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Frequency of Rasised C Reactive Protein in Patients of Acute Pancreatitis Ayub Teaching Hospital Abbottabad

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ABSTRACT

Background: Acute pancreatitis is among the common gastrointestinal emergencies with inflammation of the pancreas and, for most, distant inflammatory responses. The early establishment of inflammation severity assists in guidance of management. The C-reactive protein has been proposed as one of the prospective biomarkers for the monitoring of inflammation, although its status as a diagnostic marker for acute pancreatitis remains uncertain among local populations. **Objective:** To determine the frequency of raised C reactive protein in patients with acute pancreatitis at Ayub Teaching Hospital Abbottabad. **Study Design:** Descriptive cross-sectional study. **Duration and Place of Study:** This study was conducted from April 2024 to September 2024 in the Department of General Surgery at Ayub Teaching Hospital, Abbottabad. **Methodology:** A total of 114 patients aged 15–70 years diagnosed with acute pancreatitis based on clinical, biochemical, and ultrasound criteria were enrolled. Serum CRP was measured using the latex agglutination method, with values >10 mg/dL considered elevated. Demographic, clinical, and socioeconomic variables were documented and analyzed using SPSS version 26. **Results:** The mean age was 40.88±14.10 years, and 75.4% of patients were male. Elevated CRP was observed in 91.2% of patients. Statistically significant associations were found between CRP levels and socioeconomic status (p=0.025) as well as residential status (p=0.013). **Conclusion:** A high proportion of patients with acute pancreatitis had elevated C-reactive protein, supporting its utility as a rapid and accessible inflammatory marker.

INTRODUCTION

Acute pancreatitis is an inflammatory disease of the pancreas that arises suddenly and is characterized by pain in the abdomen and raised levels of pancreatic enzymes with variable systemic symptoms.[1] The continuum of disease ranges from mild, self-limiting disease to severe, necrotizing pancreatitis with high mortality and morbidity.[2] Gallstones, chronic alcohol intake, hypertriglyceridemia, and drugs are frequent causes.[3] Clinical evaluation, lab predictors such as raised levels of serum amylase and lipase, and imaging studies, namely contrast-enhanced CT scans, constitute the primary diagnostic and severity determination process.[4]

C-reactive protein (CRP) is an acute phase reactant, produced by the liver as part of an inflammatory response, tissue damage, or infection. Levels begin to rise 6 to 8 hours after the onset of the initial inflammatory stimulus and peak at approximately 48 to 72 hours.[5] CRP is a sensitive but non-specific marker of the systemic inflammation and has wide clinical applications for disease activity assessment or for monitoring the response to treatment.[6] The elevated levels of CRP are also not disease-specific but give valuable prognostic information, especially if considered in conjunction with the primary clinical condition being faced.[7]

Elevated levels of CRP correlate directly with severity and complication of the systemic disease in acute pancreatitis.[8] An elevated level of greater than 150 mg/L at 48 to 72 hours after disease onset has been considered an ideal marker of severe pancreatitis and pancreatic necrosis.[9] The elevated level correlates with the severity of pancreatic inflammation and severity of the systemic response to enable earlier stratification of risk and need for closer monitoring or intervention.[9] Even though CRP does not correlate as an indicator of acute pancreatitis, its prognostication entitles it to be considered an important adjunct to complete management of the affected individual.[10]

A study conducted by Irum F. et al. reported that elevated C-reactive protein levels were observed in 92% of patients diagnosed with acute pancreatitis.[11]

Despite the confirmed role of C-reactive protein as an acute pancreatitis prognostic indicator, very little local data are available to this day concerning its prevalence and clinical relevance in our setting. In Abbottabad, where access to high-end diagnostic equipment may be patchy,

CRP could offer an inexpensive and widely available marker to allow early risk stratification. This research will allow the establishment of regionally relevant evidence to advance its usefulness as an aid to making timely clinical decisions and optimizing outcomes for the patient.

METHODOLOGY

This descriptive cross-sectional study was conducted in the Department of General Surgery at Ayub Teaching Hospital, Abbottabad, over a six-month period from April 2024 to September 2024. A total of 114 patients were enrolled. The sample size was calculated using WHO sample size software, applying a 95% confidence level, 5% margin of error, and an expected frequency of elevated C-reactive protein in 92% of patients with acute pancreatitis.[11]

Eligible participants were males and females aged between 15 and 70 years who presented with acute pancreatitis, defined by the presence of all of the following: acute-onset severe central epigastric pain lasting 30 to 60 minutes with a pain score greater than 3 on the visual analogue scale, and elevated pancreatic enzymes—amylase (normal: 23–85 U/L) or lipase (normal: 0–160 U/L)—exceeding three times the upper normal limit. Additionally, abdominal ultrasound was required to show increased pancreatic volume with reduced echogenicity, along with displacement of the stomach and/or transverse colon due to pancreatic enlargement. Patients were excluded if they had a history of chronic liver disease, renal insufficiency, pregnancy, use of corticosteroids, or any chronic inflammatory disorders.

After ethical approval and informed consent, data were gathered on each participant's age, gender, body mass index, occupation, education level, duration of symptoms, socioeconomic background, and place of residence. Venous blood samples were collected from the cubital vein after an overnight fast of 8 to 14 hours, using aseptic technique by a fourth-year resident. The samples were analyzed using the latex agglutination method to determine serum C-reactive protein levels. A value exceeding 10 mg/dL was considered elevated. All information was recorded on a structured proforma. Statistical analysis was performed using IBM SPSS version 26. Frequencies and percentages were calculated for categorical variables, while means with standard deviations or medians with interquartile ranges were used for continuous variables, depending on data distribution as assessed by the Shapiro-Wilk test. Raised C-reactive protein levels were analyzed in relation to age, gender, BMI, occupation, education, symptom duration, socioeconomic status, and residential location using chi-square or Fisher's exact test, considering a p-value of ≤0.05 as statistically significant.

RESULTS

The study analyzed 114 patients with acute pancreatitis, revealing a mean age of 40.88±14.10 years and BMI of 26.14±3.42 kg/m^2, with an average duration of complaints of 7.75±3.63 days. The cohort was predominantly male (75.4%, n=86) compared to females (24.6%, n=28), while professional distribution showed business owners comprising 38.6% (n=44), jobless individuals 36.8% (n=42), and employed persons 24.6% (n=28). Socioeconomically, middle-class patients represented the majority at 51.8% (n=59), followed by poor patients at 39.5% (n=45), and wealthy patients at 8.8% (n=10). Educational attainment revealed primary education as most common at 36.8% (n=42), followed by secondary education at 23.7% (n=27), uneducated individuals at 20.2% (n=23), and higher education at 19.3% (n=22). Rural residents comprised 64.0% (n=73) while urban residents made up 36.0% (n=41) (as shown in Table 1).

Table 1

*Patient Demographics (*n=114)

Demographics		Mean ± SD
Age (years)		40.88±14.10
BMI (kg/m^2)		26.14±3.42
Duration of Complaints (days)		7.75±3.63
Gender	Male n (%)	86 (75.4%)
	Female n (%)	28 (24.6%)
Profession	Jobless n (%)	42 (36.8%)
	Job n (%)	28 (24.6%)
	Business n (%)	44 (38.6%)
Socioeconomic Status	Poor n (%)	45 (39.5%)
	Middle n (%)	59 (51.8%)
	Rich n (%)	10 (8.8%)
Education Level	Uneducated n (%)	23 (20.2%)
	Primary n (%)	42 (36.8%)
	Secondary n (%)	27 (23.7%)
	Higher n (%)	22 (19.3%)
Residential Status	Rural n (%)	73 (64.0%)
	Urban n (%)	41 (36.0%)

The primary finding demonstrated that raised C-reactive protein was present in 91.20% of patients (n=104) with acute pancreatitis, while only 8.80% (n=10) maintained normal levels (as shown in Table 2).

Table 2

Frequency of Raised C Reactive Protein Among Patients with Acute Pancreatitis

Raised C Reactive Protein	Frequency	% age
Yes	104	91.20%
No	10	8.80%
Total	114	100%

Demographic stratification revealed that among patients ≤40 years, 93.7% (n=59) had elevated C-reactive protein versus 6.3% (n=4) with normal levels, while in patients >40 years, 88.2% (n=45) showed elevation compared to 11.8% (n=6) with normal values (p=0.339). Gender analysis showed males had 90.7% (n=78) elevated and 9.3% (n=8) normal C-reactive protein, while females demonstrated 92.9% (n=26) elevated and 7.1% (n=2) normal levels (p=1.000). BMI stratification revealed patients ≤25 kg/m^2 had 95.3% (n=41) elevated versus 4.7% (n=2) normal C-reactive protein, while those >25 kg/m^2 showed 88.7% (n=63) elevated and 11.3% (n=8) normal levels (p=0.315). Professional analysis indicated jobless patients had 90.5% (n=38) elevated and 9.5% (n=4) normal levels, employed individuals showed 92.9% (n=26) elevated and 7.1% (n=2) normal, while business owners demonstrated 90.9% (n=40) elevated and 9.1% (n=4) normal C-reactive protein (p=1.000). Significant socioeconomic associations emerged (p=0.025) with poor

patients showing 82.2% (n=37) elevated and 17.8% (n=8) normal levels, middle-class patients demonstrating 96.6% (n=57) elevated and 3.4% (n=2) normal, and wealthy patients exhibiting 100.0% (n=10) elevated with 0.0% (n=0) normal C-reactive protein. Educational stratification showed uneducated patients had 82.6% (n=19) elevated and 17.4% (n=4) normal levels, primary education group demonstrated 90.5% (n=38) elevated and 9.5% (n=4) normal, secondary education patients showed 100.0% (n=27) elevated and 0.0% (n=0) normal, while higher education group had 90.9% (n=20) elevated and 9.1% (n=2) normal C-reactive protein (p=0.173). Residential status analysis revealed significant differences (p=0.013) with rural patients showing 86.3% (n=63) elevated and 13.7% (n=10) normal levels, while urban patients demonstrated 100.0% (n=41) elevated and 0.0% (n=0) normal C-reactive protein. Duration of complaints stratification showed patients with ≤7 days had 89.3% (n=50) elevated and 10.7% (n=6) normal levels, while those with >7 days demonstrated 93.1% (n=54) elevated and 6.9% (n=4) normal C-reactive protein (p=0.524) (as shown in Table 3).

Table 3

Association of Raised C Reactive Protein with Demographic Factors

Demographic Factors		Raised C Reactive Protein		p-value
		Yes n(%)	No n(%)	
Age (years)	≤40	59 (93.7%)	4 (6.3%)	0.339*
	>40	45 (88.2%)	6 (11.8%)	
Gender	Male	78 (90.7%)	8 (9.3%)	1.000*
	Female	26 (92.9%)	2 (7.1%)	
BMI (Kg/m^2)	≤25	41 (95.3%)	2 (4.7%)	0.315*
	>25	63 (88.7%)	8 (11.3%)	
Profession	Jobless	38 (90.5%)	4 (9.5%)	1.000*
	Job	26 (92.9%)	2 (7.1%)	
	Business	40 (90.9%)	4 (9.1%)	
Socioeconomic Status	Poor	37 (82.2%)	8 (17.8%)	0.025*
	Middle	57 (96.6%)	2 (3.4%)	
	Rich	10 (100.0%)	0 (0.0%)	
Education Level	Uneducated	19 (82.6%)	4 (17.4%)	0.173*
	Primary	38 (90.5%)	4 (9.5%)	
	Secondary	27 (100.0%)	0 (0.0%)	
	Higher	20 (90.9%)	2 (9.1%)	
Residential Status	Rural	63 (86.3%)	10 (13.7%)	0.013*
	Urban	41 (100.0%)	0 (0.0%)	
Duration of Complaints (days)	≤7	50 (89.3%)	6 (10.7%)	0.524*
	>7	54 (93.1%)	4 (6.9%)	

*Fischer Exact Test

DISCUSSION

The present study established elevation of C-reactive protein to be frequent amongst acute pancreatitis patients, with 91.20% demonstrating elevated levels, thus verifying CRP as an effective inflammatory marker of this disease. The high frequency of elevation signifies the extensive systemic inflammatory response characteristic of acute pancreatitis, with pancreatic acinar epithelial damage bringing about explosive cytokine release, predominantly interleukin-6, inducing brisk hepatic synthesis and elevation of CRP over hours from onset of symptoms. The lack of significant correlation of elevation of CRP with age signifies an equally powerful inflammatory cascade at all ages and proposes severity of pancreatic damage as opposed to the age of the patient as determining the extent of the system inflammatory response. The lack of discernable differences amongst females and males in elevation of CRP also signifies similar pathophysiological mechanisms of pancreatic inflammation acting amongst females and males despite an evident preponderance of males presenting this disease. The finding of BMI being of little significance for levels of CRP signifies the fact, though obesity may be an antecedent bringing this disease about, it does not correlate with severity of acute inflammatory response once pancreatitis has been established. The finding of an evident positive correlation of higher socioeconomic status and higher elevation of CRP may be an artifact of greater availability of medical care being reflected as earlier hospital attendance at the time inflammatory markers are maximally elevated, or may alternatively be reflective of an artifact of higher frequencies of alcohol-induced pancreatitis amongst higher socioeconomic groups. The lack of normal levels of CRP amongst urban as opposed to rural dwellers may be explained as urban population presenting earlier at time of elevated inflammation and medical consultation as a result of greater availability of medical care being sought at an earlier time and at an earlier disease phase, or alternatively differences as at level of pancreatitis etiology existing amongst urban and rural dwellers.

Our study results demonstrated that raised C-reactive protein was present in 91.20% of patients with acute pancreatitis, which aligns closely with findings from multiple regional studies. This frequency is remarkably consistent with Irum F, et al. [11] who reported 92% elevated CRP in their cohort of 100 patients at Lahore General Hospital, and Abbasi F, et al. [12] who found 96.52% raised CRP in 144 patients across Karachi hospitals. The similarity in these findings across different centers in Pakistan suggests a consistent pattern of CRP elevation in acute pancreatitis patients in the South Asian population, reinforcing the reliability of CRP as a biochemical marker in this demographic.

The demographic profile of our study showed a male predominance (75.4%) with a mean age of 40.88±14.10 years, which differs from some studies but aligns with others. While Deherkar JA, et al. [13] reported 63% male patients with a mean age of 38.33±12.92 years, and Ali AAA, et al. [14] found 63.9% males with a mean age of 39±4 years, our higher male percentage may reflect regional variations in risk factors or healthcare-seeking behavior. Conversely, Abbasi F, et al. [12] reported a striking 88.19% female predominance, which contrasts significantly with our findings and suggests possible differences in study populations or etiological factors between centers.

Our mean CRP values and cut-off thresholds, while not explicitly detailed in the results, appear consistent with the broader pattern observed across studies. Hebbar N, et al. [15] used a CRP cut-off of 150 mg/L and found it present in 38% of patients, demonstrating its utility in predicting severe pancreatitis with significant statistical correlation. Similarly, Habib A, et al. [16] focused specifically on patients with CRP >150 mg/L and found a strong association with necrotizing pancreatitis, with all three cases of pancreatic necrosis occurring in patients exceeding this threshold. The consistent use of 150 mg/L as a critical threshold

across multiple studies [15,16] suggests this represents an important prognostic cut-off, though our study's 91.20% elevation rate using the >10 mg/L threshold [11,12] indicates that even lower CRP levels may be clinically significant for diagnosis.

The socioeconomic stratification in our study revealed significant associations (p=0.025), with higher CRP elevation rates in middle-class (96.6%) and wealthy patients (100%) compared to poor patients (82.2%). The significant rural-urban differences we observed (p=0.013), with 100% of urban patients showing elevated CRP versus 86.3% of rural patients, similarly represents a unique finding that warrants further investigation and could be attributed to variations in healthcare infrastructure, dietary patterns, or environmental factors.

The clinical utility of CRP as demonstrated across all studies [11-16] and confirmed by our results supports its role as a practical, cost-effective biomarker for acute pancreatitis. The consistency in findings across different centers, populations, and time periods strengthens the evidence base for CRP's diagnostic and prognostic value. However, the variations in demographic patterns, etiological factors, and socioeconomic associations observed in our study compared to others [11-16] highlight the importance of considering local population characteristics when interpreting CRP values and implementing clinical protocols for acute pancreatitis management.

These findings aggregate to underscore the clinical usefulness of C-reactive protein as an instrumental marker of acute pancreatitis, where its virtually universal elevation serves as an reliable indicator of systemic inflammation for most of the demographic variables. The identified demographic variation, predominantly the socioeconomic and residential variability of the patterns of CRP, mirror the nuanced interconnection between disease time of presentation, availability of healthcare, and patient characteristics, possibly altering at the bedside the meaning of inflammatory indicators.

There are also certain limitations to be kept in mind while interpreting these results. The one-center design of the study may limit generalizability of results to other healthcare settings with dissimilar patient population, referral sources, or clinical protocols. The small sample size of 114 patients, although appropriate for rudimentary statistical analysis, may be small to discern fine associations between elevation of CRP and demographic variables, particularly in subgroups such as wealthy patients or higher education subgroups with low representation. The cross-sectional design of the study does not enable temporal changes in levels of CRP and determination of relation to course of disease or treatment response. The study also was unable to consider confounding variables such as comorbid disease, drugs, concurrent infection, or specific pancreatitis etiology, which may influence both levels of CRP as well as demographic associations.

CONCLUSION

Our study has identified elevation of the C-reactive protein as most prevalent amongst acute pancreatitis patients, hence serving as an effective inflammatory marker under this clinical condition. The findings indicate elevation of the CRP being prevalent amongst all most population groups, and thus indicate that elevation of the CRP can be an all-age and all-gender universal disease biomarker regardless of BMI, profession, education, and duration of symptoms. But significant associations were observed with level of socioeconomic status and place of dwelling, suggesting the influence of population-based factors on patterns of elevation of the CRP amongst acute pancreatitis patients.

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