INTERNATIONAL CONFERENCE
ON LIFESTYLE DISEASES AND NATURAL MEDICINE (ICOLIFEMED)
Nomor ISSN: 3124-1115

Clinicopathological Characteristics and Immunohistochemical Profile (CD20, CD3, CD45, CD30) of Lymphoma Patients at Royal Prima General Hospital Medan, 2023–2025

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ABSTRACT

Lymphoma is a malignancy of the lymphoid system arising from the abnormal proliferation of lymphocytes. The diagnosis and classification of lymphoma require immunohistochemical (IHC) examination to determine the tumor cell immunophenotype, which plays a crucial role in definitive diagnosis and treatment planning. IHC is essential for distinguishing lymphomas into B-cell or T-cell types, low-grade or high-grade, and Hodgkin or non-Hodgkin categories—each differing in biological behavior and therapeutic approach. This study aimed to describe the clinicopathological characteristics and immunohistochemical (CD20, CD3, CD45, CD30) profiles of lymphoma patients treated at Royal Prima General Hospital Medan during 2023–2025. This retrospective descriptive study used medical record data and IHC examination results from 44 patients diagnosed with lymphoma at Royal Prima General Hospital Medan between 2023 and 2025. Collected data included age, sex, lymphoma site (nodal or extranodal), clinical manifestations, clinical diagnosis, cell origin, IHC findings, histopathological diagnosis, and IHC-based diagnosis. Data were analyzed descriptively and presented as frequency distributions and tables. Among 44 lymphoma patients analyzed, the majority were male (63.64%), with the most prevalent age group being 48–58 years (40.91%). The most frequent lymphoma site was nodal (61.36%), and the predominant clinical presentation was a neck mass (29.55%). IHC examination revealed that most cases originated from B-cells (88.64%) with positive CD20 expression, followed by T-cell cases (11.36%) with positive CD3 expression; CD30 positivity was observed in 75% of cases. The most frequent IHC diagnosis was non-Hodgkin lymphoma, favoring diffuse large B-cell lymphoma (DLBCL) (63.64%). The lymphoma profile at Royal Prima General Hospital Medan was dominated by B-cell non-Hodgkin lymphoma, particularly Diffuse Large B-

Nomor ISSN: 3124-1115

Cell Lymphoma (DLBCL), consistent with global epidemiological patterns. These findings highlight the pivotal role of IHC examination in establishing a definitive diagnosis and guiding appropriate therapeutic strategies.

Keywords: *Hodgkin lymphoma, non-Hodgkin lymphoma, immunohistochemistry, DLBCL*

INTRODUCTION

The global incidence of lymphoma accounts for 3.37% of all malignancies. Over the past four decades, its incidence has increased by an average of 3–4%. The incidence of Hodgkin lymphoma has risen by 1.1% and 0.7% among men and women, respectively, while Non-Hodgkin lymphoma (NHL) has shown an increase of 6% in men and 4.1% in women. According to data from the Indonesian Ministry of Health (2013), the national incidence rate of lymphoma was 0.06%, totaling 14,905 patients, with the highest number reported in West Java Province (2,728 patients). In South Sulawesi Province, the incidence was 0.11%, with an estimated 914 patients. (1)

The etiology of lymphoma remains not fully understood. The clinical manifestations of Non-Hodgkin lymphoma are heterogeneous, often presenting as enlargement of one or multiple lymph nodes. The swelling may progress slowly over several months or years in low-grade lymphomas, whereas high-grade lymphomas tend to progress rapidly. Non-Hodgkin lymphoma can also present as an extranodal solid tumor, initially mimicking other forms of malignancy. The pathophysiological mechanisms of Hodgkin and Non-Hodgkin lymphomas differ. Hodgkin lymphoma is characterized by the presence of Reed–Sternberg cells derived from B lymphocytes, while Non-Hodgkin lymphoma commonly results from DNA abnormalities in B cells, T cells, or natural killer (NK) cells. (1–5)

Immunohistochemistry (IHC) is a diagnostic method that visualizes the interaction between tissue antigens and specific primary antibodies, followed by an enzyme–substrate reaction producing color in the nucleus, membrane, or cytoplasm. IHC is now an essential diagnostic tool for lymphoma patients, particularly for determining the specific subtype. In addition, it provides valuable prognostic information regarding disease progression. Targeted therapy can be implemented when antibody testing shows CD30 or CD20 positivity. IHC testing serves as a preliminary assessment for targeted therapy, such as anti-CD30 (Brentuximab Vedotin) and anti-CD20 (Rituximab), both of which specifically target Non-Hodgkin lymphoma cells. IHC evaluation for lymphoma can be performed individually or as part of a marker panel. (6–13)

Nomor ISSN: 3124-1115

Despite the availability of national data, specific information on the clinicopathological and immunohistochemical profiles of lymphoma patients in North Sumatra, particularly in Medan, remains limited. Therefore, this study aims to describe the clinicopathological characteristics and IHC profiles (CD20, CD3, CD45, and CD30) of lymphoma patients at Royal Prima General Hospital Medan during the period 2023–2025.

METHODS

This research employed a descriptive study design using a cross-sectional approach. The study was conducted at the Anatomical Pathology Laboratory, Royal Prima General Hospital Medan, located at Jalan Ayahanda No. 68A, Sei Putih Tengah Village, Medan Petisah District, Medan City. Data collection took place in September 2025.

The study population included all lymphoma patients who underwent IHC testing for CD20, CD3, CD45, and CD30 markers. Medical record data were obtained from inpatients diagnosed with lymphoma who had undergone IHC examination for the mentioned markers. Sampling was conducted using a non-probability method, specifically total sampling. Subjects were included if they met the inclusion and exclusion criteria.

The inclusion criteria were all lymphoma patients who underwent IHC examination (CD20, CD3, CD45, CD30) and had complete data corresponding to the study variables. The exclusion criteria were patients with incomplete or inconsistent pathological anatomy records. The collected data were analyzed using univariate analysis and presented in tabular form.

RESULTS

This study included a total of 44 patients diagnosed with lymphoma at Royal Prima General Hospital, Medan, from 2023 to 2025. The demographic, clinical, and pathological characteristics of this cohort are summarized below.

Demographic and Baseline Clinical Characteristics

The baseline characteristics of the 44 lymphoma patients are presented in Table 1. The cohort was predominantly male (n=28, 63.64%). The highest prevalence of lymphoma was observed in the 48–58 year age group (n=18, 40.91%), while the lowest was in the >81 year age group (n=1, 2.27%).

Clinically, Non-Hodgkin Lymphoma (NHL) was the most common type, accounting for 75.0% of cases (n=33), compared to Hodgkin Lymphoma (HL) (n=11, 25.0%). A nodal presentation (n=27, 61.36%) was more frequent than an extranodal presentation (n=17, 38.64%). Consistent with the high rate of NHL, lymphomas of B-cell origin were dominant (n=39, 88.64%) over those of T-cell origin (n=5, 11.36%).

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Table 1. Demographic and Baseline Clinical Characteristics of Lymphoma Patients (n=44)

Characteristic	Category	Frequency (n)	Percentage (%)
Age Group (Years)	26–36	7	15.91
	37–47	9	20.46
	48–58	18	40.91
	59–69	5	11.36
	70–80	4	9.09
	>81	1	2.27
Sex	Male	28	63.64
	Female	16	36.36
Lymphoma Location	Nodal	27	61.36
	Extranodal	17	38.64
Lymphoma Type	Non-Hodgkin (NHL)	33	75
	Hodgkin (HL)	11	25
Cell of Origin	B-cell	39	88.64
	T-cell	5	11.36

Clinical Presentation and Initial Diagnosis

The primary clinical manifestations at presentation are detailed in Table 2. The most common presenting sign was a palpable mass in the neck (cervical lymphadenopathy), reported in 13 cases (29.55%). Other significant sites included the axilla (n=5, 11.36%), inguinal region (n=4, 9.09%), and various intra-abdominal locations (n=4, 9.10%).

Table 2. Clinical Manifestations at Presentation (n=44)

Clinical Manifestation	Frequency (n)	Percentage (%)
Cervical Mass (Neck)	13	29.55
Axillary Mass	5	11.36
Inguinal Mass	4	9.09
Mesoileum/Omentum/Retroperitoneal Mass	4	9.1
Mandibular/Submandibular Mass	3	6.82
Tonsillar Mass	3	6.82
Sinonasal Mass	2	4.55
Chest Wall Mass	2	4.55
Breast Mass	1	2.27

Nomor ISSN: 3124-1115

Testicular Mass	1	2.27
Leg Mass	1	2.27
Sub-auricular Mass	1	2.27
Colon Mass	1	2.27
Gastric Mass	1	2.27
Brain Mass	1	2.27
Eyelid Mass	1	2.27
Total	44	100

Reflecting the diverse presentations, the initial clinical diagnoses varied (Table 3). The most frequent initial diagnosis was "Suspected Non-Hodgkin Lymphoma" (n=24, 54.56%). Other preliminary diagnoses included unspecified "Suspected Lymphoma" (n=5, 11.36%), "Lymphadenopathy" (n=2, 4.55%), and various suspected site-specific malignancies, such as "Suspected Sinonasal Carcinoma" (n=2, 4.55%).

Table 3. Initial Clinical Diagnoses Prior to Biopsy (n=44)

Initial Clinical Diagnosis	Frequency (n)	Percentage (%)
Suspected Non-Hodgkin Lymphoma	24	54.56
Suspected Lymphoma (unspecified)	5	11.36
Suspected Sinonasal Carcinoma	2	4.55
Lymphadenopathy	2	4.55
Suspected Meso-ileal Carcinoma	2	4.55
Breast Cancer	1	2.27
Suspected Testicular Tumor	1	2.27
Chronic Ulcer	1	2.27
Suspected Mandibular Tumor	1	2.27
Invagination (Intussusception)	1	2.27
Suspected Tonsillar Carcinoma	1	2.27
Gastric Tumor	1	2.27
Brain Tumor	1	2.27
Eyelid Tumor	1	2.27
Total	44	100

Histopathological and Immunohistochemical Findings

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Definitive diagnoses were established via histopathological and immunohistochemical (IHC) analyses, summarized in Table 4. Analysis of IHC markers (Table 4, Part A) confirmed the B-cell predominance: CD20 (B-cell marker) was positive in 39 cases (88.64%), while CD3 (T-cell marker) was positive in 5 cases (11.36%). The pan-leukocyte marker CD45 was positive in 35 cases (79.55%), and CD30 was expressed in 33 cases (75.0%).

The primary histopathological diagnosis (Table 4, Part B) was most commonly "Non-Hodgkin Lymphoma, diffuse, intermediate to large cell sub-type" (n=25, 56.82%), followed by "Small round blue cell tumor, suggestive of NHL" (n=7, 15.91%). Following integration of morphology and IHC results (Table 4, Part C), the most frequent final diagnosis was Diffuse Large B-cell Lymphoma (DLBCL) (n=28, 63.64%). T-cell Non-Hodgkin Lymphoma (n=5, 11.36%) and other diffuse B-cell lymphomas (n=11, 25.0%) constituted the remainder of the diagnoses.

Table 4. Summary of Pathological and Immunohistochemical (IHC) Analyses (n=44)

Analysis	Finding	Frequency (n)	Percentage (%)
A. IHC Marker Expression	CD20 Positive	39	88.64
	CD20 Negative	5	11.36
	CD3 Positive	5	11.36
	CD3 Negative	39	88.64
	CD45 Positive	35	79.55
	CD45 Negative	9	20.45
	CD30 Positive	33	75
	CD30 Negative	11	25
B. Histopathological Diagnosis	NHL, diffuse, intermediate to large cell; Suggestive of DLBCL	25	56.82
	Small round blue cell tumor; Suggestive of NHL, B-cell type	7	15.91
	Malignant tumor; DDx: Malignant Lymphoma	4	9.09
	NHL, small-medium cells predominantly	2	4.55
	Malignant round cell tumor; DDx: NHL/SNUC/ONB	2	4.55

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	Suggestive of Hodgkin Lymphoma, lymphocyte-depleted	1	2.27
	NHL, nodular pattern; Suggestive of Classic Follicular Lymphoma	1	2.27
	Hodgkin Lymphoma, nodular lymphocyte-rich	1	2.27
	Classical Hodgkin Lymphoma, mixed-cellularity variant	1	2.27
C. Final IHC Diagnosis	Non-Hodgkin Lymphoma, diffuse, intermediate to large cell sub-type; Diffuse Large B-cell Lymphoma (DLBCL)	28	63.64
	B-cell Lymphoma, diffuse	11	25
	T-cell Non-Hodgkin Lymphoma	5	11.36

DISCUSSION

Research by Parkin et al. regarding Global Cancer Statistics indicates that lymphoma incidence is predominantly higher in males and in individuals over 55 years of age. The presence of nodular tumors, particularly in the cervical region, suspicious for either non-Hodgkin lymphoma (NHL) or Hodgkin lymphoma (HL), represents the most frequent clinical presentation in lymphoma patients. The diffuse, intermediate to large cell subtype of Non-Hodgkin Lymphoma, consistent with Diffuse Large B-cell Lymphoma (DLBCL), was identified as the most prevalent histopathological subtype. This finding aligns with results from the International Lymphoma Epidemiology Consortium.

Immunohistochemistry (IHC) analysis confirmed 39 cases as B-cell lymphoma (via CD20 expression) and 5 cases as T-cell lymphoma (via CD3 expression). Additionally, CD30 staining diagnosed 33 cases of non-Hodgkin lymphoma. While routine Haematoxylin-Eosin (H&E) staining identified the DLBCL subtype in 25 patients, subsequent IHC analysis confirmed 28 cases as DLBCL.

CONCLUSION

Based on this study of 44 lymphoma patients at RSU Royal Prima Medan, the patient profile was predominantly male, concentrated in the 48–58 year age range, with cervical nodes being the most common site of presentation. Pathologically, the majority of lymphomas were of B-

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cell origin (88.64%). Diffuse Large B-cell Lymphoma (DLBCL) constituted the most frequent immunohistochemically confirmed diagnosis (63.64%). These findings affirm that the lymphoma profile in Medan aligns with both Indonesian and global epidemiological data, wherein B-cell non-Hodgkin lymphoma represents the most frequent malignancy. This study highlights the vital role of immunohistochemistry in accurately confirming and classifying lymphoma subtypes, an objective unattainable through routine histopathology (H&E) alone. Such diagnostic accuracy is crucial for patient management, particularly in the selection of appropriate targeted therapies.

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