



FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) OF HEAD AND NECK SWELLINGS: A CROSS SECTIONAL HOSPITAL BASED STUDY EVALUATED IN A RURAL TERTIARY CARE HOSPITAL OF WESTERN ASSAM

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ABSTRACT

Introduction: Head and neck swellings are common clinical presentations, especially in rural populations. Fine Needle Aspiration Cytology (FNAC) is a rapid, minimally invasive, and cost-effective diagnostic technique for their evaluation. This study is aimed to assess the cytomorphological spectrum of head and neck swellings and analyze their distribution according to age, sex, anatomical site, and nature of lesions in a rural tertiary care hospital of western Assam. **Materials and Methods:** This retrospective cross-sectional study was conducted in the Department of Pathology of a rural tertiary care hospital in western Assam from January 2025 to December 2025. All cases of head and neck swellings evaluated by FNAC during the study period were included. Cytological diagnoses were retrieved from departmental records and categorized based on cytomorphological features. Data were analyzed using descriptive statistics. **Results:** A total of 165 cases were studied, including 83 females (50.3%) and 82 males (49.7%), with a mean age of 35.6 years. Lymph nodes were the most common site (43.6%), followed by thyroid (30.3%), parotid gland (13.3%), and soft tissue (12.7%). Benign lesions were most frequent (39.4%), followed by inflammatory (30.9%) and granulomatous lesions (10.3%). Malignant lesions accounted for 12.1% of cases and were predominantly seen in patients above 50 years of age. **Conclusion:** FNAC is a reliable and economical first-line diagnostic tool for head and neck swellings, enabling early detection of malignancy and guiding appropriate management, particularly in resource-limited rural settings.

Keyword: FNAC, Head and Neck Swellings, Cytomorphology, Lymphadenopathy, Rural Tertiary Care Hospital.

INTRODUCTION

Head and neck swellings are a common clinical presentation encountered in outpatient and inpatient settings and may arise from a wide spectrum of pathological conditions involving lymph nodes, thyroid gland, salivary glands, and soft tissues. These lesions range from reactive and inflammatory processes to benign and malignant neoplasms, necessitating early and accurate diagnosis for appropriate clinical management.¹

Fine Needle Aspiration Cytology (FNAC) has been widely accepted as a first-line diagnostic modality for the evaluation of head and neck masses. It is a simple, rapid, minimally invasive, and cost-effective procedure that can be performed on an outpatient basis with minimal complications. FNAC plays a crucial role in differentiating non-neoplastic from

neoplastic lesions and benign from malignant conditions, thereby reducing the need for unnecessary surgical procedures.^{2,3,4}

Lymphadenopathy constitutes the most frequent cause of head and neck swellings, particularly in developing countries where infectious and granulomatous diseases such as tuberculosis remain prevalent.⁵ Thyroid swellings are another major contributor, especially in iodine-deficient regions, with FNAC serving as an essential diagnostic tool in distinguishing benign thyroid lesions from malignancies. Salivary gland and soft tissue lesions also form an important subset of head and neck swellings and demonstrate diverse cytomorphological patterns.^{6,7}

Several studies have demonstrated the high diagnostic accuracy, sensitivity, and specificity of FNAC in evaluating head and neck lesions, with good correlation to histopathological findings.^{8,9,10} Systematic reviews and meta-analyses have further confirmed FNAC as an effective and reliable diagnostic technique for head and neck masses.¹⁰ Despite extensive literature supporting the utility of FNAC, there is limited region-specific data from



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rural areas of northeastern India, including western Assam. The demographic profile, disease prevalence, and pattern of malignancies in rural populations may differ from those in urban and other geographic regions due to variations in socioeconomic conditions, healthcare accessibility, and endemic diseases.⁶

The present study was undertaken to evaluate the cytomorphological spectrum of head and neck swellings using FNAC in a rural tertiary care hospital of western Assam and to analyze their distribution with respect to age, sex, anatomical site, and nature of lesions. This study aims to contribute valuable regional data and further reinforce the role of FNAC as an indispensable diagnostic tool in rural healthcare settings.

MATERIALS AND METHODS

This retrospective cross-sectional study was conducted in the Department of Pathology of a rural tertiary care hospital in western Assam, India, over a period of one year from January 2025 to December 2025. The study included all cases of head and neck swellings evaluated by Fine Needle Aspiration Cytology (FNAC) during the study period. Data were retrieved from departmental cytology records and laboratory registers, and no direct patient contact was involved.

Cases involving lymph nodes, thyroid gland, salivary glands, and soft tissue swellings with adequate cytological material and definitive diagnoses were included, while inadequate or

unsatisfactory smears and repeat FNACs from the same lesion were excluded.

Archived cytology slides and reports were reviewed, and lesions were categorized into inflammatory, benign, granulomatous, malignant, suspicious for malignancy, and other diagnostic categories according to established cytomorphological criteria. Relevant clinical and cytological data, including age, sex, anatomical site, and cytological diagnosis, were recorded in a predesigned proforma. Data were entered and analyzed using Microsoft Excel, and descriptive statistics were applied to calculate frequencies and percentages. The results were presented in the form of tables.

Ethical clearance for the study was obtained from the Institutional Ethics Committee. As this was a retrospective record-based study, no patient identifiers or personal information were used, and confidentiality was strictly maintained.

RESULTS

A total of 165 cases of head and neck swellings evaluated by Fine Needle Aspiration Cytology (FNAC) during the study period from January 2025 to December 2025 were included in the analysis. The study population comprised 83 females (50.3%) and 82 males (49.7%), with a female-to-male ratio of 1.01:1. Patient age ranged from infancy to 80 years, with a mean age of 35.6 years. The majority of cases were observed in the third and fourth decades of life (Table 1).

Table 1: Gender distribution of study population (n = 165)

Gender	Number of cases	Percentage (%)
Male	82	49.7
Female	83	50.3
Total	165	100

Lymph nodes were the most common site of involvement, accounting for 72 cases (43.6%), followed by thyroid gland swellings in 50 cases

(30.3%), parotid gland lesions in 22 cases (13.3%), and soft tissue swellings in 21 cases (12.7%) (Table 2).

Table 2: Distribution of lesions according to anatomical site

Site	Number of cases	Percentage (%)
Lymph nodes	72	43.6
Thyroid gland	50	30.3
Parotid gland	22	13.3
Soft tissue	21	12.7
Total	165	100

Based on cytomorphological findings, benign lesions constituted the largest diagnostic category with 65 cases (39.4%). Inflammatory lesions were identified in 51 cases (30.9%), granulomatous

lesions in 17 cases (10.3%), and malignant lesions in 20 cases (12.1%). The remaining 12 cases (7.3%) fell into other diagnostic categories (Table 3).

Table 3: Cytological diagnosis of head and neck swellings

Cytological diagnosis	Number of cases	Percentage (%)
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Benign	65	39.4
Inflammatory	51	30.9
Granulomatous	17	10.3
Malignant	20	12.1
Others	12	7.3
Total	165	100

Among lymph node aspirates, reactive lymphadenitis was the most frequent diagnosis, followed by granulomatous lymphadenitis (**Figure1**). Malignant lymph node lesions were mainly metastatic deposits, predominantly squamous cell carcinoma (**Figure 2**). Thyroid lesions were predominantly benign, with colloid goiter being the most common diagnosis, followed

by lymphocytic thyroiditis. Parotid gland lesions were largely benign, with pleomorphic adenoma being the most frequently encountered tumor. Soft tissue swellings were mainly composed of benign spindle cell lesions and inflammatory conditions. The site-wise distribution of cytological diagnoses is summarized in (**Table 4**).

Table 4: Site-wise distribution of cytological diagnoses

Site	Benign	Inflammatory	Granulomatous	Malignant	Total
Lymph nodes	18	32	17	5	72
Thyroid gland	45	3	0	2	50
Parotid gland	15	2	0	5	22
Soft tissue	7	14	0	0	21
Total	85	51	17	12	165

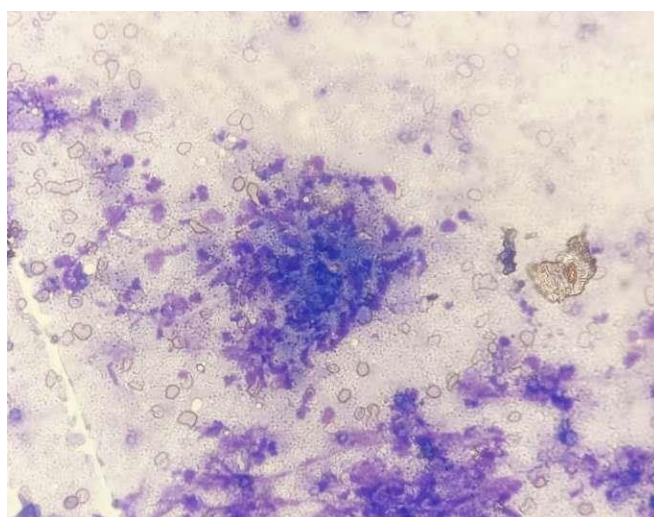


Figure 1: Granulomatous lymphadenitis

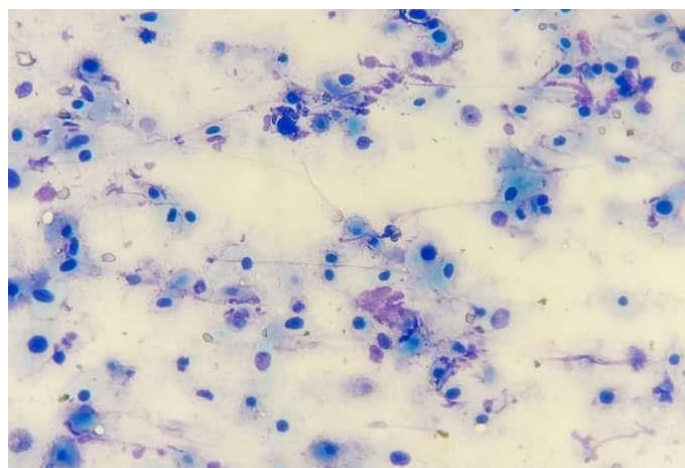


Figure 2: Metastatic squamous cell carcinoma of Lymph Node

Malignant lesions were predominantly observed in patients above 50 years of age, with a mean age of 55.4 years, whereas benign and inflammatory lesions were more commonly seen in younger age groups.

DISCUSSION

Head and neck swellings constitute a heterogeneous group of lesions that pose a diagnostic challenge due to their varied etiology and overlapping clinical presentation. Fine Needle Aspiration Cytology (FNAC) has been widely recognized as an effective first-line diagnostic modality for the evaluation of these lesions. The present retrospective cross-sectional study analyzes the cytomorphological spectrum of head and neck swellings in a rural tertiary care hospital of western Assam and highlights the utility of FNAC in such settings.

In the present study, a nearly equal gender distribution was observed, with a slight female predominance. Similar gender distributions have been reported by Rathod and Parmar¹ and Thakur et al.², while some studies have shown male predominance, particularly in studies with a higher proportion of malignant cases. The wide age range observed in this study reflects the fact that head and neck swellings affect all age groups, although benign and inflammatory lesions were more common in younger patients, and malignant lesions predominated in older age groups. This finding is consistent with observations by Poorey and Tyagi⁸ and el Hag et al.⁷.

Lymph nodes were the most common site of involvement in the present study, accounting for 43.6% of cases. This is in agreement with multiple Indian and international studies, which have consistently reported lymphadenopathy as the most frequent cause of head and neck swellings.^{1,3,5} Reactive lymphadenitis was the most common lymph node diagnosis, followed by granulomatous lymphadenitis. The relatively high proportion of granulomatous lesions likely reflects the endemicity of tuberculosis in this region, a finding also noted in studies from other developing countries.^{5,7}

Thyroid swellings constituted the second most common group of lesions in the present study. Benign thyroid lesions, particularly colloid goiter, were the predominant diagnoses. This observation parallels findings reported by Thakur et al.² and Poorey and Tyagi⁸, reinforcing the role of FNAC as an essential screening tool in thyroid nodules to distinguish benign lesions from malignancies and reduce unnecessary surgeries.

Salivary gland lesions, predominantly involving the parotid gland, were mostly benign, with pleomorphic adenoma being the most frequent diagnosis. Similar cytomorphological patterns have been described by Shekhar et al.⁴ and el Hag et al.⁷. Malignant salivary gland tumors were relatively

uncommon, which is consistent with their overall lower incidence compared to benign neoplasms.

Malignant lesions accounted for 12.1% of cases in the present study, with metastatic squamous cell carcinoma being the most frequent malignant diagnosis in lymph nodes. This finding is consistent with the results of other studies from the Indian subcontinent, where squamous cell carcinoma of the upper aerodigestive tract commonly metastasizes to cervical lymph nodes.^{2,6,8} The higher mean age among patients with malignant lesions further supports the age-related increase in cancer risk reported in earlier studies.^{7,10}

The overall findings of the present study align well with the published literature and reaffirm the diagnostic value of FNAC in the evaluation of head and neck swellings. Systematic reviews and meta-analyses have demonstrated high sensitivity and specificity of FNAC, particularly in distinguishing benign from malignant lesions, thereby validating its continued use as a primary diagnostic modality.¹⁰

The retrospective nature of the study and lack of histopathological correlation in all cases are recognized limitations. However, the large sample size and representation of a rural population provide valuable region-specific data. The study underscores the importance of FNAC as a rapid, reliable, and cost-effective diagnostic tool, especially in resource-limited rural healthcare settings.

CONCLUSION

Fine Needle Aspiration Cytology (FNAC) is a reliable, rapid, and cost-effective diagnostic modality for the evaluation of head and neck swellings. This study demonstrates a broad cytomorphological spectrum, with lymph node lesions being the most common and benign conditions predominating. FNAC effectively differentiates inflammatory, benign, and malignant lesions, enabling timely clinical decision-making and reducing unnecessary surgical interventions. Its role is particularly significant in rural tertiary care settings, where it serves as an indispensable first-line diagnostic tool.

Conflict of Interest:

None

Ethical Approval:

The study was approved by the Institutional Ethics Committee.

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