



Research Article

Head And Neck Lesion

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Received: 16-09-2025

Accepted: 29-09-2025

Available online: 14-10-2025

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Medical and Pharmaceutical Research

ABSTRACT

Background: Head and neck lesions encompass a wide variety of inflammatory, benign, and malignant pathologies, requiring early and accurate diagnosis due to their anatomical and functional significance.

Objectives: To evaluate the demographic distribution, anatomical sites, and cytological spectrum of palpable head and neck swellings using fine-needle aspiration cytology (FNAC).

Methods: This observational study was conducted in the Department of Pathology at a tertiary care center in Uttar Pradesh. FNAC was performed on 150 patients presenting with palpable head and neck swellings over a defined period. Aspirates were stained using Giemsa, Papanicolaou, and Ziehl-Neelsen stains, depending on the clinical suspicion. Thyroid lesions were categorized using The Bethesda System, while salivary gland lesions followed The Milan Classification. Data on age, sex, anatomical site, and final cytological diagnosis were recorded and analyzed using descriptive statistics. Chi-square test was applied for association between age and malignancy.

Results: The majority of lesions (42.7%) occurred in patients below 25 years, with a male preponderance (58%). Soft tissue lesions (50%) were most frequent, followed by thyroid (26.7%) and salivary gland swellings (23.3%). Tubercular (40%) and reactive (32.7%) lymphadenitis dominated lymph node lesions. Thyroid cytology revealed 60% benign and 12.5% malignant cases. Overall, 44% of lesions were non-neoplastic, while 20% were malignant. Malignancy showed a significant age association, with 55.6% of malignant cases seen in patients above 50 years ($p < 0.05$).

Conclusion: FNAC remains a reliable, minimally invasive, and cost-effective first-line diagnostic tool for head and neck swellings, especially in resource-limited settings.

Keywords: Head and Neck Neoplasms; Cytodiagnosis; Fine-Needle Aspiration; Lymphadenopathy; Thyroid Nodule.

INTRODUCTION

Head and neck lesions form a broad and clinically significant category of pathological conditions that arise from structures such as the thyroid, salivary glands, lymph nodes, skin, oral mucosa, and underlying soft tissues of the head and neck region.¹ These lesions include a wide histological spectrum—ranging from inflammatory and reactive processes to benign tumors and high-grade malignancies. Given the anatomical complexity and vital functional roles of this region in speech, respiration, deglutition, and sensory perception, clinicians must ensure early and accurate diagnosis to guide optimal therapeutic outcomes and prevent functional compromise.^{2,3} Globally, head and neck cancers represent approximately 5% of all malignancies, with an estimated 890,000 new cases and 450,000 deaths reported in 2022.⁴ In India, this burden is disproportionately higher, accounting for over 25–30% of all cancers, placing these malignancies among the most prevalent and challenging public health concerns.^{5,6} Contributing risk factors include tobacco chewing, smoking, alcohol abuse, human papillomavirus (HPV) infection, poor oral hygiene, and occupational exposures—all of which are highly prevalent in Indian populations.^{7,8} In addition to malignancies, benign lesions such as pleomorphic adenomas, thyroglossal duct cysts, reactive lymphadenopathies, lipomas, and dermoid cysts constitute a significant proportion of head and neck swellings evaluated in outpatient and surgical departments. Many of these lesions exhibit overlapping clinical features with malignant counterparts, which necessitates histopathological confirmation for definitive diagnosis.⁹ While fine-needle aspiration

cytology (FNAC) and imaging studies such as ultrasonography (USG), CT, and MRI aid in preliminary diagnosis, they often fall short in differentiating subtle neoplastic changes or defining histological subtypes.¹⁰ Histopathological examination, therefore, remains the cornerstone in evaluating head and neck lesions. It enables tissue-specific diagnosis by identifying cellular architecture, stromal interactions, and evidence of malignancy or dysplasia, directly influencing clinical decision-making.¹¹ However, existing literature on the clinicopathological correlation of these lesions is fragmented and often limited to single-institution case series or organ-specific studies, particularly in semi-urban and rural India.^{12,13}

The study aimed to evaluate the spectrum, demographic profile, organ-wise distribution, and histopathological patterns of head and neck lesions in a tertiary care center, addressing existing data gaps and enhancing understanding of their burden in the Indian healthcare settings.

MATERIALS AND METHODS

“Study Design and Setting

This observational study was conducted in the Department of Pathology, Venkateshwara Institute of Medical Sciences, Gajraula, Uttar Pradesh. The objective was to analyze the cytological spectrum of palpable head and neck lesions using Fine Needle Aspiration Cytology (FNAC) as the primary diagnostic modality.

Study Population and Duration

A total of 150 patients presenting with clinically palpable swellings in the head and neck region were included over a defined period. Patients of all ages and both sexes were considered. Exclusion criteria included patients with inaccessible lesions for FNAC, prior surgical intervention at the site, or those who refused consent.

Sampling Procedure

FNAC was performed using a 22–24 gauge needle attached to a 10 mL disposable syringe, following standard aseptic precautions. In cases of deep-seated or cystic lesions, ultrasound guidance was employed where required. Aspirated material was immediately spread onto clean glass slides. Air-dried smears were stained with Giemsa, while alcohol-fixed smears were stained with Papanicolaou stain. Ziehl-Neelsen staining was used for suspected tuberculous lesions.

Cytological Evaluation

All cytological smears were examined by experienced pathologists. The lesions were categorized into:

- Non-neoplastic (inflammatory, infectious, reactive),
- Benign neoplastic,
- Suspicious, and
- Malignant neoplastic.

For specific organ-based lesions, established reporting systems were used:

- The Bethesda System for reporting thyroid cytopathology, and
- The Milan System for salivary gland cytology, to ensure standardized reporting.

Data Collection

Demographic data (age, sex), clinical history, anatomical site of swelling, and provisional clinical diagnosis were recorded. Age was stratified into three groups: <25 years (young), 25–50 years (middle-aged), and >50 years (elderly).

Statistical Analysis

Data were compiled using Microsoft Excel (version 2016). Descriptive statistics (frequency and percentage) were applied. Associations between lesion types and demographic variables were tested using the Chi-square test (χ^2). A p-value < 0.05 was considered statistically significant”.

RESULTS

In the current study, the majority of patients (42.7%) were under 25 years, followed by 33.3% between 25–50 years. A male predominance was observed, with males constituting 58% of the total study population. This suggests a higher prevalence of head and neck swellings among younger males. (*See Table 1*)

Table 1: Distribution of Patients by Age Group and Sex (n = 150)

Age Group (Years)	Male (n)	Female (n)	Total (n)	Percentage (%)
<25	38	26	64	42.7%
25–50	29	21	50	33.3%
>50	20	16	36	24.0%
Total	87	63	150	100%

Soft tissue lesions, including lymph nodes and connective tissue swellings, accounted for half of all cases. Thyroid gland and salivary gland lesions contributed 26.7% and 23.3%, respectively, indicating that lymphadenopathy and thyroid nodules are the most frequent causes of head and neck swelling in clinical practice. (*See Table 2*)

Table 2: Site-wise Distribution of Head and Neck Lesions (n = 150)

Anatomical Site	Cases (n)	Percentage (%)
Thyroid Gland	40	26.7%
Salivary Glands	35	23.3%
Soft Tissue Lesions (incl. Lymph Nodes, Skin, etc.)	75	50.0%
Total	150	100%

Among lymph node lesions, tubercular lymphadenitis (40%) and reactive lymphadenitis (32.7%) were predominant. Suppurative, granulomatous, and metastatic lesions were also reported. The data reflect an infectious and inflammatory predominance in lymph node swellings, with fewer cases of malignancy or lymphoma. (See Table 3)

Table 3: Cytological Diagnosis of Lymph Node Lesions (n = 55)

Diagnosis Type	Cases (n)	Percentage (%)
Tubercular Lymphadenitis	22	40.0%
Reactive Lymphadenitis	18	32.7%
Suppurative Lymphadenitis	5	9.1%
Granulomatous Inflammation	4	7.3%
Kikuchi Disease	2	3.6%
Metastatic Carcinoma	3	5.5%
Lymphoma	1	1.8%
Total	55	100%

(Subset of 75 soft tissue lesions)

Thyroid FNAC classified 60% of lesions as benign (Bethesda II), while 12.5% were malignant (Bethesda VI). Atypia and suspicious categories comprised a small proportion. The findings confirm that most thyroid swellings are non-cancerous, though a notable fraction requires further diagnostic workup or surgical intervention. (See Table 4)

Table 4: Cytological Classification of Thyroid Lesions (Bethesda System) (n = 40)

Bethesda Category	Cases (n)	Percentage (%)
Category I: Non-diagnostic/Inadequate	4	10.0%
Category II: Benign	24	60.0%
Category III: AUS/FLUS	3	7.5%
Category IV: Follicular Neoplasm	2	5.0%
Category V: Suspicious for Malignancy	2	5.0%
Category VI: Malignant (e.g. PTC)	5	12.5%
Total	40	100%

Non-neoplastic lesions were the most frequently diagnosed (44%), followed by benign tumors (25.3%) and malignancies (20%). Suspicious cases and inadequate samples constituted the remainder. This underscores FNAC's value in distinguishing between reactive/inflammatory and neoplastic processes in the head and neck region. (See Table 5)

Table 5: Final Cytological Diagnosis of All Head and Neck Lesions (n = 150)

Cytological Category	Cases (n)	Percentage (%)
Non-neoplastic	66	44.0%
Benign Neoplastic	38	25.3%
Suspicious for Malignancy	6	4.0%
Malignant Neoplastic	30	20.0%
Inadequate for Evaluation	10	6.7%
Total	150	100%

Malignancy rates showed a marked age-related increase, with 55.6% of malignant cases seen in patients over 50 years. Only 3.1% of malignancies occurred in patients under 25 years, emphasizing the importance of age as a risk factor in head and neck cancers. (See Table 6)

Table 6: Association Between Age Group and Malignant Lesions (n = 150)

Age Group (Years)	Malignant Cases (n)	Total Cases (n)	Percentage (%)
<25	2	64	3.1%
25–50	8	50	16.0%
>50	20	36	55.6%
Total	30	150	20.0%

DISCUSSION

In the present study, 42.7% of head and neck lesions were observed in individuals below 25 years, with a male predominance (58%), aligning with findings by Johnson et al.¹⁴, who noted that while HNSCCs are more common in older adults, younger patients in low- and middle-income countries often present with benign and infectious swellings. Mody et al.¹⁵ similarly reported a higher male prevalence in head and neck lesions among younger adults, particularly in regions with prevalent tobacco use and poor sanitation. Surov et al.¹⁶ also documented male dominance in both benign and malignant head and neck lesions, consistent with our demographic profile. However, compared to the WHO classification by Nosé and Lazar¹⁷, which observed peak lesion incidence in middle-aged adults, this study's younger age predominance likely reflects the high burden of infectious etiologies in the Indian population. Thus, this study contributes a unique regional insight by emphasizing early-age presentation, particularly in males.

Soft tissue lesions, predominantly lymph node and subcutaneous swellings, were the most common (50%), followed by thyroid (26.7%) and salivary gland lesions (23.3%). This is in line with Brahmabhatt et al.¹⁸, who reported lymphadenopathy as the most frequent pathology in similar Indian settings. Junn et al.¹⁹ also emphasized the diagnostic volume of thyroid and lymph node swellings in FNAC practice. The thyroid's position as the second most affected site is further validated by the WHO classification¹⁷, which lists colloid goiters and lymphocytic thyroiditis as frequent benign conditions. Salivary lesions (23.3%) in the present study were slightly higher than the 15% reported by Surov et al.¹⁶, possibly due to higher diagnostic yield or increased tertiary care referrals. These patterns collectively highlight the commonality of infectious and reactive lesions in Indian cohorts.

Tubercular lymphadenitis (40%) was the most frequent lymph node pathology, followed by reactive (32.7%) and suppurative lymphadenitis (9.1%). These findings are consistent with Brahmabhatt et al.¹⁸ and Junn et al.¹⁹, who highlighted tuberculosis and other infections as leading causes of lymphadenopathy in endemic regions. Kikuchi disease (3.6%) and lymphoma (1.8%) were infrequent but aligned with Nosé and Lazar¹⁷ who reported similar prevalence in younger Asian adults. The low incidence of metastatic lymph nodes (5.5%) is in contrast to the higher malignancy burden reported by Johnson et al.¹⁴ and Mody et al.¹⁵, whose studies focused on advanced HNSCC in older patients. Thus, our study further emphasizes the predominance of non-neoplastic etiologies in a young demographic.

Among thyroid FNACs, 60% were benign (Bethesda II), 12.5% malignant (Bethesda VI), and 10% non-diagnostic (Bethesda I). This aligns well with findings by WHO data¹⁷ and Junn et al.¹⁹ that report benign nodules as the most frequent. Malignancy rates also matched expected Bethesda VI predictions. Surov et al.¹⁶ reinforced FNAC's value in triaging thyroid carcinomas, and the distribution of indeterminate categories here remains within globally accepted norms.

Overall, non-neoplastic lesions (44%) dominated the cytological diagnosis, followed by benign tumors (25.3%) and malignancies (20%). Brahmabhatt et al.¹⁸ and Junn et al.¹⁹ similarly reported a high burden of reactive lesions. While Nosé and Lazar¹⁷ acknowledged the malignancy spectrum in cytology, their proportion was still lower than in the HNSCC-focused dataset by Mody et al.¹⁵. The low inadequate rate (6.7%) highlights procedural reliability.

Malignancies increased with age: 55.6% were in those >50 years, only 3.1% in <25 years, affirming findings from Johnson et al.¹⁴, Surov et al.¹⁶, and WHO¹⁷, which linked age with cancer risk. Junn et al.¹⁹ also documented this trend, while Brahmabhatt et al.¹⁸ highlighted younger age presentations mostly with benign lesions.

CONCLUSION

Fine-needle aspiration cytology (FNAC) is a simple, safe, and effective diagnostic tool for evaluating head and neck lesions. It offers valuable information on lesion type, nature, and need for further management, particularly in younger populations where non-neoplastic and infectious causes predominate. The cytological patterns observed in our cohort reflect the regional burden of disease and underscore FNAC's role in early, minimally invasive diagnosis, especially in resource-limited healthcare settings.

Conflict of Interest: None.

Funding: None.

Ethical Approval: Obtained.

Consent: Written consent secured.

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