

## A Prospective Observational Assessment of Parameters Associated with Severity of Acute Pancreatitis

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### Abstract

**Aim:** The aim of this study was to study the various predictors of severity know the association of the parameters with severity of disease.

**Methods:** All consecutive cases admitted to the surgical wards of Department of General Surgery, Fort U Mediemergency Hospital, Patna, Bihar, India for a period of 18 months were studied. All consecutive patients were included in the study. A prospective observational study was carried out on 100 consecutive patients who were presented with features of acute pancreatitis between 20-80 years age group.

**Results:** During the study period 100 cases of acute pancreatitis were admitted in general surgery department, out of which 70 (70%) were males and 30 (30%) were females. Age of the patient in our study varied from 20 to 80 years, the youngest being 25 years and oldest being 80 years. Majority cases were seen in between 41 to 50 years 40 (40%). In our study the 75 cases were mild acute pancreatitis (75%), 15 cases were moderately severe acute pancreatitis (15%) and 10 cases severe acute pancreatitis (10%). In our study the majority of cases who presented with acute pancreatitis were of alcohol induced type, 65 (65%). Gall stone pancreatitis accounted for 20 (20%) cases.

**Conclusion:** Hence, from our study the following parameters were indicative of a severe disease and prompt treatment in terms of aggressive fluid resuscitation and supportive measures should be initiated at the time of admission. And one should not wait for any single scoring system to get scored for effective treatment.

**Keywords:** Acute pancreatitis, Severity of pancreatitis, Predictors of severity of pancreatitis

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### Introduction

Acute pancreatitis is an acute inflammatory process of the pancreatic gland. According to the Atlanta classification system, there are two forms of acute pancreatitis: mild acute pancreatitis, characterized by interstitial

edema, which is self-limiting and severe acute pancreatitis characterized by local complications such as necrosis, abscesses, pseudocysts and the presence of organ dysfunction. [1] The mortality due to severe pancreatitis is about 25%-50% and

is due mainly to infection of the necrosis. [2] Early identification of patients with severe acute pancreatitis is essential for the correct care of the disease and the avoidance of complications.

Acute pancreatitis can be a diagnostic challenge given the nonspecific nature of the symptoms and widely varying results of investigations. The diagnosis typically involves a combination of history and examination, abnormal laboratory investigations and radiological evidence of pancreatic inflammation. [3]

About (15-25) % of AP changed into SAP over time. One study shows that the death rate decreased from 12% to 2% from 1988 to 2003 in the USA but remains high in other place. [4] Determining severity can guide the mode of treatment and prevent death. The severity of pancreatitis are determined by history, physical examination, laboratory, markers, and radiological examinations; these parameters including grading system has been developed to determine the severity of pancreatitis [5], among this grading system few test are specific when done at the time of admission while others are done at (48-72) hours or later. These systems have low specificity together with low prevalence give poor predictive values. [6] For better predictive values biomarkers, genetic polymorphisms and mutations, and proteomic and metabolomic patterns should be included. [7]

The disease may occur at any age, with a peak in the young males and the older females. The mortality has remained unaltered at 10-15 percent over the past 20 years. About one-third of patients die in the early phase of an attack from multiple organ failure, while deaths occurring after the first week of onset are due to infective complications. [8] Eighty percent of patients will have a mild attack of pancreatitis in which the mortality is around 1 percent, while in those who have a severe attack of pancreatitis the mortality

varies from 20 to 50 percent. The two major causes of acute pancreatitis are biliary calculi, which occurs in 50-70 percent of patients, and alcohol, which occurs in 25 percent. The remaining cases may be due to rare causes or be idiopathic. [9] The studies done in Indian subcontinent revealed the leading aetiology as alcoholism (42%) followed by gall stones (24%) and trauma (17%). The study also showed more incidence in males (75%) and more in the age of 30s. The attacks were found to be severe in those with alcoholic pancreatitis. [10]

The aim of this study was to study the various predictors of severity know the association of the parameters with severity of disease.

### Materials and Methods

All consecutive cases admitted to the surgical wards of Department of General Surgery, Fort U Mediemergency hospital, Patna, Bihar, India for a period of 18 months were studied. All consecutive patients were included in the study. A prospective observational study was carried out on 100 consecutive patients who were presented with features of acute pancreatitis between 20-80 years age group.

### Inclusion criteria

- All the patients diagnosed as acute pancreatitis on the basis of clinical signs, biochemical markers and radiological signs.

### Exclusion criteria

- patients not willing to be included in the study and cases of chronic pancreatitis.

### Methodology

Patients who were having chronic pancreatitis and those who didn't wish to be included in the study were excluded from the study. All patients were properly examined after a detailed history taking using the proforma. Then, they were

investigated by various blood investigations like 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 indicated. Various variables included in different prognostic scores for acute pancreatitis were studied individually. The two commonly used scoring systems in

our institution were also analysed viz. Ranson's score and modified Glasgow score.<sup>6,7</sup>

#### Statistical analysis

Data obtained was complied with Microsoft excel. Finally, all these variables were correlated with the severity of the disease to find out the association and significance using appropriate statistical methods like Pearson Chi-square test, ANOVA and Kruskal Wallis test.

#### Results

**Table 1: Age distribution**

Age (years)	N (%)
20 to 30	10 (10%)
31 to 40	20 (20%)
41 to 50	40 (40%)
51 to 60	16 (16%)
>60	14 (14%)

During the study period 100 cases of acute pancreatitis were admitted in general surgery department, out of which 70 (70%) were males and 30 (30%) were females. Age of the patient in our study varied from 20 to 80 years, the youngest being 25 years and oldest being 80 years. Majority cases were seen in between 41 to 50 years 40 (40%).

**Table 2: Aetiology distribution**

Aetiology	N (%)
Alcohol induced 52 65.0	65 (65%)
Gallstones 17 21.3	20 (20%)
Idiopathic 6 7.5	7 (7%)
Drugs 1 1.3	2 (2%)
Post ERCP 1 1.3	2 (2%)
Tumor 2 2.5	2 (2%)
Hypertriglyceridemia 1 1.3	1 (1%)

In our study the 75 cases were mild acute pancreatitis (75%), 15 cases were moderately severe acute pancreatitis (15%) and 10 cases severe acute pancreatitis (10%). In our study the majority of cases who presented with acute pancreatitis were

of alcohol induced type, 65 (65%). Gall stone pancreatitis accounted for 20 (20%) cases. Drugs, tumours, Post Endoscopic retrograde cholangiopancreatography (ERCP) and hypertriglyceridemia accounted for the rest.

**Table 3: Mean BMI in the different types of pancreatitis**

Types of pancreatitis	Mean BMI	F value	P value
Mild acute pancreatitis	23.97±0.36	18.157	0.001
Moderately severe acute pancreatitis	27.93±0.65		
Severe acute pancreatitis	29.01±1.62		

The mean BMI in those with mild acute pancreatitis was  $23.97 \pm 0.36$  (Standard error (SE)), moderately severe acute pancreatitis was  $27.93 \pm 0.65$  and severe acute pancreatitis was  $29.01 \pm 1.62$ . The

difference in mean values of BMI across mild, moderate and severe acute pancreatitis with F value of 18.157 and p value of 0.001 was found to be significant.

**Table 4: Comparison of pulse rate, total count and serum lipase with severity showing significant differences in mean values**

Types of pancreatitis	Mean Pulse Rate	F value	P value
Mild acute pancreatitis	$83.40 \pm 1.14$	17.352	0.001
Moderately severe acute pancreatitis	$92.50 \pm 3.51$		
Severe acute pancreatitis	$106.00 \pm 4.32$		
Types of pancreatitis	Mean total count	F value	P value
Mild acute pancreatitis	$12671 \pm 374.03$	10.538	0.001
Moderately severe acute pancreatitis	$16492 \pm 1142.74$		
Severe acute pancreatitis	$16916 \pm 2036.73$		
Types of pancreatitis	Mean serum lipase	F value	P value
Mild acute pancreatitis	$5567 \pm 509.30$	10.352	0.007
Moderately severe acute pancreatitis	$8610 \pm 875.215$		
Severe acute pancreatitis	$8961.50 \pm 788.224$		

In our study the mean pulse rate in mild pancreatitis was  $83.40 \pm 1.14$  (SE), moderately severe pancreatitis was  $92.50 \pm 3.51$  and severe acute pancreatitis was  $106.00 \pm 4.32$ . The result showed significant difference in mean values of pulse rate across mild, moderate and severe pancreatitis with an F value of 17.351 and p value of 0.001. In our study the mean total count for mild acute pancreatitis was  $12671 \pm 374.03$  (SE), moderately severe pancreatitis was  $16492 \pm 1142.74$  and severe pancreatitis was  $16916 \pm 2036.73$ . The result showed significant difference in mean values of total count in mild, moderate and severe pancreatitis with an F value of 10.538 and p value of 0.001 (significant). In our study the mean value of serum lipase for mild acute pancreatitis was  $5567 \pm 509.30$  (SE), moderately severe pancreatitis was  $8610 \pm 875.215$  and severe pancreatitis was  $8961.50 \pm 788.224$ . Kruskal Wallis test was used to compare the value of serum lipase with mild, moderate and severe pancreatitis and was found to be significant with F value of 10.352 and p value of 0.007 (significant). In our study two patients had peripancreatic

inflammation with necrosis less than 33% and one had peripancreatic inflammation with single fluid collection. None had infected necrosis.

### Discussion

Acute pancreatitis is defined as an acute condition presenting with abdominal pain and usually associated with raised pancreatic enzyme levels in the blood or urine as a result of inflammatory disease of the pancreas. [11] Acute pancreatitis can recur and it accounts for 3 percent of all cases of abdominal pain admitted to hospital in the UK. [12] The severity of acute pancreatitis differs widely, ranging from mild cases in whom short-time remission is achieved to severe cases that are accompanied by fatal complications such as shock, organ failure and/or sepsis with infected pancreatic necrosis. The severity of acute pancreatitis is also closely associated with the validity of treatment selection. The assessment of severity at the initial medical examination plays a useful role in terms of the criteria for introducing adequate early treatment and for the transfer of patients to a medical

facility that can cope with severe acute pancreatitis.

In this study on 100 patients, acute pancreatitis was found more commonly in males (70%) than in females with a mean age of 45.78 years and with alcohol being the most common aetiology (65%), in agreement with a study by Rithin et al in which the mean age was 40.9 years and alcohol being common aetiology in 72% of the patients. [13] Similar results were mentioned by Baig et al, in which alcoholism accounted for 41.14% of cases forming the majority followed by gall stones contrary to the studies outside India which showed 51.7% cases due to gall stones and 48.3% cases due to alcohol in a study conducted by Maher et al. [14,15] In a study by Bota et al 41.6% cases were due to gall stones and 37.1% cases were due to alcohol consumption. [16] Among the various aetiologies encountered in our study, alcohol was the most common (65%) followed by gall stones (20%).

Laboratory parameters like serum lipase, total count and fall in hematocrit correlated well with the severity of pancreatitis, while liver function tests other than Aspartate aminotransferase (AST), serum sodium, serum potassium, RBS, platelet count and hemoglobin had no significant correlation with the severity of the disease. This was in agreement with the study conducted by Maher et al. [15] Presence of pleural effusion in chest x-ray showed significant correlation with severity. In our study 5 out of 6 cases of severe acute pancreatitis and 8 out of 14 cases of moderately severe pancreatitis showed pleural effusion. This shows significance of presence of pleural effusion with severity which was in agreement with the study of Maher et al. [15]

USG abdomen showed significant correlation with severity. It is better than CT scan in detection of gall stones. [17] Ultrasonogram is the most sensitive modality in evaluating the biliary tree and gall bladder. [18] Among the cases, 75

were mild acute pancreatitis (75%), 15 were moderately severe acute pancreatitis (17.5%) and 10 were severe acute pancreatitis (10%). We had mortality of 2 patients who developed severe pancreatitis. Both were due to complications of pancreatitis viz. ARDS and multi organ failure. The mortality rate in the study by Bota et al was 4.6% and that in a study by Simoes et al was 5.7%. [16,19]

CT scan is not routinely done for all pancreatitis patients. But CTSI is considered to be the gold standard for imaging in acute pancreatitis. [20] In our study CT scan showed significant correlation with severity of the disease. Exposure to radiation and multiple scans to assess progress and complications are limitations in the use of CECT. It carries a risk of anaphylactic reactions to IV contrast. Moreover, contrast cannot be used in patients with renal insufficiency.

In our study systolic BP score and creatinine score showed significance with the severity of disease as mentioned in the revised Atlanta classification. [21,22,23] Significance was also seen with total count and was in agreement with a study by Maher et al. [15]

### Conclusion

Hence, from our study the following parameters were indicative of a severe disease and prompt treatment in terms of aggressive fluid resuscitation and supportive measures should be initiated at the time of admission. And one should not wait for any single scoring system to get scored for effective treatment. An individual in the older age group with associated co-morbidities like diabetes or hypertension and presence of fever, tachycardia, tachypnoea, guarding, low mean arterial pressure (MAP), low systolic BP score at the time of admission should be treated as severe disease and strictly monitored in the intensive care unit. CT scan is a very good modality to assess

severity but in the initial stages of disease the sensitivity is very less. Hence these clinical findings and blood investigations should be kept in mind while assessing the severity of disease rather than using any single scoring system for predicting severity.

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