BIOMEDICINE AND CHEMICAL SCIENCES

Website: https://journals.irapa.org/index.php/BCS

e-ISSN: 2790-296X | p-ISSN:2957-5826

Original Article

# Study of Cervical Lymphadenitis: Correlation Between Clinical Features, Fine-Needle Aspiration Cytology and Histopathology — A Multi-Institutional Study

**Corresponding Author:**
Dr. Rashmi S. N.

**Dr. Akash Anadure[1], Dr. Rashmi S. N[2]**

1 Assistant Professor, Department of Otorhinolaryngology, Gulbarga Institute of Medical Sciences, Kalaburagi, Karnataka, India
2 Senior Resident, Department of General Surgery, ESIC Medical College, Kalaburagi, Karnataka, India

**Article History:**

Received on: Jul 25, 2026
Accepted on: Aug 20, 2026
Published on: Sep 01, 2026

**Citation:** Dr. Akash Anadure *et al.* Study of Cervical Lymphadenitis: Correlation Between Clinical Features, Fine-Needle Aspiration Cytology and Histopathology — A Multi-Institutional Study. *Biomedicine and Chemical Sciences, 5 (3): 31-36, 2026*



## ABSTRACT

**Background**: Cervical lymphadenitis is a common clinical problem with a broad differential diagnosis ranging from reactive inflammatory conditions to granulomatous infections and malignancy. Tuberculous lymphadenitis remains an important cause of cervical lymph node enlargement in regions where tuberculosis is prevalent. Fine-needle aspiration cytology (FNAC) is a minimally invasive diagnostic modality commonly used for the initial evaluation of cervical lymphadenopathy, whereas histopathological examination (HPE) provides definitive tissue diagnosis.
**Aim**: To study the clinical features of cervical lymphadenitis and evaluate the correlation between FNAC and histopathological examination, with particular emphasis on tuberculous lymphadenitis.
**Materials and Methods**: A multi-institutional observational study was conducted from September 2025 to August 2026 among 75 patients presenting with cervical lymphadenitis at Gulbarga Institute of Medical Sciences and ESIC Medical College, Kalaburagi. All patients underwent clinical evaluation, FNAC and subsequent excisional biopsy with histopathological examination. Histopathology was considered the reference standard. The diagnostic performance of FNAC was assessed.
**Results**: The study included 40 females (53.3%) and 35 males (46.7%). The largest age group was 11–20 years (30, 40%). A history of tuberculosis contact was present in 20 patients (26.7%). Cervical lymph node enlargement was present in all patients; pain was present in 30 (40%), fever in 20 (26.7%), and loss of appetite/weight loss in 20 (26.7%). The upper posterior and deep cervical nodal region was most commonly involved (30, 40%). Unilateral right-sided involvement occurred in 30 patients (40%), left-sided involvement in 25 (33.3%), and bilateral involvement in 20 (26.7%). FNAC was positive for tuberculous lymphadenitis in 40 patients (53.3%), while 35 were reported as nonspecific lymphadenopathy. HPE demonstrated tuberculous lymphadenitis in 45 patients (60%); the remaining 30 showed non-specific granulomatous lymphadenitis negative for tuberculosis. All 40 FNAC-positive cases were confirmed by HPE, while five additional TB cases were detected on HPE among FNAC-negative/nonspecific cases. FNAC demonstrated 88.9% sensitivity, 100% specificity, 100% positive predictive value, 85.7% negative predictive value and 93.3% diagnostic accuracy.

**Conclusion**: FNAC is a useful first-line investigation for cervical lymphadenitis and demonstrated high specificity and overall diagnostic accuracy for tuberculous lymphadenitis. However, false-negative cases occurred, emphasizing the importance of clinical correlation and histopathological examination when clinical suspicion persists despite a nonspecific FNAC result.

**Keywords**: Cervical lymphadenitis; cervical lymphadenopathy; tuberculosis; tuberculous lymphadenitis; FNAC; fine-needle aspiration cytology; histopathology; granulomatous lymphadenitis.

## INTRODUCTION

Cervical lymphadenopathy is one of the most frequent clinical presentations encountered in otorhinolaryngology, general surgery and primary clinical practice. Enlargement of cervical lymph nodes may occur due to a variety of infectious, inflammatory, granulomatous, autoimmune and neoplastic disorders. Establishing the underlying etiology is important because treatment and prognosis vary considerably between these conditions.

Tuberculous lymphadenitis remains an important cause of cervical lymph node enlargement in countries with a high burden of tuberculosis. Patients may present with cervical swelling, pain, fever, loss of appetite and weight loss, although the clinical presentation is variable and may overlap with other inflammatory and granulomatous disorders.

Clinical examination remains the initial step in the evaluation of cervical lymphadenopathy. Duration, site, size, tenderness, consistency, mobility, laterality, number of nodes and associated constitutional symptoms provide useful diagnostic information. A history of tuberculosis exposure may increase clinical suspicion, although absence of a known contact does not exclude tuberculosis.

Fine-needle aspiration cytology is a simple, minimally invasive and cost-effective diagnostic modality. In tuberculous lymphadenitis, cytology may demonstrate granulomatous inflammation and necrotic material. However, sampling limitations and overlapping cytological features may result in nonspecific or false-negative reports.

Histopathological examination provides additional diagnostic information through assessment of lymph node architecture and tissue morphology. Excisional biopsy can therefore establish a diagnosis when FNAC is inconclusive or discordant with the clinical presentation.

The present multi-institutional study was undertaken to evaluate the clinical profile of cervical lymphadenitis and determine the correlation between FNAC and histopathological examination, particularly in relation to tuberculous lymphadenitis.

## AIM

To study cervical lymphadenitis and evaluate the correlation between clinical features, FNAC and histopathological examination.

## OBJECTIVES

- To study the demographic profile of patients presenting with cervical lymphadenitis.
- To evaluate the common clinical manifestations and anatomical distribution of cervical lymphadenitis.
- To assess the proportion of patients with tuberculous lymphadenitis.
- To assess the association of tuberculosis contact history with cervical lymphadenitis.
- To compare FNAC findings with histopathological findings.
- To determine the diagnostic performance of FNAC for tuberculous lymphadenitis.

## MATERIALS AND METHODS

### Study Design

A multi-institutional observational study was conducted among patients presenting with cervical lymphadenitis.

### Study Setting

The study was conducted collaboratively at Gulbarga Institute of Medical Sciences, Kalaburagi, Karnataka, and ESIC Medical College, Kalaburagi, Karnataka, involving the Departments of Otorhinolaryngology and General Surgery.

### Study Period

September 2025 to August 2026.

### Study Population

A total of 75 patients presenting with cervical lymphadenitis were included.

**Clinical Evaluation**
All patients underwent detailed history taking and clinical examination. Age, sex, tuberculosis contact history, symptoms, laterality and cervical nodal location were documented.

**FNAC**
All patients underwent FNAC of the clinically significant cervical lymph node. Cytological findings were categorized as tuberculous lymphadenitis or nonspecific lymphadenopathy based on the cytological impression.

**Excisional Biopsy and Histopathology**
All 75 patients underwent excisional biopsy. Histopathological examination was considered the reference standard. HPE diagnoses were categorized as tuberculous lymphadenitis or non-specific granulomatous lymphadenitis negative for tuberculosis.

**Statistical Analysis**
Categorical variables were expressed as frequencies and percentages. Sensitivity, specificity, positive predictive value, negative predictive value and overall diagnostic accuracy of FNAC were calculated using HPE as the reference standard.

**RESULTS**
**Demographic Characteristics**
A total of 75 patients were included. There were 40 females (53.3%) and 35 males (46.7%), giving a female-to-male ratio of approximately 1.14:1. Patients ranged from 0 to 60 years. The 11–20-year age group was the largest, comprising 30 patients (40%).

| Age group | Number | Percentage |
|---|---|---|
| 0–10 years | 1 | 1.3% |
| 11–20 years | 30 | 40.0% |
| 21–30 years | 15 | 20.0% |
| 31–40 years | 10 | 13.3% |
| 41–50 years | 10 | 13.3% |
| 51–60 years | 9 | 12.0% |
| Total | 75 | 100% |

**Sex Distribution**

| Sex | Number | Percentage |
|---|---|---|
| Female | 40 | 53.3% |
| Male | 35 | 46.7% |
| Total | 75 | 100% |

**Clinical Features**
Cervical lymph node enlargement was present in all 75 patients. Pain was reported in 30 patients (40%), fever in 20 (26.7%), and loss of appetite and weight loss in 20 (26.7%). A history of tuberculosis contact was present in 20 patients (26.7%).

| Clinical feature | Number | Percentage |
|---|---|---|
| Cervical lymph node enlargement | 75 | 100% |
| Pain | 30 | 40.0% |
| Fever | 20 | 26.7% |
| Loss of appetite/weight loss | 20 | 26.7% |
| History of TB contact | 20 | 26.7% |

**Cervical Nodal Distribution**
The upper posterior and deep cervical nodal region was the most frequently involved site, accounting for 30 cases (40%).

| Nodal region | Number | Percentage |
|---|---|---|
| Submandibular/submental | 10 | 13.3% |
| Upper anterior and deep cervical | 20 | 26.7% |
| Upper posterior and deep cervical | 30 | 40.0% |
| Lower anterior and deep cervical | 7 | 9.3% |
| Lower posterior and deep cervical | 8 | 10.7% |
| Total | 75 | 100% |

**Laterality**
Unilateral right-sided involvement was observed in 30 patients (40%), left-sided involvement in 25 (33.3%), and bilateral involvement in 20 (26.7%).

| Laterality | Number | Percentage |
|---|---|---|
| Right unilateral | 30 | 40.0% |
| Left unilateral | 25 | 33.3% |
| Bilateral | 20 | 26.7% |
| Total | 75 | 100% |

**FNAC Findings**
FNAC demonstrated features suggestive of tuberculous lymphadenitis in 40 patients (53.3%). The remaining 35 patients (46.7%) were reported as having nonspecific lymphadenopathy.

| FNAC diagnosis | Number | Percentage |
|---|---|---|
| Tuberculous lymphadenitis | 40 | 53.3% |
| Nonspecific lymphadenopathy | 35 | 46.7% |
| Total | 75 | 100% |

**Histopathological Findings**
Histopathological examination following excisional biopsy demonstrated tuberculous lymphadenitis in 45 patients (60%). The remaining 30 patients (40%) demonstrated non-specific granulomatous lymphadenitis and were negative for tuberculosis on histopathological evaluation.

| HPE diagnosis | Number | Percentage |
|---|---|---|
| Tuberculous lymphadenitis | 45 | 60.0% |
| Non-specific granulomatous lymphadenitis, TB negative | 30 | 40.0% |
| Total | 75 | 100% |

**FNAC–HPE Correlation**
All 40 patients diagnosed as tuberculous lymphadenitis by FNAC were confirmed to have tuberculous lymphadenitis on HPE. Among the 35 patients reported as nonspecific on FNAC, five were subsequently diagnosed as tuberculous lymphadenitis on HPE, while 30 demonstrated non-specific granulomatous lymphadenitis negative for tuberculosis.

| FNAC finding | HPE TB positive | HPE TB negative | Total |
|---|---|---|---|
| FNAC TB positive | 40 | 0 | 40 |
| FNAC nonspecific | 5 | 30 | 35 |
| Total | 45 | 30 | 75 |

**Diagnostic Performance of FNAC**

| Parameter | Value |
|---|---|
| Sensitivity | 88.9% |
| Specificity | 100% |
| Positive predictive value | 100% |
| Negative predictive value | 85.7% |
| Overall diagnostic accuracy | 93.3% |

## DISCUSSION

The present multi-institutional study evaluated 75 patients with cervical lymphadenitis and examined the relationship between clinical findings, FNAC and histopathology. Tuberculous lymphadenitis was the predominant specific diagnosis, being identified in 45 patients (60%) on histopathological examination.

The age distribution showed a predominance of younger patients, with the 11–20-year age group accounting for 40% of the study population. This emphasizes the importance of considering tuberculous lymphadenitis in younger patients presenting with cervical lymph node enlargement.

A slight female predominance was observed, with females comprising 53.3% of the study population. Cervical lymph node enlargement was present in all patients. Pain was reported in 40%, while fever and loss of appetite/weight loss were each reported in 26.7%. These symptoms may support an infectious or inflammatory etiology but are not sufficiently specific to establish tuberculosis independently.

The upper posterior and deep cervical region was the most frequently involved nodal region (40%). Right-sided unilateral involvement was observed in 40%, left-sided unilateral involvement in 33.3%, and bilateral involvement in

26.7%. These findings provide useful information regarding the clinical distribution of cervical lymphadenitis in the present cohort.

A history of tuberculosis contact was documented in 26.7% of patients. Although contact history can increase clinical suspicion, most patients did not report a known contact. Thus, absence of a definite exposure history should not be used to exclude tuberculosis.

FNAC demonstrated tuberculous lymphadenitis in 40 patients, all of whom were confirmed on histopathology. There were no false-positive FNAC diagnoses, resulting in specificity and positive predictive value of 100%. However, five patients with histopathologically confirmed tuberculosis had been reported as nonspecific on FNAC. These false-negative cases resulted in a sensitivity of 88.9%.

The occurrence of false-negative FNAC results is clinically important. Granulomatous lymphadenitis may show overlapping cytological features, and the aspirate may not always be representative of the entire lymph node. Histopathology, by providing architectural information, may establish the diagnosis in such cases.

The remaining 30 patients demonstrated non-specific granulomatous lymphadenitis on histopathology and were negative for tuberculosis. In such cases, correlation with clinical findings and appropriate microbiological or ancillary investigations may be required where clinically indicated.

The overall diagnostic accuracy of FNAC was 93.3%, indicating good performance in this cohort. Nevertheless, the lower negative predictive value compared with the positive predictive value highlights that a nonspecific FNAC result does not completely exclude tuberculous lymphadenitis.

The findings support a stepwise diagnostic approach in which clinical evaluation guides investigation, FNAC serves as an initial tissue sampling technique, and histopathology is used when FNAC is inconclusive or discordant with the clinical picture. The multi-institutional nature of the study also demonstrates the value of collaboration between otorhinolaryngology, general surgery and pathology services.

**Clinical Implications**

- FNAC is a useful first-line investigation for cervical lymphadenitis.
- A positive FNAC suggestive of tuberculous lymphadenitis showed complete concordance with HPE in this study.
- A nonspecific FNAC result does not completely exclude tuberculosis.
- Persistent cervical lymphadenopathy with significant clinical suspicion warrants further evaluation.
- Histopathology remains valuable in FNAC-negative, inconclusive or discordant cases.

**Limitations**

- The sample size was relatively small, comprising 75 patients.
- Both participating institutions were located in the same geographic region, which may limit generalizability.
- Microbiological confirmation and molecular tests for tuberculosis were not incorporated into the present analysis.
- Detailed radiological characteristics and individual cervical nodal levels by conventional neck-level classification were not evaluated.
- The study did not provide a detailed comparison of individual cytological patterns with corresponding histopathological features.
- All patients underwent excisional biopsy, which may introduce selection bias toward patients in whom tissue diagnosis was considered clinically necessary.

## CONCLUSION

Cervical lymphadenitis has a broad etiological spectrum, and tuberculous lymphadenitis remains an important cause of cervical lymph node enlargement. In this multi-institutional study of 75 patients, histopathology demonstrated tuberculous lymphadenitis in 60% of cases.

FNAC demonstrated 88.9% sensitivity, 100% specificity, 100% positive predictive value, 85.7% negative predictive value and 93.3% overall diagnostic accuracy when compared with histopathology.
The complete concordance of FNAC-positive cases with histopathology indicates that FNAC is highly reliable when characteristic cytological findings of tuberculosis are present. However, five cases of histologically confirmed tuberculosis were reported as nonspecific on FNAC, demonstrating that false-negative cytological results can occur.

Therefore, FNAC is an effective initial diagnostic tool for cervical lymphadenitis, but it should always be interpreted in conjunction with the clinical presentation. Histopathological examination should be considered in patients with persistent lymphadenopathy, high clinical suspicion or nonspecific/discordant FNAC findings.

## DECLARATIONS

### Ethics Approval

Institutional Ethics Committee approval obtained from the participating institutions before publication of the study.

### Informed Consent

Written informed consent was obtained from patients or their legally authorized representatives for participation and relevant diagnostic procedures.

### Conflict of Interest

The authors declare no conflict of interest.


### Funding

No external funding was received for this study.


### Author Contributions

Dr. Akash Anadure: Study conception, clinical evaluation, data collection, manuscript preparation and critical revision.
Dr. Rashmi S. N.: Study conception, clinical evaluation, data collection, statistical interpretation, manuscript preparation and correspondence.

## REFERENCES


1. Cummings CW, Flint PW, Haughey BH, et al. Cummings Otolaryngology: Head and Neck Surgery. Elsevier.
2. Kocjan G. Fine Needle Aspiration Cytology: Diagnostic Principles and Dilemmas. Springer.
3. Das DK. Fine-needle aspiration cytology in the diagnosis of tuberculosis and tuberculous lymphadenitis.
4. Mohanty R, Wilkinson A. Fine needle aspiration cytology of lymph nodes.
5. World Health Organization. Global Tuberculosis Report. Geneva: World Health Organization.
6. Pynnonen MA, Gillespie MB, Roman B, et al. Clinical Practice Guideline: Evaluation of the Neck Mass in Adults. Otolaryngology–Head and Neck Surgery.
7. American Thoracic Society, CDC, and Infectious Diseases Society of America. Official clinical practice guidelines for diagnosis of tuberculosis in adults and children.