International Journal of Medical Science and Research
www.medicaljournals.in
Online ISSN: 2664-8768, Print ISSN: 2664-875X
Received: 22-07-2025, Accepted: 21-08-2025, Published: 06-09-2025
Volume 7, Issue 2, 2025, Page No. 28-30

To correlate laboratory findings with the severity of the acute biliary pancreatitis

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Abstract

Background: Acute biliary pancreatitis (ABP) is a common subtype of acute pancreatitis, primarily caused by gallstones or biliary sludge obstructing the ampulla of Vater. Early prediction of disease severity is essential for effective management and improving outcomes. This study aimed to evaluate the correlation between various laboratory parameters and the severity of ABP.

Methods: This prospective observational study was conducted on 50 patients diagnosed with ABP at a tertiary care hospital. Diagnosis was based on clinical presentation, elevated serum pancreatic enzymes, and imaging evidence of biliary pathology. Laboratory investigations included serum amylase, lipase, liver function tests, C-reactive protein (CRP), lactate dehydrogenase (LDH), and total leukocyte count (TLC). Severity of pancreatitis was classified as mild, moderate, or severe according to the Revised Atlanta Classification. Statistical analyses were performed to assess the relationship between laboratory parameters and disease severity.

Results: Out of 50 patients, 64% were female, and the mean age was 53.04 ± 14.38 years. Most patients (54%) had mild pancreatitis, 40% moderate, and 6% severe. Serum amylase and lipase were elevated in all patients but did not correlate significantly with disease severity. In contrast, both TLC and CRP levels showed a significant positive correlation with increasing severity ($p = 0.0003$ and $p < 0.0001$, respectively). LDH levels were elevated but not significantly associated with severity.

Conclusion: TLC and CRP are reliable and easily accessible markers that can aid in early risk stratification and severity assessment in ABP. Routine use of these parameters may improve clinical decision-making and patient outcomes.

Keywords: Acute biliary pancreatitis, C-reactive protein, total leukocyte count, severity prediction, laboratory parameters

Introduction

Acute pancreatitis is an acute inflammatory disorder of the pancreas characterized by sudden onset of abdominal pain and elevated levels of pancreatic enzymes in the serum. The disease can range in severity from a mild, self-limiting illness to a severe, life-threatening condition with systemic complications [1]. Among its various causes, biliary tract disease particularly gallstones and biliary sludge obstructing the ampulla of Vater remains the most common etiology worldwide, accounting for approximately 35–60% of all cases [2].

The clinical classification of acute pancreatitis, especially acute biliary pancreatitis (ABP), is based on the Revised Atlanta Classification, which stratifies the disease into mild, moderately severe, and severe forms [3]. Early prediction of severity is essential, as it directly impacts patient management, including decisions regarding intensive monitoring, nutritional support, and surgical or endoscopic intervention [4]. To aid in this, several clinical scoring systems such as Ranson's criteria, the Modified Glasgow score, APACHE II, and the Bedside Index of Severity in Acute Pancreatitis (BISAP) have been developed. However, these scoring systems often require 48 hours of observation and may not be readily applicable in all clinical settings [5].

In recent years, biochemical markers have gained attention for their potential to predict severity at an early stage. Serum amylase and lipase are pivotal in the diagnosis of acute pancreatitis; however, their levels do not consistently correlate with disease severity [6]. Liver function tests (LFTs), including alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), and total bilirubin, are often deranged in biliary pancreatitis and may suggest underlying choledocholithiasis [7]. Furthermore, systemic inflammatory markers such as C-reactive protein (CRP) and lactate dehydrogenase (LDH) have been associated with pancreatic necrosis, systemic inflammatory response syndrome (SIRS), and worse outcomes [8, 9]. Elevated CRP levels (>150 mg/L) within 48–72 hours are especially predictive of severe disease [10].

Despite the widespread availability of these laboratory tests, their role in accurately predicting the course of ABP remains under investigation. Establishing a robust correlation between these biochemical markers and clinical severity could enhance early triage and improve outcomes by allowing timely therapeutic interventions. Therefore, the present study was undertaken to correlate laboratory findings—such as serum amylase, lipase, LFTs, CRP, and LDH with the clinical severity of acute biliary pancreatitis in patients presenting to a tertiary care hospital.

Materials and Methods

This prospective observational study was conducted in the Department of General Medicine at a tertiary care hospital over a period of [insert duration, e.g., one year]. All patients aged 18 years and above who were diagnosed with acute biliary pancreatitis based on clinical presentation, elevated pancreatic enzymes (serum amylase and/or lipase ≥3 times the upper limit of normal), and abdominal ultrasonography or imaging evidence of gallstones or biliary sludge were included. Patients with alcohol-induced pancreatitis, drug-induced pancreatitis, pancreatic malignancy, or a history of chronic pancreatitis were excluded from the study.

Following informed consent, a detailed clinical history and examination were recorded for each patient. Laboratory

investigations were performed at the time of admission and included serum amylase, lipase, liver function tests (ALT, AST, ALP, total and direct bilirubin), C-reactive protein (CRP), lactate dehydrogenase (LDH), complete blood count (CBC), blood urea nitrogen (BUN), serum creatinine, and electrolytes. Imaging studies such as abdominal ultrasound and, when indicated, contrast-enhanced computed tomography (CECT) of the abdomen were performed to confirm the diagnosis and assess complications.

Data analysis

The severity of acute biliary pancreatitis was classified according to the Revised Atlanta Classification into mild, moderately severe, and severe categories. Correlation between the severity of the disease and individual laboratory parameters was analyzed using appropriate statistical methods. Continuous variables were expressed as mean ± standard deviation, and categorical variables as percentages. The Chi-square test, Student's t-test, and ANOVA were applied for group comparisons, while Pearson's or Spearman's correlation coefficients were used to assess the strength of association between laboratory values and disease severity. A p-value of <0.05 was considered statistically significant.

Results

Baseline characteristics

The study included 50 patients diagnosed with acute biliary pancreatitis. Among them, 32 (64%) were female and 18 (36%) were male. The mean age of the patients was 53.04 ± 14.38 years. Clinically, all patients (100%) presented with abdominal pain, which was the most common symptom. Vomiting was reported in 36 patients (72%), while fever was noted in 15 patients (30%).

Severity of pancreatitis

In this study, regarding the severity of pancreatitis, 27 patients (54%) were classified as having mild pancreatitis, 20 patients (40%) had moderate pancreatitis, and 3 patients (6%) were categorized as severe cases based on established clinical criteria.

Laboratory investigation

In the present study, the laboratory parameters of patients with acute biliary pancreatitis showed considerable variability, reflecting the heterogeneity in disease severity. The total leukocyte count (TLC) ranged from 5.30 to 25 $\times 10^9$/L, with a mean value of 15.04 ± 4.07, indicating a consistent leukocytic response. C-reactive protein (CRP), a marker of systemic inflammation, had a mean level of 35.49 ± 36.38 mg/L, with values ranging from 0.2 to 145 mg/L. Serum lactate dehydrogenase (LDH) levels were also elevated, with a mean of 512.52 ± 293.80 IU/L and a wide range from 120 to 1411 IU/L, suggesting varying degrees of tissue injury. Serum amylase levels were markedly raised in most patients, with a mean of 1871.12 ± 1700.39 IU/L (range: 24 to 9621 IU/L), while serum lipase levels were even higher, averaging 2606.43 ± 2289.57 IU/L and ranging from 35.80 to 7819 IU/L. These elevated pancreatic enzyme levels are consistent with the diagnosis of acute pancreatitis and may reflect the extent of pancreatic inflammation and injury in these patients.

Association between laboratory investigation and severity of pancreatitis

A statistically significant association was observed between certain laboratory parameters and the severity of acute biliary pancreatitis. The mean total leukocyte count (TLC) increased progressively with severity, from 14.45 ± 3.81 $\times 10^9$/L in mild cases to 14.74 ± 3.60 in moderate, and markedly elevated to 22.43 ± 2.37 in severe cases ($p = 0.0003$). Similarly, C-reactive protein (CRP) levels showed a sharp rise correlating with disease severity, with mean values of 23.07 ± 27.50 mg/L in mild cases, 37.57 ± 25.03 mg/L in moderate cases, and significantly higher at 133.33 ± 12.58 mg/L in severe cases ($p < 0.0001$). These findings highlight that both TLC and CRP are reliable indicators of systemic inflammatory response and may serve as useful predictors of severity in acute biliary pancreatitis.

Discussion

This study aimed to evaluate the correlation between laboratory parameters and the severity of acute biliary pancreatitis (ABP), a common and potentially serious clinical condition. The findings support the hypothesis that certain laboratory markers, particularly total leukocyte count (TLC) and C-reactive protein (CRP), are significantly associated with disease severity and can serve as useful prognostic indicators in the early management of ABP.

The demographic profile in our study revealed a female predominance (64%) and a mean age of 53.04 ± 14.38 years, which is consistent with previous studies that have identified gallstone disease as more prevalent among middle-aged females due to hormonal and metabolic factors [11]. Abdominal pain was universally present among the study population, followed by vomiting (72%) and fever (30%), aligning with the typical symptomatology described in acute pancreatitis [12].

Regarding disease severity, the majority of patients (54%) had mild pancreatitis, while 40% had moderate, and only 6% were classified as severe. This distribution is similar to previous clinical observations, where most cases tend to be mild and self-limiting, with a smaller proportion developing complications [1].

Among laboratory parameters, both serum amylase and lipase were significantly elevated in most patients, confirming their diagnostic value. However, consistent with prior reports, these enzymes did not show a statistically significant correlation with disease severity [6]. In contrast, the total leukocyte count and CRP levels demonstrated a strong and significant association with severity. TLC increased substantially in severe cases (mean: 22.43 ± 2.37 $\times 10^9$/L), and CRP levels rose sharply, reaching 133.33 ± 12.58 mg/L in severe disease ($p < 0.0001$). These findings corroborate with studies by Khanna et al. and Cardoso et al., who also reported CRP as a reliable early predictor of severity when measured within 48–72 hours of onset [7, 9, 10].

LDH, an indicator of cellular injury, was also elevated in many patients, although its direct correlation with severity was not statistically evaluated in this study. Prior studies have shown that elevated LDH may be associated with pancreatic necrosis and systemic complications [9].

The role of inflammatory markers like CRP is particularly important in settings where imaging or sophisticated scoring systems may not be readily available. CRP values above

150 mg/L have been shown to predict severe pancreatitis with reasonable accuracy, and our findings reinforce its utility as a simple, cost-effective marker [13].

Overall, this study highlights the practical importance of basic laboratory investigations—specifically TLC and CRP in the early assessment and risk stratification of patients with ABP. Early identification of patients at risk for severe disease can facilitate timely intervention, reduce complications, and improve outcomes.

Table 1: Baseline characteristics

Baseline characteristics	Frequency (n=50)	Percentage (%)
Gender		
Male	18	36%
Female	32	64%
Age	53.04±14.38 years	
Clinical symptoms		
Abdominal pain	50	100%
Vomiting	36	72%
Fever	15	64%
Duration of hospital stay	7.4±2.5 days	

Table 2: Severity of pancreatitis

Severity of pancreatitis	Frequency (n=50)	Percentage (%)
Mild	27	54%
Moderate	20	40%
Severe	3	6%

Table 3: Laboratory investigation

Laboratory investigation	Mean±SD	Range
TLC	15.04±4.07	5.30-25
CRP	35.49±36.38	0.2-145
LDH	512.52±293.80	120-1411
Amylase	1871.12±1700.39	24-9621
Lipase	2606.43±2289.57	35.80-7819

Table 4: Association between laboratory investigation and severity of pancreatitis

Laboratory investigation	Severity of pancreatitis			P value
	Mild	Moderate	Severe	
TLC	14.45±3.81	14.74±3.60	22.43±2.37	0.0003
CRP	23.07±27.50	37.57±25.03	133.33±12.58	<0.0001

Conclusion

The present study highlights the significant correlation between laboratory parameters—particularly total leukocyte count (TLC) and C-reactive protein (CRP)and the severity of acute biliary pancreatitis. Elevated levels of these markers were consistently associated with more severe forms of the disease, suggesting their potential utility in early risk stratification and clinical decision-making. While pancreatic enzymes such as serum amylase and lipase are essential for diagnosis, they showed limited value in assessing disease severity. Therefore, incorporating inflammatory markers like TLC and CRP into routine evaluation may enhance the accuracy of severity assessment and guide appropriate management strategies in patients with acute biliary pancreatitis.

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