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Original Research Article

Assessment of Acute Pancreatitis Severity Using the Neutrophil-to-Lymphocyte Ratio

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Abstract:

Background: Acute pancreatitis (AP) ranges from mild self-limiting disease to severe disease with systemic complications. Early identification of high-risk patients is important. This study evaluated the association of the neutrophil-to-lymphocyte ratio (NLR) with AP severity and systemic complications.

Methods: A prospective observational study was conducted over one year at a tertiary-care hospital in Gujarat, India, involving 108 adults with AP. Clinical and laboratory parameters were recorded at admission and 48 hours. Disease severity was assessed using the Revised Atlanta Classification and Ranson score. NLR was compared according to disease severity and complications.

Results: Of 108 patients, 87 (80.6%) had mild and 21 (19.4%) had moderate/severe AP. Gallstones were the predominant aetiology (61.1%). Admission NLR was significantly higher in moderate/severe AP than mild AP (16 vs. 5.01; $p<0.001$). NLR at 48 hours was also significantly higher (12 vs. 2.42; $p<0.001$). Higher NLR was significantly associated with systemic complications ($p<0.001$).

Conclusion: NLR was significantly associated with AP severity and systemic complications and may provide a simple, readily available marker for early risk assessment.

Keywords: Acute Pancreatitis; NLR; Disease Severity; Systemic Complications; Inflammation.

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Introduction

Acute pancreatitis (AP) is an acute inflammatory disorder of the pancreas that can range from a mild, self-limiting illness to a severe condition associated with local complications, systemic inflammation, and organ failure. It remains one of the most common gastrointestinal diseases requiring hospitalisation [1, 2]. Recent international evidence estimates the global annual incidence of AP at approximately 33.74 cases per 100,000 person-years, with a mortality rate of about 1.60 deaths per 100,000 person-years [3]. The clinical course of AP is heterogeneous. Most patients develop mild disease and recover with supportive treatment, whereas approximately one-fifth may develop complications such as pancreatic necrosis or organ failure, potentially requiring prolonged hospitalisation and intensive care. Persistent organ failure is a major determinant of mortality and is therefore an important component of severity assessment. Early identification of patients at risk of severe disease is consequently essential for appropriate monitoring, timely supportive management, and referral to specialised centres when required [4-6].

Several clinical scoring systems, laboratory parameters, and inflammatory biomarkers have been developed to assess the severity and prognosis of AP. However, some established prognostic scores require multiple clinical and laboratory variables or several hours to obtain a reliable assessment, limiting their usefulness for rapid early risk stratification [7, 8]. The neutrophil-to-lymphocyte ratio (NLR) is a readily available inflammatory marker calculated by dividing the absolute neutrophil count by the absolute lymphocyte count. An increased NLR reflects the combined effects of neutrophilia associated with acute inflammation and lymphopenia associated with physiological stress and altered immune response [9, 10].

Because NLR can be calculated from a routine complete blood count, it is inexpensive, rapidly available, and easily applicable in the initial assessment of patients with AP. Its potential value as an early indicator of disease severity has therefore

attracted considerable clinical interest. The present study was undertaken to evaluate the association of the neutrophil-to-lymphocyte ratio with the severity of acute pancreatitis and to determine its potential role as an early predictor of systemic complications

Materials and methods

Study Design and Setting: This prospective observational study was conducted over a period of one year at a tertiary-care hospital in Gujarat, India. A total of 108 consecutive adult patients diagnosed with acute pancreatitis were included.

Study Population: Patients aged ≥18 years who fulfilled the diagnostic criteria for acute pancreatitis were included. The diagnosis was established when at least two of the following criteria were present: characteristic abdominal pain, serum amylase or lipase levels >3 times the upper limit of normal, or imaging findings suggestive of acute pancreatitis on ultrasonography or computed tomography.

Exclusion Criteria: Patients aged <18 years, pregnant women, those presenting >48 hours after symptom onset, and patients with chronic liver disease, haematological disorders, recent chemotherapy or blood transfusion, concurrent infections, or treatment with corticosteroids or antibiotics were excluded.

Data Collection: Demographic characteristics, presenting symptoms, vital signs, and relevant clinical and laboratory parameters were recorded at admission. Serum amylase, C-reactive protein (CRP), procalcitonin, and complete blood count were assessed. Disease severity was classified according to the Revised Atlanta Classification, and the Ranson score and Computed Tomography Severity Index (CTSI) were recorded. Patients were also assessed for local and systemic complications, duration of hospitalisation, and need for surgical treatment.

Assessment of Neutrophil-to-Lymphocyte Ratio: Peripheral blood samples were collected at admission and 48 hours after admission for complete blood count. The neutrophil-to-lymphocyte ratio (NLR) was calculated by dividing the absolute neutrophil count by the absolute lymphocyte count. Patients were categorised into four groups according to admission NLR values: ≤3.68, 3.69-6.03, 6.04-10.28, and >10.28.

Outcome Measures: The primary outcome was the association between NLR and the severity of acute pancreatitis. The secondary outcome was the association of NLR with the development of local and systemic complications.

Statistical Analysis: Data were analysed using appropriate descriptive and inferential statistical methods. Continuous variables were expressed as mean ± standard deviation or median with interquartile range, as appropriate, while categorical variables were presented as frequencies and percentages. Comparisons between groups were performed using appropriate statistical tests, and a p-value <0.05 was considered statistically significant.

Ethical Considerations: Informed consent was obtained from all participants before enrolment.

Results

The study included 108 patients with a mean age of 58.55 ± 18.42 years, of whom 65 (60.2%) were female and 43 (39.8%) were male. Gallstone disease was the most common aetiology, accounting for 66 (61.1%) cases, while 42 (38.9%) had other causes. Typical epigastric pain was the predominant presenting complaint, reported in 55 (50.9%) patients, followed by non-specific abdominal pain in 51 (47.2%). The median duration of hospital stay was 4 days (IQR 3), while the median Ranson score at 48 hours was 2 (IQR 2) and the median CTSI score was 1 (IQR 2) (Table 1).

Table 1: Demographic and Clinical Characteristics of the Study Population (n=108)

Parameter	Value
Age, years, mean ± SD	58.55 ± 18.42
Gender, n (%)	
Male	43 (39.8%)
Female	65 (60.2%)
Etiology, n (%)	
Gallstone	66 (61.1%)
Other causes	42 (38.9%)
Presenting complaint, n (%)	
Typical epigastric pain	55 (50.9%)
Non-specific abdominal pain	51 (47.2%)
Other	2 (1.9%)
Duration of hospital stay, days, median (IQR)	4 (3)
Ranson score at 48 h, median (IQR)	2 (2)
CTSI score, median (IQR)	1 (2)

CTSI: Computed Tomography Severity Index; IQR: interquartile range; SD: standard deviation.

Patients with moderate/severe acute pancreatitis showed significantly higher inflammatory markers and NLR values than those with mild disease. The median admission NLR was 16 (IQR 13.81) in the moderate/severe group compared with 5.01 (IQR 5.10) in the mild group (p<0.001). Similarly, NLR at 48 hours was significantly higher in patients with moderate/severe disease (12 [IQR 7.24] vs. 2.42 [IQR 2.00], p<0.001). Procalcitonin and CRP levels at admission and 48 hours were also significantly elevated in the moderate/severe group (p≤0.001). Local and systemic complications were significantly more frequent among patients with moderate/severe disease (52.4% and 85.7%, respectively; both p<0.001). Amylase levels and the requirement for surgical treatment did not differ significantly between the two groups (Table 2).

Table 2: Clinical and Laboratory Parameters According to Disease Severity

Parameter	Mild AP (n=87)	Moderate/Severe AP (n=21)	p-value
Male, n (%)	30 (34.5%)	13 (61.9%)	0.022
Female, n (%)	57 (65.5%)	8 (38.1%)	
Gallstone etiology, n (%)	52 (59.8%)	14 (66.7%)	0.460
Other causes, n (%)	35 (40.2%)	7 (33.3%)	
Procalcitonin, ng/mL, median (IQR)	0.10 (0.17)	0.52 (1.28)	<0.001
Procalcitonin at 48 h, ng/mL	0.06 (0.18)	1.07 (5.04)	<0.001
CRP, mg/L, median (IQR)	7.8 (14.90)	32 (101.60)	0.001
CRP at 48 h, mg/L	28 (74.29)	170 (73)	<0.001
NLR, median (IQR)	5.01 (5.10)	16 (13.81)	<0.001
NLR at 48 h, median (IQR)	2.42 (2.00)	12 (7.24)	<0.001
Amylase, IU/L, median (IQR)	1459 (1516)	1865 (1295)	0.255
Local complications, n (%)	0	11 (52.4%)	<0.001
Systemic complications, n (%)	0	18 (85.7%)	<0.001
Surgical treatment, n (%)	23 (26.4%)	9 (42.9%)	0.162

AP: acute pancreatitis; CRP: C-reactive protein; NLR: neutrophil-to-lymphocyte ratio; IQR: interquartile range.

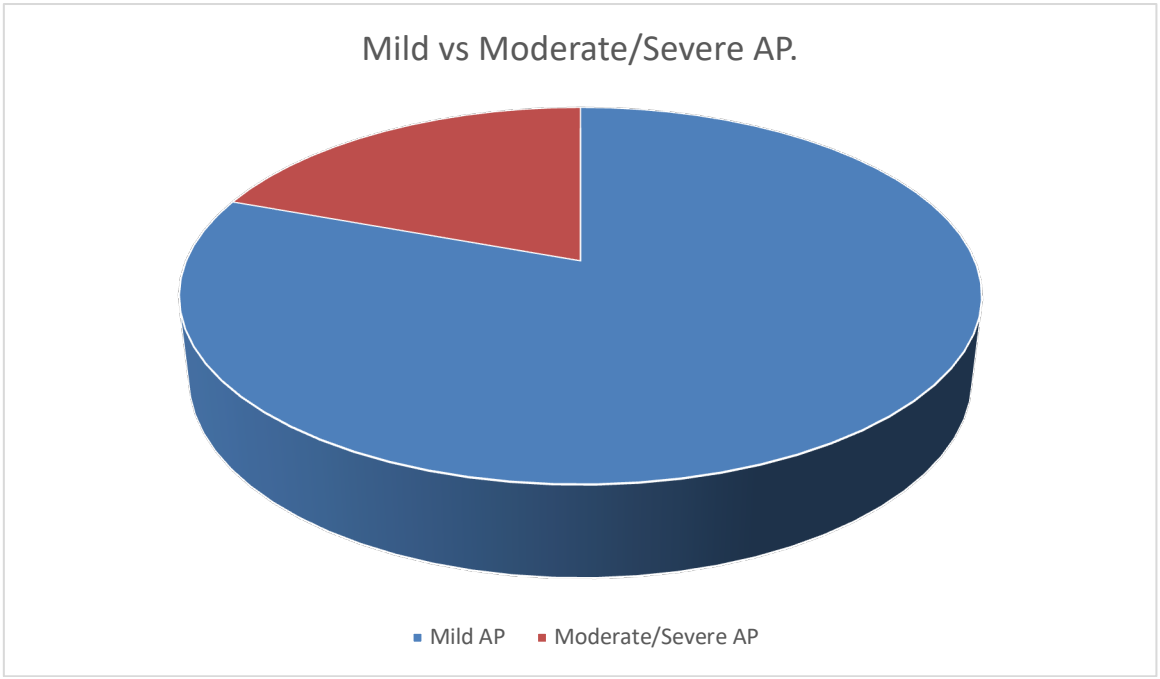

Figure 1: Distribution of Acute Pancreatitis According to Disease Severity

A significant relationship was observed between increasing NLR categories and the development of complications. Systemic complications increased progressively across the NLR groups, from 3.7% in patients with NLR ≤3.68 to 40.7% among those with NLR >10.28 (p<0.001). Similarly, local complications were observed only in the higher NLR categories, increasing from 14.8% in the 6.04–10.28 group to 22.2% in patients with NLR >10.28 (p=0.007). The proportion of patients with a Ranson score ≥3 also increased significantly with increasing NLR, from 14.8% in the lowest NLR group to 59.3% in the highest NLR group (p<0.001) (Table 3).

Table 3: Association and Predictive Performance of NLR for Systemic Complications

Parameter	NLR ≤3.68	NLR 3.69–6.03	NLR 6.04–10.28	NLR >10.28	p-value
Systemic complications, n (%)	1 (3.7%)	0 (0%)	5 (18.5%)	11 (40.7%)	<0.001
Local complications, n (%)	0 (0%)	0 (0%)	4 (14.8%)	6 (22.2%)	0.007
Ranson score ≥3, n (%)	4 (14.8%)	3 (11.1%)	12 (44.4%)	16 (59.3%)	<0.001

Values are presented as n (%) unless otherwise specified. NLR: neutrophil-to-lymphocyte ratio; AUC: area under the curve; CI: confidence interval.

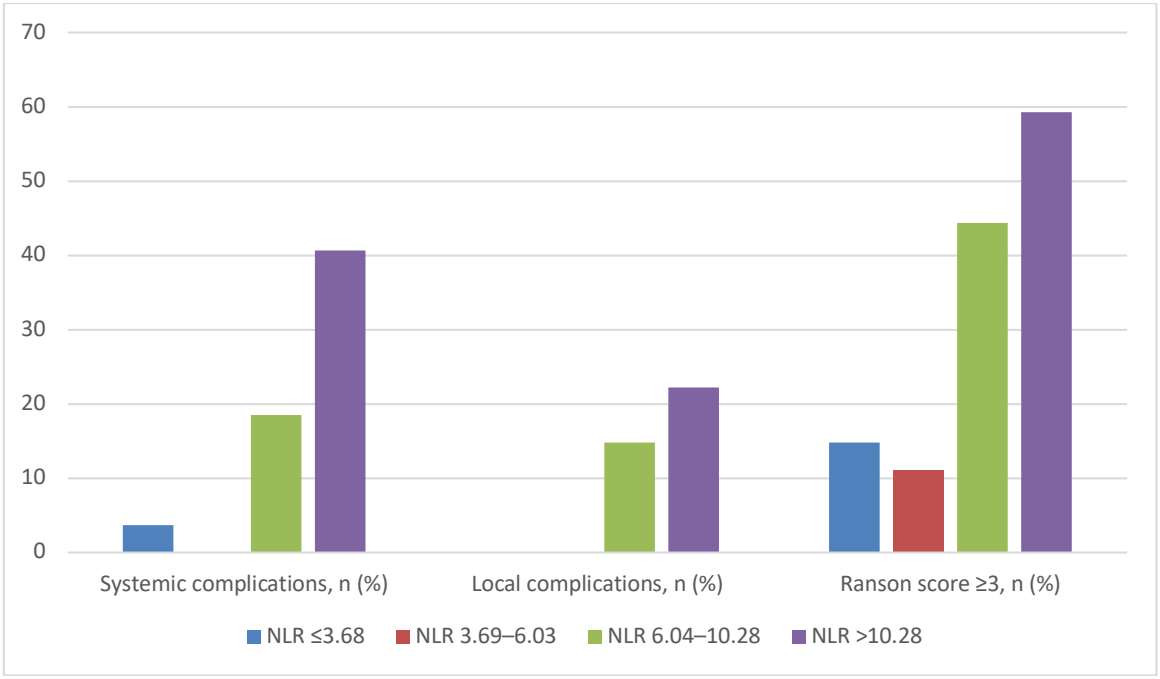

Figure 2: Association and Predictive Performance of NLR for Systemic Complications

Discussion

Acute pancreatitis has a variable clinical course, with most patients experiencing mild disease, while a smaller proportion develop local or systemic complications requiring prolonged hospitalisation and intensive management [11]. In the present study of 108 patients, 87 (80.6%) had mild acute pancreatitis, whereas 21 (19.4%) had moderate-to-severe disease. The predominance of gallstone aetiology (61.1%) was also notable. Early identification of patients likely to develop severe disease is clinically important because conventional scoring systems may require multiple parameters and may not provide rapid risk stratification. The neutrophil-to-lymphocyte ratio (NLR), derived from a routine complete blood count, is a simple and readily available inflammatory marker that may assist in this early assessment [12, 13].

In the present study, NLR was significantly higher in patients with moderate/severe acute pancreatitis than in those with mild disease, both at admission ($p<0.001$) and at 48 hours ($p<0.001$). Procalcitonin and CRP were also significantly higher in the moderate/severe group. Furthermore, systemic complications occurred in 85.7% and local complications in 52.4% of patients with moderate/severe disease, compared with none of the patients with mild disease. These findings are consistent with previous studies demonstrating an association between elevated NLR and increasing severity of acute pancreatitis [12-14]. The biological basis for this association may be related to neutrophil activation during acute pancreatic inflammation, with release of inflammatory cytokines, proteolytic enzymes, and reactive oxygen species, while lymphopenia reflects physiological stress and systemic inflammatory response [14-17].

A progressive relationship between NLR and complications was observed in the present study. Systemic complications increased from 3.7% among patients with NLR ≤3.68 to 40.7% among those with NLR >10.28 ($p<0.001$), while the proportion of patients with a Ranson score ≥3 increased from 14.8% to 59.3% across the same NLR categories ($p<0.001$). Similarly, the admission and 48-hour NLR values were significantly higher among patients who developed systemic complications than among those without complications ($p<0.001$ for both). These findings are consistent with previous studies by Azab et al. and Suppiah et al., which reported significant associations between elevated NLR and severe acute pancreatitis [12, 13].

Differences in NLR values across studies may be attributed to variations in patient characteristics, disease severity, study design, and selection criteria. Overall, the present findings suggest that higher NLR values are associated with increased disease severity and systemic complications in patients with acute pancreatitis.

The findings of the present study are also consistent with previous evidence demonstrating that NLR is associated with severity, organ failure, intensive care requirement, and prognosis in acute pancreatitis [13, 14, 18]. Jeon et al. reported significantly higher admission and day-2 NLR values in patients with moderate/severe disease and identified an admission NLR cut-off of 5.03 for predicting organ failure [14]. Similarly, previous studies have demonstrated associations between increased NLR and prolonged hospitalisation and intensive care admission [13, 18, 19]. The predominance of gallstone pancreatitis in our cohort differs from studies in populations where alcohol was a major aetiological factor, highlighting the influence of underlying patient characteristics and regional differences in disease aetiology. Overall, our findings indicate that NLR, particularly when reassessed during the early course of hospitalisation, may serve as a practical and inexpensive marker for early identification of patients with acute pancreatitis who are at increased risk of severe disease and systemic complications. Further prospective multicentre studies involving larger Indian populations are warranted to establish population-specific NLR thresholds and validate their clinical utility [11, 15-18].

Conclusion

The present study demonstrated a significant association between elevated neutrophil-to-lymphocyte ratio (NLR) and increased severity of acute pancreatitis, as well as the development of systemic and local complications. Both admission NLR and NLR at 48 hours were significantly higher among patients with moderate/severe disease and those who developed systemic complications. Higher NLR categories were also associated with higher Ranson scores. As NLR is inexpensive, rapidly available, and easily derived from a routine complete blood count, it may serve as a useful adjunct for early identification and risk stratification of patients with acute pancreatitis, particularly in resource-limited clinical settings. Further studies involving larger and multicentre Indian populations are required to validate these findings and establish clinically applicable NLR thresholds.

References

1. Szatmary P, Grammatikopoulos T, Cai W, Huang W, Mukherjee R, Halloran C, et al. Acute pancreatitis: diagnosis and treatment. Drugs. 2022;82(12):1251-76.
2. Lee PJ, Papachristou GI. New insights into acute pancreatitis. Nat Rev Gastroenterol Hepatol. 2019;16(8):479-96.
3. Li CL, Jiang M, Pan CQ, Li J, Xu LG. The global, regional, and national burden of acute pancreatitis in 204 countries and territories, 1990-2019. BMC Gastroenterol. 2021;21(1):332.
4. Mederos MA, Reber HA, Girgis MD. Acute pancreatitis: a review. JAMA. 2021;325(4):382-90.
5. Padula D, Mauro A, Maggioni P, Kurihara H, Di Sabatino A, Anderloni A. Practical approach to acute pancreatitis: from diagnosis to the management of complications. Intern Emerg Med. 2024;19(8):2091-104.
6. Brisinda G, Vanella S, Crocco A, Mazzari A, Tomaiuolo P, Santullo F, et al. Severe acute pancreatitis: advances and insights in assessment of severity and management. Eur J Gastroenterol Hepatol. 2011;23(7):541-51.
7. Meher S, Mishra TS, Sasmal PK, Rath S, Sharma R, Rout B, et al. Role of biomarkers in diagnosis and prognostic evaluation of acute pancreatitis. J Biomarkers. 2015;2015:519534.
8. Zhou H, Mei X, He X, Lan T, Guo S. Severity stratification and prognostic prediction of patients with acute pancreatitis at early phase: a retrospective study. Medicine (Baltimore). 2019;98(16):e15275.
9. Acarturk G, Acay A, Demir K, Ulu MS, Ahsen A, Yuksel S. Neutrophil-to-lymphocyte ratio in inflammatory bowel disease: a new predictor of disease severity. Bratisl Lek Listy. 2015;116(4):213-7.
10. Bhanou NM, Balachandran G, Jain NB. Neutrophil to lymphocyte ratio (NLR) in acute pancreatitis as an early predictor of severity and outcome. Int Surg J. 2018;5(11):3545-8.
11. Papachristou GI, Clermont G, Sharma A, Yadav D, Whitcomb DC. Risk and markers of severe acute pancreatitis. Gastroenterol Clin North Am. 2007;36:277-96.
12. Suppiah A, Malde D, Arab T, et al. The prognostic value of the neutrophil-lymphocyte ratio (NLR) in acute pancreatitis: identification of an optimal NLR. J Gastrointest Surg. 2013;17:675-81.
13. Azab B, Jaglall N, Atallah JP, et al. Neutrophil-lymphocyte ratio as a predictor of adverse outcomes of acute pancreatitis. Pancreatology. 2011;11:445-52.
14. Jeon TJ, Park JY. Clinical significance of the neutrophil-lymphocyte ratio as an early predictive marker for adverse outcomes in patients with acute pancreatitis. World J Gastroenterol. 2017;23:3883-9.
15. Felderbauer P, Muller C, Bulut K, et al. Pathophysiology and treatment of acute pancreatitis: new therapeutic targets—a ray of

hope. Basic Clin Pharmacol Toxicol. 2005;97:342-50.
16. Wittel UA, Rau B, Gansauge F, et al. Influence of PMN leukocyte-mediated pancreatic damage on the systemic immune response in severe acute pancreatitis in rats. Dig Dis Sci. 2004;49:1348-57.
17. Wittel UA, Rau B, Gansauge F, et al. Influence of PMN leukocyte-mediated pancreatic damage on the systemic immune response in severe acute pancreatitis in rats. Dig Dis Sci. 2004;49:1348-57.
18. Li Y, Zhao Y, Feng L, Guo R. Comparison of the prognostic values of inflammation markers in patients with acute pancreatitis: a retrospective cohort study. BMJ Open. 2017;7:e013206.
19. Jones MJ, Neal CP, Ngu WS, Dennison AR, Garcea G. Examination of the prognostic value of leucocyte subsets and neutrophil-to-lymphocyte ratio in patients with acute pancreatitis. Pancreatology. 2014;14:S63.