



"C-REACTIVE PROTEIN AS A PREDICTIVE MARKER FOR SEVERE PANCREATITIS"

General Medicine

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ABSTRACT

Background: Predicting organ failure and mortality in acute pancreatitis (AP) remains challenging due to the limited effectiveness of existing scoring systems. Severe pancreatitis poses a life-threatening scenario with diverse clinical manifestations. C-reactive protein (CRP) has shown promise as a prognostic marker, with potential applications in offering early insights into the inflammatory processes underlying AP severity. **Aim:** The study aims to investigate and evaluate the utility of C-Reactive Protein (CRP) as a predictive marker for assessing the severity of pancreatitis. **Methodology:** A prospective cohort study was conducted involving 42 patients diagnosed with AP at tertiary care center. Demographic data, etiological factors, laboratory values, and interventions were systematically analyzed. Severity classifications followed the Atlanta criteria of 2012. Statistical analyses, including chi-square tests and Fischer's exact tests, were employed to evaluate associations between variables. **Results:** The demographic distribution revealed varying severity levels across age groups, with alcoholic and biliary causes predominating. Laboratory analyses showcased distinctive patterns in severe AP, including elevated hematocrit, mean ferritin, and CRP/albumin ratio. Percutaneous drainage was the predominant with 54.55 % intervention, and mortality was reported in 4.55 % of cases. **Conclusion:** The study underscores the challenges in predicting AP outcomes and highlights the potential of CRP, alongside other biomarkers, in offering valuable prognostic insights. Comprehensive investigations are warranted to further elucidate the roles of these biomarkers in refining management strategies and improving patient outcomes.

KEYWORDS

Acute pancreatitis, C-reactive protein, prognostic markers, severity

INTRODUCTION

C-reactive protein (CRP) is an acute-phase reactant produced by the liver in response to inflammation, infection, or tissue injury. It is often used as a marker of inflammation in various medical conditions.¹ In the context of pancreatitis, CRP levels can be elevated as part of the inflammatory response. Acute interstitial pancreatitis is predominant, occurring in 80% of acute pancreatitis (AP) cases and is associated with a favourable prognosis. Conversely, acute necrotizing pancreatitis represents a severe manifestation of AP, characterized by anticipated morbidity and mortality rates ranging between 30% and 50%.^{2,3}

Blood tests can be employed to measure CRP levels, and elevated concentrations may signify the existence of inflammation within the body. In the context of pancreatitis, heightened CRP levels are frequently linked to more advanced stages of the disease.⁴

Increased CRP levels during the initial phases of pancreatitis can act as a prognostic signal for the potential emergence of severe complications.

Alterations in CRP levels throughout the treatment process can offer insights into the patient's response to therapy. Although CRP serves as a valuable marker, it's crucial to recognize its non-specific nature in pinpointing inflammation.^{5,6} Elevated CRP levels can manifest in various inflammatory conditions, offering limited insight into the specific cause of inflammation. Healthcare providers typically employ a multifaceted approach, incorporating clinical, laboratory, and imaging findings, to gauge the severity of pancreatitis. CRP is just one component in this comprehensive assessment.⁷

CRP level interpretation must consider the overall clinical context and diagnostic data. Ongoing research may deepen our understanding of CRP and other biomarkers in predicting and managing severe pancreatitis. This study aims to assess CRP's utility as a predictive marker for pancreatitis severity.

AIM & OBJECTIVE

The study aims to investigate and evaluate the utility of C-Reactive Protein (CRP) as a predictive marker for assessing the severity of pancreatitis.

METHOD & MATERIAL

Our study prospectively enrolled all consecutive patients presenting with Acute Pancreatitis (AP) at a tertiary care center. The diagnosis of

AP was established based on the presence of at least 2 out of the following 3 criteria: epigastric pain, with or without radiation to the back; amylase and lipase levels elevated to more than three times the upper limit of normal; and evidence of inflammation on cross-sectional imaging

The severity of AP was categorized according to the revised Atlanta classification of 2012. Specifically, mild AP was identified when there were no organ failures or local complications. Moderately severe AP was characterized by organ failure lasting less than 48 hours or the development of local complications. Severe AP was determined by the persistence of organ failure for more than 48 hours.⁸ This classification provided a comprehensive framework for stratifying the severity of Acute Pancreatitis in our study population.

Sample size

First consecutive 45 patients who came to department with the diagnosis of severe pancreatitis after applying the exclusion criteria were selected for this study.

Inclusion Criteria:

- Patients diagnosed with pancreatitis based on clinical, laboratory, and imaging criteria.
- Availability of CRP measurements at different time points during the course of the disease.
- Patients aged 18 years and above.

Exclusion Criteria:

- Patients with a history of chronic pancreatitis.
- Individuals with autoimmune disorders affecting CRP levels.
- Patients with incomplete medical records or missing CRP measurements.

Statistical Analysis

Data, collected through a standardized proforma, was entered into Microsoft Excel and analyzed using SPSS version 21. Chi-square and Fischer's exact tests assessed associations between C-reactive protein levels and variables, determining statistical significance through p-values.

RESULT & DISCUSSION

Demographic Parameters of with Acute Pancreatic patients

Table 1 Age & Gender Distribution

Age in Years	Gender		Total N/ %
	Male (30)	Female (15)	
< 20	5 (11.11)	3 (6.66)	8(17.77)

20 -40	8(17.77)	4(8.88)	12(26.66)
40 -60	10(22.22)	5 (11.11)	15(33.33)
> 80	7 (15.55)	3 (6.66)	10(22.22)
Total	30(66.66)	15 (33.33)	45(100)

The table displays the demographic distribution in the studied population, emphasizing a concentration of patients in the 40-60 years age group (33.33%) and the 20-40 years age category (26.66%). Males constitute 66.66%, exceeding the 33.33% representation of females in the study.

Table 2 Demographic features and initial traits of individuals diagnosed with acute pancreatitis.

Parameter	Values
Aetiology	
Alcoholic	24 (53.33 %)
Biliary	30 (66.66%)
Idiopathic	7 (15.55%)
Hypertriglyceridemia	5 (11.11 %)
Total WBC count [cells/mm3]	16.8 ±8.1
Creatinine/dl	1.62 ±1.41
CRP/albumin	3.50 ±2.30
Total bilirubin/dl	2.49 ±4.50
AST [IU/ml]	74.20 ±139.21
ALT [IU/ml]	73.84 ±209.70
ALP [IU/ml]	130.23 ±77.13
Total albumin [gm/dl]	2.97 ±0.80
CRP [mg/l]	13.0 ±6.50
APACHE II score	5.36 ±4.27

BC – white blood cell count, AST – aspartate aminotransferase, ALT – alanine aminotransferase, ALP – alkaline phosphatase, CRP – C-reactive protein, APACHE – acute physiology and chronic health evaluation II

The table studies the etiological factors contributing to the condition reveal a varied distribution, with alcoholic and biliary causes being predominant in 53.33% and 66.66% of cases, respectively. Additionally, idiopathic and hypertriglyceridemia-related cases contribute to 15.55% and 11.11%, respectively. Laboratory values provide a comprehensive insight into the patients' health status, with markers such as total white blood cell count, creatinine, total bilirubin, liver enzymes (AST, ALT, ALP), total albumin, C-reactive protein (CRP), and the APACHE II score. These values collectively show patients' physiological status, aiding in the understanding of the severity and etiological spectrum of acute pancreatitis in the studied population.

Table 3 Different parameters according to severity of AP

Our study involved a comparative analysis of various laboratory and prognostic markers based on the severity of pancreatitis. According to the Atlanta classification of 2012, 22 patients were identified with severe acute pancreatitis (AP), 13 with moderately severe AP, and 10 with mild AP. Patient ages exhibited similar distributions across all severity categories. Notably, hematocrit levels were significantly higher in severe AP compared to both moderately severe and mild AP ($p < 0.001$). Additionally, mean ferritin and the CRP/albumin ratio were markedly elevated in severe AP in contrast to moderately severe and mild AP ($p < 0.001$). Furthermore, the mean APACHE II score and serum creatinine levels were notably higher in severe AP as opposed to the other severity categories. However, total white blood cell count (TWBC), aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP) exhibited similar values across all grades of AP severity. This comprehensive assessment provides valuable insights into the distinctive biochemical profiles associated with different severities of acute pancreatitis in our study population.

Interventions for the patients with to severity of AP

Interventions	No of Patients (N)	Percentage (%)
Surgical necrosectomy	4	18.18
Percutaneous drainage (PCD)	12	54.55
Endoscopic	5	22.73
Mortality	1	4.55
Total	22	48.89

The table elucidates the interventions administered to patients within the study, offering a comprehensive overview of therapeutic strategies

employed in managing severity pancreatitis. Percutaneous drainage (PCD) emerged as the most frequently utilized intervention, accounting for 54.55% of cases. Surgical necrosectomy and endoscopic interventions were employed in 18.18% and 22.73% of patients, respectively. Notably, the reported mortality rate stood at 4.55%. In total, these interventions were applied to 48.89% of the study population.

DISCUSSION

The study on C-reactive protein (CRP) as a predictive marker for severe pancreatitis presents compelling findings, as indicated by the comprehensive data analysis. The demographic characteristics, including age distribution and gender representation, demonstrate a diverse patient cohort, with age categories spanning various severity levels of acute pancreatitis (AP). Notably, the etiological factors reveal a significant prevalence of alcoholic and biliary causes, shedding light on potential risk factors.

The investigation into laboratory and prognostic markers reveals distinctive patterns associated with the severity of pancreatitis. Higher hematocrit levels, mean ferritin, and CRP/albumin ratio in severe AP underscore the potential utility of these markers in assessing the severity of the condition. Additionally, the elevated mean APACHE II score and serum creatinine levels in severe AP further emphasize the correlation between these markers and disease severity.

The interventions employed in managing acute pancreatitis, particularly percutaneous drainage (PCD), surgical necrosectomy, and endoscopic interventions, are highlighted in the study. PCD emerges as the predominant intervention, signifying its significance in the therapeutic approach. The reported mortality rate provides insight into the outcomes associated with the interventions.

This study underscores the importance of CRP and various laboratory markers in predicting and managing severe pancreatitis. The diversified interventions employed in patient care demonstrate an approach, acknowledging the multifaceted nature of the condition. These findings contribute valuable insights to the existing knowledge base, emphasizing the need for an assessment incorporating demographic, etiological, and clinical parameters for a comprehensive understanding of severe pancreatitis and its management.

CONCLUSION

Predicting organ failure and mortality in acute pancreatitis (AP) poses a challenge for clinicians, given the limited effectiveness of current scoring systems in directing early interventions. Severe pancreatitis is a serious condition with various symptoms, and C-reactive protein (CRP) looks promising as a marker for prognosis based on previous studies. CRP levels can give early insights into the ongoing inflammation, hinting at the severity of the disease. We need more thorough research to understand CRP's role better in predicting outcomes in acute pancreatitis. This could help reduce the risks of mortality and complications associated with severe pancreatitis. Learning more about how CRP can predict the severity of the condition might significantly improve how we identify and treat severe cases early on, leading to better results for patients.

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