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Original Research Article

Association of High Sensitivity C - reactive protein and Serum Triglyceride Levels with Severity of Acute Pancreatitis: A Prospective Observational Study

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Conflict of interest: Nil

Abstract

Background: Acute pancreatitis (AP) is a potentially life-threatening condition with varying severity. Early identification of severe cases is crucial for improving outcomes. This study aimed to evaluate the role of high-sensitivity C-reactive protein (hs-CRP), and serum triglyceride levels in predicting the severity of AP.

Methods: A cross-sectional study was conducted on 125 patients diagnosed with AP. Serum calcium, hs-CRP, and triglyceride levels were measured within 24-48 hours of admission. Patients were classified into mild, moderately severe, and severe AP based on the Revised Atlanta Classification. Statistical analysis was performed to assess the correlation between these biomarkers and disease severity.

Results: The mean age of patients was 50±15 years, with a male predominance (72.8%). Alcohol was the most common etiology (60%), followed by gallstones (25%). Severe AP was associated with higher hs-CRP (337±21 mg/L) and triglyceride levels (359±171 mg/dL) compared to mild and moderate AP ($p<0.001$). Elevated hs-CRP, and hypertriglyceridemia were independent predictors of severe AP.

Conclusion: hs-CRP, and triglyceride levels are useful biomarkers for predicting the severity of AP. Early measurement of these parameters can aid in risk stratification and guide clinical management.

Keyword: Serum hs-CRP, serum triglyceride, acute pancreatitis.

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Introduction

Acute pancreatitis (AP) is a common gastrointestinal disorder with a wide spectrum of severity, ranging from mild, self-limiting disease to severe, life-threatening conditions. The incidence of AP has been increasing globally, with gallstones and alcohol abuse being the leading causes in developed countries. Despite advancements in medical care, the mortality rate for severe AP remains high, ranging from 10% to 30%. Early identification of patients at risk for severe AP is critical for timely intervention and improved outcomes.

Several scoring systems, such as the Ranson criteria, APACHE II, and BISAP, have been developed to predict the severity of AP.

However, these systems are often complex and require multiple parameters, limiting their utility in clinical practice. Biomarkers such as hs-CRP, and triglycerides have been proposed as simpler, more accessible predictors of disease severity. This study aimed to evaluate the role of these biomarkers in predicting the severity of AP and to correlate them with clinical outcomes.

Methods

Study Design and Population: This was a cross-sectional study conducted at a tertiary care center from May 2022 to December 2023. A total of 125 patients diagnosed with AP were included.

The diagnosis of AP was based on the presence of two of the following three criteria: (1) abdominal pain consistent with AP, (2) serum amylase or lipase levels at least three times the upper limit of normal, and (3) radiological evidence of AP on contrast-enhanced computed tomography (CECT), ultrasound, or magnetic resonance imaging (MRI).

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Patients aged ≥18 years with a diagnosis of AP.
- Availability of serum hs-CRP, and triglyceride levels measured within 24-48 hours of admission.

Exclusion Criteria:

- Patients with pancreatic tumors or carcinoma.
- Patients with hypertriglyceridemia (HTG) syndrome.
- Patients with chronic kidney disease, diabetic ketoacidosis, or other conditions that could affect calcium or lipid metabolism.

Sample Size: The sample size was estimated based on prevalence of disease and using the formula

$n=z^2pq/d^2$

Where n = Sample Size

z= Statistic for a level of confidence. (1.96 For 95%)

p= Expected prevalence or Proportion (8%)

d=Precision (5%)

Sample size = 125

Data Collection: Demographic data, clinical presentation, etiology, and laboratory parameters were recorded. Serum hs-CRP, and triglyceride levels were measured within 24-48 hours of admission. Patients were classified into mild, moderately severe, and severe AP based on the Revised Atlanta Classification.

Statistical Analysis: Data were analyzed using SPSS version 20. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables were expressed as percentages.

The chi-square test and ANOVA were used to compare categorical and continuous variables, respectively. A p-value <0.05 was considered statistically significant. Receiver operating characteristic (ROC) curve analysis was performed to assess the predictive value of biomarkers for severe AP.

Results

Demographic and Clinical Characteristics: The study included 125 patients, with a mean age of 50±15 years. Males constituted 72.8% of the cohort. Alcohol was the most common etiology (60%), followed by gallstones (25%) and idiopathic causes (15%).

The prevalence of diabetes and hypertension was 28% and 20%, respectively, and both were significantly associated with severe AP (p<0.001).

Table 1: Categorization of Cases as per Age

Age Categories	No. of Cases	%
<25 Years	11	8.8%
25 - 34 Years	11	8.8%
35 - 44 Years	17	13.6%
45 - 54 Years	23	18.4%
55 - 64 Years	40	32%
>= 65 Years	23	18.4%
Total	125	100%

Table 2: Age profile of Grades of Acute Pancreatitis

Parameter	Grade of Acute Pancreatitis				P Value
	Mild	Moderate	Severe	Total	
	Mean	Mean	Mean	Mean	
Age (years)	34±11	58±8	59±6	50±15	<0.001

Table 3: Sex profile of Grades of Acute Pancreatitis

Parameter		Grade of Acute Pancreatitis								P Value
		Mild		Moderate		Severe		Total		
		No.	%	No.	%	No.	%	No.	%	
Sex	Female	12	35.3%	16	47.1%	6	17.6%	34	27.2%	0.986
	Male	32	35.2%	44	48.4%	15	16.5%	91	72.8%	
	Total	44	35.2%	60	48.0%	21	16.8%	125	100.0%	

Biomarkers and Disease Severity

Table 4: Mean hs-CRP levels of Grades of Acute Pancreatitis

Parameter	Grade of Acute Pancreatitis				P Value
	Mild	Moderate	Severe	Total	
	Mean	Mean	Mean	Mean	
hs-CRP (mg/L)	178±23	261±21	337±21	244±60	<0.001

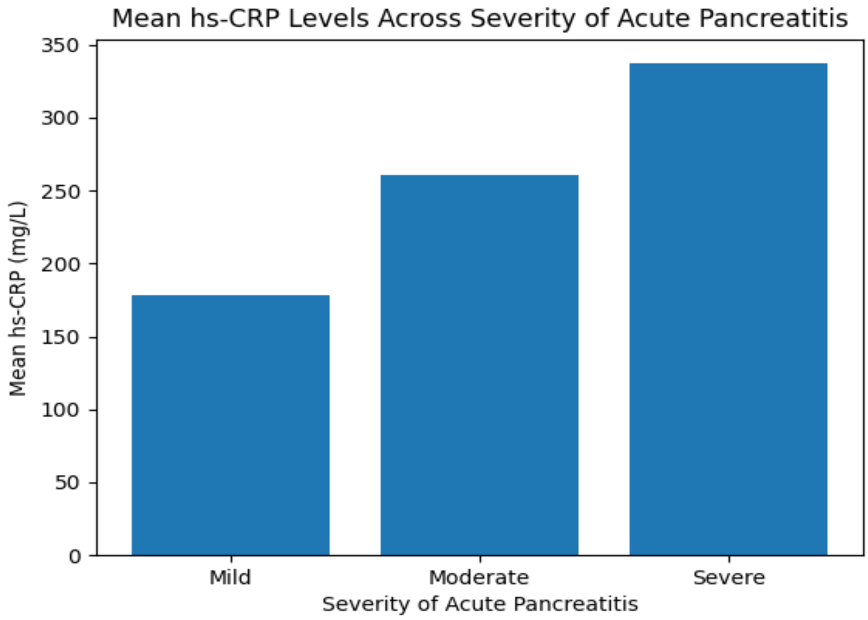

Figure 1: Mean hs-CRP levels Across Severity of Acute Pancreatitis

Table 5: TG profile of Grades of Acute Pancreatitis

Parameter	Grade of Acute Pancreatitis				P Value
	Mild	Moderate	Severe	Total	
	Mean	Mean	Mean	Mean	
TG (mg/dL)	163±30	229±89	359±171	227±115	<0.001

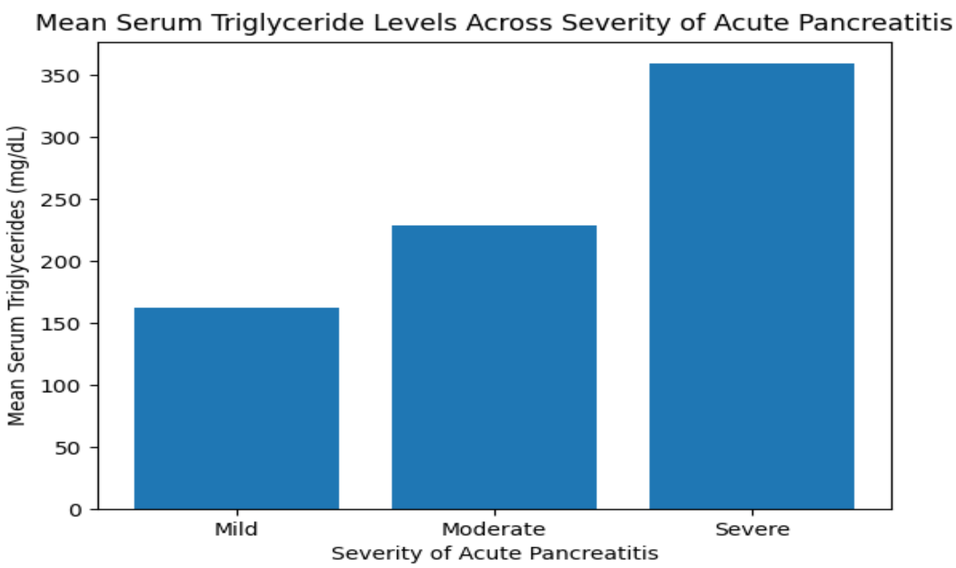

Figure 2: Mean Serum Triglyceride levels Across Severity of Acute Pancreatitis

ROC Analysis: ROC curve analysis demonstrated that serum calcium, hs-CRP, and triglyceride levels were strong predictors of severe AP. The area under the curve (AUC) for serum calcium was 0.888, for hs-CRP was 0.999, and for triglycerides was 0.837.

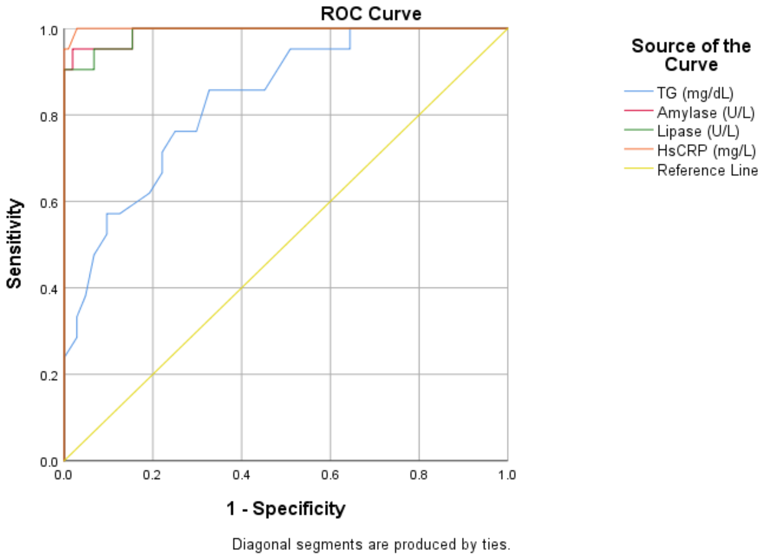

Figure 3: ROC Analysis

Table 7: ROC Analysis for Severe Acute Pancreatitis

Area Under the Curve					
Test Result Variable(s)	**Area**	**Std. Error**	**Asymptotic Sig.**	**Asymptotic 95% Confidence Interval**	
				Lower Bound	**Upper Bound**
TG (mg/dL)	0.837	0.045	0.000	0.749	0.925
Amylase (U/L)	0.992	0.008	0.000	0.977	1.000
Lipase (U/L)	0.989	0.008	0.000	0.973	1.000
hs-CRP (mg/L)	0.999	0.001	0.000	0.997	1.000

Table 8: Correlations of various parameters with Severe Acute Pancreatitis

Correlations with Severity of Acute Pancreatitis		
Variables	**Correlation Coefficient**	**P Value**
TG (mg/dL)	0.518	<0.001
Amylase (U/L)	0.810	<0.001
Lipase (U/L)	0.829	<0.001
HsCRP (mg/L)	0.693	<0.001

Clinical Outcomes: Patients with severe AP had significantly longer hospital stays (19±2 days) compared to moderate (14±1 days) and mild AP (7±1 days) (p<0.001). Severe AP was also associated with higher rates of vasopressor use, mechanical ventilation, and renal replacement therapy.

Discussion

This study highlights the importance of serum hs-CRP, and triglyceride levels as predictors of severity in AP.

Elevated hs-CRP, and hypertriglyceridemia were significantly associated with severe AP, longer hospital stays, and higher rates of organ failure.

These findings are consistent with previous studies, which have shown that hypocalcemia is a poor prognostic marker in AP, likely due to its role in acinar cell injury and systemic inflammation. The strong correlation between hs-CRP and disease severity underscores the role of systemic inflammation in the pathogenesis of AP. CRP, an acute-phase reactant, peaks 48-72 hours after symptom onset and is a well-established marker of inflammation. Elevated triglyceride levels, particularly above 1000 mg/dL, are known to contribute to pancreatic injury through mechanisms such as capillary occlusion and free fatty acid-induced inflammation.

Limitations: This study has several limitations. First, it was conducted at a single tertiary care center, which may limit the generalizability of the findings. Second, serum hs-CRP, and triglyceride levels were measured only at admission, and serial measurements could provide additional insights into disease progression. Finally, the study did not account for potential confounding factors such as nutritional status or concurrent medications.

Conclusion

Serum hs-CRP, and triglyceride levels are valuable biomarkers for predicting the severity of AP. Early measurement of these parameters can aid in risk stratification and guide clinical management, particularly in resource-limited settings where complex scoring systems may not be feasible. Future multicenter studies with larger sample sizes are needed to validate these findings and explore the role of serial biomarker measurements in predicting outcomes in AP.

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