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Epidemiological Analysis of 9,064 Cases of Non-Hodgkin Lymphoma

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Abstract: *Objective:* This study aimed to investigate the epidemiological characteristics and treatment regimens of non-Hodgkin lymphoma (NHL) in China through a retrospective analysis of 9,064 NHL cases. *Methods:* Clinical data of 9,064 patients were collected from 555 hospitals in 28 provinces of China. *Results:* Among 9,064 NHL patients, there were 5,241 males (57.8%) and 3,823 females (42.2%), with a male-to-female ratio of 1.37:1. Patients aged ≥ 45 years accounted for 89.6%, with a mean age of 61.87 ± 13.30 years. The predominant NHL subtypes were diffuse large B-cell lymphoma (DLBCL, 45.2%), chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL, 19.8%), marginal zone lymphoma (MZL, 13.9%), mantle cell lymphoma (MCL, 9.7%), and central nervous system lymphoma (CNSL, 4.3%). Combination therapy served as the primary treatment modality across all NHL subtypes. *Conclusions:* NHL in China demonstrates male predominance and primarily affects middle-aged and elderly populations, with combination chemotherapy remaining the mainstay therapeutic approach.

Keywords: Non-Hodgkin lymphoma; Epidemiology; Treatment regimen

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1. Background

Non-Hodgkin lymphoma (NHL) is a lymphoproliferative malignancy primarily involving lymph nodes and extranodal sites [1-3]. In developed countries, the most common NHL subtypes are diffuse large B-cell lymphoma (DLBCL) and follicular lymphoma (FL), while other subtypes exhibit incidence rates less than 10% [4]. In China, about 70–80% of patients are aggressive NHL subtypes. Despite the relatively high efficacy of combination chemotherapy, over 50% of patients ultimately die from NHL, underscoring its substantial societal burden [5]. Currently, there are few epidemiological studies on NHL in China. Therefore, this study retrospectively analyzed the data of Chinese NHL patients to investigate the epidemiological characteristics of NHL and evaluate current treatment regimens.

2. Materials and methods

Data were derived from the study named "Public Welfare Action of Health Development: Yi Xin Wei Lin." The study included 9,064 NHL patients diagnosed in 555 hospitals of 28 provinces in China from December 2023 to July 2024. The collected data included age, sex, geographic origin, subtypes of NHL, disease stage, and treatment regimens. Descriptive analyses were performed to summarize the epidemiological features and therapeutic approaches of NHL (**Table 1**).

3. Results

3.1. Demographic characteristics and disease distribution

Among 9,064 non-Hodgkin lymphoma patients, 5,241 (57.8%) were male and 3,823 (42.2%) females, yielding a male-to-female ratio of 1.37:1. The age range spanned 6–95 years, with patients aged < 45 years accounting for 10.4% and those patients age ≥ 45 years comprising 89.6% of the cohort. The mean age was 61.87 ± 13.30 years. Geographically, cases were distributed across 28 Chinese provinces, with the highest frequency observed in Zhejiang Province, followed by Guangdong, Jiangsu, Sichuan, and Shandong, while fewer cases came from northeastern China (**Figure 1**).

The NHL subtypes identified included diffuse large B-cell lymphoma (DLBCL), chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL), mantle cell lymphoma (MCL), central nervous system lymphoma (CNSL), marginal zone lymphoma (MZL), Waldenström macroglobulinemia (WM), and other rare subtypes. DLBCL accounts for the majority of the patients (45.2%), followed by CLL/SLL (19.8%), MZL (13.9%), MCL (9.7%), CNSL (4.3%), follicular lymphoma (FL, 3.7%), WM (0.5%), and other subtypes (2.8%).

3.2. Disease status and treatment patterns

Disease progression status was categorized as treatment-naive (48.6%), relapsed (45.0%), or refractory (6.4%). Regarding therapeutic approaches, combination therapy constituted the primary regimen (6,080 cases, 67.9%), while monotherapy was administered in 2,868 cases (32.1%).

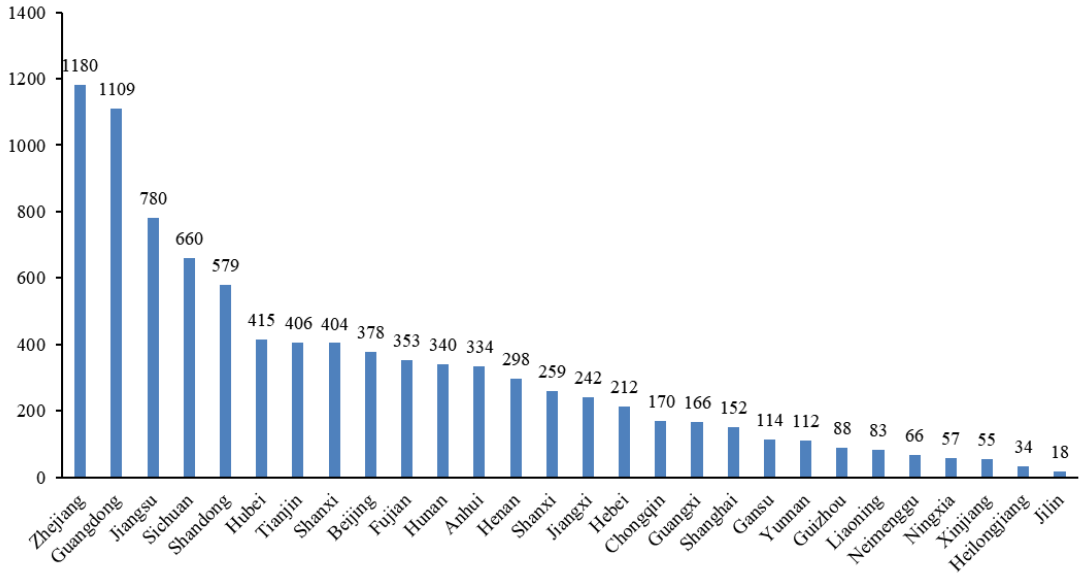

Figure 1. Geographic distribution of 9,064 non-Hodgkin lymphoma cases in China

Table 1. Descriptive analysis of baseline characteristics in patients with non-Hodgkin lymphoma

Parameters	All (*n* = 9,064)
Age	
Mean ± SD	61.87 ± 13.30
Median (Q1, Q3)	63.00 (54.00, 71.00)
Min, max	6.00, 95.00
Age group	
Age < 30	200 (2.2%)
30 ≤ age < 45	747 (8.2%)
45 ≤ age < 60	2573 (28.4%)
60 ≤ age < 75	4109 (45.3%)
Age ≥ 75	1435 (15.8%)
Gender	
Male	5241 (57.8%)
Female	3823 (42.2%)
Types of lymphoma	
DLBCL	4099 (45.2%)
CLLSLL	1795 (19.8%)
MZL	1261 (13.9%)
MCL	882 (9.7%)
CNSL	392 (4.3%)
FL	336 (3.7%)
WM	46 (0.5%)
Others	253 (2.8%)
Disease stage	
Initial treatment	4409 (48.6%)
Recurrence	4076 (45.0%)
Intractable	579 (6.4%)
Treatment plan	
Monotherapy	2868 (32.1%)
Combination therapy	6080 (67.9%)
Missing	116 (1.3%)

DLBCL: Diffuse large B-cell lymphoma; CLL/SLL: Chronic lymphocytic leukemia/small lymphocytic lymphoma; MCL: Mantle cell lymphoma; CNSL: Central nervous system lymphoma; MZL: Marginal zone lymphoma; WM: Waldenström macroglobulinemia; FL: Follicular lymphoma;

4. Discussion

This real-world study data came from 9,064 NHL patients across 28 Chinese provinces. Results of the study revealed a slight male predominance (male-to-female ratio: 1.37:1), with middle-aged and elderly individuals constituting the majority (89.6% aged ≥ 45 years). Demographic characteristics including age and gender distributions across NHL subtypes aligned with prior reports [6].

DLBCL was the most prevalent subtype (45.2%), consistent with domestic studies but slightly higher than rates reported in Western countries [6-9]. Two-thirds of DLBCL patients achieved favorable outcomes with the R-CHOP regimen (cyclophosphamide + doxorubicin + vincristine + prednisone). Preliminary trials of Bruton's tyrosine kinase (BTK) inhibitor-based combination therapies demonstrated promising efficacy and safety in DLBCL treatment [10].

CLL/SLL accounted for 19.8% of the total patients, ranking second in prevalence, significantly higher than rates of 6.39% reported by Li *et al.* [9] and the studies of Western countries (7–10%) [11]. Head-to-head studies showed superior progression-free survival and overall response rates with zanubrutinib versus ibrutinib [12]. A U.S. real-world evidence further highlighted zanubrutinib's enhanced safety profile, particularly lower cardiovascular adverse events than ibrutinib and acalabrutinib [13].

MZL comprised 13.9% of all the cases. This heterogeneous subtype encompassing mucosa-associated lymphoid tissue (MALT), splenic, and nodal MZL, requires tailored treatment strategies based on subtypes and stages. As an indolent lymphoma, MZL generally exhibits favorable responses to conventional therapies and prolonged survival.

MCL represented 9.7% of all the cases. Despite classification as a chronic B-cell lymphoproliferative disorder, MCL often demonstrates aggressive progression. Median survival with chemotherapy alone remains limited to 3–4 years [14]. Standardized therapies are lacking, and early identification of high-risk patients is critical to optimize outcomes [15,16].

CNSL accounted for 4.3% of all the cases, predominantly DLBCL histology. Multidisciplinary collaboration is essential for optimal management. While whole-brain radiotherapy historically achieved > 80% response rates, high-dose methotrexate (HD-MTX) based combination were the first-line treatment regimen for primary CNS lymphoma (PCNSL) due to rapid relapse risks [17].

FL, the most common indolent B-cell lymphoma, constituted 3.7% of all the cases. Patients with relapsed/refractory FL after multiple lines of therapy face poor prognoses. Emerging strategies, including CAR-T cell therapy and bispecific antibody-based regimens, show efficacy in refractory cases, though optimal sequencing and combination approaches require further investigation [18].

WM, a rare indolent mature B-cell lymphoma, represented 0.5% of all the cases. The first-line treatment for symptomatic patients depends on factors such as age, clinical manifestations (e.g., cytopenias, organomegaly), and eligibility for autologous stem cell transplantation (ASCT). Rituximab-based chemotherapy remains the primary treatment [19].

5. Conclusion

This nationwide, large-scale retrospective analysis delineates the epidemiological distribution and therapeutic landscape of major NHL subtypes in China, providing critical insights for future research and clinical strategies.

Disclosure statement

The authors declare no conflict of interest.

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