To Evaluate the Association of Various Parameters Associated with Severity of Acute Pancreatitis-A Prospective Observational Study

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Abstract
Acute pancreatitis (AP) presents with a broad spectrum of clinical manifestations and severity. While the majority of patients experience a moderate course that resolves spontaneously, approximately 20% of cases progress to a severe necrotizing form, characterized by organ failure and mortality rates ranging from 10% to 50%. A critical component of acute pancreatitis management is the accurate assessment of its severity. Current scoring methods often fail to identify individuals with severe illness, and the cost associated with generating these scores is substantial. Consequently, this study focused on identifying individual characteristics that may serve as early indicators of severe illness. Given the high incidence of acute pancreatitis admissions in this region, this topic was selected for investigation. The objective of this study was to examine the factors associated with the severity of acute pancreatitis. This prospective observational study aimed to evaluate the association of clinical, biochemical, and radiological parameters with the severity of acute pancreatitis. Conducted from August 2023 to September 2024 at the general surgery department of the PES Institute of Medical Sciences and Research in Andhra Pradesh, the study included eighty consecutive patients aged 18 to 68 years who presented with symptoms of acute pancreatitis. Diagnosis was based on clinical signs, biochemical markers, and radiological findings. The majority of cases (37.5%) were observed in individuals aged 40–50 years. In our study, 56 patients (70%) had mild acute pancreatitis, 15 (18.5%) had moderately severe acute pancreatitis, and 9 (11.25%) had severe acute pancreatitis. Alcohol consumption was identified as the cause in 56 patients (70%), while gallstone pancreatitis accounted for 14 cases (17.5%). Among the study population, 50 patients (62.5%) had diabetes, 32 (40%) had hypertension, and 40 (50%) had dyslipidemia, with diabetes mellitus being the most prevalent comorbidity. In terms of body mass index (BMI), 38 cases (47.5%) had a BMI between 18.5 and 24.9, 8 (10%) had a BMI over 30, and 34 (42.5%) had a BMI between 18.5 and 19.9. Notably, 56 participants (70%) reported a history of alcohol consumption. Effective treatment should not rely solely on a single grading system. Diagnosis of pancreatitis should be based on clinical, laboratory, and radiological assessments, with prompt initiation of vigorous crystalloid resuscitation and intensive care monitoring.

INTRODUCTION

Acute pancreatitis (AP) has a wide range of clinical manifestations and severity. The majority of patients get a moderate course that resolves spontaneously, while around 20% of patients experience a severe necrotizing form with organ failure and fatality rates ranging from 10% to 50%. Because of the risk of worsening and death, stratification of the severity of AP is critical[1-4]. Clinical evaluation, imaging evaluation [contrast-enhanced computed tomography (CECT), magnetic resonance imaging (MRI), and contrast-enhanced ultrasound (CEUS)], and testing of various biochemical markers[5-7] have all been used to predict the severity of AP and its outcome.

Imaging approaches have made major contributions to the severity staging and prognostic evaluation of AP. CECT is the most often used imaging technique for AP staging. The abdominal CECT scan has been utilised to identify the severity of AP, the amount of necrosis, fluid collections, pseudo cysts, abscesses, and the prognosis of clinical outcome[8-10]. Except for modified Ranson's criteria, the other scoring methods use the same severity score parameters independent of AP aetiology. The factors used to quantify severity in the modified Ranson scoring system differ depending on etiology[11]. The conditions for nongallstone-induced AP are more strict than for gallstone-induced AP. In practise, the majority of gallstone-induced AP patients have a modest clinical course. Depending on the aetiology, several risk factors may contribute to the severity of AP. Obesity, for example, is thought to be an independent risk factor for SAP[12,13], while there has been a contradicting report[14]. Patients with low body mass index (BMI) have worse clinical outcomes, particularly in Asian populations[15,16]. Alcoholism (42%) was shown to be the top aetiology in Indian subcontinent research, followed by gall stones (24%) and trauma (17%). The research also found that men had a higher incidence (75%), as did those in their 30s. Alcoholic pancreatitis was reported to cause severe attacks[17].

One of the most critical aspects of acute pancreatitis care is the determination of severity. such scoring methods fail to identify people with severe illness, and the cost of generating such ratings is also considerable. As a result, the study focused on individual characteristics that might provide early warning signs of patients developing severe illness, and since the number of admissions due to acute pancreatitis is large in this location, this issue was chosen for research. The purpose of this research was to look at the factors that are linked to the severity of acute pancreatitis.

Aims and Objectives: To evaluate the association of clinical, biochemical, and radiological parameters with the severity of acute pancreatitis.

1. To assess clinical parameters (age, gender, comorbidities, presenting symptoms) in relation to the severity of acute pancreatitis.
2. To correlate biochemical markers (serum amylase, lipase, CRP, hematocrit, serum calcium) with disease severity.
3. To evaluate radiological findings (CT severity index, presence of necrosis, fluid collections) in assessing the severity of acute pancreatitis.

MATERIALS AND METHODS

This prospective observational research was conducted from Aug 2023 to Sep 2024 at a general surgery department in PES institute of medical sciences and research at Andhra Pradesh. This research comprised 80 consecutive patients who arrived with symptoms of acute pancreatitis between the ages of 18 and 68 and were classified as having acute pancreatitis based on clinical signs, biochemical markers, and radiological signals.

Patients with chronic pancreatitis and those who did not want to participate in the trial were excluded. After a thorough history was taken using the proforma, all patients were thoroughly examined. They were then tested for haemoglobin, total leukocyte count, differential count, haematocrit, calcium, Blood urea nitrogen (BUN), arterial blood gas analysis, serum electrolytes, Random blood sugar (RBS), liver function tests, Lactate dehydrogenase (LDH), serum amylase, serum lipase, ultrasound abdomen, and contrast Computed tomography (CT) for those who were indicated. Individual factors in distinct prognosis scores for acute pancreatitis were explored. The two most often used scoring methods in our institution, Ranson's score and modified Glasgow score[11,17], were also examined.

Data collected were entered into Microsoft Excel and analyzed using SPSS version 22.0. Descriptive statistics, including means and percentages, were used to summarize the data. The outcomes were compared and analyzed to determine the effectiveness of the LIFT technique.

RESULTS AND DISCUSSIONS

During the research period, 80 patients of acute pancreatitis were admitted to the general surgery department, including 58 (72.5%) men and 22 (27.5%) women. The patients in our research ranged in age from 18 to 68 years old, with the youngest being 19 and the oldest being 68. Most instances (37.5%) were observed in people aged 40 to 50. (Table1)

In our research, 56 patients (70% of the total) had mild acute pancreatitis, 15 had moderately severe acute pancreatitis (18.5%), and 9 had severe acute pancreatitis (11.25%). (Table 2)

Most patients with acute pancreatitis in our research, 56 (70%), were caused by alcohol. 14 (17.5%)

Table 1: Age Distribution

Age (years)	Number of patients=80	Percentage
Below 30	6	7.5
30 to 40	19	23.75
40to 50	30	37.5
50 to 60	15	18.75
Above 60	10	12.5

Table 2: Type of Pancreatitis

Pancreatitis	Number of patients	Percentage
Mild acute pancreatitis	56	70
Moderately	Severe	Acute
Pancreatitis	15	18.75
Severe acute Pancreatitis	9	11.25

Table 3: Aetiology Distribution

Aetiology	Number of patients	Percentage
Alcohol induced	56	70
Gallstones	14	17.5
Idiopathic	5	6.25
Drugs	1	1.25
Post ERCP	1	1.25
Tumor	2	2.50

Table 4: BMI and Pulse rate of the patients

Pancreatitis	BMI of the patients	Pulse rate
Mild acute pancreatitis	25.47±0.21	85.31±1.11
Moderately	Severe	Acute
Pancreatitis	29.54±0.62	94.16±3.34
Severe acute Pancreatitis	29.87±1.67	106.84±4.12

of the cases were due to gallstone pancreatitis. The remainder was accounted for by drugs, tumours, Post Endoscopic Retrograde Cholangiopancreatography (ERCP), and hypertriglyceridemia (Table 3). In our research, 50 patients (62.5%) had diabetes, 32 (40%) had hypertension, and 40 (50%) had dyslipidaemia. Diabetes mellitus was the most common co-morbidity in the study population. In our analysis, 38 instances (47.5%) had a BMI between 18.5 to 24.9, 8 (10%) had a BMI more than 30, and 34 (42.5%) had a BMI between 18.5 and 19.9. The majority of the 56 instances (70%) who presented had a drinking habit. In our research, 4 (5%) individuals died as a result of severe acute pancreatitis complications. One was caused by acute respiratory distress syndrome (ARDS), while the other was caused by multi-organ failure.

The mean BMI for those with mild acute pancreatitis was 25.470.21 (standard error (SE)), 29.540.62 for those with moderately severe acute pancreatitis, and 29.871.67 for those with severe acute pancreatitis. The ANOVA test revealed a significant variation in mean BMI values across mild, moderate, and severe acute pancreatitis, with F value of 17.79 and p value of 0.001 (significant) among individuals with hypertension. Hypertension was shown to be statistically significant after analysis, with a Pearson Chi-square test value of 9.87, a df of 2, and a p value of 0.005.

In our research, individuals with diabetes mellitus got more severe illness. With a Pearson Chi-square test score of 9.06, a degree of freedom (df) of 2, and a p value of 0.015, it was determined to be statistically significant. In our research, mild pancreatitis had a mean pulse rate of 85.311.11 (SE), moderately severe pancreatitis had a mean pulse rate of 94.163.34, and

severe acute pancreatitis had a mean pulse rate of 106.844.12. The ANOVA test revealed a significant difference in mean pulse rate values for mild, moderate, and severe pancreatitis, with a F value of 14.59 and a p value of 0.001 (significant)(Table 4).

With a Pearson Chi-square value of 24.87, df of 4, and a p value of 0.001 (significant), there was statistical relevance between systolic blood pressure (BP) score and severity in our research. In our research, there was statistical significance between respiratory rate and severity, with a Pearson Chi-square value of 21.78, df of 4, and a p value of 0.001 (significant).

In our research, the mean total count for mild acute pancreatitis was 12875384.21 (SE), 168711096.07 for moderately severe pancreatitis, and 173622874.21 for severe pancreatitis. With a F value of 10.01 and a p value of 0.001, the ANOVA test revealed a significant difference in mean total count values in mild, moderate, and severe pancreatitis. With a Pearson Chi-square value of 38.12, df of 2, and a p value of 0.001 (significant), there was statistical significance between BUN and severity. Our research found statistical significance between base deficiency and pancreatitis severity, with a Pearson Chi-square value of 57.03, df of 4, and p value of 0.001 (significant).

During the research period, 80 patients with acute pancreatitis were admitted to the general surgery department, comprising 58 males (72.5%) and 22 females (27.5%). The participants in our study were aged between 18 and 68 years, with the youngest at 19 and the oldest at 68.

Most occurrences (37.5%) were noted in individuals aged 40 to 50. Our research indicated that 56 individuals (70% of the total) experienced mild acute pancreatitis, 15 patients had moderately severe acute pancreatitis (18.5%), and 9 patients presented with severe acute pancreatitis (11.25%). In our study, the predominant aetiology of acute pancreatitis among patients was alcohol, accounting for 56 cases (70%). Gallstone pancreatitis constituted 14 instances (17.5%), aligning with Rithin *et al*.'s study, which reported a mean age of 40.9 years and identified alcohol as a predominant aetiology in 72% of the patients[18]. Baig et al. observed analogous findings, indicating that alcohol consumption was responsible for 41.14% of cases, with gallstones following. In contrast, research conducted outside India by Maher et al. demonstrated that 51.7% of cases were linked to gallstones and 48.3% to alcohol[19,20]. Bota et al. reported that 41.6% of cases were attributable to gallstones, whereas 37.1% were due to alcohol intake.

Our research indicated that 56 patients (70% of the total) experienced mild acute pancreatitis, 15 patients (18.5%) had moderately severe acute pancreatitis, and 9 patients (11.25%) suffered from severe acute pancreatitis. Both resulted from

complications of pancreatitis, including ARDS and multi-organ failure. The death rate in Bota *et al*.'s research was 4.6%, whereas in Simoes et al.'s study it was 5.7%[17,21]. The predominant aetiology observed in our study was alcohol (70%), followed by gallstones (17.5%).

Our analysis revealed that systolic blood pressure and creatinine levels correlated with sickness severity as delineated by the revised Atlanta classification [22]. The total count was likewise substantial, corroborating the findings of study conducted by Maher et al. [20] Serum amylase, serum lipase, LDH, CRP, creatinine, total count, arterial pH, serum calcium, and a decrease in haematocrit exhibited a strong correlation with the severity of pancreatitis, whereas liver function tests, excluding Aspartate aminotransferase (AST), along with serum sodium, serum potassium, RBS, platelet count, and haemoglobin, demonstrated no significant correlation. This aligned with the results of the Maher *et al*. study[20]. A significant correlation with CRP was also identified in a study conducted by Campos *et al*.[23]

A CT scan is not conducted on every patient with pancreatitis. However, CTSI is regarded as the gold standard for imaging in acute pancreatitis[24]. In our investigation, CT scan indicated a substantial connection with illness severity. The use of CECT is limited by radiation exposure and repeated scans to monitor progress and problems. It raises the possibility of allergic responses to IV contrast. Furthermore, contrast cannot be employed in individuals with renal failure. In our investigation, CT scans were performed on 12 patients, two of whom had peripancreatic inflammation with necrosis less than 30% and one had peripancreatic inflammation with solitary fluid collection. None of them had infected necrosis. In our research cases, no surgical intervention was performed. CTSI was associated with severity, which is consistent with the findings of Simoes *et al*.[17]

The presence of pleural effusion on a chest x-ray was shown to have a strong connection with severity. In our research, pleural effusion was seen in 6 of 9 instances of severe acute pancreatitis and 9 of 15 cases of moderately severe pancreatitis. This correlates the occurrence of pleural effusion with severity, which is consistent with the findings of Maher *et al*.[20]

CONCLUSION

One should not wait for any single scoring system to get scored for effective treatment. A diagnosis of pancreatitis should be made using clinical, laboratory and radiological means and treatment in the form of aggressive crystalloid resuscitation should be started with intensive care monitoring at the earliest.

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