International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 2, February 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.2.2025.73

Original Research

The prognostic value of C-reactive protein in acute pancreatitis an experience from tertiary care centre in South India

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Received: 12 December, 2024 Accepted: 27 January, 2025 Published: 14 February, 2025

ABSTRACT

Background: Acute pancreatitis is a potentially fatal inflammatory condition of the pancreas that can infiltrate distant organ systems or regional tissues in different ways. Plasma levels of the acute phase protein CRP rise in almost all acute and chronic inflammatory conditions. The present study was conducted to evaluate the prognostic value of C-reactive protein in acute pancreatitis an experience from tertiary care centre in South India.

Methods: The present retrospective diagnostic test evaluation study was conducted among all the 230 patients admitted with acute pancreatitis in the Surgical Department of Government Medical College, Ernakulam for the last of 5 yrs. Ranson's scoring system, and serum CRP assays (CRP >9.6mg/dl in the 1st 48hours and Ranson's score of > or = 3 as cut-off). C-reactive protein was estimated by using latex agglutination test on the day of admission or the next day. Results were analyzed using SPSS version 25.0.

Results: Maximum patients were in the age group of 31-40 years 81 (35%) and least were in the age group of 18-20 years 12 (5%). Number of male patients were 138 (60%) and female were 92 (40%). The most common etiology was alcohol (85%) followed by gall stones (10%), Cyst (3%) and viral infection (2%). 184 (80%) had ranson score <3 while 46 (20%) patients had score ≥3 as shown in table 2. 182 (78%) patients had CRP value <9.6 and 48 (22%) had CRP values ≥ 9.6. 11 (4.7%) patients died and 219 (95.3%) were discharged from hospital. Sensitivity, specificity, PPV, NPV and accuracy values for Ranson score were 79.6%, 81%, 64.5%,87.6% and 80.3% whereas for CRP were 86.7%,76.3%, 66.9%, 91.1% and81.9%

Conclusion: The disease known as acute pancreatitis can be fatal and presents with a variety of symptoms. Previous research on C Reactive Protein as a predictive marker has produced encouraging findings. To lower the mortality and morbidity linked to acute pancreatitis, more research on its function is required.

Keywords- acute pancreatitis, c-reactive protein, Ransons score, severity.

INTRODUCTION

Acute pancreatitis is an inflammatory condition of the pancreas that may affect surrounding tissues or distant organ systems, leading to potentially severe outcomes.[1] Acute pancreatitis (AP) is prevalent, with a concerning increase in global occurrence.[2] The clinical progression of acute pancreatitis is markedly heterogeneous, ranging from mild, self-limiting symptoms to multiple organ failure and/or mortality. Numerous prognostic models and scoring systems have been developed over the years to assess the severity of acute pancreatitis, including the Ranson score, Glasgow score, and the Acute Physiology and Chronic Health Evaluation (APACHE).[3] These have demonstrated a restricted capacity for distinguishing between mild and severe illness. The change of the Atlanta classification to incorporate a 'moderately severe' pancreatitis category may yield new implications and advantages in clinical practice regarding the application of these scoring systems to delineate distinct disease subgroups.[4] The global incidence of acute pancreatitis ranges from 5 to 80 cases per 100,000 individuals. [5]

The role of diagnostic markers, such as pancreatic enzymes like amylase and lipase, as prognostic indicators has been unsatisfactory. Additional

DOI: 10.69605/ijlbpr_14.2.2025.73

biochemical markers, such as CRP and pro-calcitonin, are being evaluated as prognostic indicators. The evaluation of CRP is a modest yet useful option.[6] It is to be check whether early measurement of CRP levels serves as a reliable indication of morbidity and mortality in acute pancreatitis. C-reactive protein (CRP) is the most prevalent and economical biomarker, generated in the liver under the influence of interleukin-6 (IL-6) and interleukin-1 (IL-1). Serum peak readings between 48-72 hours, with levels exceeding 100-150 mg/dl, are considered positive. [7]
Further, the importance of CRP lies in its value for predicting the healing of acute pancreatic inflammation as follow-up CRP levels will correctly reveal which patients will develop complications or which will heal uneventfully.[8]
Hence the present study was conducted to evaluate the prognostic value of C-reactive protein in acute pancreatitis an experience from tertiary care centre in South India.

MATERIAL AND METHODS

The present retrospective diagnostic test evaluation study was conducted among all patients admitted with acute pancreatitis in the Surgical Department of Government Medical College, Ernakulam.

Sample size was estimated using the formula

$$N = \frac{Z2(1-\alpha/2) * \text{sensitivity} * (1-\text{Specificity})}{d2 * \text{prevalence}}$$

Z2(1-α/2)=3.96
D=5% (can keep it as 1%,2%,3%. upto 5%)
Sensitivity from previous study 83.9%
Prevalence 3.2%
N= 230

Hence a total of 230 patients admitted with acute pancreatitis will be selected on the basis of inclusion and exclusion criteria.

- Inclusion criteria: Patients diagnosed with acute pancreatitis on the basis of serum amylase, lipase and a compatible clinical picture.
- Exclusion criteria:
- Abdominal disorders with similar clinical picture – peptic ulcer perforation, intestinal obstruction.
- Cases of chronic pancreatitis (i.e., acute exacerbation of chronic pancreatitis)
- Pregnant women, OC pills

The case records were collected from the records library. The data was collected in a proforma from each case sheet with pancreatitis. No patient's identifiable data was collected. Case sheets which contains all the required details especially CRP, CT were used.
All the study variables including demographic, clinical and laboratory data was included in the proforma and apache score, ransons score, ct severity was calculated for each patient. Patients were categorized into mild, moderate and severe with the available information using clinical assessment, Ranson's scoring system, and serum CRP assays (CRP >9.6mg/dl in the 1st 48hours and Ranson's score of > or = 3 as cut-off). C-reactive protein was estimated by using latex agglutination test on the day of admission or the next day.

Statistical Analysis

Results were analyzed using SPSS version 25.0. Quantitative data was presented with the help of mean and standard deviation. Qualitative data was presented with the help of frequency and percentage table. Association was assessed with the help of Fisher test, student „t" test and Chi-square test. P value less than 0.05 is taken as significant.

RESULTS

Maximum patients were in the age group of 31-40 years 81 (35%) and least were in the age group of 18-20 years 12 (5%). Number of male patients were 138 (60%) and female were 92 (40%) as shown in table 1.

Demographic data		N (%)
Age (years)	18-20	12 (5)
	21-30	46 (20)
	31-40	81 (35)
	41-50	35 (15)
	51-60	30 (13)
	Above 61	26 (12)
Gender	Male	138 (60)
	Female	92 (40)

Table: 1 Demographic data of patients

The most common etiology was alcohol (85%) followed by gall stones (10%) , Cyst (3%) and viral infection (2%) as shown in figure 1.

DOI: 10.69605/ijlbpr_14.2.2025.73

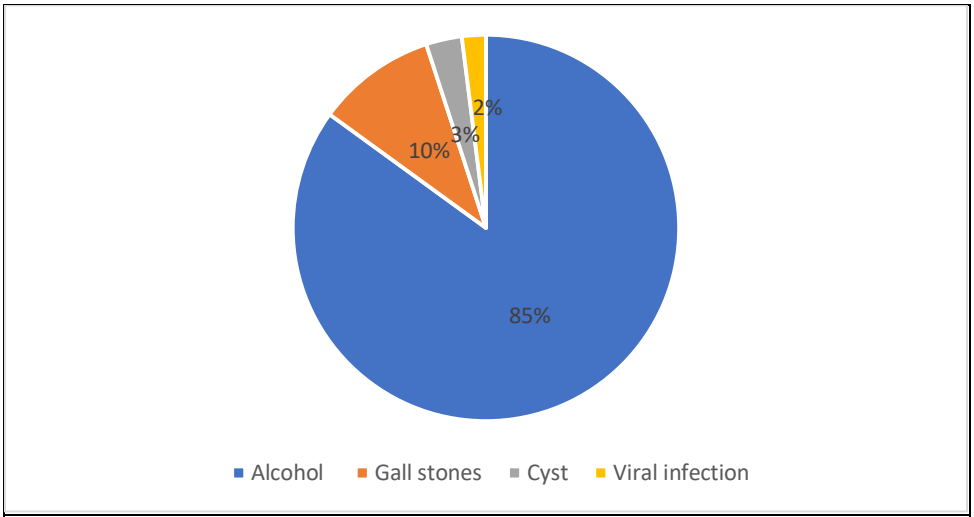

Figure: 1 Etiology of patients

Out of 230 patients 184 (80%) had ranson score <3 while 46 (20%) patients had score ≥3 as shown in table 2. 182 (78%) patients had CRP value <9.6 and 48 (22%) had CRP values ≥ 9.6 as shown in table 3.

Ranson's score	N (%)
<3	184 (80)
≥3	46 (20)

Table 2 Distribution of patients according to Ranson's score

CRP value	N (%)
<9.6	182 (78)
≥ 9.6	48 (22)

Table 3 Distribution of patients according to serum CRP levels of patients

Patients were classified on the basis of severity of disease and it was found that 60 (26%) were mild, 130 (56.5%) were moderate and 40 (17.5%) were sever as shown in table 4.

Classification	N (%)
Mild	60 (26.0)
Moderate	130 (56.5)
Severe	40 (17.5)

Table 4 Classification of patients on the basis of severity

11 (4.7%) patients died and 219 (95.3%) were discharged from hospital as shown in figure 2

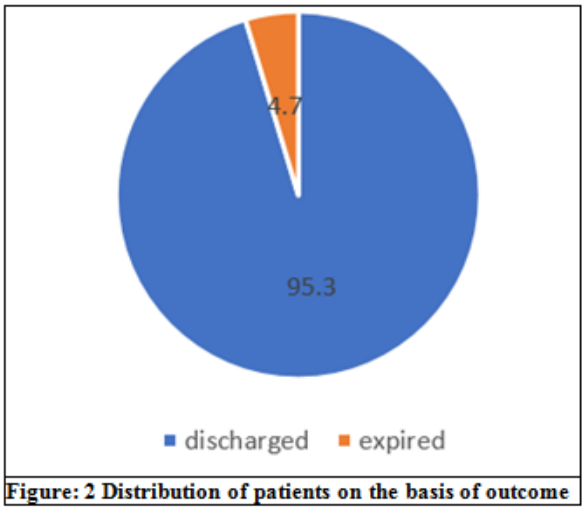

Figure: 2 Distribution of patients on the basis of outcome

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Sensitivity, specificity, PPV, NPV and accuracy values for Ranson score were 79.6%, 81%, 64.5%, 87.6% and 80.3% whereas for CRP were 86.7%,76.3%, 66.9%, 91.1% and 81.9% as shown in table 5.

Parameter	Sensitivity	Specificity	PPV	NPV	Accuracy
Ranson score	79.6%	81%	64.5%	87.6%	80.3%
CRP	86.7%	76.3%	66.9%	91.1%	81.9%

Table 5 Comparison of CRP values and Ranson core on the basis of sensitivity, specificity, PPV, NPV and accuracy

DISCUSSION

C-reactive protein (CRP) is a hepatic protein synthesised in response to inflammatory stimuli. Increased concentrations of CRP in the bloodstream may indicate inflammation and can assist in evaluating the severity of acute pancreatitis, a disorder marked by pancreatic inflammation. In acute pancreatitis, CRP levels are generally increased within the initial days following the beginning of symptoms. The concentrations of CRP can assist in categorising the severity of the illness. Elevated CRP levels are typically correlated with a more severe presentation of acute pancreatitis and may assist in informing treatment recommendations. It is important to acknowledge that CRP levels are not the sole criterion employed to evaluate the severity of acute conditions.[9,10]

The present study was conducted to evaluate the prognostic value of C-reactive protein in 230 patients of acute pancreatitis at a tertiary care centre in South India. The highest number of patients belonged to the age range of 31-40 years, totalling 81 (35%), while the lowest number was in the age group of 18-20 years, totalling 12 (5%). The number of male individuals was 138 (60%), whereas the number of female subjects was 92 (40%). Parmar et al. conducted a hospital-based study assessing C-reactive protein levels in acute pancreatitis using a semi-quantitative method and its correlation with prognosis. The study revealed that the majority of cases (54%) occurred in the 21-40 age group, followed by 24% of patients over 55 years of age, with an overall male to female ratio of 1.77:1. The predominant age group for females was 40 to 60 years. It was prevalent among females aged 50 to 60 years. [11] The study by Kaplan et al. examined the prognostic significance of the combination of platelet-lymphocyte ratio (PLR) and neutrophil-lymphocyte ratio (NLR) in patients diagnosed with acute pancreatitis and its correlation with mortality. Among the 142 patients, 84 were female (59.2%) and 58 were male (40.8%).9 The average age of the patients was 61.6 ± 17.4 years. [12]

In our study the most common etiology was alcohol (85%) followed by gall stones (10%) , Cyst (3%) and viral infection (2%). Contrary with our study's findings, Roberts et al. observed that 36.9% of patients identified gallstones as the primary aetiology of acute pancreatitis, followed by alcohol at 22.0%.[10] Similar to our study's findings, Sekimoto et al. stated that in the Japanese population, alcohol accounted for 37% of acute pancreatitis (AP), while the biliary system contributed 20%.[13] Similarly, Akhtar and Shaheen indicated that alcohol was the primary cause in 53% of patients.[14]

In our study patients were categorised according to disease severity, revealing that 60 (26%) were categorised as mild, 130 (56.5%) as moderate, and 40 (17.5%) as severe. 11 (4.7%) patients died, while 219 (95.3%) were discharged from the hospital. 182 (78%) patients had CRP value <9.6 and 48 (22%) had CRP values ≥ 9.6. Sensitivity, specificity, PPV, NPV and accuracy values for CRP were 86.7%,76.3%, 66.9%, 91.1% and 81.9%.

The study by Ustundag et al on C-reactive protein (CRP) for assessing the severity of acute pancreatitis (AP) utilising the Ranson scoring system indicated that patients in group 3 exhibited the highest accuracy (92%) in distinguishing between mild and severe forms of AP, compared to the other groups (Group 1: 80%, Group 2: 88%, and Group 4: 76%).Thirteen The conjunction of a Ranson score of ≥3 with a CRP level of ≥150 mg/dl in Group 3 was deemed more significant and precise than an elevation in CRP level alone in the context of pre-existing acute biliary or gallbladder inflammatory conditions. [15]

Sharma et al conducted a study to ascertain the correlation between CRP levels and the severity of acute pancreatitis, as well as the nature of the tissue response. Among 20 patients with acute pancreatitis, 12 exhibited severe disease with CRP levels ranging from 96 to 192 mg/l. In contrast, 7 patients with mild disease had CRP levels between 24 and 48 mg/l, while only 1 patient presented with a normal CRP level, defined as below 6 mg/l.[16]

The study by Gurleyik et al identified that a Ranson score of 4 or higher, an APACHE II score of 8 or higher, a baseline 1L-6, and a C-reactive protein level of 150 mg/l are significant predictors of acute pancreatitis. The levels of C-reactive protein at 24, 48, and 72 hours (p=0.02) were considerably elevated. The sensitivity was 83.3%, the specificity was 71%, and the accuracy was 73.3%.[17]

CONCLUSION

Acute pancreatitis is a critical illness characterized by a broad range of clinical manifestations. The role of diagnostic markers, such as pancreatic enzymes like amylase and lipase, as prognostic indicators has been unsatisfactory. Nonetheless, CRP has demonstrated encouraging outcomes as a predictive marker in

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previous trials. CRP levels can provide preliminary information into the ongoing inflammatory process. Further investigation into its significance is necessary to mitigate the mortality and morbidity linked to acute pancreatitis.

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