJS. Diagnostic Utility of Fine Needle Aspiration Cytology and Cell Block Technique in Thyroid Lesions. *Journal of Medical Science And clinical Research*. 2020 Jul 22;08(07).
8. Bhartiya R, Mallik M, Kumari N, et al. Evaluation of thyroid lesions by fine-needle aspiration cytology based on Bethesda system for reporting thyroid cytopathology classification among the population of South Bihar. *Indian journal of medical and paediatric oncology*. 2016 Oct;37(04):265-70.
9. Akshatha N, Patil S, Bommanahalli BP. Clinical and cytological spectrum of thyroid lesions and the role of fine needle aspiration cytology in its diagnosis at a tertiary care hospital. *Dysphagia*.;9:8-9.
10. Handa U, Garg S, Mohan H, et al. Role of fine needle aspiration cytology in diagnosis and-management of thyroid lesions: A study on 434 patients. *Journal of cytology*. 2008 Jan 1;25(1):13-7.
11. Bahaj AS, Alkaff HH, Melebari BN, et al. Role of fine-needle aspiration cytology in evaluating thyroid nodules: a retrospective study from a tertiary care center of Western region, Saudi Arabia. *Saudi Medical Journal*. 2020;41(10):1098.
12. Manzoor F, Sheikh AR, Sheikh BA. Diagnostic utility of fine needle aspiration cytology in thyroid lesions. *International Journal of Research in Medical Sciences*. 2020 Jul;8(7):2628.
13. Reddy MR, Rajyalakshmi S, Indira V, et al. Utility of FNAC in diagnosis of thyroid lesions and to correlate histopathological studies. *IP Journal of Diagnostic Pathology and Oncology*. 2022 Feb 15;7(1):13–7.
14. Mohite S, Yelave R, Mane V. Study of FNAC in diagnosis of thyroid lesions: A prospective study. *Indian Journal of Pathology and Oncology*. 2018 Oct;5(4):574-9.
15. Ghartimagar D, Ghosh A, Shrestha MK, et al. Histopathological spectrum of non-neoplastic and neoplastic lesions of thyroid: A descriptive cross-sectional study. *JNMA: Journal of the Nepal Medical Association*. 2020 Nov;58(231):856.
16. Wahid FI, Khan SF, Rehman HU, et al. Role of fine needle aspiration cytology in diagnosis of solitary thyroid nodules. *Iranian journal of otorhinolaryngology*. 2011;23(65):111.
17. Sengupta A, Pal R, Kar S, et al. Fine needle aspiration cytology as the primary diagnostic tool for thyroid enlargement. *J Nat Sci Biol Med*. 2011;2:113-8.
18. Roy PK, Bandyopadhyay S, Dubey AB, et al. A comparative study on aspiration cytology and histopathology in diagnosis of thyroid nodule and its correlation. *Indian J Otolaryngol Head Neck Surg*. 2019;71:997-1001.
19. Gupta M, Gupta S, Gupta VB. Correlation of fine needle aspiration cytology with histopathology in the diagnosis of solitary thyroid nodules. *J Thyroid Res*. 2010;2010:379051.
20. Kessler A, Gavriel H, Zahav S, et al. Accuracy and consistency of fine-needle aspiration biopsy in the diagnosis and management of solitary thyroid nodules. *Isr Med Assoc J*. 2005;7:371-3.

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