Section: Pathology

Original Research Article

DIAGNOSTIC SPECTRUM OF SUPERFICIAL LYMPHADENOPATHY: INSIGHTS FROM MORPHOLOGY AND IMMUNOHISTOCHEMISTRY – A RETROSPECTIVE STUDY IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: Lymph nodes are among the most common sites affected by both neoplastic and non-neoplastic diseases. This study was undertaken to analyze the spectrum and patterns of lesions observed in cases of lymphadenopathy and to classify neoplastic lesions according to their histomorphological features and immunophenotypic profiles. **Materials and Methods:** This retrospective study included 147 cases of lymph node biopsies conducted in the Department of Pathology over a period of three years. Relevant patient data were retrieved from medical records. All histopathological slides were thoroughly reviewed, and special stains and immunohistochemistry were applied wherever necessary. **Result:** Of the 147 lymph node biopsies, 130 cases (88.4%) were non-neoplastic and 17 cases (11.6%) were neoplastic. Cervical lymph nodes were the most commonly biopsied. Tuberculosis was the predominant lesion (45.6%), followed by reactive hyperplasia (36.7%). Among malignant lesions, lymphomas (6.1%) slightly outnumbered metastatic deposits (5.4%). **Conclusion:** Tuberculosis remains the leading cause of lymphadenopathy, with a higher prevalence observed among young females. Histopathological examination continues to be the gold standard for confirming the diagnosis of lymph node lesions.

INTRODUCTION

Lymphoid tissue is a vital component of the immune system and includes the lymph nodes, spleen, tonsils, adenoids, and thymus. Lymph nodes are bean-shaped structures distributed along the lymphatic pathways and play a major role in the body's defense mechanisms. Approximately 600 lymph nodes are present in the human body, with the highest concentrations found in the cervical, axillary, and inguinal regions, as well as along the mesentery and within the mediastinum. Superficial lymph nodes are located deep within the subcutaneous tissue and are normally palpable; they may enlarge in response to a variety of pathological processes.[1-3]

Lymphadenopathy is defined as an abnormality in the size, consistency, or number of lymph nodes. It represents a common clinical presentation in medical practice. Lymph node biopsy is frequently required to establish the etiology of lymph node enlargement, which may result from neoplastic or non-neoplastic conditions.[4,5]

Due to their easy accessibility, peripheral lymphadenopathies can be readily detected during routine physical examination and are frequently biopsied.[1]

Non-neoplastic lesions comprise a wide and diverse group of conditions, including infections, drug-induced reactions and autoimmune diseases. Neoplastic causes of lymphadenopathy primarily include lymphohematogenous malignancies and metastatic tumors.[2]

Although clinical examination, laboratory investigations, and imaging modalities contribute significantly to the diagnostic workup of lymphadenopathy, a definitive diagnosis can be established only through tissue biopsy, which remains the gold standard. The aim of the present

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study is to evaluate the pathological spectrum of both non-neoplastic and neoplastic lesions of lymph nodes with the use of immunohistochemistry wherever required.

Aims and objectives of the Study

1. To study the histopathological spectrum of lesions of superficial lymphnodes.
2. To evaluate the Age related frequency of various nonneoplastic and neoplastic lesions of lymphnode.
3. To categorize neoplastic lesions according to their histomorphological characteristics and immunophenotypic profiles.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of Pathology at Dr. B. R. Ambedkar Medical College over a three-year period, from January 2023 to December 2025, after obtaining ethical clearance from the Institutional Ethics Committee. Lymph nodes with known primary malignancies that formed part of radical surgical specimens, inadequate samples, and deep-seated lymph nodes were excluded. A total of 147 lymph node specimens were included in the study. The tissue sections were processed using routine paraffin-embedding techniques and stained with hematoxylin and eosin (H&E). All histopathological slides were carefully reviewed and categorized into non-neoplastic and neoplastic lesions Special stains and immunohistochemical stains were applied whenever necessary. Relevant patient information was obtained from patient request forms and hospital records. Appropriate statistical methods were employed to analyze the data.

RESULTS

A total of 147 lymph node biopsies were included in this study, with patients ranging in age from 9 to 72 years. Of the 147 cases, 96 (65.3%) were female and 51 (34.7%) were male, resulting in a male-to-female ratio of 1:1.9. Age distribution analysis showed a peak incidence in the 21–30 year age group (45 cases (30.6%), with the next most common age group being 41–50 years (28 cases (19%) [Table 1]. The cervical region was the most common site of lymph node biopsy 132 (89.7%), while axillary and inguinal regions accounted for 9 (6.1%) and 6 (4.1%) cases, respectively [Table 2].

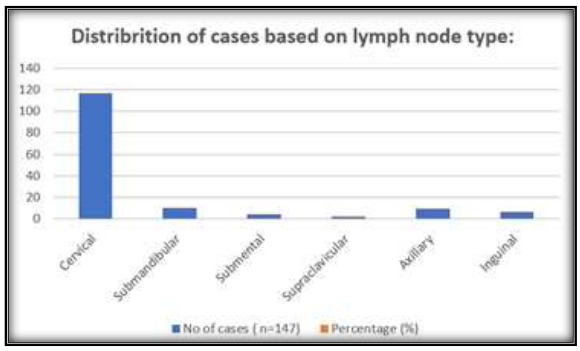

Table 1: Age wise distribution of cases

Age (years)	No of cases (n=147)	Percentage (%)
0 -10	4	2.7 %
11-20	15	10.2 %
21-30	45	30.6 %
31-40	23	15.6 %
41-50	28	19 %
51-60	16	10.8 %
61-70	13	8.8 %
71-80	3	2.0%

Table 2: Distribrition of cases based on lymph node type

Type of lymphnode	No of cases (n=147)	Percentage (%)
Cervical	116	78.9 %
Submandibular	10	6.8 %
Submental	4	2.7%
Supraclavicular	2	1.3%
Axillary	9	6.1%
Inguinal	6	4%

Table 3: Distribution of various lesions in different age groups

Type of lesion	0-10 yrs	11-20yrs	21-30yrs	31-40 yrs	41-50 yrs	51-60yrs	61-70yrs	71-80yrs	Total
Tuberculous lymphadenitis	0	10 (0.7%)	32 (21.7%)	8(5.4%)	9(6.1%)	5(3.4%)	3(2%)	0	67 (45.5%)
Reactive lymphadenitis	1 (0.6%)	3(2%)	18(12.2%)	8(5.4%)	14(9.5%)	7(4.7%)	8(5.4%)	3(2%)	54(36.7%)
Kikuchi disease	0	0	0	1(0.7%)	0	0	0	0	1(0.7%)
Cat scratch disease	0	0	1(0.7%)	0	0	0	0	0	1(0.7%)
Necrotizing lymphadenitis	0	0	0	0	1(0.7%)	1(0.7%)	0	0	2(1.3%)

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Hodgkin lymphoma	1(0.7%)	1(0.7%)	0	1(0.7%)	0	1(0.7%)	0	0	4(2.7%)
Non Hodgkin lymphoma	0	0	0	0	2(1.3%)	1(0.7%)	2(1.3%)	0	5(3.4%)
Metastasis	0	1(0.7%)	0	1(0.7%)	2(1.3%)	2(1.3%)	2(1.3%)	0	8(5.4%)

Out of 147 cases, non-neoplastic lesions constituted 130 cases (88.4%), while neoplastic lesions accounted for 17 cases (11.6%).

Among the non-neoplastic category, tuberculous lymphadenitis was the most common entity, comprising 67 cases (45.6%) of total cases. It was most commonly observed in the 21–30-year age group, comprising 32 cases (47.7%). There was a female preponderance, with 47 cases (70.1%) (Table 3). Of the 67 cases of tuberculous lymphadenitis, 22 cases (32.8%) were positive for Ziehl–Neelsen staining.

The second most common category was reactive lymphadenitis, which accounted for 54 cases (36.7%). Females constituted the majority of cases, with 40 cases (74%). Microscopic examination revealed one of the following patterns: follicular hyperplasia, paracortical hyperplasia, sinus expansion with histiocytosis, or a mixed pattern of these features. One case each (0.68 %) of cat scratch disease and Kikuchi disease was identified, both in female patients. Microscopy demonstrated granulomatous inflammation characterized by central stellate necrosis with neutrophilic debris and surrounding palisading histiocytes in cat scratch disease. Necrotising lymphadenitis was identified in two cases (1.3%).

Among the 17 malignant cases (11.5%), metastatic deposits were observed in 8 cases (5.4%), and the remaining 9 cases (6.1%) were lymphomas. Among the metastatic deposits, squamous cell carcinoma was the most common, observed in 5 cases, followed by papillary thyroid carcinoma in 2 cases and adenocarcinoma in 1 case. Metastatic deposits were most commonly observed in patients aged 35–64 years, with an equal male-to-female distribution. One case of metastatic papillary thyroid carcinoma was noted in a young patient aged 18 years.

Of the 9 cases of lymphoma, Non-Hodgkin lymphoma (NHL) accounted for 5 cases (55.5% of all lymphomas), while Hodgkin lymphoma (HL) comprised 4 cases (44.4%). All cases of NHL were observed between the fourth and sixth decades of life. Among the 5 cases of NHL, 3 cases were chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL), 1 case was follicular lymphoma and 1 case was diffuse large B-cell lymphoma (DLBCL). Immunohistochemistry was performed in three cases of non-Hodgkin lymphoma (NHL). Two cases of chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL) showed strong positivity for CD20 and CD79a. In the case of diffuse large B-cell lymphoma (DLBCL), CD20 was diffusely positive, CD10 and BCL6 showed moderate positivity, and Ki-67 demonstrated a proliferative index of approximately 70%. CD30 and ALK were negative. Immunohistochemistry could not be performed in the remaining two cases due to non-availability of tissue blocks for review.

Hodgkin lymphoma was observed across a wide age range, including two pediatric patients (10 and 14 years) and two adults (35 and 58 years), with an equal male-to-female ratio. All 4 cases of Hodgkin lymphoma were of the classical type. Of these, 2 cases were lymphocyte-predominant type, 1 case was mixed cellularity type and 1 case was nodular sclerosing type. All four cases of classical Hodgkin lymphoma showed positivity for CD15 and CD30.

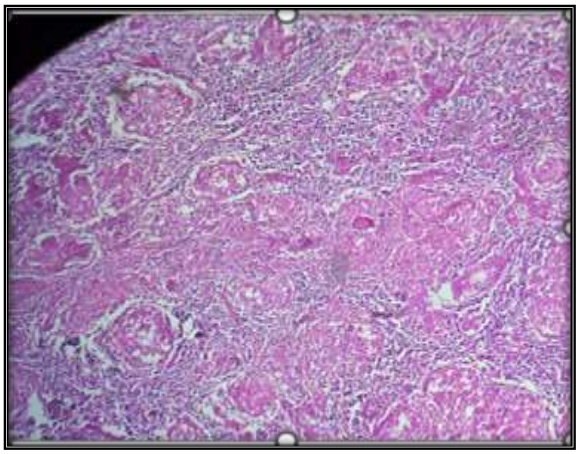

Figure 1: Tuberculous lymphadenitis (H&E, 20x)

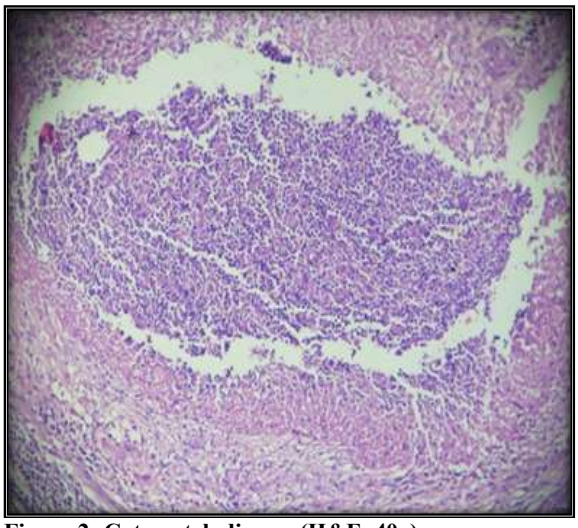

Figure 2: Catscratch disease (H&E, 40x)

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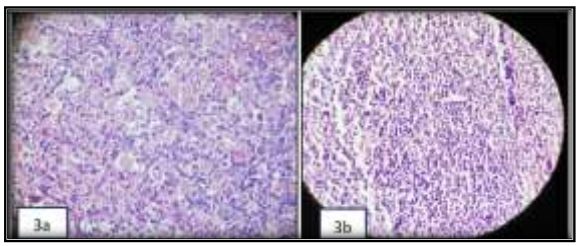

Figure 3: Hogdkin lymphoma - Mixed cellularity type (Fig 3a), lymphocyte predominant type (Fig 3b) (H&E, 40x)

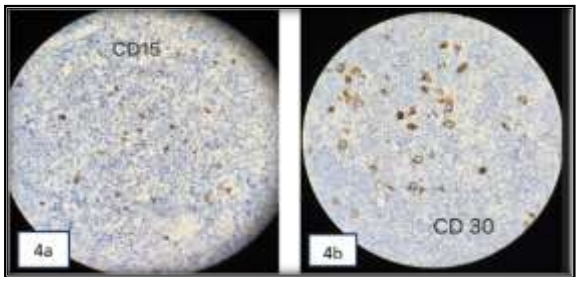

Figure 4 a, b: Hodgkin Lymphoma positive for CD 15 and CD30

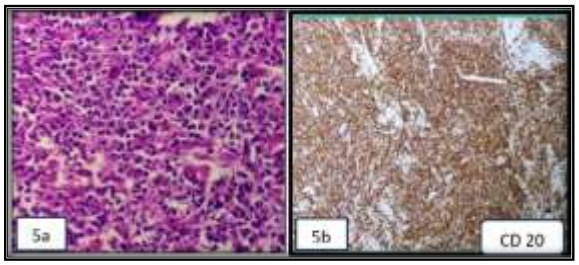

Figure 5 a,b: DLBCL positive for CD 20

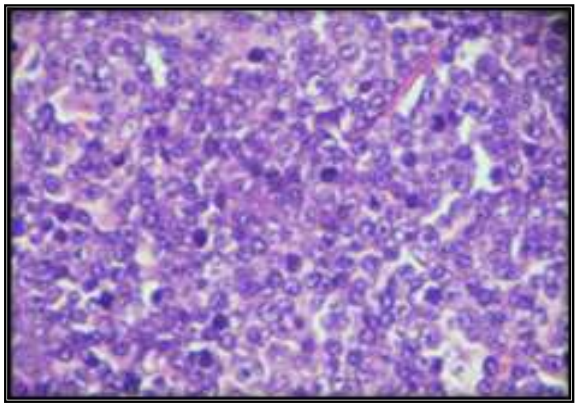

Figure 6: NHL – SLL/CLL (H&E 40x)

DISCUSSION

Patients with lymph node enlargement are frequently encountered in routine clinical practice. Excisional biopsy and histopathological evaluation enable early diagnosis, which is crucial for effective management of lymphadenopathy. This study was conducted over a period of three years to analyze the histopathological findings of lymph node biopsies in patients at a tertiary care centre. In the present study, the majority of biopsies were from female patients, with a male-to-female ratio of 1:1.8. Similar female predominance has been reported in other studies.[6-8]

In the present study, non-neoplastic lesions constituted the most common diagnosis. Similar findings have been observed in various studies conducted in India.[9-12] Cervical group was the most commonly biopsied lymph node group, accounting for 132 cases (89.7%) in our study. This finding is consistent with those reported in several recent studies in the literature.[10-12]

Majority of patients belonged to the 21–30 years age group, comprising 45 cases (30.6%), which is similar to the findings reported by Naik GS7 et al. and Shah B8 et al. In developing countries like India, tuberculosis is the most common cause of superficial lymphadenopathy. Tuberculosis constituted the most frequent lesion observed in the present study, accounting for 67 cases (45.6%). This finding is in concordance with several previous studies.[9,13,14] The high incidence of tuberculosis in the present series may be attributed to factors such as low socioeconomic status and poor standards of living, which continue to play a significant role in disease prevalence. A female predominance was noted in tuberculosis, with the majority of patients belonging to the 21–30-year age group, comprising 32 cases (47.7%). This demographic distribution is consistent with findings reported by other authors.[8,10,12] However, studies by Yadhav V 10 et al and Potti R15 et al reported reactive lymphadenitis as the most common non-neoplastic lesion. Tuberculosis is relatively rare in Western countries, where malignant conditions, particularly lymphomas, constitute the predominant cause of lymphadenopathy.

Among all neoplastic lesions, lymphomas accounted for 9 cases (6.1%), while metastatic deposits were observed in 8 cases (5.4 %). These findings were consistent with those reported by Deka J et al,[1] and Amrita et al,[4] in which lymphomas constituted the largest proportion of cases. However, the results were not in concordance with other studies, where metastatic lesions were identified as the most common neoplastic cause.[9,13]

Among the lymphomas, non-Hodgkin lymphoma (NHL) was more common than Hodgkin lymphoma (HL), accounting for 3.4% of all lymph node lesions. Similar findings have been reported by several other authors, who also identified NHL as the most common type of lymphoma.[9,13,15] However, Pathak V et al,[6] reported an equal incidence of Hodgkin lymphoma and non-Hodgkin lymphoma.

Among the metastatic cases, metastatic squamous cell carcinoma (SCC) was the most common, found in 5 (3.4%) cases. While Potti et al,[15] identified squamous cell carcinoma as the most frequent metastatic lesion in their study, Priya S.S. et al,[13] reported adenocarcinoma as the most common metastatic lesion, highlighting a variation in histopathological patterns across studies. Metastatic papillary thyroid carcinoma and metastatic adenocarcinoma were observed in 2 (1.3%) and 1 (0.6%) case, respectively. This predominance of metastatic SCC can be explained by the widespread

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use of tobacco products in the population, which increases the risk of aerodigestive tract malignancies. Limitations of this study include its retrospective design, which restricted access to complete clinical data, and the relatively small sample size from a single tertiary care centre, which may limit the generalizability of the findings. Additionally, immunohistochemistry could not be performed in all cases due to unavailability of tissue blocks, which may have limited diagnostic confirmation in some instances.

CONCLUSION

This study highlights the diverse histopathological spectrum of lymph node lesions, including both non-neoplastic and neoplastic conditions. Tuberculosis remains the leading cause of lymphadenopathy, with a higher prevalence observed among young females. While clinical evaluation, laboratory investigations, and imaging are important for initial assessment, definitive diagnosis relies on tissue biopsy and histopathological examination. The use of immunohistochemistry further enhances diagnostic accuracy, particularly in accurate subclassification of lymphomas and other neoplastic lesions. Recognition of the pathological patterns of lymph node involvement is critical for accurate diagnosis, prognostication, and selection of appropriate therapeutic strategies.

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