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A Clinicopathological Correlation of Non-Neoplastic and Neoplastic Lesions of the Lymph Nodes in the Indian Population

Ranjana Pankanti[1], Zohra Fatima Sharmilee[2], Arshia Fatima[3], Ayesha Fatima[4]

[1]Associate Professor, Dept of pathology, Mahavir institute of medical sciences
[2]Assistant Professor, Dept of pathology, Mahavir institute of medical sciences
[3]Assistant Professor, Dept of pathology, Mahavir institute of medical sciences
[4]Intern Dept of pathology, Mahavir institute of medical sciences

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*Corresponding Author:

Zohra Fatima Sharmilee
Assistant Professor, Dept of pathology, Mahavir institute of medical sciences

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A B S T R A C T

Background: Lymphadenopathy is a common clinical finding with a broad spectrum of etiologies ranging from infections to malignancies. Histopathological examination of lymph node biopsies is crucial for a definitive diagnosis and effective management.
Aim: To analyze the clinicopathological spectrum of non-neoplastic and neoplastic lymph node lesions and correlate them with clinical parameters in the Indian population.
Materials and Methods: A prospective observational study was conducted over one year at Mahavir Institute of Medical Sciences, Vikarabad, involving 100 lymph node biopsy specimens. Clinical data were recorded, and histopathological examination was performed using H&E staining, along with special stains when necessary. Lesions were classified into non-neoplastic and neoplastic categories, and clinicopathological correlation was established.
Results: Out of 100 cases, 65% were non-neoplastic and 35% were neoplastic. Tubercular lymphadenitis was the most common non-neoplastic lesion (46.15%), while non-Hodgkin lymphoma (42.86%) was the predominant neoplastic lesion. The cervical lymph nodes were most frequently involved (60%), and the 21–30 years age group was the most affected. Males were more commonly affected than females.
Conclusion: Histopathological examination remains the gold standard for diagnosing lymph node lesions. Accurate clinicopathological correlation is essential for timely diagnosis, especially in regions with high prevalence of tuberculosis and increasing cancer burden.

Keywords: Lymphadenopathy, Histopathology, Tubercular Lymphadenitis, Non-Hodgkin Lymphoma, Hodgkin Lymphoma, Metastatic Carcinoma, Non-neoplastic Lesions

INTRODUCTION

Lymphadenopathy is a common clinical presentation encountered in both outpatient and inpatient departments. It can result from a wide range of conditions, including infections, autoimmune disorders, and malignant neoplasms. Lymph nodes act as filters in the lymphatic system and play a central role in immune surveillance and response [1].
Histopathological examination of lymph node biopsies remains the gold standard for definitive diagnosis in cases of persistent lymphadenopathy. It enables the distinction between **non-neoplastic lesions** such as **tubercular or reactive lymphadenitis**, and **neoplastic conditions**, including **lymphomas and metastatic malignancies** [2]. In countries like India, where **tuberculosis** is endemic, tubercular lymphadenitis continues to be the most frequent cause of non-neoplastic lymphadenopathy [3].

On the other hand, **lymphomas**—both **Hodgkin (HL)** and **non-Hodgkin (NHL)**—and **metastatic carcinomas** constitute the majority of neoplastic lymph node lesions. The classification of lymphomas has undergone significant evolution, with the current WHO guidelines offering a more precise framework for diagnosis and management [4].
A thorough clinicopathological correlation is essential not only for accurate diagnosis but also for guiding further investigations, staging, and therapeutic decisions. This study aims to analyze the histopathological spectrum of lymph

node lesions in the Indian population and to correlate them with clinical features, age, gender, and lymph node site. Such correlation is vital to improve diagnostic accuracy, particularly in resource-limited settings [5].

MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study conducted in the Department of Pathology, Mahavir Institute of Medical Sciences, Vikarabad, over **1 year**.

Sample Size

A total of **100 lymph node biopsy specimens** were included in the study. All patients presenting with lymphadenopathy who underwent lymph node biopsy were considered.

Inclusion Criteria

- Patients of all age groups and both sexes presenting with palpable lymphadenopathy.
- Patients who consented to undergo lymph node biopsy and participate in the study.
- Adequate biopsy specimens suitable for histopathological evaluation.

Exclusion Criteria

- Inadequate or autolyzed biopsy samples.
- Patients already diagnosed and on treatment for lymphoproliferative or metastatic diseases.
- Patients who did not give informed consent.

Methodology

1. **Clinical Evaluation**
   Detailed clinical history and physical examination were recorded for all patients, including duration, site, size, and associated symptoms of lymphadenopathy.
2. **Specimen Collection and Processing**
   - Lymph node biopsies were obtained either by excisional or incisional method under aseptic conditions.
   - Specimens were fixed in **10% buffered formalin**, processed routinely, and paraffin-embedded.
3. **Histopathological Examination**
   - **4–5 µm thick sections** were cut and stained with **Hematoxylin and Eosin (H&E)**.
   - Special stains such as **Ziehl-Neelsen stain** (for tuberculosis) and **PAS** (for fungal infections) were used when necessary.
4. **Classification of Lesions**
   Based on microscopic findings, lesions were broadly categorized into:
   - **Non-neoplastic lesions** (e.g., reactive lymphadenitis, tubercular lymphadenitis, granulomatous lymphadenitis).
   - **Neoplastic lesions** (e.g., Hodgkin lymphoma, non-Hodgkin lymphoma, metastatic deposits).
5. **Clinicopathological Correlation**
   Each histopathological diagnosis was correlated with clinical findings, including age, gender, lymph node site, and systemic features.

Data Analysis

The collected data were compiled and analyzed statistically using descriptive methods. Frequencies, percentages, and correlation between clinical and pathological diagnoses were evaluated.

RESULTS AND OBSERVATIONS

1. Age-wise Distribution of Cases

Age Group (Years)	Number of Cases (n=100)	Percentage (%)
0–10	8	8%
11–20	20	20%
21–30	25	25%
31–40	15	15%
41–50	12	12%
51–60	10	10%
>60	10	10%
Total	**100**	**100%**

2. Gender-wise Distribution

Gender	Number of Cases	Percentage (%)
Male	58	58%
Female	42	42%
Total	**100**	**100%**

3. Site-wise Distribution of Lymphadenopathy

Site of Lymph Node	Number of Cases	Percentage (%)
Cervical	60	60%
Axillary	15	15%
Inguinal	12	12%
Mesenteric	8	8%
Generalized	5	5%
Total	**100**	**100%**

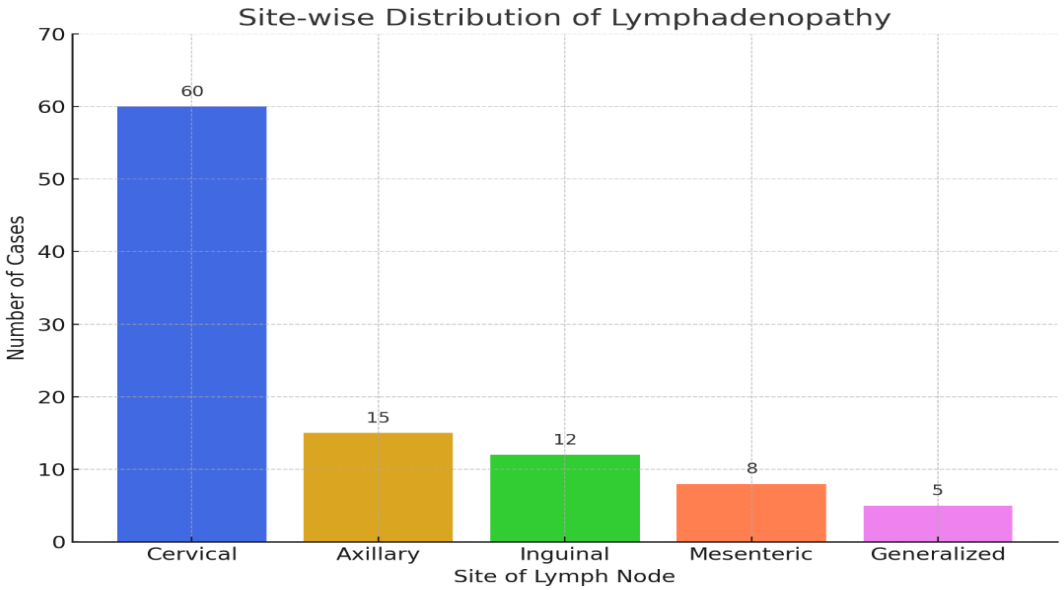

Figure 1 Site-wise Distribution of Lymphadenopathy

4. Histopathological Classification

Lesion Type	Number of Cases	Percentage (%)
Non-Neoplastic Lesions	65	65%
Neoplastic Lesions	35	35%
Total	**100**	**100%**

5. Distribution of Non-Neoplastic Lesions (n=65)

Type	Number of Cases	Percentage (%)
Tubercular Lymphadenitis	30	46.15%
Reactive Lymphoid Hyperplasia	20	30.77%
Chronic Non-specific Lymphadenitis	10	15.38%
Granulomatous Lymphadenitis (non-TB)	5	7.70%
Total	**65**	**100%**

6. Distribution of Neoplastic Lesions (n=35)

Type	Number of Cases	Percentage (%)
Hodgkin Lymphoma	8	22.86%
Non-Hodgkin Lymphoma	15	42.86%
Metastatic Carcinoma	12	34.28%
Total	**35**	**100%**

7. Clinical Presentation of Lymphadenopathy

Clinical Feature	Number of Cases	Percentage (%)
Fever	50	50%
Weight Loss	28	28%
Night Sweats	20	20%
Painful Swelling	30	30%
Non-Tender Swelling	70	70%
Generalized Weakness	25	25%
Loss of Appetite	22	22%

8. Correlation of Site with Type of Lesion

Site	Tubercular	Reactive	Lymphoma (HL/NHL)	Metastasis	Total Cases
Cervical	25	18	7	10	60
Axillary	2	1	4	8	15
Inguinal	2	0	3	7	12
Mesenteric	1	0	5	2	8
Generalized	0	1	4	0	5
Total	**30**	**20**	**23**	**27**	**100**

9. Cytological vs Histopathological Concordance (if FNAC was done)

Initial FNAC Diagnosis	Final HPE Diagnosis	Concordant Cases	Discordant Cases
Reactive Lymphadenitis	Reactive Lymphadenitis	18	2
Tubercular Lymphadenitis	Tubercular Lymphadenitis	28	2
Suspicious for Lymphoma	Lymphoma (HL/NHL)	12	3
Suggestive of Metastatic Deposit	Metastatic Carcinoma	11	1
Total Cases with FNAC (n=80)		**69 (86.25%)**	**11 (13.75%)**

10. Distribution of Hodgkin vs Non-Hodgkin Lymphoma (n=23)

Subtype	Number of Cases	Percentage (%)
Hodgkin Lymphoma (n=8)		
- Mixed Cellularity	5	62.5%
- Nodular Sclerosis	2	25%
- Lymphocyte Rich	1	12.5%
Non-Hodgkin Lymphoma (n=15)		
- Diffuse Large B-Cell Lymphoma	10	66.7%
- Follicular Lymphoma	3	20%
- T-cell Lymphoma	2	13.3%

11. Type of Metastatic Carcinomas (n=12)

Primary Site Suspected	Number of Cases	Percentage (%)
Squamous Cell Carcinoma (Head & Neck)	6	50%
Adenocarcinoma (GI Tract)	3	25%
Breast Carcinoma	2	16.7%
Unknown Primary	1	8.3%

DISCUSSION

In the present study of 100 lymph node biopsies conducted over one year at Mahavir Institute of Medical Sciences, Vikarabad, **non-neoplastic lesions** accounted for the majority (65%) of cases, while **neoplastic lesions** comprised 35%. This predominance of non-neoplastic lesions is consistent with findings reported in other Indian studies, where **tubercular lymphadenitis** was frequently observed due to the high prevalence of tuberculosis in the region [6,7].

Tubercular lymphadenitis, accounting for 30% of all cases and 46.15% of non-neoplastic lesions in our study, remains the most common etiology of lymphadenopathy in developing countries like India. These findings align with those reported by Swetha et al. and Sheikh et al., who also observed a high burden of tuberculosis among non-neoplastic lymph node biopsies [5,8].

Reactive lymphoid hyperplasia was the second most common non-neoplastic diagnosis (20%), typically affecting younger age groups and frequently associated with viral infections or non-specific immune activation. This pattern has

also been documented in other studies, indicating that reactive changes are a common benign cause of lymphadenopathy, particularly in children and young adults [9].

Among **neoplastic lesions**, **non-Hodgkin lymphoma (NHL)** was the most prevalent (15%), followed by **metastatic carcinoma** (12%) and **Hodgkin lymphoma (HL)** (8%). These findings are consistent with international trends, where NHL is more common than HL and frequently affects older individuals [10,11]. The most common subtype of NHL in our study was **diffuse large B-cell lymphoma (DLBCL)**, which has also been reported as the most frequent histological variant in multiple Indian studies [12].

Cervical lymph nodes were the most commonly involved site (60%), regardless of the nature of the pathology. This may be due to the high lymphatic drainage of the head and neck region and the ease of clinical detection. Similar site-specific distribution has been reported in other Indian and international studies [6,13].

In terms of age distribution, the **21–30 year age group** was the most affected, with a male preponderance (M: F = 1.4:1). This demographic trend mirrors other published data indicating that younger adults in developing countries are more likely to present with lymphadenitis due to infectious etiologies [7,14].

Additionally, our study emphasizes the critical importance of **clinicopathological correlation**. In several cases, **initial clinical suspicion** was altered following **histopathological diagnosis**, particularly in distinguishing between lymphoma and reactive hyperplasia or granulomatous inflammation. Histopathology, therefore, remains the cornerstone of definitive diagnosis, aiding in both **therapeutic planning** and **prognostication** [2,4].

CONCLUSION

Histopathological examination is essential for accurately diagnosing lymph node lesions. In this study, non-neoplastic lesions, especially tubercular lymphadenitis, were more common than neoplastic ones. Non-Hodgkin lymphoma was the leading neoplastic lesion. The cervical region was the most frequently involved site, with a predominance in young adults and males. A strong clinicopathological correlation is crucial for the timely and appropriate management of lymphadenopathy.

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