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CHARACTERISTICS OF PATIENTS WITH LYMPHOMA DIAGNOSIS AT GUNUNG JATI CIREBON HOSPITAL IN 2022-2024

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ABSTRAK

Latar Belakang: Limfoma merupakan keganasan sistem limfoid yang dapat mengenai nodus limfa maupun lokasi ekstranodal dan masih menjadi masalah kesehatan dengan angka kejadian yang terus meningkat. Data karakteristik pasien limfoma di rumah sakit daerah masih terbatas. **Tujuan:** Mengetahui karakteristik pasien dengan diagnosis limfoma di RSD Gunung Jati Cirebon. **Metode:** Penelitian deskriptif retrospektif menggunakan data rekam medis pasien limfoma di RSD Gunung Jati Cirebon periode 2022–2024. Pengambilan sampel dilakukan dengan total sampling. Variabel yang dianalisis meliputi usia, jenis kelamin, gejala klinis, lokasi tumor, hasil histopatologi dan imunohistokimia, terapi, serta rekurensi. **Hasil:** Dari 90 pasien, sebagian besar berjenis kelamin laki-laki dan berada pada kelompok usia lanjut. Manifestasi klinis tersering berupa benjolan atau massa dengan keterlibatan lokasi ekstranodal yang dominan. Mayoritas pasien terdiagnosis Limfoma Non-Hodgkin dengan subtipe imunohistokimia terbanyak Diffuse Large B-Cell Lymphoma. Terapi yang paling sering diberikan adalah kemoterapi dan tidak ditemukan data rekurensi selama periode pengamatan. **Kesimpulan**: Pasien limfoma di RSD Gunung Jati Cirebon periode 2022–2024 didominasi oleh laki-laki usia lanjut dengan keterlibatan ekstranodal dan tipe Limfoma Non-Hodgkin, terutama Diffuse Large B-Cell Lymphoma. Temuan ini penting sebagai dasar pemetaan klinis dan perencanaan pelayanan limfoma di rumah sakit daerah.

ABSTRACT

Background: *Lymphoma is a malignancy of the lymphoid system that can involve lymph nodes and extranodal sites and remains a public health problem with an increasing incidence. Data on the characteristics of lymphoma patients in regional hospitals are still limited.* ***Objective:*** *To describe the characteristics of patients diagnosed with lymphoma at Gunung Jati Regional Hospital, Cirebon.* ***Methods:*** *This was a retrospective descriptive study using medical record data of lymphoma patients treated at Gunung Jati Regional Hospital during the period 2022–2024. Total sampling was applied. The variables analyzed included age, sex, clinical manifestations, tumor location, histopathological and immunohistochemical findings, treatment, and recurrence.* ***Results:*** *Of the 90 patients, most were male and belonged to the older age group. The*

most common clinical manifestation was a lump or mass, with predominant extranodal involvement. Most patients were diagnosed with Non-Hodgkin Lymphoma, with Diffuse Large B-Cell Lymphoma as the most frequent immunohistochemical subtype. Chemotherapy was the most commonly administered treatment, and no recurrence data were found during the observation period. ***Conclusion:*** *Lymphoma patients at Gunung Jati Regional Hospital, Cirebon, during 2022–2024 were predominantly older males with extranodal involvement and Non-Hodgkin Lymphoma, particularly Diffuse Large B-Cell Lymphoma. These findings are important as a basis for clinical mapping and planning of lymphoma services in regional hospitals.*

INTRODUCTION

Lymphoma is a neoplasm that originates from lymphoid tissue and can involve lymph nodes, bone marrow, and extranodal organs. The disease is among the most commonly found lymphoid malignancies and has a broad clinical spectrum. The course of lymphoma disease can be indolent with slow progression or aggressive with rapid progression, thus requiring different approaches to diagnosis and management (Octavia et al., 2023; L. Wang et al., 2020).

In general, lymphomas are classified into two main groups, namely Hodgkin Lymphoma and Non-Hodgkin Lymphoma. This classification is based on clinical characteristics, histopathological picture, as well as the origin of lymphocyte cells that undergo malignant transformation. Hodgkin lymphoma originates from B cells and has distinctive histopathological characteristics, while Non-Hodgkin lymphoma can originate in B cells as well as T cells or NK, thus exhibiting a wider biological, clinical, and therapeutic response diversity (Nolan et al., 2021; Octavia et al., 2023).

Globally, lymphoma accounts for about 3.37% of all malignancies that occur in the world. Non-Hodgkin lymphoma has a higher incidence rate than Hodgkin Lymphoma and is among the top ten most malignant malignancies globally. Meanwhile, Hodgkin Lymphoma, although rarer, still contributes to the burden of cancer, especially in certain age groups (Bray et al., 2024).

In the Asian region, the incidence of Hodgkin Lymphoma and Non-Hodgkin Lymphoma is relatively high compared to other continents. This condition is suspected to be related to demographic, environmental, and exposure to certain infections. In Indonesia, lymphoma is still a significant health problem with the number of new cases and mortality rates continuing to increase every year, both in Hodgkin Lymphoma and Non-Hodgkin Lymphoma, so it requires special attention in the health care system (Ferlay et al., 2024).

The increase in the incidence of lymphoma is influenced by various risk factors, including old age, gender, genetic factors, and family history of lymphoma. In addition, chronic infections, immunosuppression, autoimmune diseases, and chronic inflammation also play a role in the process of lymphomagenesis. Exposure to environmental pollution and chemicals has also been reported to increase the risk of lymphoma. Lifestyle factors such as obesity and smoking habits are also known to contribute to an increased risk of the disease (Huang et al., 2022; Lewis et al., 2020; Thandra et al., 2021).

Clinically, lymphoma generally manifests as painless lymphadenopathy, both at nodal and extranodal locations. In some cases, patients may come with systemic symptoms or organ-related complaints involved. Diagnosis enforcement is carried out

through tissue biopsy examination which is then histopathologically evaluated. In the examination of hematoxilin-eosin, the presence of Reed–Sternberg cells is one of the distinguishing characteristics of Hodgkin Lymphoma from Non-Hodgkin Lymphoma (Alwi, 2014; Lewis et al., 2020; Nolan et al., 2021).

Several studies in Indonesia show that lymphoma patients are more commonly found in the elderly age group and are dominated by the male gender. Non-Hodgkin lymphoma is the most common type of histopathology found in various healthcare centers. In addition, extranodal site involvement is reported to be quite high, indicating variations in the clinical manifestations of lymphoma in local populations (Oehadian et al., 2024; Wibawa & Ekawati, 2021).

Although there have been several studies on the characteristics of lymphoma patients in Indonesia, data from regional hospitals is still limited. Gunung Jati Cirebon Hospital has been designated as a network hospital for intermediate strata cancer services in West Java Province, so it has an important role in serving lymphoma cases (Ministry of Health of the Republic of Indonesia, 2023). Therefore, research on the characteristics of patients with lymphoma diagnosis at Gunung Jati Cirebon Hospital is important to provide a local epidemiological picture and become the basis for more optimal service planning and management of lymphoma.

RESEARCH METHODS

This study is a retrospective descriptive study with a cross-sectional design that uses secondary data in the form of medical records of lymphoma patients. The research is within the scope of Surgery, Oncology, and Anatomical Pathology, and is carried out at Gunung Jati Cirebon Hospital. The research implementation period lasted from October 2024 to June 2025, while patient data sources were limited to the period of 2022–2024 as an administrative limit for data collection, so clinical data for 2025 were not included in the analysis.

The target population of this study is all patients with a lymphoma diagnosis, while the affordable population includes patients who undergo anatomical pathology examinations at Gunung Jati Cirebon Hospital in the 2022–2024 period. Samples were obtained using the total sampling technique, i.e. all patients in the affordable population who met the inclusion criteria were included as a research sample. Inclusion criteria include patients with a clinical diagnosis of lymphoma who undergo histopathological examinations, both nodal and extranodal, and have complete medical record data. Exclusion criteria include patients with a diagnosis of malignancies other than lymphoma, non-lymphoma histopathological outcomes, and incomplete medical records.

Study variables included age, sex, family history of lymphoma, smoking history, clinical symptoms, tumor location, histopathological and immunohysterectomymic outcomes, type of therapy, and recurrence, all of which were obtained from medical records. Data collection is carried out after obtaining ethical approval and official permission from the relevant parties. The data were analyzed in univariate using SPSS software to describe the distribution of patient characteristics in the form of tables and diagrams, while upholding the principles of research ethics and confidentiality of patient data.

RESEARCH RESULTS

Overview of Patient Characteristics

Age

Table 1. Distribution of lymphoma patient frequency by age

Age Range (Years)	Percent (%)	Remarks
20–23	6.6	Early adulthood
27–32	6.6	Young adults
35–38	6.6	Adult
39–43	11.0	Adult
45–49	11.0	Adult
50–54	14.3	Pre-elderly
55–59	17.6	Pre-elderly
60–64	14.4	Early Elderly
65–69	10.9	Elderly
71–78	6.6	Advanced Elderly
Total	**100**	

Based on the results of the study, out of 90 samples, the prevalence of lymphoma was most found at the age of 61 years (5 people; 5.6%). Ages 53, 55, 58, and 62 years were found in 4 patients (4.4%) respectively. The average age of patients was 51.47 years, with the youngest age being 20 years and the oldest age being 78 years.

Gender

Table 2. Distribution of lymphoma patient frequency by sex

Gender	Frequency (n)	Percentage (%)
Male	53	58,9
Women	37	41,1
Total	**90**	**100**

Based on the results of the study in table 2, it shows that of the 90 samples of the prevalence of lymphoma incidence based on gender distribution at Gunung Jati Cirebon Hospital in 2022-2024, it was found in the male group as many as 53 people (58.9%) compared to the female group as many as 37 people (41.1%).

Family History of Lymphoma

Table 3. Distribution of patients based on family history of lymphoma

Family History	Frequency (n)	Percentage (%)
No data	90	100
Total	**90**	**100**

Based on the results of the study in table 3, it shows that out of 90 samples of the prevalence of lymphoma incidence based on the distribution of family history of lymphoma at Gunung Jati Cirebon Hospital in 2022-2024, no data on family lymphoma history was found in all patients as many as 90 people (100%).

Smoking History

Table 4. Distribution of lymphoma patients based on smoking history

Smoking History	Frequency (n)	Percentage (%)
Smoking	2	2,2
No smoking	24	26,7
No data	64	71,1
Total	**90**	**100**

Based on the results of the study in table 4, it shows that from 90 samples of the prevalence of lymphoma incidence based on the distribution of smoking history at Gunung Jati Cirebon Hospital in 2022-2024, more results were obtained that there was no smoking data, namely 64 people (71.1%), 24 people (26.7%) who did not smoke,

and 2 people (2.2%) smoked.

Clinical Symptoms

Table 5. Distribution of the frequency of clinical symptoms of lymphoma patients

Clinical Symptoms	Frequency	Percentage (%)
Lumps/Masses	31	25,4
Crowded	8	6,6
Constipation	1	0,8
Dysphagia	2	1,6
Lemmas	13	10,8
Nausea	8	6,6
Vomiting	2	1,6
Seizures	1	0,8
Decreased consciousness	3	2,5
Weight loss	8	6,6
Cold	2	1,7
Cough	3	2,5
Enlarged belly	1	0,8
Abdominal pain	4	3,3
Neck pain	3	2,5
Headache	2	1,6
Anal pain	1	0,8
Chest pain	1	0,8
Leg pain	1	0,8
Dizziness	1	0,8
Hematemesis	1	0,8
Hematophysis	1	0,8
No data	24	19,7
Total	**122**	**100**

Based on the results of the study in table 5, it shows that of the 90 samples of the prevalence of lymphoma incidence based on the distribution of clinical symptoms at Gunung Jati Cirebon Hospital in 2022-2024, more lump/mass symptoms were found in 31 people (25.4%), while the prevalence was less than there was no data on clinical symptoms because 22 patients came because of referrals from other hospitals (25.6%).

Clinical Symptoms Based on Age and Type of Lymphoma

Table 6. Distribution of clinical symptoms in lymphoma patients by age and lymphoma type.

Aspects	Key Findings
Patient's age range	20–78 years old
Most age groups	Medium to advanced adulthood (≥40 years)
Dominant lymphoma type	Non-Hodgkin lymphoma
Other types of lymphoma	Hodgkin lymphoma (fewer, partially concomitant than non-Hodgkin)
Main clinical symptoms	Lump (lymphadenopathy)
Systemic symptoms are often found	Weakness, weight loss, nausea, vomiting
Respiratory symptoms	Shortness of breath, cough
Severe/advanced symptoms	Impaired consciousness, gastrointestinal bleeding, seizures, dysphagia
Data limitations	Some patients are referral cases with incomplete symptom data

Based on the results of the study in table 6, out of 90 samples, it was found that Hodgkin lymphoma patients were 23–53 years old with an average age of 41 years and generally experienced symptoms in the form of lumps, tightness, chest pain, and

weight loss. Meanwhile , non-Hodgkin lymphoma patients were 20–78 years old with an average age of 52 years and showed more diverse symptoms, including lumps, weakness, nausea, vomiting, weight loss, abdominal or neck pain, seizures, decreased consciousness, headache, hematoxia, hematemesis, dysphagia, dizziness, enlarged stomach, cough, runny nose, tightness, and constipation.

Tumor Location

Table 7. Distribution of patient frequency based on tumor location

Tumor Location	Frequency (n)	Percentage (%)
Nodal	42	46,7
Extranodal	46	51,1
Nodal + Extranodal	2	2,2
Total	**90**	**100**

Based on the results of the study in table 7, it shows that of the 90 samples of the prevalence of lymphoma incidence based on the distribution of tumor locations at Gunung Jati Cirebon Hospital in 2022-2024, more than 46 people (51.1%) were found in extranodals, while the prevalence was less found in nodal as many as 42 people (46.7%).

Histopathological Examination

Table 8. Distribution of histopathological examination results

Histopathological Examination (Hematoxilyn-Eosin and Immunohistochemistry)	Frequency (n)	Percentage (%)
Hodgkin Lymphoma	7	7,8
- Hodgkin lymphoma of a non-specific subtype	3	3,3
- *Classical Hodgkin lymphoma*	2	2,2
- *Classical Hodgkin lymphoma, lymphocytic depletion*	1	1,1
- *Classical Hodgkin lymphoma, nodular sclerosing*	1	1,1
Non-Hodgkin Lymphoma	83	92,2
- Non-Hodgkin lymphoma of non-specific subtypes	49	54,4
- *Diffuse Large B Cell Lymphoma*	29	32,2
- *T cell lymphoma*	1	1,1
- *Burkitt lymphoma*	1	1,1
- *Lymphoma MALT type*	1	1,1
- *Follicular lymphoma*	1	1,1
- *Small lymphocytic lymphoma*	1	1,1
Total	**90**	**100**

Based on the results of the study in table 8, it shows that out of 90 samples of the prevalence of lymphoma incidence based on histopathological examination at Gunung Jati Cirebon Hospital in 2022-2024, more results were obtained from Non-Hodgkin Lymphoma as many as 83 people (92.2%) compared to Hodgkin Lymphoma as many as 7 people (7.8%). In some patients, no immunohistochemistry examination is performed, so the subtype cannot be determined and the diagnosis is only up to Hodgkin lymphoma or non-Hodgkin lymphoma.

Therapy

Table 9. Distribution of lymphoma patients therapy

Therapy	Frequency (n)	Percentage (%)
Chemotherapy	58	64,4
Medicine	19	21,1
No data	13	14,4
Total	**90**	**100**

Based on the results of the study in table 9, it shows that of the 90 samples of the prevalence of lymphoma incidence based on the distribution of therapy at Gunung Jati Cirebon Hospital in 2022-2024, 58 people (64.4%) were given chemotherapy, 19 people (21.1%) were medically vaccinated, and 13 people (14.4%) were given no data.

Recurrence

Table 10. Distribution of recurrence of lymphoma patients

Recurrence	Frequency (n)	Percentage (%)
No data	90	100
Total	**90**	**100**

Based on the results of the study in table 10, it shows that out of 90 samples of the prevalence of lymphoma incidence based on the distribution of recurrence at Gunung Jati Cirebon Hospital in 2022-2024, no recurrence data was found in all patients as many as 90 people (100%).

DISCUSSION

Age

Based on research that has been conducted on 90 samples, the characteristics of lymphoma patients by age show that the highest prevalence is found at the age of 61 years as many as 5 people (5.6%) with an average age of 51.47 years, while the lowest prevalence is found in several age groups which each consists of only one person (1.1%) and is spread across the age range of adults to the elderly. This pattern suggests that the incidence of lymphoma tends to increase in middle to advanced age, which indicates a link between the aging process and an increased risk of lymphoma. These findings are in line with research Wibawa & Ekawati (2021) who reported that the 61–70 year age group was the age group with the most lymphoma diagnoses, as well as research Tasyandita et al. (2023) which states that the majority of non-Hodgkin lymphoma patients are ≥40 years old. The increase in the prevalence of lymphoma with age is known to increase by 40–50% after the age of 60, which is biologically related to a decrease in the proportion of CD19+ B cells, reduced diversity *B-cell receptor* (BCR), increased BCR clonality, and accumulation *Age-Associated B Cells* which produce autoantibodies and proinflammatory cytokines, thereby degrading the immune function of B cells and increasing susceptibility to B cell malignant transformation.

Gender

Based on the study, the characteristics of lymphoma patients by gender showed that out of 90 samples, a higher prevalence was found in 53 men (58.9%) compared to 37 women (41.1%). These findings suggest that men appear to be more susceptible to lymphoma, which is in line with research Yan et al. (2022) in 100 patients primary extranodal lymphoma of the head and neck also showed more males (59%) than females (41%). Other research by Latifovic et al. (2020) found that men had more

Hodgkin lymphoma (93.1%) plus that men had more Hodgkin lymphoma (93.1%) than women. The condition may be related to biological and environmental factors, including male susceptibility to protooncogenic mutations, chronic infections, as well as exposure to obesity, HIV, smoking, and chemicals, suggesting that gender factors influence the risk of lymphoma occurrence.

Family History of Lymphoma

The study showed that out of 90 samples, no family history of lymphoma was found in all patients (100%), suggesting that hereditary factors do not appear to play a role in this population. These findings are different from the report Boddicker et al. (2025) indicating that 14.9% of the case group and 8.6% of the control group had a family history of lymphoma or leukemia, with a significant increased risk (OR = 1.92; 95% CI: 1.75–2.10). The risk of non-Hodgkin lymphoma and Hodgkin lymphoma in first-degree families increased by 1.7 times and 3.1 times, respectively, highest in brothers, but not found in siblings of the opposite sex, while in monozygous twins, the risk of Hodgkin lymphoma increased by up to 100 times compared to the general population. Genetic factors in the HLA region as well as the IL13, REL, PVT1, GATA3, and TCF3 genes have also been reported to contribute to hereditary susceptibility. The results of this study show that although genetic factors can influence the risk of lymphoma in general, in this sample the incidence of lymphoma is more influenced by non-hereditary factors, thus confirming the importance of considering other environmental and biological factors in the lymphoma risk analysis.

Smoking History

The results showed that out of 90 samples, most patients had no smoking history data (64 people; 71.1%), while 24 people (26.7%) were recorded as non-smokers and 2 people (2.2%) were recorded as smokers, although there may be smoking patients who are not documented in medical records. These findings are different from the report Latifovic et al. (2020) which stated that 60.8% of lymphoma patients were smokers or had smoked, as well as research Jun Wang et al. (2021) which found that 59% of lymphoma patients had a history of smoking. Smoking history is known to affect the biomarker of Hodgkin's lymphoma disease, namely CCL17/TARC, which increases in smokers; heavy smokers had CCL17/TARC levels 52.4% higher than light smokers and 62.9% higher than non-smokers. This suggests that although the data on these samples are largely unrecorded, smoking factors still have the potential to play a role in lymphoma pathogenesis through increased proinflammatory biomarkers.

Clinical Symptoms

Of the 90 samples, the most common clinical symptoms were lumps or masses in 31 people (25.4%), followed by the unavailability of symptom data in 24 people (19.7%), while lymphoma symptoms were generally accompanied by other comorbid complaints. This is in line with research Storck et al. (2019) which shows that in lymphomas in the head and neck region, a lump in the neck is the most dominant symptom, as well as research Guerra et al. (2023) who found painless adenopathy (38%) to be the most complaints. Lymphoma usually appears as painless lymphadenopathy, both of the indolent and aggressive types, which exhibits consistent clinical characteristics of lymphoma. In addition, many patients were referred to Gunung Jati Cirebon Hospital, which based on the Decree of the Minister of Health HK.01.07/MENKES/1337/2023 is a network hospital for intermediate strata cancer, so that patient data reflects the referral population that requires chemotherapy. These findings confirm that lumps remain the main symptom of lymphoma, both as a single

manifestation and accompanied by systemic complaints, and the importance of early detection in referral patients.

Histopathological Examination

Based on the results of the study on 90 samples, the prevalence of lymphoma based on histopathological examination was dominated by Non-Hodgkin Lymphoma, which was 83 patients (92.2%), with the majority of cases being subtype DLBCL, followed by MALT, follicular lymphoma, small cell lymphoma, Burkitt lymphoma, and several other subtypes that could not be specifically determined because many patients did not undergo immunohistochemistry examination. Meanwhile, Hodgkin Lymphoma was found in 7 patients (7.8%), including classical Hodgkin lymphoma, nodular sclerosis Hodgkin lymphoma, and subtypes that were not specifically identified. These findings are in line with research Wibawa & Ekawati (2021) at Sanglah Hospital which reported the dominance of Non-Hodgkin Lymphoma at 95.8%, as well as research Oehadian et al. (2024) Oehadian et al. (2024) found a prevalence of 80.5%. The literature also shows that Non-Hodgkin Lymphoma is more common than Hodgkin Lymphoma, with the main difference being the presence of Reed-Sternberg cells in Hodgkin Lymphoma (Harrison et al., 2018; Nolan et al., 2021; Octavia et al., 2023). These results indicate that in the patient population studied, Non-Hodgkin Lymphoma remains the dominant type of lymphoma, so understanding of the subtypes and immunohistochemical examinations is essential for proper diagnosis and therapy planning.

Therapy

Based on the results of the study, chemotherapy is the most widely given therapy modality, namely in 58 patients (64.4%), consistent with the study Sezgin & Bektas (2022) who reported that 76.9% of patients received chemotherapy with the R-CHOP regimen as the most commonly used. Hodgkin Lymphoma therapy is highly dependent on the stage and initial response to treatment; in the early stages without risk factors, standard therapy included two cycles of ABVD followed by ISRT radiotherapy of 20 Gy (Ansell, 2024; Momotow et al., 2021). Meanwhile, in Non-Hodgkin Lymphoma, therapy is tailored to the histological character, where DLBCL as the most common subtype is usually treated using R-CHOP as the first line, with or without radiotherapy depending on the stage and clinical risk factors (Adaniya & Barta, 2021; Karsten et al., 2024; Mamgain et al., 2022; Rojek & Smith, 2022). These findings show that the selection of therapy in lymphoma patients follows international standard guidelines and is adapted to individual characteristics, both in terms of histology and disease stage, to achieve optimal therapeutic response.

Recurrence

Based on the study data, all patients (100%) had no recurrence records in the medical records, indicating that no post-therapy recurrence was detected in this sample. In general, lymphoma recurrence is most common in the first 2–3 years after treatment and can appear at different locations or with changes in histopathological type. Case report by Serin et al. (2020) describe a patient who previously had Hodgkin Lymphoma sclerosis nodular and was later diagnosed with Non-Hodgkin Lymphoma more than ten years later with an isolated pericardial recurrence. Recent research by Morar et al. (2025) suggests that disease stage is a significant predictor of recurrence risk, where patients with stage IV B have a higher risk than stage II A. These findings confirm the importance of long-term monitoring, especially in patients with advanced stages, although recurrence has not been recorded in the current study sample.

Thus, this research has been carried out in accordance with the established procedures, but there are some limitations. The completeness of medical record data is a major obstacle, because many documents do not include important information about patient risk factors, such as family history of lymphoma, smoking status, and data on recurrence. In addition, there are medical records that do not include complete clinical information or supporting examinations, so the analysis of certain variables is limited. This limitation needs to be considered in the interpretation of research results and is an important consideration for future research so that data collection is more systematic and comprehensive.

CONCLUSIONS AND SUGGESTIONS

The study using secondary data from the medical records of lymphoma patients at Gunung Jati Cirebon Hospital showed that the most cases occurred at the age of 61 years with an average of 51.47 years, and were more experienced by men. All patients had no family history of lymphoma, and most had no smoking history information. The most common symptom is a lump or mass, with the location of the tumor being dominant on the extranodal. Histopathological examination showed that the majority of cases were non-Hodgkin lymphoma, most patients received chemotherapy, and no recurrence data were found in all samples.

Based on these results, this study could be the basis for further research exploring other variables for a more comprehensive picture of lymphoma risk. Health workers are expected to use these findings to educate the public regarding risk factors, symptoms, and therapy. Educational institutions can make it a reference for research development, while hospitals are expected to improve the completeness of medical record data so that future research is more optimal.

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