

DENTINO
JURNAL KEDOKTERAN GIGI
VOL. X. No 2. SEPTEMBER 2025

DISTRIBUTION AND FREQUENCY OF MALIGNANT LYMPHOMA AT RSUD DR. SOETOMO BETWEEN 2013 - 2023

Sisca Meida Wati¹⁾, Theresia Indah Budhy¹⁾, Nadila Tahta Fidari²⁾, Amira Nazhifa²⁾, Najwa Aulina Zulfa²⁾, Ridholia³⁾

¹⁾Department of Oral and Maxillofacial Pathology Faculty of Dental Medicine, Universitas Airlangga, Surabaya - Indonesia

²⁾Undergraduate Student, Faculty of Dental Medicine Universitas Airlangga, Surabaya – Indonesia

³⁾Department of Anatomical Pathology, RSUD Dr. Soetomo, Surabaya - Indonesia

ABSTRACT

Background: Malignant lymphoma is a type of cancer caused by the proliferation of abnormal lymphocyte cells. In Indonesia, Non-Hodgkin's Lymphoma is ranked seventh as the most common new malignancy, while Hodgkin's Lymphoma is ranked 27th. Information on malignant lymphoma in East Java, especially Surabaya, is still limited, especially for a period of more than five years. Therefore, a ten-year study was conducted to gain a more comprehensive understanding of its distribution and frequency. **Purpose:** To obtain an overview of the distribution and frequency level of malignant lymphoma cases at Dr. Soetomo Hospital, Surabaya in the period 2013-2023. **Methods:** This observational study with a descriptive approach involved 382 patients as samples, which were analyzed based on the variables of age, gender, type of work, area of residence, anatomical location of the tumor, and size of the tumor. **Results:** Non-Hodgkin's Lymphoma was found to more dominant (59.4%) compared to Hodgkin's Lymphoma (40.6%). Cases were more common in men (57.3%) than women (42.7%), with the largest age group being in the range of 51–60 years. The majority of patients came from East Java Province, especially Surabaya, and were most often found in individuals working in the private sector (28.8%). The most common anatomical location was the nodal area, with the most common tumor size being less than 2 cm in diameter. **Conclusion:** This study presents the latest data on the distribution of malignant lymphoma at Dr. Soetomo Hospital, Surabaya and is expected to be a reference for further epidemiological research.

Keywords: distribution, frequency, hodgkin lymphoma, malignant lymphoma, non-hodgkin lymphoma

***Correspondence:** Sisca Meida Wati, Department of Oral and Maxillofacial Pathology, Faculty of Dental Medicine Universitas Airlangga. Jl. Prof Dr. Moestopo No. 47 Surabaya, Indonesia, siscameida@fkg.unair.ac.id.

INTRODUCTION

Cancer is a group of diseases characterized by uncontrolled growth of abnormal cells, attacking surrounding tissue, and potentially spreading to other parts of the body through the bloodstream and lymphatic system.¹ According to World Health Organization (WHO), cancer is one of the leading causes of death in the world. Every year, around 8.2 millions people worldwide lose their lives to this disease.² Meanwhile, data from GLOBOCAN 2022 released by the International Agency for Research on Cancer (IARC), the number of cancer cases in Indonesia increased significantly, namely 408,661 new cases and 242,988 deaths. The report also includes the distribution and frequency of various types of cancer, including malignant lymphoma.³ Malignant lymphoma is a malignancy of the lymphatic system characterized by abnormal and uncontrolled proliferation of lymphocyte cells.⁴ Until now, the exact cause of malignant lymphoma is still uncertain, but a number of risk factors have been identified, including age, gender, occupation, geographic factors, tumor size, anatomical location, and histopathological examination findings.^{5,6}

Malignant lymphoma is classified into two, namely Hodgkin's Lymphoma (HL) and non-Hodgkin's Lymphoma (NHL).⁷ Based on the number of new cases, NHL ranks 7th while HL ranks 27th. The distinction between these two subtypes is determined by the histopathological absence of Reed-Sternberg cells, which are a hallmark of Hodgkin lymphoma.⁸ Several studies have shown that malignant lymphoma is more common in the elderly, with the highest prevalence in men, the most common tumor location is nodal, and the most common histopathological type is NHL.⁹

The prevalence of malignant lymphoma shows geographic variation influenced by a number of factors, including environmental exposure, high rates of viral infection, genetic predisposition, and differences in lifestyle

in various regions.¹⁰ In addition, individuals who work in environments with exposure to toxic chemicals, radiation, or air pollution that are carcinogenic also have a higher risk of developing cancer, including malignant lymphoma.¹¹

In the case of malignant lymphoma, the therapeutic approach is tailored to the clinical condition of each patient, which includes chemotherapy, radiotherapy, or bone marrow transplantation. In HL, the choice of therapy depends on the stage of the disease, where the BEACOPP chemotherapy regimen is generally used for advanced stages. The BEACOPP regimen, consisting of bleomycin, etoposide, doxorubicin, cyclophosphamide, vincristine, procarbazine, and prednisone, was initially designed to explore the therapeutic benefits of moderately escalating conventional polychemotherapy doses to enhance the suboptimal outcomes observed in advanced-stage Hodgkin lymphoma within the general population. This regimen subsequently demonstrated efficacy as a successful treatment strategy for patients with unfavorable Hodgkin disease.¹² Meanwhile, in NHL, rituximab is one of the main agents that is often combined with other chemotherapy, such as the R-CVP regimen.^{8,13}

Comprehensive data on malignant lymphoma in East Java, especially Surabaya, is still limited and under-explored. Until now, no recent studies have been found that map the distribution and frequency of cases at Dr. Soetomo Hospital. Therefore, this study aims to evaluate the distribution and frequency of malignant lymphoma in the hospital in the period 2013–2023.

MATERIALS AND METHODS

The research material is all medical records of patients with malignant lymphoma at Dr. Soetomo Hospital, Surabaya in 2013–2023, namely 58,877 people.

This study uses a secondary data analysis approach by taking data from medical records of patients diagnosed with malignant lymphoma at Dr. Soetomo Hospital, Surabaya, during the period 2013 to 2023. The variables analyzed include age, gender, domicile, tumor size, anatomical location, type of work, and histopathology type. The total number of case populations reached 58,877. Due to the large population, the sample size was determined using the Lemeshow formula, resulting in 382 samples. From 58,877 medical records, 382 were randomly selected to ensure equal selection probability. Inclusion criteria were records of malignant lymphoma patients (2013–2023) with complete data on demographics, tumor characteristics, and histopathology. Exclusion criteria were inaccessible electronic records and duplicates.

Steps of Procedure

Processing procedure in secondary data analysis involves important steps starting from taking documentation by identifying medical record documentation, the data collection process by collecting data from documentation sources that have been identified systematically and structured, data cleaning by cleaning data to ensure accuracy, completeness, and consistency before analysis, data normalization by compiling data in a consistent and standardized format to facilitate analysis, and data analysis procedures by analyzing data that has been cleaned and normalized to answer research questions.

RESULTS

Of the total 382 cases of malignant lymphoma recorded at Dr. Soetomo Hospital during the period 2013 to 2023, the most dominant histopathological subtype was Non-Hodgkin's Lymphoma (NHL), with a total of 227 cases (59.4%), which was significantly higher than Hodgkin's Lymphoma (HL) with 155 cases (40.6%). The majority of malignant lymphoma cases came from the East Java Province, with the highest concentration in Surabaya (20.2%), followed by Sidoarjo (11.8%) and Lamongan (8.1%). Several patients were also recorded as coming from outside the province. Based on job classification, private employees were the most dominant professional group (28.8%), followed by housewives (18.1%) and farmers (13.4%). Meanwhile, data on tumor size showed that most medical records did not include information on the size of the tumor mass (63.1%). However, from the available data, tumors measuring less than 2 cm were most often found (22.0%), while tumors measuring more than 6 cm were the least common (5.0%).

Table 1. Histopathological and Gender

Gender	Hodgkin's Lymphoma		Non-Hodgkin's Lymphoma	
	Frequency (person)	Percentage (%)	Frequency (person)	Percentage (%)
Women	72	44,2	91	55,8
Men	83	37,9	136	62,1
Total	155	82,1	227	117,9

Based on gender distribution, men were recorded to had a higher number of cases than females. In addition, men tend to have a higher risk of developing lymphoma than women, for both HL and NHL types. Analysis based on age group showed that the age group 51–60 years was the group with the highest incidence, followed by the age group 41–50 years and the age group over 60 years.

Table 2. Histopathological and Age patient

Ages	Hodgkin's Lymphoma		Non-Hodgkin's Lymphoma	
	Frequency	Percentage	Frequency	Percentage
	(person)	(%)	(person)	(%)
0-10	8	57,1	6	42,9
11-20	19	63,3	11	36,7
21-30	33	58,9	23	41,1
31-40	26	53,1	23	46,9
41-50	31	42,5	42	57,5
51-60	21	22,1	74	77,9
>60	17	26,2	48	73,8
Total	155	323,2	227	376,8

Table 3. Histopathological and Anatomical location

Anatomical location	Hodgkin's Lymphoma		Non-Hodgkin's Lymphoma	
	Frequency	Percentage	Frequency	Percentage
	(person)	(%)	(person)	(%)
Nodal	117	39,6	179	60,4
Ekstranodal	38	44,1	48	55,9
Total	155	83,7	227	116,3

In nodal location, there were 296 cases with 117 cases being LH and 179 cases being NHL. Meanwhile, in extra nodal location, there were 86 cases, consisting of 38 cases LH and 48 cases NHL. These data indicate that nodal location is more often the site of malignant lymphoma manifestation than extranodal location. In addition, NHL is more dominant than HL in both anatomical locations.

DISCUSSION

This study presents a comprehensive overview of the distribution and frequency malignant lymphoma cases at Dr. Soetomo Hospital during the period 2013 to 2023. The results of the study showed Non-Hodgkin Lymphoma (NHL) is more common than Hodgkin Lymphoma (HL), in line with global trends reported by the International Agency for Research on Cancer (2022). The high incidence of NHL is thought to be related to a wider diversity of subtypes compared to NHL.

One of the main reasons behind the high incidence of NHL is that NHL is very heterogeneous in nature, with more than 30 different subtypes. On the other hand, LH tends to be more homogeneous and consists of only five main subtypes, which makes it more structured both in terms of pathogenesis and clinical response.¹⁴

In terms of age, the results of this study show differences in patterns between Hodgkin Lymphoma and Non-Hodgkin Lymphoma (NHL). HL tends to be more common in young individuals (21-30 years),¹⁵ which is in line with the Delayed Infection Hypothesis – a theory that delayed exposure to infection in childhood can increase the risk of HL. Conversely, NHL is more likely related to the immunosenescence process, namely a decrease in immune system function due to aging, which makes individuals more susceptible to cellular mutations.¹⁶

The result of this study also indicates that malignant lymphoma cases are more common in men than in women. This difference is thought to be related to lifestyle factors, such as higher levels of cigarette and alcohol consumption in men.¹⁷ In addition, genetic factors such as loss of Y chromosome (LOY) are also thought to play a role in increasing susceptibility to cancer in the men population.⁵

Chronologically, the incidence of malignant lymphoma at Dr. Soetomo Hospital showed a downward trend between 2013-2018, but experienced a significant increase after 2018. The decline at the beginning of the period was likely influenced by limitations in the reporting system and referral mechanism. Meanwhile, the spike in cases

in the following years was thought to be caused by increased public awareness of the importance of early detection, as well as improvements in the case recording and reporting system.

Most patient diagnoses with malignant lymphoma come from East Java province, with the highest concentration in Surabaya City. Environmental conditions, such as high levels of air pollution and unhealthy urban lifestyles, are thought to play a role in the high incidence of lymphoma in the region¹⁸. In addition, the high level of public awareness of the importance of health checks also likely contributes to the increases case detection rate.¹⁹

In terms of work, private employees recorded the highest proportion of malignant lymphoma cases. This is likely related to higher levels of exposure to chemicals and radiation in the work environment, as well as unhealthy lifestyles, and such as lack of physical activity and high prevalence of smoking.^{11,17}

Based on tumor characteristics, most patient had tumors less than 2 cm. However, tumor size cannot be the only indicator of malignancy. Lymph node involvement and the presence of metastasis are the main factors that determine the TNM system.¹⁹ In addition, malignant lymphomas are more often found in lymph nodes are the main site of lymphoma development, in accordance with their function in the immune system.²⁰

The result of this study provides valuable insights into the distribution patterns and characteristics of malignant lymphoma that occur in Dr. Soetomo Hospital. This study successfully identified a number of factors that potentially contribute to the spread of this disease, both in terms of demographics, environment, and characteristics of the tumor itself. However, to gain a deeper understanding of the main causes and more specific risk factors, further research is still needed. In addition, further evaluation of the effectiveness of various early detection strategies and treatment methods applied is also needed to improve the quality of malignant lymphoma treatment in this region.

CONCLUSION

This ten-year review at RSUD Dr. Soetomo demonstrated that Non-Hodgkin's Lymphoma was more prevalent than Hodgkin's Lymphoma, with a higher incidence in males and patients aged 51–60 years. Most cases originated from East Java, particularly Surabaya, with nodal involvement as the predominant anatomical site. These findings provide updated epidemiological data on malignant lymphoma in Surabaya and may serve as a reference for future research and the development of targeted prevention and management strategies.

ACKNOWLEDGEMENT

The authors would like to express their sincere appreciation to The Faculty of Dental Medicine, Universitas Airlangga, and RSUD Dr. Soetomo Surabaya for the support and access to data that made this study possible. Although this research received no specific grant from any funding agency, commercial, or not-for-profit sectors, the institutional assistance and cooperation are gratefully acknowledged.

The authors declare no conflict of interest.

REFERENCES

1. Budhy, Theresia Indah. *Mengapa Terjadi Kanker*. Surabaya: Airlangga University Press; 2019.
2. Hanggoro Putro DU, Ike Darmayanti AR, Tandiola R, Aulawi K. Pengendalian Infeksi pada Pasien Kanker: Literature Review. *Jurnal Kesehatan Vokasional*. 2023;8(1):46.
3. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2024;74(3):229–63.
4. Ekawati NP, Kedokteran F, Udayana U, Udayana U. Karakteristik Pasien Limfoma Maligna di Rumah Sakit Umum Pusat Sanglah Denpasar Bali Tahun 2018. 2021;10(10).
5. Lopes-Ramos CM, Quackenbush J, DeMeo DL. Genome-Wide Sex and Gender Differences in Cancer. *Front Oncol*. 2020;10(November):1–17.
6. Polepole P, Mudenda VC, Munsaka SM, Zhang L. Spectrum of common Hodgkin lymphoma and non-Hodgkin lymphomas subtypes in Zambia: a 3-year records review. *J Health Popul Nutr*. 2021;40(1):1–9.
7. Nolan J. Profil Gambaran Limfoma Malignum Non-Hodgkin Menurut Klasifikasi Who Dan Working Formulation Di Laboratorium Patologi Anatomi Rsup Sanglah Denpasar Periode Tahun 2016 – 2018. *E-Jurnal Medika Udayana*. 2022;11(1):7.
8. Parastuti NPYR, Rena NMRA. Gambaran Klinis Efek Samping Kemoterapi Pada Pasien Limfoma Maligna Yang Dirawat Di Rsup Sanglah Denpasar Periode Januari 2015-Agustus 2016. *Januari*. 2020;9(1):28–40.
9. Adhi Wibawa IKP, Ekawati NP. Karakteristik Pasien Limfoma Maligna Di Rumah Sakit Umum Pusat Sanglah Denpasar Bali Tahun 2018. *E-Jurnal Medika Udayana*. 2021;10(10):99.
10. Huang J, Chan SC, Lok V, Zhang L, Lucero-Prisno DE, Xu W, et al. Global burden, risk factors, and trends of non-Hodgkin lymphoma: A worldwide analysis of cancer registries. *Cancer Med*. 2024;13(5):1–13.
11. Chairudin MR, Marhana IA, Erawati D. Profil Pasien Kanker Paru Primer yang Dirawat Inap dan Rawat Jalan di Rumah Sakit Umum Daerah Dr Soetomo Surabaya. *Jurnal Respirasi*. 2020;5(3):65.
12. Hartmann P, Rehwald U, Salzberger B, Franzen C, Sieber M, Wöhrmann A, et al. BEACOPP therapeutic regimen for patients with Hodgkin's disease and HIV infection. *Annals of Oncology*. 2003;14:1562–9.

13. Bröckelmann PJ, Eichenauer DA, Jakob T, Follmann M, Engert A, Skoetz N. Clinical practice guideline: Hodgkin lymphoma in adults—diagnosis, treatment, and follow-up. *Dtsch Arztebl Int.* 2018;115(31–32):535–40.
14. Asmara IGY. Penanda Biologis Limfoma Maligna. *Unram Medical Journal.* 2018;7(4):40.
15. Desai S, Guddati AK. Bimodal Age Distribution in Cancer Incidence. *World J Oncol.* 2022;13(6):329–36.
16. Mancuso S, Carlisi M, Santoro M, Napolitano M, Raso S, Siragusa S. Immunosenescence and lymphomagenesis. *Immunity and Ageing.* 2018;15(1):1–7.
17. Maria IL, Sainal AA, Nyorong M. Risiko Gaya Hidup Terhadap Kejadian Kanker Payudara Pada Wanita. *Media Kesehatan Masyarakat Indonesia.* 2017;13(2):157.
18. Ummah K, Nisa AH, Kurniawati DE, Purnomo EP. Efektifitas Hubungan Kerjasama Green Sister City Kota Surabaya dengan Kitakyushu. *Journal of Education, Humaniora and Social Sciences (JEHSS).* 2022;5(1):46–55.
19. Detterbeck FC. The eighth edition TNM stage classification for lung cancer: What does it mean on main street? *Journal of Thoracic and Cardiovascular Surgery.* 2018;155(1):356–9.
20. Menzel L, Höpken UE, Rehm A. Angiogenesis in Lymph Nodes Is a Critical Regulator of Immune Response and Lymphoma Growth. *Front Immunol.* 2020;11(December):1–25.