Original Article

Cytomorphological Spectrum of Fine Needle Aspiration Cytology at Jashore Medical College Hospital, Bangladesh: A Retrospective Study

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Abstract

Background: Fine needle aspiration cytology (FNAC) is a rapid, minimally invasive, and cost-effective diagnostic technique widely used for the evaluation of superficial masses and organ lesions. It plays a crucial role in differentiating benign, inflammatory, and malignant conditions, thereby guiding clinical management and reducing the need for unnecessary surgical procedures. **Objective:** To evaluate the cytomorphological spectrum of lesions diagnosed by FNAC in a tertiary care hospital and analyze their demographic and site distribution. **Methods:** This retrospective study included 186 FNAC cases performed in the Department of Pathology at Jashore Medical College. Data regarding patient age, sex, site of aspiration, and cytological diagnosis were retrieved and analyzed. Lesions were categorized into benign, inflammatory, malignant, and suspicious groups. Statistical analysis was performed using descriptive statistics and contingency tables. **Results:** The majority of patients belonged to the 21–40 years age group, and a female predominance was observed. The most frequently involved organ system was the thyroid, followed by lymph nodes, soft tissue lesions and breast. Most lesions were benign, while inflammatory lesions formed a significant proportion. Malignant lesions constituted a small but clinically important percentage of cases. A statistically significant association was observed between the organ system involved and the cytological diagnostic category. **Conclusion:** FNAC remains an invaluable diagnostic modality for the evaluation of superficial lesions. Its simplicity, rapid turnaround time, and high diagnostic accuracy make it an essential first-line investigation in routine clinical practice.

Keywords: Fine needle aspiration cytology; Cytomorphology; Superficial lesions; Thyroid lesions; Retrospective study.

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Introduction

Fine needle aspiration cytology (FNAC) is a widely accepted diagnostic technique for evaluating palpable and superficial lesions. Since its introduction into routine clinical practice, FNAC has gained popularity because of its simplicity, minimal invasiveness, rapid results, and cost-effectiveness. It is particularly useful in the initial assessment of lesions involving the thyroid, breast, lymph nodes, salivary glands, and soft tissues. By providing cytological diagnosis with minimal patient discomfort, FNAC helps clinicians determine the need for further investigations or surgical intervention. [1] The diagnostic utility of FNAC lies in its ability to distinguish between inflammatory, benign, and malignant lesions, which is essential for appropriate patient management and can significantly reduce the number of unnecessary surgical biopsies. Numerous studies have demonstrated that FNAC has high sensitivity and specificity for diagnosing a wide range of lesions, especially those involving superficial organs. [2]

Among the commonly aspirated sites, thyroid lesions constitute a significant proportion of FNAC samples worldwide. The introduction of standardized reporting systems such as the Bethesda

System for Reporting Thyroid Cytopathology has further improved diagnostic consistency and communication between pathologists and clinicians. [3] In addition to thyroid lesions, FNAC also plays an important role in evaluating lymphadenopathy, breast lumps, salivary gland masses, and various soft tissue swellings. [4] Several studies conducted in different regions have reported variations in the distribution of cytological diagnoses based on demographic factors, prevalence of inflammatory diseases, and regional patterns of malignancy. Therefore, evaluating the cytomorphological spectrum of FNAC cases in a specific population is important for understanding disease patterns and improving diagnostic services. [5] The present study was undertaken to analyze the cytomorphological spectrum of lesions diagnosed by FNAC in a tertiary care hospital and to assess their demographic distribution and site-specific patterns.

Materials and Methods

This retrospective cross-sectional study was conducted in the Department of Pathology at Jashore Medical College, Jashore, Bangladesh. The study included 186 cases of fine needle aspiration cytology (FNAC) performed for evaluation of palpable swellings and superficial lesions during the period from November 2024 to March 2026. Cases with complete demographic and cytological information were included, while cases with incomplete records or inadequate smears were excluded. FNAC was performed using a 22–23-gauge needle attached to a 10 mL disposable syringe under aseptic precautions. The aspirated material was expelled onto clean glass slides and smears were prepared. The smears were immediately fixed in 95% ethanol and stained with Hematoxylin and Eosin (H&E). All stained smears were examined under light microscopy, and cytological diagnoses were made based on established cytomorphological criteria. Patient information including age, sex, site of aspiration, and cytological diagnosis was retrieved from the cytology records. For analysis, age was grouped into five categories: 0–10, 11–20, 21–40, 41–60, and >60 years. Lesions were also categorized according to the organ system involved, including thyroid, lymph node, breast, soft tissue, salivary gland, vascular, and musculoskeletal lesions. Cytological diagnoses were further classified as benign, inflammatory, malignant, suspicious, or indeterminate. Data were entered into Microsoft Excel and analyzed using Jamovi statistical software. Descriptive statistics were used to determine frequencies and percentages of variables. Associations between categorical variables were analyzed using the Chi-square test, and a p-value <0.05 was considered statistically significant. Ethical approval for this study was obtained from the Institutional Ethical Review Board (IERB) of Jashore Medical College Teachers' Association, Jashore, Bangladesh (Ref No: IERB/JMCTA/2026/003, Date: 10/04/26). As this was a retrospective study based on laboratory records, informed consent from individual patients was waived. All patient information was kept confidential and anonymized during data collection and analysis.

Result

A total of 186 FNAC cases were analyzed in the present study. The patients ranged in age from infancy to over 60 years, with a mean age of 33.45 ± 17.38 years. The majority belonged to the 21–40 years age group (40.3%), followed by the 41–60 years group (27.4%). The detailed age distribution of cases is shown in Table I and Figure 1. Among the study population, 120 patients (64.5%) were female and 66 patients (35.5%) were male, demonstrating a clear female predominance (Figure 2).

Regarding the site of aspiration, the thyroid gland was the most frequently involved organ system (28.5%), followed by lymph nodes (24.2%) and soft tissue lesions (23.7%). Breast lesions accounted for 17.2% of cases, whereas salivary gland, vascular, and musculoskeletal lesions were comparatively less common (Table II, Figure 3). Cytological evaluation showed that 112 cases (60.2%) were benign, 57 cases (30.6%) were inflammatory, 11 cases (5.9%) were malignant, 5 cases (2.7%) were suspicious, and 1 case (0.5%) was indeterminate. Benign and inflammatory lesions were classified as separate categories, with the inflammatory category comprising non-neoplastic inflammatory conditions (Figure 3).

A statistically significant association was observed between the organ system involved and the cytological diagnostic category ($\chi^2 = 116$, $p < 0.001$) (Table III), indicating that the distribution of diagnostic categories differed significantly according to the aspiration site. The spectrum of individual cytological diagnoses observed in the study is summarized in Table IV, with lipoma, reactive lymphadenitis, fibroadenoma, and fibrocystic change being among the most frequent diagnoses. Among the 53 thyroid FNAC cases, the majority were benign Bethesda category II lesions, with nodular goiter with cystic degeneration being the most common diagnosis (35.8%), followed by nodular goiter with thyroiditis (17.0%) and nodular/colloid goiter (15.1%) (Table V).

Table I: Age distribution of patients (n = 186).

Age group (years)	Frequency n (%)
0–10	25 (13.4)
11–20	21 (11.3)
21–40	75 (40.3)
41–60	51 (27.4)
>60	14 (7.5)

Mean age ± SD: 33.45 ± 17.38 years.

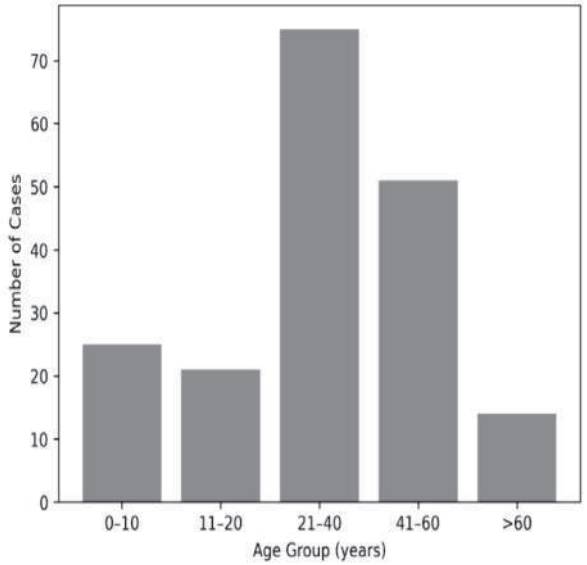


Figure 1: Bar chart showing age group distribution of FNAC cases (n=186).

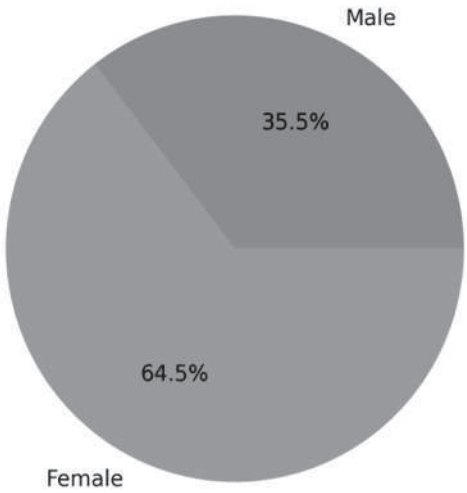


Figure 2: Pie chart showing sex distribution of FNAC cases (n=186).

Table II: Distribution of FNAC cases according to organ system (n=186).

Organ system	Frequency n (%)
Thyroid	53 (28.5)
Lymph node	45 (24.2)
Soft tissue	44 (23.7)
Breast	32 (17.2)
Salivary gland	6 (3.2)
Vascular	4 (2.2)
Musculoskeletal	2 (1.1)

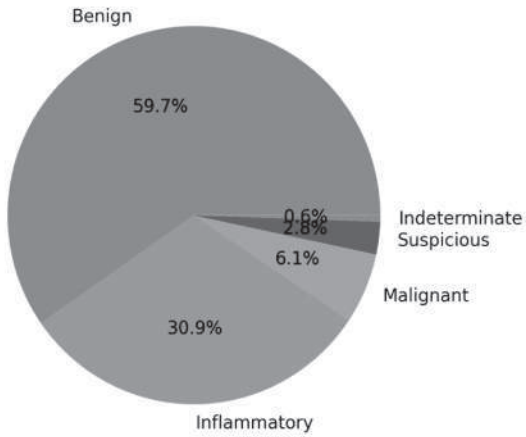


Figure 3: Pie chart showing distribution of cytological diagnoses (n=186).

Table III: Distribution of cytological diagnostic categories across different organ systems (n = 186).

Organ System	Benign n (%)	Indeterminate n (%)	Inflammatory n (%)	Malignant n (%)	Suspicious n (%)	Total
Thyroid	42 (79.2%)	1 (1.9%)	5 (9.4%)	2 (3.8%)	3 (5.7%)	53
Lymph node	0 (0%)	0 (0%)	35 (77.8%)	9 (20.0%)	1 (2.2%)	45
Soft tissue	33 (75.0%)	0 (0%)	10 (22.7%)	0 (0%)	1 (2.3%)	44
Breast	29 (90.6%)	0 (0%)	3 (9.4%)	0 (0%)	0 (0%)	32
Salivary gland	2 (33.3%)	0 (0%)	4 (66.7%)	0 (0%)	0 (0%)	6
Vascular	4 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4
Musculoskeletal	2 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2
Total	**112(60.2%)**	**1 (0.5%)**	**57 (30.6%)**	**11 (5.9%)**	**5 (2.7%)**	**186**

A statistically significant association was observed between the organ system involved and the cytological diagnostic category ($\chi^2 = 116$, $p < 0.001$) (Table IV), indicating that the distribution of cytological diagnoses varied significantly according to the site of aspiration.

Benign lesions and inflammatory lesions were analyzed as separate categories. “Benign” refers to cytologically benign, non-inflammatory lesions, whereas “inflammatory” refers to non-neoplastic inflammatory conditions.

Table IV: Spectrum of Cytological Diagnoses in FNAC Cases (n = 186).

Cytological Diagnosis	Frequency n (%)
Lipoma	17 (9.1)
Reactive lymphadenitis	15 (8.1)
Fibroadenoma	12 (6.5)
Fibrocystic change	11 (5.9)
Abscess / Suppurative inflammation	11 (5.9)
Chronic nonspecific lymphadenitis	10 (5.4)
Nodular goiter with thyroiditis	9 (4.8)
Cystic goiter	8 (4.3)
Epidermal inclusion cyst	6 (3.2)
Nodular goiter (Bethesda II)	6 (3.2)
Benign mesenchymal lesion	6 (3.2)
Thyroglossal duct cyst	4 (2.2)
Suspicious for papillary thyroid carcinoma (TBS-V)	3 (1.6)
Chronic sialadenitis	3 (1.6)
Metastatic poorly differentiated carcinoma	3 (1.6)
Nodular goiter with cystic degeneration	3 (1.6)
Benign cystic lesion	3 (1.6)
Gynecomastia	3 (1.6)
Papillary thyroid carcinoma (TBS-VI)	1 (0.5)
Anaplastic carcinoma of thyroid (TBS-VI)	1 (0.5)
Other individual diagnoses*	25 (13.4)
Total	**186 (100)**

*Other individual diagnoses included various rare benign and malignant lesions such as giant cell tumors, hemangioma, granulomatous and tubercular lymphadenitis, salivary gland tumors, metastatic carcinomas, cystic lesions, and other uncommon conditions.

Table V: Cytological diagnosis of thyroid lesions (n = 31).

Thyroid Diagnosis	Bethesda Category	Frequency n (%)
Nodular goiter / colloid goiter	II	8 (15.1)
Nodular goiter with thyroiditis	II	9 (17)
Nodular goiter with cystic degeneration	II	19 (35.8)
Lymphocytic / Hashimoto thyroiditis	II	5 (9.4)
Granulomatous thyroiditis	II	1 (1.9)
Atypia of undetermined significance (AUS)	III	1 (1.9)
Suspicious for papillary thyroid carcinoma	V	3 (5.7)
Papillary thyroid carcinoma	VI	1 (1.9)
Anaplastic carcinoma	VI	1 (1.9)
Other thyroid lesions	II	5 (9.4)
Total		**53 (100)**

Discussion

Fine needle aspiration cytology (FNAC) has become an indispensable diagnostic modality for the evaluation of palpable and superficial lesions. It is widely used because it is simple, minimally invasive, cost-effective, and provides rapid results with minimal patient discomfort. FNAC plays an important

role in differentiating benign, inflammatory, and malignant lesions and often serves as the first-line investigation before more invasive procedures such as biopsy or surgical excision. Several studies have demonstrated the high diagnostic accuracy and clinical utility of FNAC in the evaluation of lesions involving the thyroid, lymph nodes, breast, salivary glands, and soft tissues. [1-4]

In the present study, the majority of patients belonged to the 21–40 years age group, which is comparable to findings reported in many previous studies. Kumar et al. and Patel et al. also observed that most FNAC cases occurred in the third and fourth decades of life. [2,5] This age distribution may reflect the higher prevalence of benign thyroid nodules, breast lesions, and inflammatory lymph node conditions in this age group. A female predominance was also noted in our study, which is consistent with the observations of Hirachand et al., Bukhari et al., and Tariq et al. [3, 6, 7] The predominance of female patients is largely attributed to the higher frequency of thyroid and breast diseases among women.

In terms of site distribution, the thyroid was the most commonly aspirated organ, followed by lymph nodes and soft tissue lesions. Similar findings have been reported in several FNAC studies where thyroid lesions accounted for the largest proportion of cases. [8, 9] Thyroid nodules are common in the general population, and FNAC is considered the most reliable and cost-effective initial investigation for evaluating these lesions. The diagnostic approach to thyroid cytology has been further standardized with the introduction of the Bethesda System for Reporting Thyroid Cytopathology, which improves communication between cytopathologists and clinicians and helps guide patient management. [10]

The majority of lesions in the present study were benign, followed by inflammatory lesions, while malignant lesions constituted a relatively small proportion of cases. This pattern is consistent with findings from many other FNAC studies where benign and inflammatory conditions accounted for the majority of diagnoses. [6, 7, 11] Among individual diagnoses, nodular goiter and related thyroid lesions were the most common, followed by reactive lymphadenitis, fibroadenoma, and lipoma. Reactive lymphadenitis represented the most frequent lymph node pathology, which is in agreement with previous studies reporting inflammatory lymph node conditions as the predominant cause of lymphadenopathy. [12, 13] Malignant lesions were relatively infrequent in our study and mainly included metastatic carcinoma and thyroid malignancies. Statistical analysis demonstrated a significant association between the organ system involved and the cytological diagnostic category, further emphasizing the usefulness of FNAC as a reliable diagnostic tool for the evaluation of superficial lesions. [14, 15]

Conclusion

The present study highlights the important role of fine needle aspiration cytology (FNAC) as a reliable, rapid, and minimally invasive diagnostic technique for the evaluation of superficial lesions. The majority of cases in this study were benign, with thyroid lesions representing the most frequently aspirated organ system, followed by lymph node and soft tissue lesions. FNAC proved to be an effective diagnostic tool for distinguishing benign, inflammatory, and malignant conditions, thereby facilitating early diagnosis and appropriate clinical management. Owing to its simplicity, cost-effectiveness, and high diagnostic yield, FNAC remains an invaluable first-line investigation in routine clinical practice.

Limitations of the Study

This study had certain limitations. First, it was a single-center retrospective study, which may limit the generalizability of the findings to other populations. Second, histopathological correlation was not available for all cases, which could have further validated the cytological diagnoses. The study included both palpable and clinically suspected deep-seated lesions; however, image-guided FNAC could not be performed due to logistic limitations in our setting. The availability of image-guided FNAC might have improved sampling adequacy and overall diagnostic accuracy, particularly for deep-seated lesions. Future multicenter studies with larger sample sizes, incorporation of image-guided FNAC, and routine histopathological

correlation would help provide a more comprehensive evaluation of the diagnostic utility of FNAC.

Funding: This research received no external funding.

Conflict of Interest: The authors declare that there is no conflict of interest regarding the publication of this paper.

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