

A Hospital Based 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, for a period of 24 months were studied. All consecutive patients were included in the study. A prospective observational study was carried out on 200 consecutive patients who were presented with features of acute pancreatitis between 20-80 years age group.

Results: Age of the patient in our study varied from 20 to 80 years, the youngest being 26 years and oldest being 80 years. Majority cases were seen in between 41 to 50 years 88 (44%). In our study the 144 cases were mild acute pancreatitis (72%), 32 cases were moderately severe acute pancreatitis (16%) and 24 cases severe acute pancreatitis (12%). In our study the majority of cases who presented with acute pancreatitis were of alcohol induced type, 144 (72%). Gall stone pancreatitis accounted for 40 (20%) cases. Drugs, tumours, Post Endoscopic retrograde cholangiopancreatography (ERCP) and hypertriglyceridemia accounted for the rest. The mean BMI in those with mild acute pancreatitis was 25.95±0.35 (Standard error (SE)), moderately severe acute pancreatitis was 28.96±0.68 and severe acute pancreatitis was 29.01±1.66. The difference in mean values of BMI across mild, moderate and severe acute pancreatitis with F value of 19.161 and p value of 0.001 was found to be significant.

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 characterized as a sudden onset of stomach discomfort and typically accompanied by elevated levels of pancreatic enzymes in the blood or urine, which arise from inflammatory processes affecting the pancreas. [1] The condition has the potential to manifest at any stage of life, with a higher incidence among young boys and older females. The death rate has stayed constant at a range of 10-15 percent over the course of the last two decades. Approximately 33% of patients experience mortality during the initial stage of an attack as a result of multiple organ failure, whereas fatalities that occur beyond the first week following commencement are primarily attributed to infective consequences. [2] Approximately 80% of patients will experience a moderate episode of pancreatitis, with a death rate

of approximately 1%. Conversely, patients who suffer from a severe episode of pancreatitis face a mortality rate ranging from 20% to 50%. Acute pancreatitis is mostly attributed to two major etiological factors, namely biliary calculi, which manifest in approximately 50-70 percent of patients, and alcohol consumption, which accounts for approximately 25 percent of cases. The other instances could perhaps be attributed to uncommon etiologies or classified as idiopathic. [3]

Acute pancreatitis (AP) is an illness that can be life-threatening and has a range of severity in its presentation. The updated Atlanta categorization system has categorized acute pancreatitis (AP) into three distinct levels of severity: mild, moderate, and severe. The majority of acute pancreatitis

episodes, exceeding 80%, are characterized as mild and self-limiting, ultimately resolving without significant consequences. In a subset of instances, specifically 20% of cases, the condition might manifest as severe and give rise to significant morbidity or fatality. [4] The diagnosis of acute pancreatitis might provide a challenge due to the non-specific character of the symptoms and the diverse outcomes of investigative procedures. The diagnostic process normally entails a comprehensive assessment that includes a thorough evaluation of the patient's medical history, physical examination, analysis of laboratory test results indicating abnormalities, and the identification of radiographic evidence indicating inflammation in the pancreas. [6,7] The objective of this study was to examine the different predictors of illness severity and assess the relationship between these factors and the severity of the disease.

Methods

All consecutive cases admitted to the surgical wards of Department of General Surgery, Government Medical College, Bettiah, Bihar, India for a period of 24 months were studied. All consecutive patients were included in the study. A prospective observational study was carried out on 200 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. [8,9] 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 and gender distribution

Gender	N (%)
Male	144 (72)
Female	56 (28)
Age (years)	
20 to 30	22 (11%)
31 to 40	40 (20%)
41 to 50	88 (44%)
51 to 60	30 (15%)
>60	20 (10%)

During the study period 200 cases of acute pancreatitis were admitted in general surgery department, out of which 144 (72%) were males and 56 (28%) were females. Age of the patient in our study varied from 20 to 80 years, the youngest being 26 years and oldest being 80 years. Majority cases were seen in between 41 to 50 years 88 (44%).

Table 2: type of pancreatitis and aetiology distribution

Types of pancreatitis	N (%)
Mild pancreatitis	144 (72%)
Moderate pancreatitis	32 (16%)
Severe pancreatitis	24 (12%)
Aetiology	
Alcohol induced	130 (65%)
Gallstones	40 (20%)
Idiopathic	10 (5%)
Drugs	6 (3%)

Post ERCP	6 (3%)
Tumor	5 (2.5%)
Hypertriglyceridemia	3 (1.5%)

In our study the 144 cases were mild acute pancreatitis (72%), 32 cases were moderately severe acute pancreatitis (16%) and 24 cases severe acute pancreatitis (12%). In our study the majority of cases who presented with acute pancreatitis were

of alcohol induced type, 144 (72%). Gall stone pancreatitis accounted for 40 (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	25.95±0.35	19.161	0.001
Moderately severe acute pancreatitis	28.96±0.68		
Severe acute pancreatitis	29.01±1.66		

The mean BMI in those with mild acute pancreatitis was 25.95±0.35 (Standard error (SE)), moderately severe acute pancreatitis was 28.96±0.68 and severe acute pancreatitis was 29.01±1.66. The difference in mean values of BMI across mild, moderate and severe acute pancreatitis with F value of 19.161 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	84.46±1.16	18.356	0.001
Moderately severe acute pancreatitis	93.47±3.57		
Severe acute pancreatitis	107.00±4.36		
Types of pancreatitis	Mean total count	F value	P value
Mild acute pancreatitis	12636±376.04	10.540	0.001
Moderately severe acute pancreatitis	16486±1142.78		
Severe acute pancreatitis	16916±2036.73		
Types of pancreatitis	Mean serum lipase	F value	P value
Mild acute pancreatitis	5536±509.30	10.360	0.007
Moderately severe acute pancreatitis	8612±875.220		
Severe acute pancreatitis	8961.50±788.224		

In the present study, the average pulse rate was determined for different severity levels of pancreatitis. Specifically, the mean pulse rate for mild pancreatitis was found to be 84.46±1.16 (SE), while for moderately severe pancreatitis it was 93.47±3.57, and for severe acute pancreatitis it was 107.00±4.36. The findings indicated a notable disparity in the average pulse rates among individuals with mild, moderate, and severe pancreatitis, as evidenced by a F value of 18.356 and a p value of 0.001. In the present investigation, the average total count for mild acute pancreatitis was determined to be 12636±376.04 (standard error). Similarly, the total count for moderately severe pancreatitis was found to be 16916±2036.73, while the count for severe pancreatitis was also determined to be 16916±2036.73. The findings revealed a statistically significant variation in the average total count across patients with mild, moderate, and severe pancreatitis, as indicated by a F value of 10.540 and a p value of 0.001 (indicating significance). In the present investigation, the average serum lipase levels for mild acute pancreatitis were determined to be 5567±509.30

(SE), whereas for moderately severe pancreatitis, the mean value was found to be 8610±875.215. Additionally, for severe pancreatitis, the mean serum lipase level was observed to be 8961.50±788.224. The Kruskal-Wallis’s test was employed to compare the serum lipase levels across individuals with mild, moderate, and severe pancreatitis. The test yielded a significant result, as shown by a F value of 10.360 and a p value of 0.007.

Discussion

Acute pancreatitis refers to a sudden onset of inflammation in the pancreatic gland. Based on the Atlanta classification system, acute pancreatitis can be categorized into two distinct forms: mild acute pancreatitis, which is characterized by the presence of interstitial edema and is self-limiting in nature, and severe acute pancreatitis, which is distinguished by the occurrence of local complications such as necrosis, abscesses, pseudocysts, and the manifestation of organ dysfunction. [10] The death rate associated with severe pancreatitis ranges from 25% to 50%, primarily attributed to necrosis-related infections.¹

The timely detection of individuals with severe acute pancreatitis is imperative for the appropriate management of the condition and the prevention of associated consequences. The diagnosis of acute pancreatitis might provide a challenge due to the non-specific character of the symptoms and the diverse outcomes of investigative procedures. The diagnostic process normally entails a comprehensive assessment that incorporates a thorough patient history and physical examination, as well as the analysis of aberrant test findings and radiographic data indicating inflammation of the pancreas. [5]

During the designated research period, a total of 200 cases of acute pancreatitis were admitted to the general surgery department. Among these cases, 144 (72%) were identified as males, while the remaining 56 (28%) were identified as females. The age range of participants in our study spanned from 20 to 80 years, with the youngest participant being 26 years old and the oldest participant being 80 years old. The majority of instances were observed within the age range of 41 to 50 years, accounting for 88 cases, or 44% of the total. In the present study, a total of 144 cases were identified as mild acute pancreatitis, accounting for 72% of the sample. Additionally, 32 cases (16%) were classified as moderately severe acute pancreatitis, while 24 instances (12%) were categorized as severe acute pancreatitis. In our research, a significant proportion of the observed instances of acute pancreatitis were classified as alcohol-induced, accounting for 144 cases or 72% of the total sample. Gallstone pancreatitis was responsible for 40 instances, or 20% of the total. The remaining factors contributing to the cases included in this study included drug use, tumors, Post Endoscopic retrograde cholangiopancreatography (ERCP), and hypertriglyceridemia. These findings align with a previous study conducted by Rithin et al, which reported a mean age of 40.9 years and identified alcohol as the predominant cause in 72% of the patients. [11] Baig et al. reported comparable findings, indicating that alcoholism constituted the majority of instances at 41.14%, followed by gall stones. This contrasts with studies conducted outside of India, such as the one conducted by Maher et al., which revealed that gall stones accounted for 51.7% of cases, while alcohol was responsible for 48.3% of cases. [12,13] According to a study conducted by Bota et al, 41.6% of the cases analyzed were attributed to gall stones, whereas 37.1% of the cases were linked to alcohol intake. [14]

The average body mass index (BMI) among individuals with mild acute pancreatitis was recorded as 25.95 ± 0.35 (standard error (SE)). For those with moderately severe acute pancreatitis, the mean BMI was 28.96 ± 0.68 , while individuals with

severe acute pancreatitis had a mean BMI of 29.01 ± 1.66 . A statistically significant difference in the mean values of BMI was seen among individuals with mild, moderate, and severe acute pancreatitis, as shown by a F value of 19.161 and a p value of 0.001. In the present study, the average pulse rate was determined for different severity levels of pancreatitis. Specifically, the mean pulse rate for mild pancreatitis was found to be 84.46 ± 1.14 (standard error), while for moderately severe pancreatitis it was 94.46 ± 3.51 , and for severe acute pancreatitis it was 108.00 ± 4.36 . The findings indicated a statistically significant variation in the average pulse rate among individuals with mild, moderate, and severe pancreatitis, as evidenced by a F value of 17.343 and a p value of 0.001. In the present study, the average total count for mild acute pancreatitis was determined to be 12671 ± 374.03 (standard error). Similarly, the mean total count for moderately severe pancreatitis was found to be 16492 ± 1142.74 , while for severe pancreatitis it was seen to be 16916 ± 2036.73 . The findings revealed a statistically significant disparity in the average total count across patients with mild, moderate, and severe pancreatitis, as indicated by a F value of 10.538 and a p value of 0.001 (indicating significance). In the present investigation, the average blood lipase levels for mild acute pancreatitis were recorded as 5567 ± 509.30 (standard error), whereas for moderately severe pancreatitis the mean value was 8610 ± 875.215 . Additionally, severe pancreatitis exhibited an average serum lipase value of 8961.50 ± 788.224 . The Kruskal-Wallis test was employed to assess the differences in serum lipase levels among patients with mild, moderate, and severe pancreatitis. The results indicated statistical significance, as evidenced by a F value of 10.352 and a p value of 0.007 (significant). The severity of pancreatitis showed a strong correlation with laboratory parameters such as serum lipase, total count, and decrease in hematocrit. However, liver function tests, except for Aspartate aminotransferase (AST), serum sodium, serum potassium, RBS, platelet count, and hemoglobin did not exhibit a significant correlation with the severity of the disease. This finding aligns with the research undertaken by Maher et al. [12,13] The observation of pleural effusion in a chest x-ray had a notable association with the degree of severity. In the present investigation, it was observed that pleural effusion was present in 5 out of 6 instances of severe acute pancreatitis and 8 out of 14 cases of moderately severe pancreatitis. This finding demonstrates the importance of the occurrence of pleural effusion in relation to its severity, which aligns with the findings of Maher et al. [13] The results of the abdominal ultrasonography (USG) exhibit a notable association with the degree of severity. In

terms of identifying gallstones, USG outperforms computed tomography (CT) scans. [15] The ultrasonogram is considered to be the most sensitive modality when it comes to examining the biliary tree and gall bladder. [16] Out of the observed cases, 75 instances were classified as mild acute pancreatitis, accounting for 75% of the total. Additionally, 15 cases were identified as moderately severe acute pancreatitis, representing 17.5% of the sample. Lastly, 10 cases were categorized as severe acute pancreatitis, making up 10% of the overall population. Two patients who developed severe pancreatitis experienced mortality. Both consequences, namely acute respiratory distress syndrome (ARDS) and multi-organ failure, were a result of pancreatitis. The study conducted by Bota et al reported a mortality rate of 4.6%, while the study conducted by Simoes et al reported a mortality rate of 5.7%. [14,9] The utilization of CT scans is not a standard practice for all individuals diagnosed with pancreatitis. The CTSI is widely regarded as the preferred imaging modality for diagnosing acute pancreatitis. [17] Our investigation found a substantial association between the severity of the disease and the results obtained from the CT scan. Limitations associated with the utilization of CECT include the potential for radiation exposure and the need for multiple scans to evaluate both progress and problems. The administration of intravenous contrast poses a potential hazard of allergic responses. Furthermore, the utilization of contrast is contraindicated in individuals with renal impairment.

Conclusion

Therefore, based on our research, certain parameters were found to be indicative of a severe disease. It is recommended that aggressive fluid resuscitation and supportive measures be promptly initiated upon admission, without relying solely on a single scoring system for effective treatment. Specifically, individuals in the older age group with comorbidities such as diabetes or hypertension, along with the presence of fever, tachycardia, tachypnea, guarding, low mean arterial pressure (MAP), and low systolic blood pressure upon admission, should be considered as having a severe disease and closely monitored in the intensive care unit. While CT scans are a valuable tool for assessing disease severity, their sensitivity is limited in the early stages of the disease. Therefore, it is important to consider these clinical findings and blood investigations when evaluating disease severity, rather than relying solely on a single scoring system for predicting severity.

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