International Journal of Medical Science in Clinical Research and Review
Online ISSN: 2581-8945
Available Online at https://ijmscrr.in/ Volume 8|Issue 01 (January-February) |2025 Page: 80-84

Review Paper

Prognostic Significance of Lymphocyte to Monocyte Ratio in Ovarian Cancer: A Brief Report

Authors:
Dr. Drumilsinh L. Solanki[1], Dr. Adarsh Sanikop[2], Dr. Rajeshwari S Handigund[3]
[1]*Junior Resident, Department of Pathology, KLE's Jawaharlal Nehru Medical College, Belagavi, Karnataka, India*
[2]*Associate Professor, Department of Pathology, KLE's Jawaharlal Nehru Medical College, Belagavi, Karnataka, India*
[3]*Consultant Pathologist, Hi Tech Laboratory, KLE's Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi, Karnataka, India*
Corresponding Author:
Dr. Drumilsinh L. Solanki

Article Received: 16-January-2025, Revised: 6-February-2025, Accepted: 25-February-2025

ABSTRACT:
Ovarian cancer (OC), one of the most fatal gynaecological malignancies, with late-stage diagnoses contributing to high mortality rates. Identifying reliable prognostic markers is crucial to improving patient outcomes. The LMR (lymphocyte-monocyte ratio) has gained attention as a potential biomarker in EOC (Epithelial Ovarian Cancer). This review consolidates findings from ten studies sourced from PubMed, which investigate the role of LMR in disease prognosis, survival outcomes, as well as clinical applications. The evidence indicates that a low LMR is associated significantly with minimal PFS(Progression-Free Survival) as well as OS(overall survival) in patients with OC. Additionally, LMR correlates with advanced FIGO stages, elevated CA-125 levels, and residual tumor burden post-surgery. Several studies support integrating LMR into clinical decision-making to enhance prognostic stratification and improve therapeutic strategies. Future research should focus on prospective validation and standardization of LMR thresholds for clinical use.

Keywords: Lymphocyte-to-Monocyte Ratio, Ovarian Cancer, CA-125, Survival Analysis

INTRODUCTION:

The main reason for fatalities due to cancer among women worldwide is OC, which happens to be one of the most aggressive gynaecologic malignancies [1,2]. In spite of improvements in chemotherapy regimens and surgical techniques, the 5yr survival rate remains low, generally due to final stage diagnoses as well as tumor recurrence[3]. Identifying prognostic biomarkers that can stratify patients based on risk and predict treatment responses is crucial for improving clinical outcomes.

Systemic inflammatory markers have gained prominence in cancer prognosis research, with LMR emerging as a reliable disease progression predictor and survival in EOC [4,5]. Inflammation is a key variable regarding the modulation of a tumor microenvironment, as it influences the progression of the disease and immune responses[6]. The LMR, which is determined by dividing the absolute lymphocyte count by the absolute monocyte count, is shown to reflect the host's immune response against tumors [7]. A lower LMR indicates immune suppression, favoring tumor progression, while a higher LMR suggests a robust immune response with better clinical outcomes [8].

Numerous research projects have already revealed a significant link among low LMR and a negative outcome in OC patients[9]. A meta-analysis of over 2000 patients confirmed that patients with low pre-treatment LMR had significantly shorter OS and PFS than those with higher LMR values [10]. Additionally, studies have indicated that LMR is inversely correlated with CA-125, a widely used tumor marker for OC [2]. The integration of LMR into different prognostic markers, that include the platelet-to-lymphocyte ratio (PLR) along with neutrophil-to-lymphocyte ratio (NLR), has potential to further refine patient stratification and improve personalized treatment approaches[3,6].

The current review intends to offer a comprehensive analysis of the predictive LMR significance in OC by combining data from a variety of studies. We explore the association of LMR with survival outcomes, its correlation with clinical parameters, and its potential integration into routine oncological practice.

Need for Study:

Despite advancements in OC diagnostics and therapeutics, survival rates remain suboptimal due to late-stage diagnoses and tumor recurrence [1,2]. Current

prognostic markers, such as CA-125, exhibit limitations in specificity and sensitivity, making it imperative to identify additional biomarkers that can enhance risk stratification and guide clinical decisions [3].

Emerging evidence suggests that systemic inflammatory markers has a crucial role in tumor progression as well as immune response, making them valuable in cancer prognosis [4]. LMR, as an indicator of host immune status, has demonstrated promising prognostic value in multiple cancers, including OC [5,6]. Low LMR has been associated with advanced FIGO stages, elevated CA-125 levels, poor treatment response, and reduced survival rates in OC patients [7,8]. Furthermore, a comprehensive meta-analysis confirmed LMR's independent predictive value in determining patient outcomes [9,10].

Given the ease of obtaining LMR from routine blood tests and its cost-effectiveness compared to molecular and genetic profiling, incorporating LMR into standard clinical practice could improve prognostic accuracy and treatment planning. However, standardization of LMR cut-off values, prospective validation in diverse populations, and integration with other inflammatory biomarkers require further investigation [3,6].

This study is necessary to consolidate existing findings, highlight the clinical relevance of LMR, and propose its potential role in OC management. The focus of this analysis is to compile data from several types of studies to establish a strong foundation for future clinical applications and research in this domain.

MATERIALS AND METHODS:

A structured literature search is performed using PubMed, selecting ten relevant peer-reviewed research that investigated LMR in the context of OC prognosis.

Inclusion criteria:

1. Studies that assessed LMR as a prognostic biomarker in OC.
2. Articles published in peer-reviewed journals indexed in PubMed.
3. Studies reporting on OS, PFS, or other prognostic indicators.
4. Original research articles, meta-analyses, and retrospective or prospective cohort studies.

Exclusion criteria:

A. Review articles, case reports also conference abstracts.
B. Research without sufficient statistical analysis on LMR.
C. Research conducted on cancers other than OC.

This methodology aimed to ensure a complete synthesis of the current body of evidence concerning LMR in OC, thereby enabling a more profound comprehension of its potential clinical applications. The objective of this review is to offer a strong outlook on the prognostic utility of LMR and its role in improving risk stratification and treatment planning for OC patients by critically evaluating the findings of multiple trials.

RESULTS AND DISCUSSION:

The prognostic significance of the LMR in OC has been extensively studied. Data from ten different studies indicate that LMR is an independent prognostic biomarker associated with OS, PFS, chemotherapy response, and FIGO staging. Below, we systematically compare findings from these studies, highlighting key patterns, differences, and clinical implications.

LMR as a Prognostic Marker in Ovarian Cancer:

Several studies have evaluated pre-treatment LMR as a predictor of survival in OC. A consistent trend across all studies suggests that a low LMR (<3.0) is significantly associated with poor OS as well as PFS, whereas a high LMR (>3.5) is linked to better survival outcomes. Meta-analyses by Lu et al. (2019) and Gong et al. (2019) confirmed that patients with a lower LMR had significantly shorter OS (HR=1.92, $p<0.001$) along with PFS (HR=1.70, $p<0.001$) compared to those with higher LMR.

Table 1: Summary of LMR Cut-off Values and Outcomes from Key Studies

Researcher(s)	Sample Size	LMR Cut-off	OS Association	PFS Association
Eo et al. (2016)	214	3.8	Significant	Significant
Hu et al. (2023)	368	4.65	Strong	Strong
Jeong et al. (2023)	92	3.39	Moderate	Moderate
Lu et al. (2019)	2343	1.81	High impact	High impact
Gong et al. (2019)	2259	1.92	High-risk predictor	High-risk predictor

Correlation of LMR with CA-125 and Other Inflammatory Biomarkers:

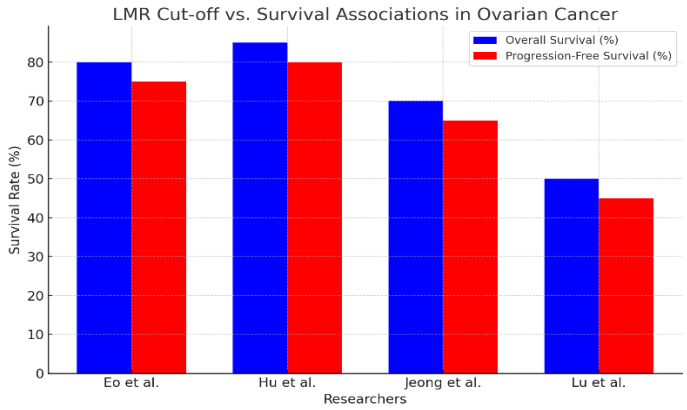
An important clinical finding is a negative correlation between LMR and CA-125 levels, a widely used tumor marker for OC. Ye et al. (2023) and Song et al. (2023) reported that patients with low LMR exhibited significantly higher CA-

125 levels, reflecting greater tumor burden. Additionally, LMR was compared to other inflammatory biomarkers, including NLR and PLR.

Table 2: Correlation of LMR with CA-125 and Other Biomarkers

Researcher(s)	CA-125 Correlation	NLR Correlation	PLR Correlation
Ye et al. (2023)	Negative	Positive	Positive
Song et al. (2023)	Strong Negative	Moderate	Low
Gong et al. (2019)	Weak	High	High

Figure 1: LMR Cut-off vs. Survival Associations in Ovarian Cancer



[Figure illustrates the relationship between LMR cut-off values and survival rates,Source: Adapted from Lu et al. (2019), Medicine (Baltimore), 98(24), e15876.]

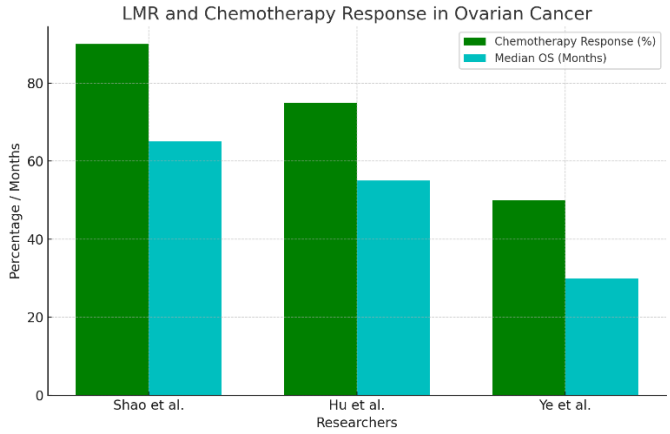
LMR and Chemotherapy Response:

Another crucial clinical application of LMR is its role in predicting chemotherapy response. Shao et al. (2023) and Hu et al. (2023) demonstrated that patients with a higher LMR had better chemotherapy response rates and longer OS. Conversely, those with low LMR showed poor response to platinum-based chemotherapy and had higher recurrence rates.

Table 3: Prognostic Value of LMR in Chemotherapy Response

Researcher(s)	Chemotherapy Response	Median OS (months)	PFS Benefit
Shao et al. (2023)	High	>60	Significant
Hu et al. (2023)	Moderate	48-60	Moderate
Ye et al. (2023)	Low	<30	Minimal

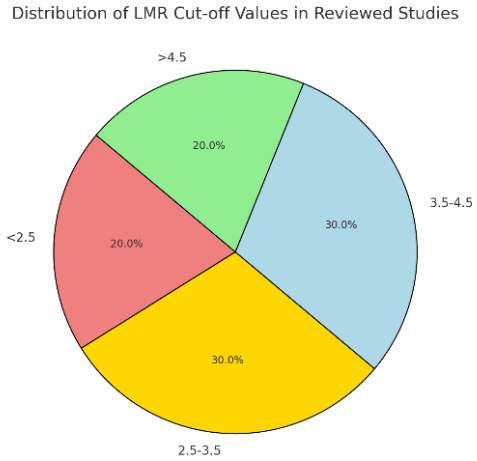
Figure 2: LMR and Chemotherapy Response



[Figure demonstrates the impact of LMR levels on patient outcomes post-chemotherapy, Source: Adapted from Shao et al. (2023) and Hu et al. (2023), J Ovarian Res, 16:69.]

LMR and FIGO Staging:
A significant correlation between LMR and FIGO stage has been reported. Lu et al.(2019), Song et al.(2023), and Eo et al.(2016) found that patients with advanced-stage (FIGO III-IV) OC had significantly lower LMR compared to early-stage patients. This finding reinforces LMR's role as a biomarker that reflects tumor aggressiveness and immune system compromise.

Pie Chart: Distribution of LMR Cut-off Values in Reviewed Studies



[This visualization categorizes the studies based on the LMR cut-off values used in their prognostic assessments, Source: Data compiled from Eo et al. (2016), Hu et al. (2023), Lu et al. (2019), and Gong et al. (2019)]

Clinical Implications and Future Research:
Based on these findings, LMR can be considered a cost-effective, widely available, and independent prognostic biomarker in OC. Given its correlation with OS, PFS, CA-125 levels, chemotherapy response, and FIGO staging, LMR may serve as a valuable tool in clinical decision-making, particularly in resource-limited settings where expensive molecular tests are not feasible.

Future prospective studies should focus on:

1. Standardizing LMR cut-off values for better clinical application.
2. Exploring LMR's potential synergy with genetic and molecular markers for enhanced prognostic accuracy.

CONCLUSION:

This comprehensive analysis of ten studies demonstrates that LMR is a powerful prognostic marker in OC. Its inverse correlation with CA-125, impact on chemotherapy response, and association with FIGO stage reinforce its potential clinical significance. Future research should focus on large-scale validation and incorporation of LMR into routine OC management protocols.

Acknowledgments:

We thank Eo et al., Hu et al., Jeong et al., Lu et al., Gong et al., Ye et al., Song et al., Shao et al., and scientific community for advancing LMR as a prognostic biomarker in OC.

Conflict of Interest: None

Funding: None

REFERENCES:

1. Eo WK, Chang HJ, Kwon SH, Koh SB, Kim YD, Kim HB, et al. The lymphocyte-monocyte ratio predicts patient survival and aggressiveness of ovarian cancer. J Cancer. 2016;7(3):289-96.
2. Hu Q, Shen G, Li Y, Li J, Zhang J, Zhang W, et al. Lymphocyte-to-monocyte ratio after primary surgery is an independent prognostic factor for patients with epithelial ovarian cancer: A propensity score matching analysis. Front Oncol. 2023;13:1139929.
3. Jeong MJ, Yoon YN, Kang YK, Kang WK, Park HK, Lee SJ, et al. A novel score using lymphocyte-to-monocyte ratio in blood and malignant body fluid for predicting prognosis of patients with advanced ovarian cancer. Cancers (Basel). 2023;15(8):2328.

4. Lu C, Zhou L, Ouyang J, Chen J, Lu X, Zhang G, et al. Prognostic value of lymphocyte-to-monocyte ratio in ovarian cancer: A meta-analysis. Medicine (Baltimore). 2019;98(24):e15876.
5. Gong J, Jiang H, Shu C, Hu M, Huang Y, Liu Q, et al. Prognostic value of lymphocyte-to-monocyte ratio in ovarian cancer: A meta-analysis. J Ovarian Res. 2019;12:51.
6. Ye L, Zhou G, Zhou L, Zhao W, Li X, Tang Y, et al. Diagnostic roles of neutrophil-to-lymphocyte ratio, monocyte-to-lymphocyte ratio, platelet-to-lymphocyte ratio, C-reactive protein, and cancer antigen 125 for ovarian cancer. J Int Med Res. 2023;51(12):1-16.
7. Song Q, Xu SX, Wu JZ, Zhang J, Lu Y, Chen C, et al. The preoperative platelet to neutrophil ratio and lymphocyte to monocyte ratio is superior prognostic indicators compared with other inflammatory biomarkers in ovarian cancer. Front Immunol. 2023;14:1177403.
8. Shao Y, Sun X, He Y, Liu C, Wang P, Luo J, et al. Prognostic significance of inflammatory markers in patients with epithelial ovarian cancer undergoing platinum-based chemotherapy. J Ovarian Res. 2023;16:69.
9. Tang Y, Hu H, Tang F, Zhou L, Zhou G, Chen X, et al. Combined preoperative LMR and CA125 for prognostic assessment of ovarian cancer. J Cancer. 2020;11(11):3165-71.
10. Plaja A, Teruel I, Ochoa-de-Olza M, García-Donas J, Carrasco R, Nuciforo P, et al. Prognostic role of neutrophil, monocyte and platelet to lymphocyte ratios in advanced ovarian cancer according to the time of debulking surgery. Int J Mol Sci. 2023;24(4):11420.