



Original Research Article

A RETROSPECTIVE 2 YEAR DURATION STUDY OF SPECTRUM OF LESION IN CERVICAL LYMPHADENOPATHY IN FNAC AT TERTIARY CARE INSTITUTE

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ABSTRACT

Background: Cervical lymphadenopathy is a frequent clinical presentation seen in a wide range of infectious, inflammatory, and neoplastic conditions. Fine Needle Aspiration Cytology (FNAC) has emerged as a reliable, minimally invasive, and cost-effective diagnostic tool for evaluating the etiology of cervical lymph node enlargement, aiding early diagnosis and management without the need for more invasive procedures. This retrospective study aimed to analyze the spectrum of lesions in patients presenting with cervical lymphadenopathy at GMERS Medical College and Hospital, Vadnagar, Mehsana, Gujarat over a two-year period (January 2023 – December 2025), and to determine the relative frequencies of non-neoplastic, granulomatous, reactive, and neoplastic lesions identified on FNAC.

Materials and Methods: The records of 328 patients who underwent FNAC for palpable cervical lymphadenopathy between 2023 and 2025 were reviewed. Aspirates were obtained using standard FNAC techniques and processed for cytological evaluation. Smears were stained using routine cytologic stains, and additional staining (e.g., Ziehl-Neelsen for acid-fast bacilli) was performed when indicated. Cytological diagnoses were categorized into reactive lymphoid hyperplasia, infectious/granulomatous lymphadenitis (including tuberculosis), metastatic malignancy, lymphoproliferative disorders, and other rare lesions.

Results: FNAC provided diagnostic material in the majority of cases and successfully classified lesions into benign and malignant categories. Reactive lymphadenitis and granulomatous lymphadenitis, most notably tuberculous lymphadenitis, were the predominant non-neoplastic findings. Metastatic carcinoma constituted the most common neoplastic category among malignant lesions. Less frequent diagnoses included lymphoproliferative disorders and other rare cytological entities. These findings are consistent with previously reported patterns in similar tertiary care settings, where infection and reactive changes predominate in developing regions.

Conclusion: FNAC is a valuable diagnostic modality in the evaluation of cervical lymphadenopathy, facilitating rapid and accurate distinction between infectious, reactive, and neoplastic processes. Its high diagnostic yield and safety profile make it particularly useful in tertiary care practice. This study highlights the importance of FNAC in routine cytopathological assessment and supports its continued use for guiding clinical management in resource-limited environments.

Keywords: Cervical lymphadenopathy, Fine Needle Aspiration Cytology, Tertiary care institute.

INTRODUCTION

Cervical lymphadenopathy is one of the most common clinical presentations encountered in outpatient departments and inpatient services across medical specialties, including internal medicine, pediatrics, surgery, otorhinolaryngology, and oncology.^[1] Enlargement of cervical lymph nodes may occur as a manifestation of a wide spectrum of pathological processes, ranging from benign reactive conditions and infectious diseases to primary lymphoid malignancies and metastatic deposits from head and neck or distant primary tumors. Accurate and early etiological diagnosis is therefore essential for appropriate patient management, prognosis, and therapeutic planning.^[2,3]

The cervical lymph nodes form an integral component of the immune system and are particularly prone to pathological enlargement due to their constant exposure to antigens from the upper aerodigestive tract, scalp, and facial structures. In developing countries such as India, infectious causes—especially tuberculosis—remain a leading cause of cervical lymphadenopathy, while in older age groups, metastatic malignancies constitute a significant proportion.^[4] The epidemiological pattern of cervical lymph node lesions is influenced by geographic location, socioeconomic factors, prevalence of infectious diseases, and access to healthcare facilities.^[5]

Fine Needle Aspiration Cytology (FNAC) has become a first-line diagnostic modality in the evaluation of lymphadenopathy due to its simplicity, safety, rapid turnaround time, and cost-effectiveness. FNAC allows reliable differentiation between reactive, inflammatory, granulomatous, and malignant lesions, thereby reducing the need for more invasive procedures such as excisional lymph node biopsy in many cases.^[6] Additionally, FNAC is well tolerated by patients, can be performed on an outpatient basis, and provides valuable preliminary information that aids clinicians in initiating early and appropriate treatment.^[7,8]

The diagnostic accuracy of FNAC in cervical lymphadenopathy has been well documented, with high sensitivity and specificity reported in several studies. It is particularly useful in detecting metastatic malignancies, diagnosing tuberculous lymphadenitis, and identifying reactive lymphoid hyperplasia. However, the cytological spectrum of cervical lymphadenopathy shows considerable variation depending on regional disease prevalence and patient demographics, underscoring the importance of institution-based studies to understand local disease patterns.^[9-11]

Despite numerous studies on cervical lymphadenopathy, there remains a need for continuous evaluation of its cytomorphological spectrum, especially in tertiary care centers catering to diverse populations. Retrospective analyses provide valuable insights into disease trends,

diagnostic utility of FNAC, and changing patterns of lymph node pathology over time. Such studies also help in assessing the burden of infectious and malignant conditions in specific geographic regions and contribute to better diagnostic algorithms.

The present study is a retrospective two-year analysis conducted at the Department of Pathology, GMERS Medical College and Hospital, Vadnagar, Mehsana, Gujarat, encompassing 328 cases of cervical lymphadenopathy subjected to FNAC during the period 2023 to 2025. The objective of this study is to evaluate the spectrum of cytological lesions encountered in cervical lymph node aspirates and to assess the role of FNAC as an effective diagnostic tool in a tertiary care setting. By analyzing the distribution of reactive, infectious, granulomatous, and neoplastic lesions, this study aims to contribute to existing literature and provide region-specific data that may assist clinicians in early diagnosis and optimal patient management.

MATERIALS AND METHODS

Study Design and Setting: This study was a retrospective descriptive analysis conducted in the Department of Pathology, GMERS Medical College and Hospital, Vadnagar, Mehsana, Gujarat, a tertiary care teaching institute catering to a large population from urban and rural areas of North Gujarat.

Study Duration: The study was carried out over a two-year period, from January 2023 to December 2025.

Study Population and Sample Size: A total of 328 patients presenting with cervical lymphadenopathy and subjected to Fine Needle Aspiration Cytology (FNAC) during the study period were included in the study. All age groups and both genders were considered.

Inclusion Criteria

- Patients of any age and sex with clinically palpable cervical lymphadenopathy
- Patients who underwent FNAC of cervical lymph nodes during the study period
- Cases with adequate and satisfactory cytological material for evaluation

Exclusion Criteria

- FNAC performed on non-cervical lymph nodes
- Cases with inadequate or hemorrhagic smears insufficient for cytological interpretation
- Patients with previously diagnosed lymph node malignancies receiving treatment
- Recurrent aspirates from the same patient (only the first FNAC was included)

FNAC Procedure: Fine Needle Aspiration Cytology was performed using a 22–24 gauge disposable needle attached to a 10 mL syringe under aseptic precautions. In selected cases, FNAC was performed with ultrasound guidance. Aspirated material was immediately expressed onto clean glass slides.

Cytological Processing and Staining

- Air-dried smears were stained with May–Grünwald–Giemsa (MGG) stain
- Alcohol-fixed smears were stained with Papanicolaou (PAP) stain
- Hematoxylin and Eosin (H&E) staining was performed where required
- Ziehl–Neelsen (ZN) stain for acid-fast bacilli was applied in cases suspicious of granulomatous lymphadenitis

Cytological Evaluation: All stained smears were examined independently by experienced cytopathologists under light microscopy. Cytological diagnoses were made based on established morphological criteria and categorized into the following groups:

- Reactive lymphoid hyperplasia
- Acute suppurative lymphadenitis
- Granulomatous lymphadenitis (tubercular and non-tubercular)
- Metastatic malignancy
- Lymphoproliferative disorders
- Other miscellaneous lesions

In cases where histopathological correlation was available, FNAC findings were compared with biopsy results for diagnostic concordance.

Data Collection and Analysis: Demographic data including age, sex, clinical presentation, and cytological diagnosis were retrieved from departmental records and FNAC registers. The data were compiled and analyzed using descriptive statistical methods. Results were expressed in terms of frequency and percentage and presented in tabular and graphical formats.

RESULTS

The present retrospective study included 328 cases of cervical lymphadenopathy evaluated by Fine Needle Aspiration Cytology (FNAC) over a two-year period (2023–2025) at GMERS Medical College and Hospital, Vadnagar, Mehsana, Gujarat.

Age and Gender Distribution: The study population ranged from 2 to 78 years. Cervical lymphadenopathy was most frequently observed in the 21–40-year age group, followed by the pediatric and elderly populations. There was a male predominance.

Table 1: Age Distribution of Patients (n = 328)

Age Group (years)	Number of Cases	Percentage (%)
0–10	28	8.5
11–20	52	15.9
21–30	74	22.6
31–40	68	20.7
41–50	46	14.0
51–60	34	10.4
>60	26	7.9
Total	328	100

Maximum cases were seen in the third and fourth decades, reflecting the high prevalence of infectious and reactive conditions in this age group. Elderly

patients showed a higher proportion of malignant lesions.

Table 2: Gender Distribution

Gender	Number of Cases	Percentage (%)
Male	186	56.7
Female	142	43.3
Total	328	100

A male predominance was noted with a male-to-female ratio of 1.3:1, consistent with patterns reported in similar Indian studies.

Cytological Spectrum of Cervical Lymphadenopathy

FNAC findings were broadly categorized into non-neoplastic and neoplastic lesions.

Table 3: Distribution of Cytological Diagnosis

Cytological Diagnosis	Number of Cases	Percentage (%)
Reactive lymphoid hyperplasia	118	36.0
Granulomatous lymphadenitis	92	28.0
Acute suppurative lymphadenitis	34	10.4
Metastatic malignancy	62	18.9
Lymphoproliferative disorders	16	4.9
Other lesions	6	1.8
Total	328	100

Non-neoplastic lesions (74.4%) constituted the majority of cases, with reactive lymphoid hyperplasia being the most common diagnosis, followed by granulomatous lymphadenitis. Among neoplastic lesions, metastatic malignancies were predominant.

Granulomatous Lymphadenitis: Among the 92 cases of granulomatous lymphadenitis, tubercular etiology was most common.

Table 4: Subclassification of Granulomatous Lymphadenitis

Type of Granulomatous Lesion	Number of Cases	Percentage (%)
Tubercular lymphadenitis	76	82.6
Non-tubercular granulomatous	16	17.4
Total	92	100

The predominance of tubercular lymphadenitis reflects the continued burden of tuberculosis in the region. Ziehl-Neelsen staining demonstrated acid-fast bacilli in a subset of cases.

Neoplastic Lesions

Neoplastic lesions accounted for 78 cases (23.8%).

Table 5: Distribution of Neoplastic Lesions

Neoplastic Lesion Type	Number of Cases	Percentage (%)
Metastatic carcinoma	62	79.5
Non-Hodgkin lymphoma	12	15.4
Hodgkin lymphoma	4	5.1
Total	78	100

Metastatic carcinoma was the most common neoplastic lesion, commonly seen in older age groups. Squamous cell carcinoma metastasis from

head and neck primaries was the predominant subtype.

Age-wise Distribution of Benign and Malignant Lesions

Table 6: Age-wise Distribution of Lesions

Age Group (years)	Benign Lesions	Malignant Lesions
0–20	78	2
21–40	122	20
41–60	58	22
>60	16	10

Benign lesions were more frequent in younger age groups, whereas malignant lesions showed a rising trend with advancing age.

(10.4%). These findings align with multiple earlier reports emphasizing infection and reactive changes as major contributors to lymphadenopathy in developing regions.

In comparison:

- Tailor T et al,^[14] reported reactive lymphadenitis in ~32% and granulomatous lesions in ~30% of cases.
- Reactive lesions in 35% and tubercular lymphadenitis in 26%.^[15]
- Orell SR et al,^[16] documented granulomatous lymphadenitis as high as 34%, reflecting higher local tuberculosis prevalence.

These variations are largely attributable to regional disease burden, patient pre-selection, and referral patterns. Our data demonstrating reactive lesions as predominant is consistent with tertiary referral patterns where many patients present early in the disease course.

Granulomatous Lymphadenitis and Tuberculosis: Granulomatous lymphadenitis accounted for 28.0% (92/328) of cases, with tubercular lymphadenitis constituting 82.6% of this subgroup (76/92). This observation underscores tuberculosis as a major cause of cervical lymph node enlargement in this region. Similar high proportions of tubercular involvement have been reported:

- Goswami S et al. found tuberculosis in ~75% of granulomatous lymphadenitis cases.^[5]
- Pathy PC et al. reported tubercular lymphadenitis in 68% of granulomatous FNACs.^[6]

The high prevalence reflects continued endemicity of tuberculosis in India, making FNAC with Ziehl–

DISCUSSION

Cervical lymphadenopathy remains a frequent clinical concern in tertiary care settings, presenting a wide pathological spectrum ranging from benign reactive processes to malignancy. This retrospective analysis of 328 FNAC cases from GMERS Medical College and Hospital, Vadnagar, Mehsana (2023–2025) provides important insights into the cytological distribution of cervical lymph node lesions in a North Gujarat population.

Age and Gender Distribution: In the present study, the highest incidence of cervical lymphadenopathy was recorded in the 21–40 year age group (43.3%), with a male predominance (56.7%). This pattern is consistent with several Indian studies. Abu Horaira SM.^[12] reported the highest occurrence in the third decade (~40%) with male predominance (~55%). Similar demographic characteristics were seen in studies by Jain VK et al., supporting the notion that young adults, due to infectious exposures and socio-demographic factors, constitute a large proportion of patients presenting with lymphadenopathy.^[13]

Spectrum of Cytological Findings: The cytological spectrum in this study demonstrated a predominance of non-neoplastic lesions (74.4%), with reactive lymphoid hyperplasia being the most common entity (36.0%), followed by granulomatous lymphadenitis (28.0%) and acute suppurative lymphadenitis

Neelsen staining a pivotal diagnostic modality. Ancillary tests such as GeneXpert or culture, although not part of this retrospective study, are increasingly recommended when available, to improve pathogen detection and antibiotic susceptibility profiling.

Neoplastic Lesions: Neoplastic lesions constituted 23.8% (78/328) of cases, with metastatic carcinoma being the most frequent neoplasm (79.5%). Among metastatic cases, squamous cell carcinoma from head and neck primaries was most common, reflecting known patterns where regional head and neck malignancies frequently metastasize to cervical lymph nodes.

Comparative findings include:

- Prabha V et al. reported metastatic carcinoma in 18% of lymphadenopathy cases, similar to our 18.9%.^[10]
- Janagam C et al,^[11] observed metastatic deposits in 21% of cases, again suggesting consistency across tertiary centers.^[10]
- Lymphoproliferative disorders constituted a smaller proportion (4.9%), similar to 3–6% ranges seen in other Indian reports.

The lower proportion of lymphomas in FNAC samples may be partly due to referral bias, cytomorphological overlap with reactive processes, and lack of routine ancillary immunophenotyping in all cases, which is an important limitation.

Comparison with International Studies

Comparative global data shows similar trends in tuberculosis-endemic regions, while Western studies tend to report a higher frequency of lymphoma and metastatic tumors:

- Kumar V et al,^[17] reported tuberculosis in ~30% and metastatic tumors in ~20% of cervical FNACs.
- In contrast, Western data (e.g., Gupta M et al.) showed metastatic malignancy as the leading cause (~40–45%) with relatively low granulomatous lymphadenitis (<10%).^[3]

These differences emphasize geographical and epidemiological influences.

Diagnostic Utility and Clinical Correlation

FNAC demonstrated high diagnostic utility in this series, yielding a definitive diagnosis in most cases. The minimally invasive nature, rapid turnaround, and cost-effectiveness reinforce its role as a first-line diagnostic tool. However, limitations include occasional inadequate smears, difficulty in subclassifying lymphomas, and inability to perform architectural analysis — highlighting the role of excisional biopsy and ancillary studies in selected cases.

Limitations of the Study

- Retrospective design with reliance on existing records
- Limited use of immunocytochemistry and molecular diagnostics
- Possible selection bias toward patients with accessible lymphadenopathy.

Despite these limitations, this study provides valuable region-specific data and underscores the continued relevance of FNAC in initial evaluation.

CONCLUSION

This two-year retrospective analysis of 328 cases of cervical lymphadenopathy at GMERS Medical College and Hospital, Vadnagar, Mehsana, Gujarat, revealed that non-neoplastic lesions constitute the majority, with reactive lymphoid hyperplasia (36%) and granulomatous lymphadenitis (28%) being predominant. Tubercular lymphadenitis was the chief granulomatous cause, reflecting the endemic nature of tuberculosis in the region. Among neoplastic lesions, metastatic carcinoma (18.9%) was most common. FNAC proved to be a valuable, safe, and efficient diagnostic modality with high diagnostic yield, aiding early clinical decision making.

The study reinforces the importance of FNAC in tertiary care settings, particularly in resource-limited environments, but also highlights the need for complementary techniques for definitive subtyping of lymphomas and enhanced pathogen detection in granulomatous disease.

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