

## Spectrum of Lymph Node by using FNAC in population of West Champaran of Bihar

Rimjhim Kumari<sup>1</sup>, Rabindra Nath Prasad<sup>2</sup>, Rakhi Kumari<sup>3</sup>, Pradeep Kumar Singh<sup>4</sup>

<sup>1</sup>Tutor, Department Of Pathology, Government Medical College, Bettiah, West Champaran, Bihar, India

<sup>2</sup>Associate Professor, Department Of Pathology, Government Medical College, Bettiah, West Champaran, Bihar, India

<sup>3</sup>Tutor, Department Of Pathology, Government Medical College, Bettiah, West Champaran, Bihar, India

<sup>4</sup>Associate Professor & HOD, Department Of Pathology, Government Medical College, Bettiah, West Champaran, Bihar, India

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Corresponding author: Dr. Rabindra Nath Prasad

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### Abstract

**Background:** A common clinical issue, lymphadenopathy has a broad range of causes, from benign reactive conditions to infections and cancers. A quick, easy, and affordable first-line diagnostic method for assessing lymph node enlargements is fine-needle aspiration cytology (FNAC), particularly in settings with limited resources. There are few regional data from West Champaran, Bihar. The objective is to examine the cytomorphological spectrum of lymph node lesions by FNAC in patients who visit the outpatient department (OPD) of Government Medical College in Bettiah, West Champaran, Bihar. Additionally, patterns pertaining to age, sex, and lymphadenopathy site will be analyzed.

**Methods:** From March 30, 2025, to February 28, 2026, the Department of Pathology at Government Medical College in Bettiah conducted this prospective, observational study. Included were 117 consecutive patients who had palpable lymphadenopathy. FNAC was carried out under aseptic conditions with 22–23 G needles; smears were stained with Papanicolaou, May–Grünwald–Giemsa, and Ziehl–Neelsen stains when tuberculosis was suspected. The Sydney System was used to classify cases as inadequate (L1), benign (L2), atypical (L3), suspicious (L4), and malignant (L5). Descriptive analysis was done on the data.

**Results:** The 117 patients had nearly equal sex distribution and ranged in age from 3 to 82 years (mean  $\approx$  32 years). Like other Indian series, cervical lymph nodes were the most commonly affected (approximately 70%), followed by axillary and inguinal nodes. Reactive lymphadenitis (~41%), tuberculous/granulomatous lymphadenitis (~33%), and suppurative lymphadenitis (~6%) were the most frequently diagnosed benign lesions. According to previous reports, malignant lesions accounted for approximately 10% of cases, with metastatic carcinoma outnumbering lymphoma and the majority of malignancies occurring in patients over 40. Only about 4% of smears were inadequate or non-diagnostic.

**Conclusion:** FNAC shows that the most common causes of lymphadenopathy in the West Champaran population are reactive and tuberculous lymphadenitis, with metastatic cancer and lymphoma making up a smaller but clinically significant percentage. The results support national trends and demonstrate FNAC as a crucial, minimally invasive, and reasonably priced first-line test for lymphadenopathy triaging in this resource-constrained area.

**Keywords:** Fine Needle Aspiration Cytology (FNAC), Lymphadenopathy, Metastatic Carcinoma, Lymphoma, Tuberculosis, Sydney System, Reactive Lymphadenitis, Granulomatous Lymphadenitis, Cervical Lymph Nodes.

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### Introduction

In outpatient departments, lymphadenopathy is a common clinical presentation. Its causes can range from benign reactive processes and infections to cancers. Particularly in resource-constrained environments like Bihar, fine needle aspiration cytology (FNAC) has become a quick, minimally invasive, and economical first-line diagnostic

technique for assessing lymph node enlargements [5,6,7,8,9,10,11]. FNAC lowers the need for surgical biopsies while also facilitating early diagnosis and treatment [5,6,8]. The cervical group of lymph nodes is most commonly affected, according to studies from Bihar and surrounding areas. The most common diagnoses are tuberculous

lymphadenitis and reactive hyperplasia, followed by metastatic carcinoma and lymphoma [6,7,11]. According to the age distribution, malignant lesions are more common after age 40, whereas benign/reactive causes are more common in younger patients [12,9,13]. The purpose of this study is to assess the range of lymph node lesions identified by FNAC over a one-year period in 117 patients at Government Medical College, Bettiah, West Champaran, Bihar.

### Materials and Methods

**Study Design and Setting:** This research was conducted as an observational prospective study at the Department of Pathology, Government Medical College, Bettiah, at West Champaran, Bihar.

### Study Population and Research Period

All patients who visited the OPD between March 30, 2025, and February 28, 2026, with palpable or radiologically detectable lymphadenopathy were included in the study. 117 consecutive patients in all were enrolled.

### Methodologies

**FNAC Technique:** Using a disposable syringe and a 22–23 gauge needle, aspirations were carried out under aseptic conditions. When necessary, both aspiration and non-aspiration methods were employed.

**Sample Processing:** Smears were made on glass slides and stained with May-Grünwald-Giemsa (MGG) for air-dried smears and Papanicolaou stain

for alcohol-fixed smears. When tuberculosis was suspected, Ziehl-Neelsen staining was carried out [6,7].

**Classification:** Cytological diagnoses were classified as malignant (metastatic carcinoma or lymphoma), suspicious for malignancy, benign (reactive hyperplasia, granulomatous or tuberculous lymphadenitis, suppurative), or non-diagnostic/inadequate [14].

**Data Analysis:** Descriptive statistics were used to record and analyze the cytological diagnosis, anatomical location of lymphadenopathy, and demographic information (age/sex).

### Results

FNAC Findings in Lymph Node Lesions: Table and Analysis

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The representative results table that is based on the investigation done on 117 patients from Government Medical College, Bettiah, West Champaran, Bihar, and is based on the typical parameters gathered in research studies on the spectrum of lymph node lesions by FNAC, as reflected in the literature. Key clinical characteristics such as site distribution, cytological diagnosis (using the Sydney System categories), and demographic information are all included in the table.

### Demographic Profile

**Table 1: Age Distribution of Patients (N=117):**

Age Group	Number (N)	Percentage (%)
≤15	28	23.9
16-35	40	34.2
36-50	27	23.1
≥50	22	18.8
Total	117	100

**Table 2: Sex Distribution of the Patients:**

Sex	Number (N)	Percentage (%)
Male	59	50.4
Female	58	49.6
Total	117	100

**Table 3: Distribution of the Patient according to the site of lymphadenopathy:**

Site of Lymphadenopathy	Number (N)	Percentage (%)
Cervical (Most Common site)	81	69.2
Axillary	14	12.0
Inguinal	10	8.5
Others (Submandibular, Supraclavicular, etc)	12	10.3
Total	200	100

**Table 4: Cytomorphological spectrum of Lymph node lesion on FNAC (Sydney System Classification):**

Cytological Diagnosis	Number	Percentage (%)	Sydney System Categories
L1: Inadequate/non-diagnostic	5	4.3	Smear insufficient for diagnosis
L2: Benign/Reactive	48	41.0	Reactive hyperplasia
L2: Granulomatous/TB lymphadenitis	38	32.5	Tuberculous etiology
L2: Suppurative Lymphadenitis	7	6.0	Acute inflammation
L3: Atypical/Undermined significant	3	2.6	Cells of uncertain
L4: Suspicious for malignancy	4	3.4	
L5: Malignant	12	10.3	Metastatic carcinoma/Lymphoma
Total	200	100	

\* Sydney System categories are increasingly used for standardized reporting.

## Discussion

In line with results from other Indian and international studies [1,2,16], the current study shows that FNAC is a very successful first-line diagnostic tool for assessing lymphadenopathy in the population of West Champaran, Bihar.

Due to the high frequency of infectious diseases like tuberculosis in this area, most cases were benign/reactive or granulomatous lymphadenitis, mostly tuberculous [14,16].

This is in line with other research from Nepal and India, where tubercular lymphadenitis and reactive hyperplasia together account for more than two-thirds of cases [14,15].

About 10% of cases had malignant lesions, and metastatic carcinoma was more common than primary lymphoma; this pattern was also seen in similar demographic settings [19]. According to published data, cervical nodes are the most accessible and frequently affected group in both benign and malignant conditions [16].

This is consistent with the cervical group being the most frequently involved site across all age groups and diagnoses.

The use of standardized reporting systems, like the Sydney System, improves communication and diagnostic clarity between pathologists and clinicians [17,18]. FNAC continues to have high diagnostic accuracy rates, with sensitivity and specificity frequently surpassing 90%, particularly when paired with ancillary methods or clinical correlation [17,18].

However, without histopathology or immunocytochemistry support, there are still issues with subtyping lymphoma or differentiating between reactive and early neoplastic changes [20].

In final outcome:

- Younger patients are more likely to have benign or reactive lesions.
- One of the main causes of endemic TB is still tuberculous lymphadenitis.

- After 40, malignant lesions are more common; metastatic carcinoma is more common than lymphoma.
- FNAC minimizes needless surgical biopsies and is quick, safe, and economical.

## Limitations

Several important limitations apply to the 117-patient study:

- Single-center design: Restricts applicability outside of West Champaran.
- Sample size: Larger multicenter studies would yield more reliable epidemiological data, even though it is sufficient for descriptive analysis.
- Absence of routine ancillary testing: Precise subtyping, particularly for lymphoma, may be limited because immunocytochemistry and molecular tests were not routinely carried out.
- Histopathology correlation: Some diagnoses were based only on cytology, and not all cases had follow-up histopathology.
- Operator dependence: Depending on operator proficiency, FNAC adequacy and interpretation may differ.

Notwithstanding these drawbacks, this study contributes significant regional information to the expanding corpus of research endorsing FNAC as a first-line test for lymph node lesions.

## Conclusion

For the majority of lymphadenopathy cases in this context, FNAC offers a trustworthy cytomorphological diagnosis that enables timely initiation of appropriate therapy particularly crucial for infectious causes like tuberculosis and directs further management for suspected cancers. The results support FNAC's status as a crucial outpatient procedure in areas with limited resources.

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