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Original Article

Cytomorphological Evaluation of Thyroid Lesions in Male Patients: A Cross-Sectional Study in India

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) is a well-established first line investigation for thyroid lesions. Although thyroid lesions are more common in females, thyroid nodules in males have a relatively higher risk of neoplastic and malignant pathology. The present study was undertaken to evaluate the spectrum and cytomorphological features of thyroid lesions in male patients, assess the diagnostic accuracy of FNAC with histopathological correlation wherever available, and compare the findings with female patients from the same study period.

Materials and Methods: This retrospective cross-sectional study was conducted in the Department of Cytopathology at a tertiary care center from January 2017 to April 2018. A total of 70 male patients who underwent FNAC for thyroid swellings were included. Clinical details, thyroid function test findings, and ultrasonography findings were recorded wherever available. Smears were categorized according to the Bethesda System for Reporting Thyroid Cytopathology. Histopathological follow up was obtained in surgically treated cases and was considered the gold standard for diagnosis. Sensitivity, specificity, and diagnostic accuracy of fine needle aspiration cytology were calculated.

Results: Among 420 thyroid FNAC cases performed during the study period, 70 were males. The majority of male patients belonged to the 51-to-60-year age group (30%). Benign lesions formed the largest category, with Bethesda Category II accounting for 50% of cases. Goitre was the most common benign lesion, while papillary thyroid carcinoma was the most common malignancy. Malignant lesions accounted for 8.57% of cases. Surgical follow up was available in 13 cases. FNAC showed 100% sensitivity, 60% specificity, and 81% overall diagnostic accuracy. The risk of malignancy was 100% in Bethesda Categories IV, V, and VI in the followed cases. Neoplastic lesions were more frequent in males than females during the same period.

Conclusion: FNAC is a safe, reliable, and effective diagnostic tool for evaluating thyroid lesions in male patients. The Bethesda System for Reporting Thyroid Cytopathology provides a useful framework for cytological classification and risk stratification. Because thyroid nodules in males carry a higher likelihood of malignancy, careful evaluation is particularly important, especially in indeterminate categories.

Keywords*: Thyroid lesions, fine needle aspiration cytology, FNAC, Bethesda System for Reporting Thyroid Cytopathology, papillary thyroid carcinoma, cytomorphology.*

INTRODUCTION

Fine-needle aspiration cytology (FNAC) is a well-established first-line diagnostic test for evaluating thyroid lesions, including diffuse enlargement and solitary nodules. It is widely used because it is simple, rapid, minimally invasive, and cost-effective, with a high diagnostic accuracy for detecting thyroid malignancy.[1,2] FNAC has greatly reduced unnecessary thyroid surgeries and their associated complications, such as recurrent laryngeal nerve injury, hypoparathyroidism, and lifelong thyroid hormone dependence in patients with benign thyroid nodules.[3]

However, despite its high utility, FNAC has certain limitations. These include false-negative and false-positive results, as well as a proportion of cases that are classified as indeterminate or suspicious due to overlapping cytological features between benign and malignant lesions.[4] These diagnostic gray zones, especially in follicular patterned lesions, continue to pose challenges in routine cytopathology practice.

Thyroid disease is generally more common in females, but thyroid nodules in males are clinically important because they are associated with a higher risk of malignancy. Although thyroid swellings are less frequently encountered in men, nodules detected in male patients have been reported to show a significantly greater malignant potential than those in females.[5,6] This makes careful cytological evaluation in male patients particularly relevant.

The Bethesda System for Reporting Thyroid Cytopathology has provided a standardized and uniform reporting framework for thyroid FNAC.[7] This system classifies thyroid aspirates into six diagnostic categories, each associated with an estimated risk of malignancy and a recommended management approach. Such standardization improves communication among cytopathologists, clinicians, endocrinologists, surgeons, and radiologists and facilitates cytohistological correlation and comparison across studies.[7]

Previous studies have shown that FNAC is an effective screening tool for thyroid nodules and has significantly improved patient selection for surgery.[8] The additional use of ultrasonography, particularly in small, cystic, or difficult-to-palpate lesions, has further improved sampling adequacy and diagnostic yield.[9]

In view of the relatively lower prevalence but higher malignant potential of thyroid lesions in males, the present study was undertaken to evaluate the spectrum and cytomorphological features of thyroid lesions in male patients, assess the diagnostic accuracy of FNAC with histopathological correlation wherever available, identify possible causes of cytohistological discrepancy, and compare the findings in male patients with those observed in female patients during the same study period.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of Cytopathology at a tertiary care center from January 2017 to April 2018. A total of 70 male patients who underwent fine needle aspiration cytology (FNAC) for thyroid swellings during this period were included in the study.

Clinical details were obtained from patient records, including age, presenting complaints, and relevant history. Thyroid function test results and ultrasonography findings were also recorded wherever available.

FNAC was performed using 24 or 25-gauge disposable needles under aseptic precautions. Aspirations were performed using either a palpation-guided or an ultrasound-guided technique, depending on the nature and accessibility of the lesion. The aspirated material was expelled onto clean glass slides, and at least four smears were prepared in each case. Two smears were immediately fixed in 95% ethanol for Papanicolaou staining, while the remaining smears were air-dried and stained with Giemsa.

All cytological smears were examined and categorized according to the Bethesda System for Reporting Thyroid Cytopathology into six categories: nondiagnostic or unsatisfactory, benign, atypia of undetermined significance (AUS)/Follicular Lesion of Undetermined Significance (FLUS), follicular neoplasm or suspicious for follicular neoplasm, suspicious for malignancy, and malignant.[7]

Histopathological follow-up was obtained in cases with available surgical specimens and was considered the gold standard for diagnosis. Cytological findings were correlated with histopathological results to assess diagnostic accuracy.

Statistical analysis was performed to calculate the sensitivity, specificity, and overall diagnostic accuracy of FNAC using standard formulas based on true positives, true negatives, false positives, and false negatives.

Additionally, the distribution of thyroid lesions in male patients was compared with that in female patients evaluated during the same study period to assess differences in pattern and malignancy rates.

RESULTS

A total of 420 patients underwent ultrasound-guided and or non-guided thyroid FNAC in the Department of Cytopathology, KEM Hospital, Mumbai, during the study period. Of these, 70 were males.

Age Distribution

The age distribution of male patients is shown in Table 1. The majority of patients belonged to the 51–60-year age group (n=21, 30%), followed by the 41–50-year age group (n=15, 21.4%) and the 61–70-year age group (n=12, 17.1%). Very few cases were seen at the extremes of age.

Table 1. Age Distribution of Male Patients (n=70)

Age group (years)	Number of patients (n)	%
0–10	0	0
11–20	4	5.7
21–30	6	8.6
31–40	10	14.3
41–50	15	21.4
51–60	21	30.0
61–70	12	17.1
≥70	2	2.9
Total	**70**	**100**

Distribution According to the Bethesda System

The cytological findings were categorized according to the Bethesda System. As shown in Table 2, benign lesions (Category II) constituted the largest group (n=35, 50%), followed by Category I (n=13, 18.57%) and Category III (n=11, 15.71%). Malignant lesions (Category VI) accounted for 8.57% of cases. Goitre was the most common benign lesion, while papillary thyroid carcinoma (PTC) was the most common malignancy.

Table 2. Distribution of Cases According to the Bethesda System

Bethesda category	Number of cases (n)	%	Cytological diagnosis
I	13	18.57	Unsatisfactory
II	35	50.0	Goitre (32), Thyroiditis (3)
III	11	15.71	Atypia of Undetermined Significance (AUS) / Follicular Lesion of Undetermined Significance (FLUS)
IV	3	4.2	Follicular neoplasm
V	2	2.85	Suspicious for malignancy
VI	6	8.57	Malignant
Total	**70**	**100**	-

Category-wise Analysis

Category I: Unsatisfactory (n=13)

- Category I constituted 18.57% of cases. Most cases showed cystic change with low cellularity. Histopathological follow-up was available in 2 cases, both of which were diagnosed as goitre.

Category II: Benign Lesions (n=35)

- This was the most common category, comprising 50% of cases. Colloid goitre was the predominant lesion (n=32), followed by thyroiditis (n=3). Histopathological correlation available in 3 cases showed complete concordance with cytological diagnosis.

Category III: AUS/FLUS (n=11)

- A total of 11 cases (15.71%) were categorized as AUS/FLUS. Histopathological follow-up was available in 2 cases, both of which were benign and diagnosed as goitre.

Category IV: Follicular Neoplasm (n=3)

- Three cases (4.2%) were categorized under follicular neoplasm. Histopathological follow-up was available in 2 cases, both of which were malignant.

Category V: Suspicious for Malignancy (n=2)

- Both cases categorized as suspicious for malignancy were confirmed on histopathology.

Category VI: Malignant (n=6)

- Six cases (8.57%) were diagnosed as malignant. Papillary thyroid carcinoma was the most common malignancy (n=4), while 2 cases represented metastatic carcinoma involving the thyroid.

Table 3. Category IV Correlation (n=3)

Cytological diagnosis	Number of cases (n)	Histological diagnosis
Hurthle cell neoplasm	1	Hurthle cell carcinoma
Follicular neoplasm	1	Minimally invasive follicular carcinoma
Hurthle cell neoplasm	1	No follow-up
Total	**3**	-

Table 4. Distribution of Malignant Lesions (n=6)

Type of malignancy	Number of cases (n)	%
Papillary thyroid carcinoma	4	66.7
Metastatic carcinoma	2	33.3
Total	**6**	**100**

Surgical Follow-Up and Cytohistological Correlation

Surgical follow-up was available in 13 cases. There was good concordance between cytological and histopathological diagnoses, particularly in higher Bethesda categories.

Table 5. Surgical Follow-Up and Cytohistological Correlation

Bethesda category	Total cases (n)	Cases with surgical follow-up (n)	Cytology	Histology
I	13	2	Unsatisfactory	Goitre
II	35	3	Goitre	Goitre
III	11	2	AUS/FLUS	Goitre
IV	3	2	Follicular neoplasm	Hurthle cell carcinoma / Minimally invasive follicular carcinoma
V	2	2	Suspicious for malignancy	Follicular variant of papillary thyroid carcinoma (FVPTC) / Papillary thyroid carcinoma (PTC)
VI	6	2	Papillary thyroid carcinoma (PTC)	Follicular variant of papillary thyroid carcinoma (FVPTC)
Total	**70**	**13**	-	-

Diagnostic Accuracy

Based on cytohistological correlation, the diagnostic performance of FNAC was as follows:
Sensitivity was 100%, specificity was 60%, and overall accuracy was 81%.

Table 6. Diagnostic Accuracy of FNAC

Parameter	Value
Sensitivity	100%
Specificity	60%
Accuracy	81%
Total surgical follow-up cases	**13**

Risk of Malignancy

The observed risk of malignancy in the present study was compared with Bethesda system estimates, as shown in Table 7. A notably higher risk of malignancy was observed in Categories IV, V, and VI.

Table 7. Risk of Malignancy According to Bethesda Category

Bethesda category	Bethesda ROM (%)	Present study ROM (%)
I	5–10	0
II	0–3	0
III	10–30	0
IV	25–40	100
V	50–75	100
VI	97–99	100

Comparison with Female Patients

Although thyroid lesions were more common in females, the rate of neoplastic lesions was higher in males.

Table 8. Comparison of Bethesda Categories in Males and Females (n=420)

Bethesda category	Male (n=70)	Male %	Female (n=350)	Female %
I	13	18.57	49	14.0
II	35	50.0	219	62.5
III	11	15.7	53	15.1
IV	3	4.2	8	2.2
V	2	2.8	9	2.5
VI	6	8.5	12	3.42
Total	**70**	**100**	**350**	**100**

Table 9. Comparison of Overall Thyroid Lesions in Males and Females (n=420)

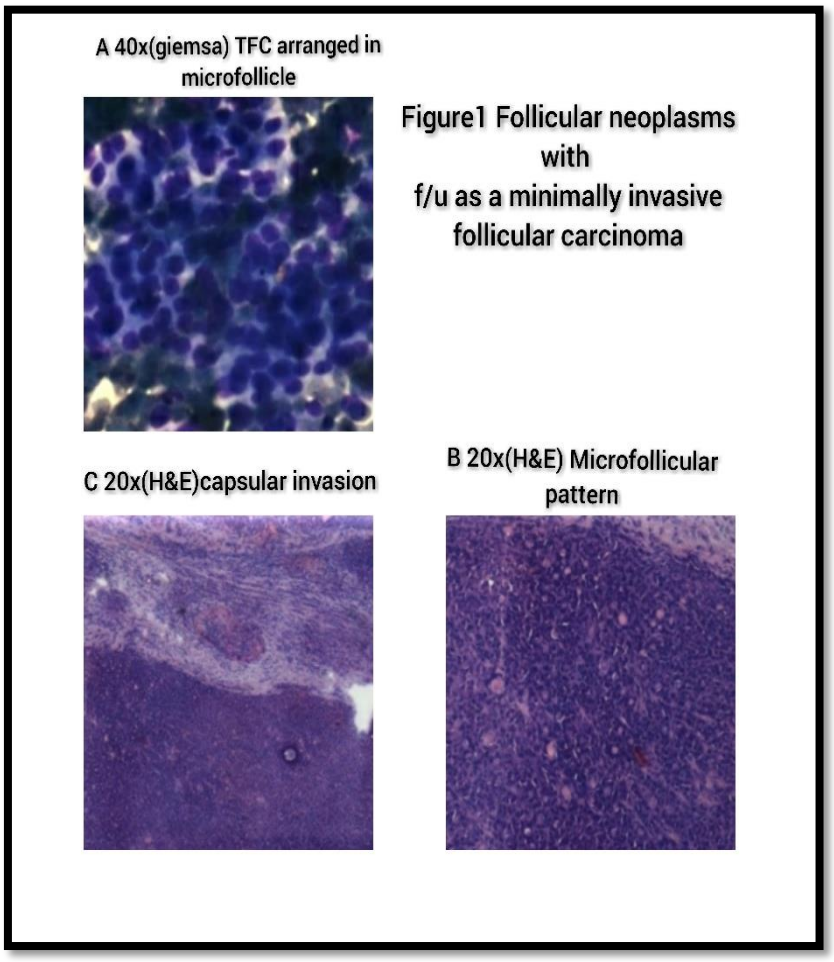
Sex	Total cases (n)	Most common lesion	Most common age group affected
Male	70	Goitre	41–50 years
Female	350	Goitre	31–40 years

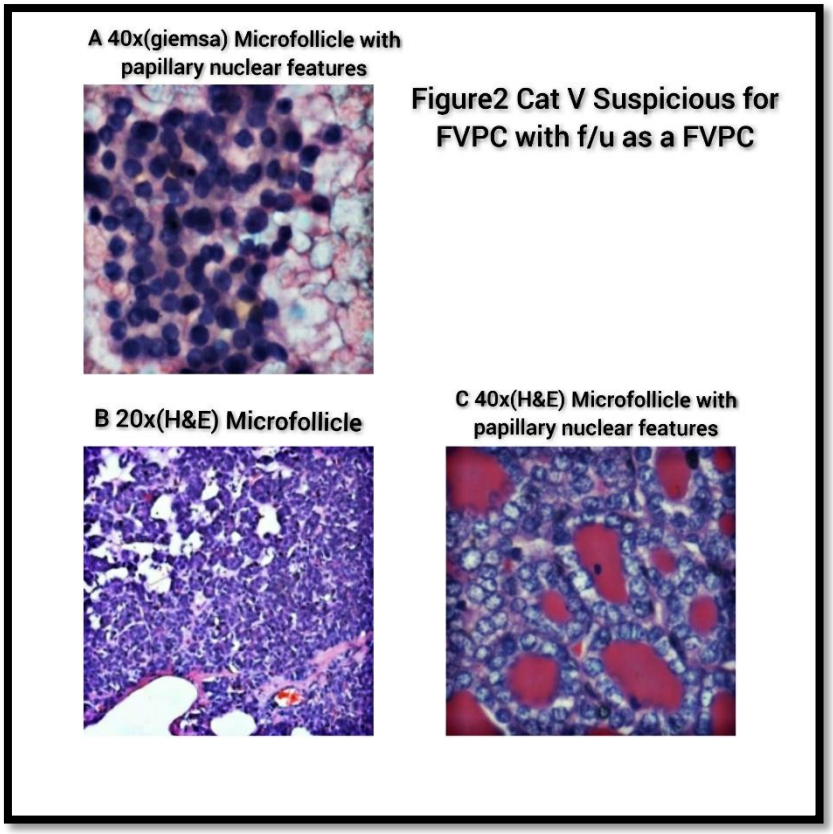
Table 10. Comparison of Malignant Thyroid Lesions in Males and Females (n=420)

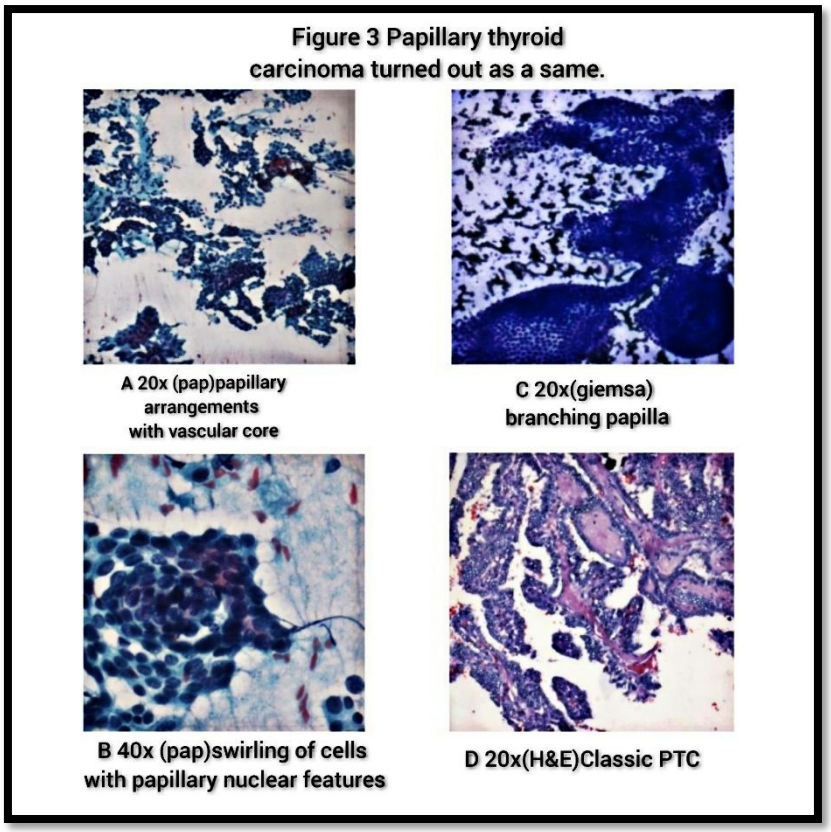
Sex	Total cases (n)	Most common malignancy	Most common age group affected	Rate of neoplasm (%)
Male	70	PTC	51–60 years	15.71
Female	350	PTC	31–40 years	8.28

Overall, neoplastic lesions were nearly twice as common in males compared to females. Papillary thyroid carcinoma was the most common malignancy in both sexes, but males presented at a relatively older age and had a higher rate of neoplastic lesions.

SOME CASE IMAGES







DISCUSSION

Fine-needle aspiration cytology (FNAC) remains the cornerstone of thyroid nodule evaluation due to its high diagnostic accuracy, simplicity, and cost-effectiveness.[1,2] In the present study, FNAC demonstrated a sensitivity of 100%, a specificity of 60%, and an overall accuracy of 81%, which is comparable to previously published studies.[10,11]

Age Distribution
In the present study, the majority of patients belonged to the 51–60-year age group, followed by the 41–50-year age group. This finding is consistent with studies by Sinna et al. and Muratli et al., which also reported a higher incidence of thyroid lesions in middle-aged individuals.[10,12] However, it is noteworthy that males tend to present at a relatively older age compared to females, which may be attributed to delayed healthcare-seeking behavior and lower clinical suspicion.

Spectrum of Thyroid Lesions
Benign lesions constituted the majority (50%) of cases in the present study, with goitre being the most common diagnosis. This is consistent with previous studies that have consistently identified colloid goitre as the most common thyroid lesion.[6,10]

Malignant lesions accounted for 8.57% of cases, with papillary thyroid carcinoma (PTC) being the most common malignancy. This finding is consistent with global literature, where PTC represents the predominant histological subtype of thyroid cancer.[11,13]

Bethesda Category-wise Analysis
The distribution of cases across Bethesda categories in the present study was comparable to previously reported data.[7] Category I (18.57%) represented nondiagnostic cases, mainly due to cystic lesions and inadequate sampling. Similar findings have been reported in other studies, emphasizing the importance of repeat FNAC and ultrasound guidance.[9]

Category II (50%) was the most common category, with excellent cytohistological concordance. This highlights the reliability of FNAC in diagnosing benign thyroid lesions.

Category III (15.71%) remains a diagnostic gray zone. In the present study, all cases with follow-up were benign, which is similar to findings reported by Sinna et al.[10] However, variability in malignancy rates in this category has been reported in the literature, necessitating careful follow-up.

Category IV showed a malignancy rate of 100% in the present study, which is higher than the Bethesda expected range (25–40%).[7] This may be attributed to the small sample size and the higher malignant potential of follicular lesions in males.[13]

Categories V and VI showed complete concordance with histopathology, reinforcing the high predictive value of FNAC in diagnosing malignancy.

Risk of Malignancy
The risk of malignancy in Categories IV, V, and VI was 100% in the present study, which is significantly higher than standard Bethesda estimates.[7] This finding supports previous studies suggesting that thyroid nodules in males carry a higher risk of malignancy.[6]

Recent studies have also highlighted that male gender is an independent risk factor for thyroid cancer and is associated with more aggressive disease behavior.[14,15]

Diagnostic Accuracy
The diagnostic accuracy of FNAC in the present study (81%) is comparable to that reported by Sinna et al. (93.6%) and Hajmanoochehri et al. (85.14%).[10,11] The slightly lower specificity observed in this study may be due to false-positive cases in indeterminate categories.

The integration of ultrasound guidance and multiple sampling has been shown to improve diagnostic yield and reduce errors.[9] Recent advances, such as molecular testing and risk stratification systems, have further enhanced diagnostic precision.[16]

Comparison with Female Patients
Although thyroid lesions were more common in females, the rate of neoplastic lesions was nearly twice as high in males (15.71% vs 8.28%). This is consistent with previous studies indicating a higher malignancy rate in males despite a lower incidence.[6,14]

Males also presented at an older age compared to females, which may contribute to more advanced disease at diagnosis.

Strengths, Limitations, Clinical Implications, and Future Directions

The present study has several important strengths. It specifically focuses on thyroid lesions in male patients, a subgroup that is less commonly studied but clinically important because of the relatively higher risk of neoplastic and malignant lesions. The use of the Bethesda System for Reporting Thyroid Cytopathology adds value by providing a standardized framework for diagnosis and risk stratification. Histopathological follow-up was available in a proportion of cases, which allowed assessment of cytohistological correlation and evaluation of the diagnostic performance of FNAC. In addition, comparison with female patients from the same institution and study period helped highlight differences in lesion patterns and malignant potential between the two sexes.

At the same time, certain limitations must be considered while interpreting the findings. The study was retrospective in nature and therefore depended on the completeness and accuracy of existing clinical records. The sample size of male patients was relatively small, which may limit the broader applicability of the results. Surgical follow-up was available in only a limited number of cases, particularly in the indeterminate and malignant categories, which may have affected the precise estimation of the risk of malignancy. Some patients were also lost to follow-up, restricting complete cytohistological correlation. Since the study was conducted at a single tertiary care center, the findings may not fully represent the disease pattern in the general population.

Despite these limitations, the study has clear clinical relevance. It emphasizes that thyroid nodules in male patients, although less common, should be evaluated with particular care due to their higher likelihood of neoplastic and malignant pathology. FNAC remains a practical and reliable first-line diagnostic investigation that helps identify lesions requiring surgery or close monitoring, while also reducing unnecessary intervention in benign cases. The Bethesda classification further supports this process by improving communication between pathologists and clinicians and by guiding risk-based management. Indeterminate categories require especially cautious interpretation and should always be correlated with clinical findings and imaging.

The findings of the present study also point toward important future directions. Larger prospective studies with multicentric participation would be useful to confirm these observations and improve generalizability. More complete surgical follow-up would help more accurately define the true risk of malignancy, particularly in indeterminate categories such as Bethesda III and IV. Future work may also benefit from combining FNAC with ultrasound-based risk stratification and ancillary methods such as molecular testing to improve diagnostic precision. More focused research on male thyroid lesions may ultimately help in developing subgroup-specific diagnostic and management strategies.

CONCLUSION

FNAC is a highly effective, safe, and minimally invasive diagnostic tool for evaluating thyroid lesions in male patients. It provides rapid and reliable cytological assessment, helps differentiate benign from malignant lesions, and reduces unnecessary surgery in benign cases. Although thyroid nodules are less common in males, they carry a higher likelihood of neoplastic and malignant pathology. Therefore, thyroid swellings in male patients require careful evaluation and a high index of suspicion.

The Bethesda System for Reporting Thyroid Cytopathology offers a structured and reliable method for categorizing thyroid FNAC findings. It improves reporting uniformity, supports risk stratification, and helps guide further management. However, indeterminate categories remain a diagnostic challenge, as cytology alone may not always clearly distinguish benign from neoplastic lesions. In such cases, close clinicoradiological correlation, repeat FNAC when required, and histopathological confirmation are important.
Overall, FNAC is a dependable first line investigation for thyroid lesions in males and plays an important role in diagnosis, risk assessment, and treatment planning.

CONFLICT OF INTEREST

The authors declare no conflict of interest regarding the publication of this study.

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