

A Study of Fine Needle Aspiration Cytology of Patients with Enlarged Palpable Lymph Nodes at a Tertiary Care Hospital Pali, Rajasthan**Lokendra Bidiyasar¹, Mahmood Ali Sayed², Hanuman Prasad Toshniwal³**¹PG Resident, Department of Pathology, MPGMC, Pali, Rajasthan, India²Professor, Department of Pathology, MPGMC, Pali, Rajasthan, India³Head of Department, Department of Pathology, MPGMC, Pali, Rajasthan, India

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Abstract**Background:** Peripheral lymphadenopathy is a common clinical presentation with diverse etiologies ranging from reactive inflammatory conditions to malignancy. Fine-needle aspiration cytology (FNAC) is a rapid, minimally invasive, and cost-effective diagnostic technique for the initial evaluation of enlarged lymph nodes.**Aims:** To evaluate the cytomorphological spectrum of palpable lymphadenopathy using FNAC and determine its distribution according to age, sex, anatomical site, and cytological diagnosis.**Settings and Design:** Hospital-based retrospective and prospective observational study conducted in the Department of Pathology at a Tertiary Care Center.**Materials and Methods:** A total of 350 patients with palpable lymphadenopathy undergoing FNAC between December 2021 and November 2025 were included. Cytological smears stained with May–Grünwald–Giemsa were evaluated and classified into reactive, inflammatory, granulomatous, tubercular, and malignant lesions. Clinical and cytological data were analyzed statistically.**Statistical Analysis:** Data were analyzed using MedCalc version 23.0. Categorical variables were expressed as frequency and percentage. Associations were assessed using the Chi-square test, with $P < 0.05$ considered statistically significant.**Results:** Among 350 cases, benign lesions accounted for 95.43% and malignant lesions for 4.57%. Reactive lymphadenitis was the commonest diagnosis (37.71%), followed by granulomatous lymphadenitis (28.86%) and tubercular lymphadenitis (15.71%). Cervical lymph nodes were most frequently involved (68.0%). Malignant lesions were significantly associated with advancing age and male sex ($P < 0.05$).**Conclusion:** FNAC is a reliable first-line investigation for palpable lymphadenopathy. It accurately differentiates benign from malignant lesions, facilitates early diagnosis, and reduces unnecessary surgical biopsy, particularly in tuberculosis-endemic and resource-limited settings.**Keywords:** Fine-needle aspiration cytology; lymphadenopathy; reactive lymphadenitis; tubercular lymphadenitis; cervical lymph nodes; cytomorphology.**DOI:** 10.25258/ijcpr.18.8.306

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Introduction

Lymphadenopathy is a common clinical presentation encountered in patients of all age groups and may arise from a wide range of infectious, inflammatory, granulomatous, and neoplastic conditions.[1,2] Early identification of the underlying pathology is essential because clinical management and prognosis differ substantially according to the etiology.[1] Fine-needle aspiration cytology (FNAC) has become the preferred initial diagnostic modality owing to its simplicity, rapid turnaround time, minimal invasiveness, and cost-effectiveness.[2,3] The recently introduced Sydney System has standardized the reporting of lymph node cytology

and facilitates uniform risk stratification and clinical decision-making.[4,5] Recent validation studies have further supported its diagnostic utility in routine practice.[6,7] The present study was undertaken to evaluate the cytomorphological spectrum of lymph node lesions diagnosed by FNAC at a tertiary care teaching hospital.[8]

Materials and Methods

This retrospective–prospective observational study was conducted in the Department of Pathology, Government Medical College and Associated Shree Bangur Hospital, Pali, Rajasthan, over a four-year

period from 1 December 2021 to 30 November 2025.

The study included patients of all age groups presenting with palpable peripheral lymphadenopathy who underwent fine-needle aspiration cytology (FNAC) in the Cytopathology section. Only adequate and representative FNAC smears were included. Inadequate or poorly preserved smears, cases with incomplete clinical information, and aspirates obtained from sites other than lymph nodes were excluded.

FNAC was performed under aseptic precautions using 22–25-gauge needles attached to 5- or 10-mL disposable syringes. Multiple smears were prepared from each aspirate. Air-dried smears were stained with May–Grünwald–Giemsa (MGG) stain, while alcohol-fixed smears were stained with Papanicolaou and Hematoxylin–Eosin (H&E) stains whenever required. Cytomorphological diagnosis was established after microscopic examination by experienced pathologists.

Relevant demographic and clinical information, including age, sex, site of lymph node involvement, and clinical diagnosis, was retrieved from cytology requisition forms and hospital records. Cytological findings were categorized into inflammatory, granulomatous, reactive, suppurative, metastatic, lymphoproliferative, and other diagnostic groups according to standard cytomorphological criteria.

Data were entered into Microsoft Excel and analyzed using MedCalc version 23.0. Categorical variables were expressed as frequencies and percentages, whereas continuous variables were summarized as mean $\pm$ standard deviation. Appropriate statistical tests, including the Chi-square test, Student's t-test, Mann–Whitney U test, one-way ANOVA, and Kruskal–Wallis test, were applied as applicable. A p value <0.05 was considered statistically significant.

The study was approved by the Institutional Ethics Committee, Government Medical College, Pali. Written informed consent was obtained from all prospectively enrolled participants, while confidentiality of patient information was maintained by anonymizing all study records.

Results

A total of 350 patients with palpable lymphadenopathy underwent fine needle aspiration cytology (FNAC) during the study period. The study population comprised 177 (50.57%) males and 173 (49.43%) females, with the highest frequency of cases occurring in the 21–30 years age group, followed by the 11–20 years and 1–10 years age groups (Table 1).

Table 1: Demographic characteristics of patients with palpable lymphadenopathy (N = 350)

Variable	Number of patients (n)	Percentage (%)
Age group (years)		
1–10	64	18.29
11–20	71	20.29
21–30	92	26.29
31–40	58	16.57
41–50	22	6.29
51–60	20	5.71
≥ 61	23	6.57
Total	350	100.00
Gender		
Male	177	50.57
Female	173	49.43
Total	350	100.00

Values are presented as number and percentage

The cervical lymph nodes were the most frequently aspirated site (68.00%), followed by the axillary (9.14%), supraclavicular (6.86%), submandibular (5.71%), and inguinal (5.14%) lymph nodes. Other nodal groups accounted for a relatively small proportion of aspirates (Table 2).

Table 2: Anatomical distribution of palpable lymphadenopathy (N = 350)

Anatomical site	Number of patients (n)	Percentage (%)
Cervical lymph node	238	68.00
Axillary lymph node	32	9.14
Supraclavicular lymph node	24	6.86
Submandibular lymph node	20	5.71
Inguinal lymph node	18	5.14
Submental lymph node	9	2.57
Post-auricular lymph node	7	2.00
Occipital lymph node	2	0.57
Total	350	100.00

Table 3: Cytological spectrum of palpable lymphadenopathy diagnosed by fine needle aspiration cytology (N = 350)

FNAC diagnosis	Number of patients (n)	Percentage (%)
Reactive lymphadenitis	132	37.71
Granulomatous lymphadenitis	101	28.86
Tubercular lymphadenitis	55	15.71
Chronic/Chronic non-specific lymphadenitis	32	9.14
Acute on chronic/Acute suppurative lymphadenitis	14	4.00
Malignant lymph nodes (metastatic lymph nodes/lymphoma)	16	4.57
Total	350	100.00

Among the cytological diagnoses, Reactive lymphadenitis was the most common lesion (37.71%), followed by Granulomatous lymphadenitis (28.86%), Tubercular lymphadenitis (15.71%), Chronic non-specific lymphadenitis (9.14%), and Acute suppurative lymphadenitis (4.00%). Malignant lesions were identified in 16 (4.57%) cases and comprised Metastatic deposits and Lymphoma, whereas the remaining 334 (95.43%) cases were non-neoplastic (Table 3).

Representative cytomorphological features included a polymorphous lymphoid population with tingible-body macrophages in Reactive lymphadenitis, epithelioid cell granulomas with or without multinucleated giant cells in Granulomatous lymphadenitis, and caseous necrosis in Tubercular lymphadenitis. Acute suppurative lymphadenitis demonstrated abundant neutrophils in a necrotic background, while Metastatic deposits showed pleomorphic malignant epithelial cells and Lymphoma exhibited a monomorphic population of atypical lymphoid cells.

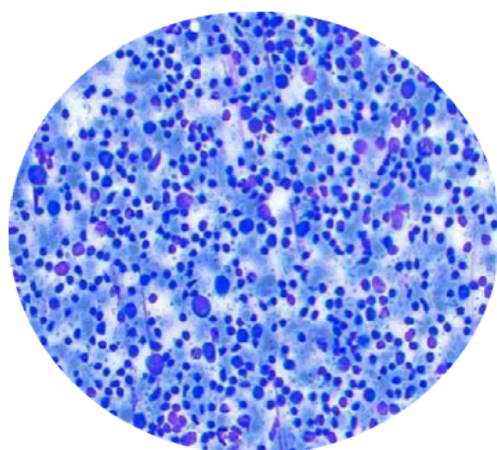


Figure 1: Fine needle aspiration cytology smear of Reactive lymphadenitis showing a polymorphous lymphoid population comprising small and large lymphocytes, centroblasts, centrocytes, immunoblasts and tingible-body macrophages (May-Grünwald-Giemsa stain, ×400).

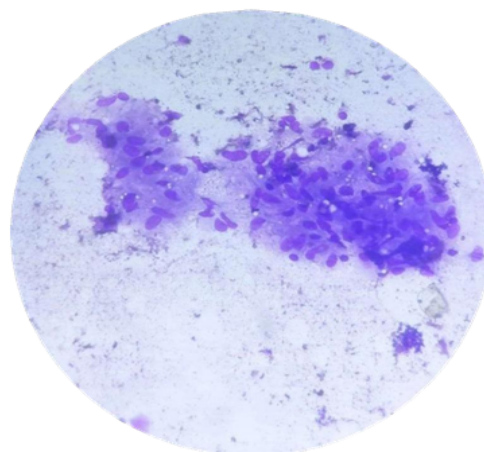


Figure 2: Fine needle aspiration cytology smear of Tubercular lymphadenitis showing epithelioid cell granulomas with caseous necrosis and multinucleated giant cells (May-Grünwald-Giemsa stain, ×400).

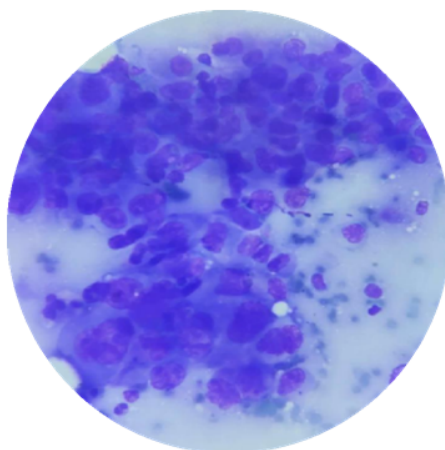


Figure 3: Fine needle aspiration cytology smear of Metastatic lymph node showing cohesive clusters of pleomorphic malignant epithelial cells with hyperchromatic nuclei, irregular nuclear membranes and high nuclear-to-cytoplasmic ratio (May–Grünwald–Giemsa stain, $\times 400$).

Malignant lesions were observed predominantly in older patients and demonstrated a significant association with increasing age ($P = 0.001$). A male predominance was also noted among malignant cases, whereas non-neoplastic lesions showed a nearly equal sex distribution.

Discussion

The present study showed that benign lesions constituted the majority of palpable lymphadenopathy, with reactive lymphadenitis being the most common cytological diagnosis, followed by granulomatous and tuberculous lymphadenitis. Similar findings have been reported by Jadhav et al. and Kochhar et al., highlighting the predominance of inflammatory lesions in routine FNAC practice, particularly in tuberculosis-endemic regions.[9,10]

Most patients were ≤ 30 years of age, and the cervical lymph nodes were the most frequently involved site. This pattern is consistent with the observations of Dharmalingam et al. and Pavithra and Geetha, who also reported cervical lymphadenopathy as the commonest presentation because of frequent infectious involvement of the head and neck region.[11,12]

Malignant lesions represented only a small proportion of cases and were more common in older patients, supporting the established association between advancing age and metastatic or lymphoid malignancies. Similar trends have been documented in previous cytological studies.[9,10]

The findings reaffirm that fine-needle aspiration cytology (FNAC) is a rapid, minimally invasive, and cost-effective first-line investigation for lymphadenopathy. It provides reliable cytomorphological diagnosis in most cases,

although histopathological examination remains essential when lymphoma or inconclusive cytological findings are suspected.[11,13]

The major strengths of this study include its relatively large sample size and combined retrospective-prospective design. Limitations include its single-centre nature and the lack of histopathological confirmation in all cases.

Overall, the study confirms that reactive, granulomatous, and tuberculous lymphadenitis remain the predominant causes of palpable lymphadenopathy, while malignant lesions are comparatively infrequent. FNAC continues to be an effective initial diagnostic tool that facilitates timely diagnosis and appropriate patient management.[13,14]

Conclusion

Fine-needle aspiration cytology (FNAC) proved to be a reliable, rapid, and minimally invasive diagnostic modality for the evaluation of palpable lymphadenopathy. Benign lesions predominated in the present study, with reactive lymphadenitis being the most common diagnosis, followed by granulomatous and tuberculous lymphadenitis, whereas malignant lesions constituted a relatively small but clinically significant proportion. Cervical lymph nodes were the most frequently involved site, and the likelihood of malignancy increased with advancing age. These findings emphasize the continued value of FNAC as an effective first-line investigation that facilitates early diagnosis, guides appropriate clinical management, and minimizes unnecessary surgical biopsies. Integration of FNAC with clinical findings and ancillary investigations, when indicated, can further improve diagnostic accuracy and optimize patient care

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Conflicts of Interest: The authors declare no conflict of interest.

Ethical Approval: The study was approved by the Institutional Ethics Committee, Government Medical College, Pali, Rajasthan.

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References

1. Mohseni S, Shojaiefard A, Khorgami Z, Alinejad S, Ghorbani A, Ghafouri A. Peripheral lymphadenopathy: Approach and diagnostic tools. *Iran J Med Sci.* 2014;39(2 Suppl):158-170.
2. Pathy PC, Hota SK, Dash S, Samantaray S, Panda S, Rout N. Analysis of fine needle aspiration cytology in diagnosis of lymphadenopathy: A retrospective study from a regional cancer centre, Cuttack, Odisha. *Int J Res Med Sci.* 2017;5(10):4357-4361. doi:10.18203/2320-6012.ijrms20175442.
3. Al-Abbadi MA, Barroca H, Bode-Lesniewska B, Calaminici M, Caraway NP, Chhieng DF, Cochand-Priollet B, Dey P, Gupta P, Jhala N, et al. A proposal for the performance, classification, and reporting of lymph node fine-needle aspiration cytopathology: The Sydney System. *Acta Cytol.* 2020;64(4):306-322. doi:10.1159/000506497.
4. Gupta P, Gupta N, Kumar P, Bhardwaj S, Srinivasan R, Dey P, Rohilla M, Bal A, Das A, Rajwanshi A. Assessment of risk of malignancy by application of the proposed Sydney System for classification and reporting lymph node cytopathology. *Cancer Cytopathol.* 2021;129(10):777-789. doi:10.1002/cncy.22432.
5. Caputo A, Ciliberti V, D'Antonio A, D'Ardia A, Fumo R, Giudice V, Pezzullo L, Sabbatino F, Zeppa P. Real-world experience with the Sydney System on 1458 cases of lymph node fine needle aspiration cytology. *Cytopathology.* 2022;33(2):166-175. doi:10.1111/cyt.13079.
6. Das S, Das A, Das B. Application of the Sydney System for classification and reporting lymph node cytopathology to assess the risk of malignancy and its diagnostic accuracy. *J Oral Maxillofac Pathol.* 2024;28(Suppl 1):S56-S63. doi:10.4103/jomfp.jomfp_168_23.
7. Liang S, Cozzolino I, Zeppa P, Field AS. The Sydney system for lymph node fine-needle aspiration biopsy cytopathology: Analysis of recent publications and meta-analysis and a proposal for the components of an ideal prospective study. *Cancer Cytopathol.* 2024;132(12):745-756. doi:10.1002/cncy.22890.
8. Ghosh S, Guha P, Verma S, Gupta N, Vimal JK, Prasad P, et al. Evaluation of fine-needle aspiration of lymph nodes and assessment of risk of malignancy based on the Sydney System of Reporting Lymph Node Cytology. *J Cytol.* 2025;42(1):11-19. doi:10.4103/joc.joc_20_24.
9. Jadhav DS, Barge AK, Valand AG. Study of fine needle aspiration cytology of palpable head and neck lesions in a tertiary care centre. *Indian J Pathol Oncol.* 2018;5(3):375-381. doi:10.18231/2394-6792.2018.0073.
10. Kochhar AK, Duggal G, Kochhar SK. Spectrum of cytological findings in patients with lymphadenopathy in rural population of Southern Haryana, India: Experience in a tertiary care hospital. *Internet J Pathol.* 2012;13(1). doi:10.5580/2b94.
11. Dharmalingam S, Sutrarakar SK, Jatav J, Verma S. Cytological study on peripheral lymphadenopathy in a tertiary care center with special reference to tuberculous lymphadenitis. *Asian J Med Sci.* 2022;13(9):227-232. doi:10.3126/ajms.v13i9.45077.
12. Pavithra P, Geetha JP. Role of fine needle aspiration cytology in the evaluation of the spectrum of lymph node lesions. *Int J Pharma Bio Sci.* 2014;5(4):B377-B384.
13. Wu M, Burstein DE. Fine needle aspiration. *Cancer Invest.* 2004;22(4):620-628. doi:10.1081/CNV-200027160.
14. Simo R, Leslie A. Differential diagnosis and management of neck lumps. *Surgery (Oxford).* 2006;24(9):312-322.