



CYTOMORPHOLOGICAL SPECTRUM OF THYROID SWELLINGS IN A TERTIARY CARE CENTRE: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Introduction: Thyroid swellings are one of the most frequently encountered endocrine problems, with a wide range of underlying causes including benign colloid goitre, thyroiditis, and malignancies. Fine Needle Aspiration Cytology (FNAC) is a widely accepted first-line diagnostic technique for evaluating thyroid lesions. Its classification under the Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) provides a standardized framework for risk assessment and clinical decision-making. **Aim & Objective:** To evaluate the cytomorphological spectrum of thyroid swellings in a tertiary care centre using FNAC and classify findings as per TBSRTC. Specific objectives were to:

- Determine the cytological diagnosis of thyroid lesions.
- Classify thyroid swellings as per TBSRTC categories.
- Correlate cytology with available histopathological and radiological findings.

Methodology: A prospective observational study was conducted in the Department of Pathology, S.M.M.H. Medical College, Saharanpur, from November 2022 to November 2024. FNAC was performed on 150 patients presenting with thyroid swellings. Smears were stained using May-Grünwald-Giemsa (MGG) and Papanicolaou stains and interpreted under TBSRTC categories I–VI. Relevant clinical data, thyroid function tests (TFTs), ultrasonography (USG), and histopathological findings (where available) were correlated. Statistical analysis was done using SPSS v25.0. **Result:** Out of 150 cases, 138 (92%) were female. The most affected age group was 21–30 years. The most common presentation was neck swelling. FNAC diagnoses included colloid nodular goitre (56%) and lymphocytic thyroiditis (32%). According to TBSRTC, 82% cases were classified as benign (Category II), 8% were non-diagnostic (Category I), and 4.7% as atypia of undetermined significance (Category III). Histopathological correlation in 27 cases showed strong concordance with cytological diagnosis. **Conclusion:** FNAC, especially when reported using the Bethesda system, is a reliable, economical, and effective diagnostic tool for evaluating thyroid swellings. The majority of lesions encountered in this population were benign, highlighting the utility of FNAC in reducing unnecessary surgical interventions. Integration with imaging and histopathology strengthens diagnostic accuracy.

KEYWORDS : Thyroid Swelling, Fine Needle Aspiration Cytology, Bethesda System, Colloid Goitre, Lymphocytic Thyroiditis, Histopathological Correlation, Thyroid Nodules, Cytomorphology, Tertiary Care Centre

INTRODUCTION

Thyroid disorders are among the most common endocrine abnormalities globally, with a significant burden in developing countries, particularly India, where over 42 million individuals are affected by thyroid diseases (1). These disorders range from benign goitrous lesions to malignant neoplasms, and thyroid nodules are frequently encountered in clinical practice, with prevalence rates ranging from 4–7% based on palpation and up to 76% when detected via ultrasonography (2,3).

Fine Needle Aspiration Cytology (FNAC) has emerged as a cornerstone in the evaluation of thyroid swellings due to its simplicity, cost-effectiveness, and diagnostic accuracy. It is widely recommended as a first-line investigation for thyroid nodules and is especially beneficial in resource-limited settings (4). The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) was introduced in 2007 and updated in 2017 to standardize reporting and improve communication among clinicians, cytopathologists, and surgeons (5).

The categorization of cytological findings using TBSRTC facilitates accurate risk stratification and guides further clinical management. However, the cytomorphological spectrum and distribution of thyroid lesions vary geographically due to differences in iodine intake, environmental factors, and access to diagnostic facilities (6). This study aims to evaluate the cytomorphological patterns of thyroid lesions at a tertiary care centre in Western Uttar Pradesh and correlate them with available histopathological and radiological data.

This prospective observational study was conducted in the Department of Pathology at Shaikh-ul-Hind Maulana Mahmood Hasan Medical College, Saharanpur, over a period of two years, from November 2022 to November 2024. A total of 150 patients presenting with thyroid swellings were enrolled from the outpatient and inpatient departments after obtaining written informed consent. The inclusion criteria comprised patients aged 18 years and above with clinically detectable thyroid swellings who consented to undergo FNAC. Patients with known bleeding disorders, those who did not consent, or whose cytological smears were inadequate for interpretation were excluded from the study. Fine Needle Aspiration was performed under aseptic precautions using a 22–24-gauge needle attached to a 10 mL syringe. Most aspirations were palpation-guided, while ultrasound-guided FNAC was reserved for non-palpable or deep-seated nodules. Two to three smears were prepared per patient, air-dried, and stained with May-Grünwald-Giemsa (MGG) and Papanicolaou (Pap) stains. The cytological interpretation of all smears was done according to the second edition of the Bethesda System for Reporting Thyroid Cytopathology (TBSRTC), classifying cases into one of six diagnostic categories. Additional clinical data, including thyroid function test (TFT) results and ultrasonography (USG) findings, were recorded for all cases. Histopathological correlation was performed in patients who subsequently underwent thyroidectomy. Statistical analysis was carried out using SPSS version 25.0. Frequencies and percentages were calculated to describe categorical variables. The study received approval from the Institutional Ethics Committee, and all patients were managed as per institutional protocols.

RESULT

A total of 150 patients with thyroid swellings were included in

MATERIALS AND METHODS

the study. The majority of the study population were females, accounting for 138 cases (92%), while males comprised only 12 cases (8%), resulting in a male-to-female ratio of approximately 1:11. The most commonly affected age group was 21–30 years, which included 45 patients (30%), followed by 31–40 years (25.3%). The age-wise distribution of cases is detailed in Table 1.

Clinically, all patients presented with a neck swelling (100%). Additional symptoms included features suggestive of hypothyroidism in 75 patients (50%) and hyperthyroidism in 49 patients (32.7%). Most patients were euthyroid on biochemical testing (56.7%), while the remaining had either hypo- or hyperthyroid profiles. Ultrasound findings revealed solid or mixed echogenic nodules in a majority of cases.

Cytomorphological analysis revealed colloid nodular goitre as the most common diagnosis, observed in 84 patients (56%), followed by lymphocytic thyroiditis in 48 cases (32%). Less common findings included follicular neoplasm in 6 patients (4%), and papillary thyroid carcinoma in 2 cases (1.3%). These findings are summarized in Table 3.

When classified according to the Bethesda System for Reporting Thyroid Cytopathology (TBSRTC), the distribution was as follows: Category I (non-diagnostic) – 12 cases (8%), Category II (benign) – 123 cases (82%), Category III (atypia of undetermined significance/follicular lesion of undetermined significance, AUS/FLUS) – 7 cases (4.7%), Category IV (follicular neoplasm/suspicious for a follicular neoplasm) – 3 cases (2%), Category V (suspicious for malignancy) – 3 cases (2%), and Category VI (malignant) – 2 cases (1.3%). The complete TBSRTC-based categorization is presented in Table 2.

Histopathological correlation was available for 27 cases in which patients underwent surgery. Among these, FNAC diagnosis was confirmed in 25 cases, yielding a concordance rate of 92.6%. The two discordant cases included one Category II lesion that turned out to be a follicular variant of papillary thyroid carcinoma and one Category III case found to be benign on histology.

Overall, the high proportion of benign lesions and the strong agreement between cytological and histological findings highlight the diagnostic utility and reliability of FNAC in the initial assessment of thyroid swellings.

Table 1: Age-wise Distribution of Patients

Age Group (years)	No. of Patients	Percentage (%)
<20	12	8.0
21–30	45	30.0
31–40	38	25.3
41–50	30	20.0
>50	25	16.7

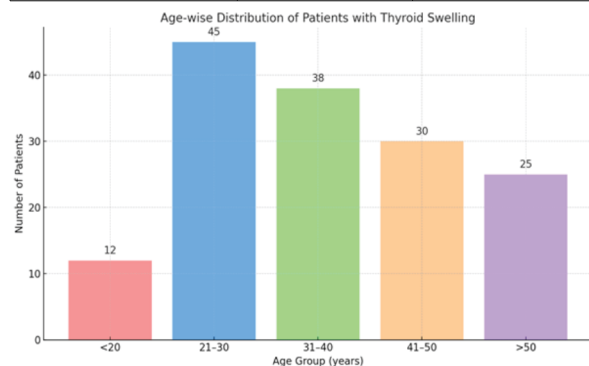


Table 2: TBSRTC Category Distribution

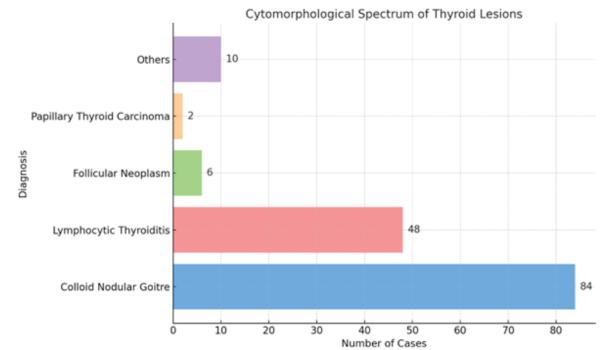
TBSRTC Category	No. of Cases	Percentage (%)
I (Non-diagnostic)	12	8.0
II (Benign)	123	82.0
III (AUS/FLUS)	7	4.7
IV (Follicular neoplasm)	3	2.0
V (Suspicious for malignancy)	3	2.0
VI (Malignant)	2	1.3

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Table 3: Cytomorphological Spectrum of Thyroid Lesions

Diagnosis	No. of Cases	Percentage (%)
Colloid Nodular Goitre	84	56.0
Lymphocytic Thyroiditis	48	32.0
Follicular Neoplasm	6	4.0
Papillary Thyroid Carcinoma	2	1.3
Others	10	6.7

Among 27 cases with available histopathology, strong concordance with FNAC was observed. TFTs revealed that 56.7% were euthyroid.



DISCUSSION

The demographic trend in this study—predominance of female patients and peak incidence in the 21–30 years age group—is consistent with findings by Bhartiya et al. [7] and Anila et al. [8], who also observed a higher prevalence of thyroid lesions among women in their second to fourth decades.

Colloid nodular goitre emerged as the most common lesion, consistent with Agrawal et al. [6], who reported 87.9% of cases as benign with colloid goitre being most frequent. Similar patterns have also been documented by Pathak et al. [9], where colloid goitre and lymphocytic thyroiditis were the leading diagnoses.

The categorization of cases using TBSRTC helped stratify the risk and guided management decisions effectively. In our study, 82% cases were reported as benign (Category II), which aligns with Mahajan et al. [15], who demonstrated TBSRTC's utility in reducing diagnostic ambiguity. The presence of 4.7% cases in Category III (AUS/FLUS) falls within the acceptable range but necessitates further evaluation due to the associated malignancy risk, which some studies have reported to be higher than initially estimated (up to 34%) [12].

Histopathological correlation in 27 cases validated the cytological interpretations, consistent with previous studies by Bhartiya et al. [7] and Chandanwale et al. [39], who highlighted FNAC's diagnostic accuracy, especially when used in conjunction with USG and biochemical markers.

The findings support FNAC as a cost-effective, outpatient procedure with high diagnostic yield. Additionally, this study reinforces the value of integrating cytology with radiological and biochemical data for comprehensive thyroid nodule evaluation, as recommended by TBSRTC guidelines [10].

CONCLUSION

FNAC, especially when classified using TBSRTC, is a valuable and efficient first-line tool for evaluating thyroid swellings. Most lesions are benign and can be managed conservatively.

Correlation with TFT, USG, and histopathology enhances diagnostic accuracy and patient care.

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