Prognostic Value of Lymphocyte-to-Monocyte Ratio in Diffuse Large B-Cell Lymphoma: A Retrospective Study from Pakistan

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Introduction

Diffuse large B-cell lymphoma (DLBCL) is a heterogeneous disease with variable treatment outcomes. The lymphocyte-to-monocyte ratio (LMR), derived from routine complete blood counts, has emerged as a potential prognostic biomarker reflecting host immunity and tumor microenvironment. However, its utility in South Asian populations remains underexplored.

Objectives

To evaluate the prognostic significance of LMR in predicting treatment response in DLBCL patients receiving rituximab-based chemotherapy, and to assess its association with molecular subtypes as defined by the Hans algorithm.

Methods

This retrospective study included patients under 80 years of age who had been newly diagnosed, histologically confirmed de novo DLBCL, and were treated at The Aga Khan University Hospital between 2018 and 2020. Approval from the Ethical Review Committee (ERC) was obtained before the commencement of the study. Patients received R-CHOP or equivalent regimens. LMR was calculated using absolute lymphocyte count (ALC) and the absolute monocyte count (AMC) at baseline, during therapy, and at treatment completion. Subtyping was performed using the Hans algorithm to classify cases as germinal center B-cell-like (GCB) or non-GCB. Treatment response was evaluated by interim and end-of-treatment PET scans per institutional criteria.

Results

Characteristics	COMPLETE RESPONSE		PARTIAL RESPONSE		
	n	Mean (SD)	n	Mean (SD)	*p*-value
LMR CYCLE 1	55	2.04 (1.4)	20	2.01 (1.1)	0.9409
End of treatment LMR	55	2.62 (1.2)	20	1.71 (0.8)	0.0006

Table 1: COMPLETE & PARTIAL RESPONSE at 6 cycles

Characteristic	n	%
Age Group		
61-80	25	33.33
Gender		
Male	48	64.00
Female	27	36.00
Ann Arbor Stage		
Stage 1	10	13.33
Stage 2	8	10.67
Stage 3	17	22.67
Stage 4	40	53.33
ECOG PS		
0-1	73	97.33
2-3	2	2.67
IPI Score		
Low	26	34.67
Intermediate	5	6.67
High	44	58.67
Cell of Origin		
GCB	43	57.00
non GCB	32	42.00
Chemotherapy Regimen Given		
R-CHOP	53	70.67
Other regimens	14	18.67
R-EPOCH	8	10.67

Table 2: Patient Characteristics and Treatment Outcomes

A total of 75 patients were included (median age 50 years; median follow-up 18 months). Complete response (CR) was achieved in 73% (n=55). Among these, mean LMR increased from 2.04 ± 1.4 at diagnosis to 2.62 ± 1.2 at treatment end. In contrast, LMR declined from 2.01 ± 1.1 to 1.71 ± 0.8 in patients with partial response or progressive disease (n=20) (p = 0.006).

In the GCB subgroup (n=43), 72% achieved CR, with LMR increasing from 1.59 to 1.88. Among non-GCB patients (n=32), 62.5% achieved CR, with LMR rising from 1.54 to 1.61 (p = 0.001).

Summary

In summary, our study demonstrates that an increasing LMR during treatment is significantly associated with favorable response to rituximab-based chemotherapy in DLBCL patients. These findings highlight the potential of LMR as a dynamic, low-cost prognostic tool applicable across molecular subtypes and patient populations. Future prospective, multi-center studies with larger cohorts and standardized protocols are warranted to validate these findings and explore the integration of LMR into routine prognostic models alongside imaging and molecular data.

Discussion

Diffuse large B-cell lymphoma (DLBCL) is a biologically heterogeneous disease with variable responses to R-CHOP therapy. Traditional prognostic models like the IPI do not account for host immune status or the tumor microenvironment (TME), both of which significantly influence outcomes.

Our study supports the lymphocyte-to-monocyte ratio (LMR) as a simple, cost-effective, and dynamic biomarker that reflects immune status and treatment response. Patients who achieved a complete response (CR) had a significant increase in LMR, while those with partial response or progressive disease showed a decline. These patterns were consistent across both GCB and non-GCB subtypes.

Subgroup analysis revealed slightly higher CR rates and greater LMR increases in the GCB group, suggesting a possible link between molecular subtype, immune dynamics, and response. This highlights the potential benefit of integrating LMR with molecular profiling for better prognostication.

Our study also adds valuable insight from a South Asian population, where immune-inflammatory markers in DLBCL are underreported. Validating such biomarkers across diverse populations is critical for global applicability.

Although PET/CT remains a standard for response assessment, it primarily reflects tumor burden. Combining PET/CT with LMR may offer a more holistic assessment of disease status by incorporating both metabolic and immunologic information.

Limitations include retrospective design, modest sample size, and potential confounders (e.g., infection, concurrent conditions). Prospective studies are needed to validate LMR as a clinical decision-making tool in DLBCL.

References

1. Porrata LF, Ristow K, Habermann TM, et al. Absolute monocyte/lymphocyte count prognostic score is independent of immunohistochemically determined cell of origin in predicting survival in diffuse large B-cell lymphoma. *Leuk Lymphoma*. 2012;53(11):2159-2165.

2. Zhou S, Xu L, Ma Y, Tang L, Zhang Y, Shi Y, et al. Peripheral blood lymphocyte to monocyte ratio recovery from low levels at diagnosis after completion of first-line therapy predicts good clinical outcomes in patients with diffuse large B-cell lymphoma. *Oncotarget*. 2017;8(12):19556-65.