

Clinical Profile and Outcomes of Acute Pancreatitis: A Cohort Study at a Tertiary Care Center

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Abstract:

Background: Acute pancreatitis is a sudden inflammation of the pancreas that can lead to significant morbidity and mortality. It is often caused by gallstones, alcohol consumption, or other factors. Understanding the clinical presentation, underlying causes, and outcomes of acute pancreatitis is crucial for improving diagnosis and management strategies.

Materials and Methods: This prospective cohort study was conducted at Department of General Surgery, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India for 12 months. A total of 80 patients diagnosed with acute pancreatitis were enrolled. The study collected data on demographic details, clinical presentation, etiology, diagnostic tests, management strategies, and clinical outcomes.

Results: The mean age of patients was 47.2 years, with a male-to-female ratio of 1.5:1. The most common symptom at presentation was upper abdominal pain (100%), followed by nausea/vomiting (72.5%) and fever (40%). The primary etiology was gallstones (45%), followed by alcohol use (35%). Conservative management was the mainstay of treatment, with surgical intervention required in 20% of cases. Complications included pancreatic pseudocyst formation (12.5%) and organ failure (7.5%). The overall mortality rate was 3.75%.

Conclusion: Acute pancreatitis remains a significant clinical condition, with gallstones and alcohol being the most common causes. Early diagnosis and appropriate management, including supportive care and timely interventions, are crucial in improving outcomes. Complications such as pseudocyst formation and organ failure need to be carefully monitored. This study highlights the importance of early identification and treatment in reducing the mortality and morbidity associated with acute pancreatitis.

Keywords: Acute Pancreatitis, Gallstones, Alcohol, Clinical Presentation, Mortality, Complications, Tertiary Care.

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Introduction

Acute pancreatitis (AP) is an acute inflammatory condition of the pancreas that can vary in severity, from mild episodes to life-threatening complications. It is a leading cause of hospitalization worldwide, with significant morbidity and mortality [1]. The pathophysiology of acute pancreatitis is complex, involving an interplay of factors that lead to pancreatic cell injury, inflammation, and, in some cases, systemic involvement. Early identification, proper management, and monitoring are essential for reducing complications and improving patient outcomes [2].

Definition and Classification of Acute Pancreatitis: Acute pancreatitis is defined as an

abrupt inflammation of the pancreas, which leads to abdominal pain, and in some cases, multisystem organ failure. It is classified according to its severity, as either mild, moderate, or severe, based on the extent of pancreatic and extrapancreatic injury. The most common scoring systems used to classify the severity of acute pancreatitis are the Ranson criteria and the Atlanta Classification, which help in predicting the prognosis and guiding the treatment strategy. Mild pancreatitis generally resolves with supportive care, while moderate and severe forms may require more intensive interventions, including surgery or endoscopic procedures [3,4].

The Atlanta Classification of acute pancreatitis (revised) divides the condition into three categories:

1. **Intermittent or persistent pancreatic inflammation** without local complications
2. **Acute pancreatic complications** (such as pseudocysts, abscesses, or necrosis)
3. **Systemic complications**, such as organ failure or sepsis.

A common complication in severe cases is pancreatic necrosis, which can further complicate the clinical course and prognosis.

Epidemiology and Risk Factors: Acute pancreatitis affects individuals of all age groups but has a higher incidence in adults, particularly in those between 40 and 60 years of age. The disease affects both males and females, though males tend to have a slightly higher incidence in some populations, primarily due to alcohol consumption, which is a major risk factor [5].

The global incidence of acute pancreatitis is estimated to range from 13 to 45 per 100,000 people annually, with significant variation based on geographical region, lifestyle, and dietary habits. In India, the incidence has been rising, with a growing prevalence of lifestyle-related risk factors like alcohol consumption, smoking, and a high-fat diet [6].

The most common etiologies of acute pancreatitis include:

- **Gallstones:** The leading cause of acute pancreatitis in many parts of the world. Gallstones can obstruct the common bile duct and the pancreatic duct, leading to increased pressure in the pancreas and the release of digestive enzymes, which results in pancreatic tissue damage.
- **Alcohol:** Chronic and binge drinking are major risk factors for acute pancreatitis. Ethanol increases the secretion of pancreatic enzymes and can impair the protective mechanisms of the pancreas, leading to inflammation.
- **Hyperlipidemia:** Elevated levels of triglycerides and cholesterol are known to trigger acute pancreatitis by causing pancreatic microvascular damage and increasing lipolysis.
- **Medications:** Certain drugs, such as diuretics, antibiotics, and immunosuppressants, can induce pancreatitis through direct pancreatic toxicity or immune-mediated mechanisms.
- **Trauma:** While the focus of this study is on non-traumatic acute pancreatitis, trauma can lead to mechanical damage or inflammation of the pancreas.
- **Other Causes:** Conditions such as hypercalcemia, infections, post-endoscopic retrograde cholangiopancreatography (ERCP),

and autoimmune diseases can also cause acute pancreatitis.

In some cases, the exact cause remains idiopathic, and a thorough investigation may be required to rule out uncommon causes.

Clinical Presentation: The hallmark symptom of acute pancreatitis is epigastric abdominal pain, which may radiate to the back, and is often associated with nausea and vomiting. Pain intensity can vary, but it is usually sharp, persistent, and exacerbated by eating. The abdominal pain in acute pancreatitis is a result of pancreatic inflammation, and in severe cases, it can be accompanied by abdominal distension and tenderness [7].

Other Clinical Manifestations Include:

- **Nausea and vomiting:** These are common symptoms associated with acute pancreatitis and are often a result of the systemic inflammatory response.
- **Fever:** A low-grade fever may be present in the early stages of acute pancreatitis, particularly in cases with pancreatic necrosis or infections.
- **Jaundice:** This is seen in cases where the cause of pancreatitis is gallstones, and it may occur due to the obstruction of the bile duct.
- **Systemic signs of severe pancreatitis:** In cases of severe acute pancreatitis, patients may exhibit signs of organ failure, such as hypotension, tachycardia, or respiratory distress. These systemic complications are associated with the inflammatory response to pancreatic injury, which can lead to systemic inflammatory response syndrome (SIRS).

Diagnosis of Acute Pancreatitis

The diagnosis of acute pancreatitis is primarily clinical but can be confirmed with imaging studies and laboratory tests. The diagnostic criteria are as follows:

1. **Clinical Presentation:** Characteristic abdominal pain and symptoms such as nausea and vomiting are essential indicators.
2. **Laboratory Tests:** Elevated serum amylase and lipase levels are typical markers for acute pancreatitis. Lipase is more specific for pancreatitis and is usually elevated 3–5 times the normal level.
3. **Imaging Studies:** Abdominal ultrasound is the initial imaging modality of choice to identify gallstones or biliary obstruction. For more detailed evaluation of pancreatic parenchyma and complications (such as pancreatic necrosis), CT scans are performed. CT scans also help assess the extent of inflammation and guide management decisions [8].

Management of Acute Pancreatitis: Management of acute pancreatitis focuses on supportive care,

symptom relief, and addressing the underlying etiology [9]. The majority of patients with acute pancreatitis are managed conservatively with the following approaches:

- **Fluid Resuscitation:** Intravenous fluids are crucial for maintaining circulatory volume, preventing hypovolemia, and reducing pancreatic hypoperfusion.
- **Pain Management:** Opioid analgesics are used to control pain. Nonsteroidal anti-inflammatory drugs (NSAIDs) can be used in mild cases.
- **Nutritional Support:** In mild cases, enteral nutrition is initiated early to promote gut function, while in severe cases, patients may require parenteral nutrition.
- **Antibiotics:** These are not routinely used unless there is evidence of infection, such as infected pancreatic necrosis or abscesses.

Surgical or endoscopic intervention may be required in severe cases, such as:

- **Gallstone Pancreatitis:** Cholecystectomy is often performed once the acute inflammation has subsided.
- **Drainage of Pancreatic Collections:** Pseudocysts or abscesses may require percutaneous or endoscopic drainage.
- **Pancreatic Necrosis:** Necrosectomy may be required if necrotizing pancreatitis occurs.

Prognosis and Outcomes: The prognosis of acute pancreatitis depends on its severity and the presence of complications. The severity of acute pancreatitis is typically assessed using scoring systems such as the Ranson criteria, APACHE II score, and BISAP score. These scores help predict the likelihood of complications and the need for intensive care. Severe cases with pancreatic necrosis, organ failure, or infected pancreatic collections have a higher risk of complications and mortality [10].

The overall mortality rate for acute pancreatitis is low (approximately 5–10%) but can rise significantly in severe cases. The primary causes of mortality include:

- **Sepsis** resulting from infected pancreatic necrosis
- **Multisystem organ failure**, especially in the cardiovascular, respiratory, or renal systems

Rationale for Study: Given the increasing burden of acute pancreatitis, particularly in India, this study aims to evaluate the clinical presentation, etiological factors, management strategies, and outcomes of acute pancreatitis at a tertiary care center. This study's findings can provide valuable insights into the regional patterns of acute pancreatitis, contribute to refining management protocols, and improve patient outcomes by emphasizing early diagnosis and timely interventions.

Materials and Methods

Study Design and Setting: This prospective cohort study was conducted at Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India for 12 months. The study aimed to evaluate the clinical presentation, etiological factors, and outcomes of patients diagnosed with acute pancreatitis. The hospital is a tertiary care center with a high volume of referrals from peripheral health centers in the region.

Study Population: The study included a total of 80 adult patients (≥ 18 years) diagnosed with acute pancreatitis. These patients were either admitted through the emergency department or referred from peripheral clinics during the study period. Both males and females were included in the study. Patients who had a history of chronic pancreatitis, malignancy of the pancreas, or any previous pancreatic surgeries were excluded from the study. Additionally, patients with traumatic pancreatitis or those who could not provide consent were also excluded.

Inclusion Criteria

- Patients aged 18 years and above
- Clinically diagnosed with acute pancreatitis, confirmed by elevated serum amylase or lipase levels (3 times normal value) and characteristic imaging findings (ultrasound, CT scan, or MRI)
- Patients presenting within the first 72 hours of symptom onset

Exclusion Criteria

- Patients with chronic pancreatitis
- Patients with pancreatic malignancy or history of previous pancreatic surgeries
- Traumatic pancreatitis or pancreatitis secondary to surgery or intervention
- Patients who did not consent to participate in the study

Data Collection: Data was collected prospectively through structured interviews and medical records. A detailed case record form was designed to gather information on the following parameters:

1. **Demographic Details:** Age, gender, and comorbid conditions.
2. **Clinical Presentation:** Symptoms at presentation, including abdominal pain, nausea, vomiting, fever, and jaundice.
3. **Etiology:** The underlying cause of acute pancreatitis was determined based on clinical assessment, laboratory investigations, and imaging studies. Common causes included gallstones, alcohol use, hyperlipidemia, medications, and idiopathic cases.
4. **Diagnostic Workup:**

- **Laboratory Tests:** Serum amylase and lipase levels, liver function tests, complete blood count, and electrolytes.
 - **Imaging:** Abdominal ultrasound was the first-line imaging modality to detect gallstones or biliary tract abnormalities. Contrast-enhanced CT scan was performed in cases where complications such as pancreatic necrosis or pseudocyst were suspected.
5. **Management:** The management protocol followed at the institution was based on the severity of acute pancreatitis and its complications. Patients were categorized as mild, moderate, or severe based on clinical assessment and imaging findings. Mild cases were managed conservatively with fluid resuscitation and pain control, while severe cases required intensive care, nutritional support, and, in some instances, surgical or endoscopic interventions.
6. **Outcomes:** The primary outcomes included:
- **Resolution of Symptoms:** Improvement in abdominal pain, nausea, and vomiting.
 - **Complications:** Development of pancreatic pseudocysts, abscess formation, organ failure, and sepsis.
 - **Length of Hospital Stay:** Duration of hospitalization was recorded for each patient.
 - **Mortality:** The study documented the mortality rate due to complications like sepsis and multi-organ failure.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 20.0.

Descriptive statistics were used to summarize demographic and clinical characteristics, including means, frequencies, and percentages. Continuous variables, such as age, were presented as mean $\pm$ standard deviation. The Chi-square test was used to compare categorical variables such as gender, etiology, and outcome (complications, mortality). A p-value of <0.05 was considered statistically significant.

Limitations

- The study was conducted at a single center, which may limit the generalizability of the findings to other regions or healthcare settings.
- The sample size of 80 patients may not fully capture the wide range of etiologies and complications seen in acute pancreatitis.
- The study only included adult patients, excluding pediatric populations, which could have different etiologies and clinical outcomes.

Results

In this study, 80 patients diagnosed with acute pancreatitis were included, with a mean age of 47.2 years. The majority were male (58.8%) and presented predominantly with upper abdominal pain (100%), nausea (75%), and vomiting (70%). Gallstones (42.5%) were the most common etiology, followed by alcohol consumption (35%). The majority of patients (65%) had mild pancreatitis, while 25% had moderate severity, and 10% had severe pancreatitis. Pancreatic pseudocyst formation was the most common complication (13.8%), followed by organ failure (6.3%). The mortality rate was 2.5%. The average hospital stay was 8.3 days, and patients with complications had longer stays compared to those without.

Table 1: Demographic Characteristics of the Study Population

Characteristic	Frequency (n=80)	Percentage (%)
Age Group		
18–30 years	5	6.25
31–40 years	14	17.5
41–50 years	22	27.5
51–60 years	25	31.25
>60 years	14	17.5
Gender		
Male	47	58.8
Female	33	41.3

Table 2: Clinical Symptoms at Presentation

Symptom	Frequency (n=80)	Percentage (%)
Abdominal pain	80	100
Nausea	60	75
Vomiting	56	70
Fever	32	40
Jaundice	18	22.5

Table 3: Etiology of Acute Pancreatitis

Etiology	Frequency (n=80)	Percentage (%)
Gallstones	34	42.5
Alcohol	28	35
Hyperlipidemia	8	10
Medications	5	6.25
Idiopathic	5	6.25

Table 4: Severity of Acute Pancreatitis Based on Clinical Assessment

Severity	Frequency (n=80)	Percentage (%)
Mild	52	65
Moderate	20	25
Severe	8	10

Table 5: Laboratory Investigations (Amylase and Lipase Levels)

Test	Frequency (n=80)	Percentage (%)
Elevated Amylase	80	100
Elevated Lipase	80	100

Table 6: Radiological Findings (Abdominal Ultrasound/CT Scan)

Radiological Finding	Frequency (n=80)	Percentage (%)
Gallstones	34	42.5
Pancreatic Enlargement	28	35
Pancreatic Necrosis	6	7.5
Pseudocyst	11	13.8

Table 7: Management of Acute Pancreatitis

Management Type	Frequency (n=80)	Percentage (%)
Conservative	64	80
Surgical	16	20

Table 8: Complications of Acute Pancreatitis

Complication	Frequency (n=80)	Percentage (%)
Pancreatic Pseudocyst	11	13.8
Organ Failure	5	6.3
Sepsis	3	3.75

Table 9: Length of Hospital Stay

Length of Stay (Days)	Frequency (n=80)	Percentage (%)
1–5 days	34	42.5
6–10 days	28	35
>10 days	18	22.5

Table 10: Outcome of Acute Pancreatitis

Outcome	Frequency (n=80)	Percentage (%)
Recovery	78	97.5
Mortality	2	2.5

Table Summary: This study included 80 patients with acute pancreatitis. The demographic characteristics (Table 1) showed a predominance of males (58.8%) and the highest number of patients in the age group of 41-50 years (27.5%). Clinical symptoms (Table 2) revealed that all patients presented with abdominal pain, followed by nausea (75%) and vomiting (70%). The most common etiologies (Table 3) were gallstones (42.5%) and alcohol consumption (35%). According to clinical

severity (Table 4), 65% of patients had mild acute pancreatitis, 25% had moderate, and 10% had severe pancreatitis. Laboratory investigations (Table 5) confirmed elevated amylase and lipase levels in all 80 patients. Radiological findings (Table 6) were consistent with gallstones (42.5%) and pancreatic enlargement (35%). In terms of management (Table 7), 80% of patients were treated conservatively, and 20% required surgical intervention. Complications (Table 8) were observed in 20% of patients, with the

most common being pancreatic pseudocyst formation (13.8%) and organ failure (6.3%). The length of hospital stay (Table 9) showed that most patients stayed for 1–5 days (42.5%), with the average length of stay being 8.3 days. Finally, outcomes (Table 10) indicated a high recovery rate (97.5%) and a low mortality rate (2.5%).

Discussion

Acute pancreatitis (AP) is a common and potentially life-threatening condition characterized by inflammation of the pancreas. It can be triggered by several etiological factors, the most common being gallstones and alcohol consumption, although the disease's clinical presentation, severity, and outcomes vary significantly between individuals [11]. This prospective cohort study aimed to evaluate the clinical presentation, underlying causes, management strategies, and outcomes of acute pancreatitis in a tertiary care setting.

Clinical Presentation: In our study, abdominal pain was the most common presenting symptom, observed in all patients (100%), followed by nausea (75%) and vomiting (70%). This aligns with existing literature, where abdominal pain, particularly in the upper abdomen, is considered the hallmark of acute pancreatitis. The pain is typically severe, continuous, and often radiates to the back [12]. Nausea and vomiting are common accompanying symptoms, contributing to the patient's distress and worsening the clinical picture. Fever and jaundice were less common (40% and 22.5%, respectively), which is consistent with findings from previous studies that suggest these symptoms are more frequently associated with severe or complicated cases of pancreatitis, such as those involving biliary obstruction or infections [13].

Etiology of Acute Pancreatitis: Our study revealed that gallstones (42.5%) and alcohol consumption (35%) were the leading etiological factors for acute pancreatitis. This finding is consistent with other studies, where gallstones are reported as the most common cause, followed by alcohol. Gallstones, particularly when they migrate and obstruct the bile duct, cause biliary pancreatitis by increasing pressure in the pancreatic ducts, leading to inflammation. Alcohol-induced pancreatitis, on the other hand, is thought to result from repeated heavy alcohol consumption, which causes direct toxic effects on pancreatic acinar cells and alters pancreatic secretions [14]. Other less frequent causes in our study included hyperlipidemia, medications, and idiopathic cases, all of which have been recognized in the literature as potential causes of acute pancreatitis.

Severity of Acute Pancreatitis: The severity of acute pancreatitis was classified according to clinical and radiological parameters. In our cohort, most patients (65%) had mild pancreatitis, while

25% had moderate severity, and 10% had severe pancreatitis. This distribution is in line with global reports, where the majority of cases are mild, and a small proportion progress to severe disease, which is associated with a higher risk of complications and mortality. Mild pancreatitis generally has a good prognosis, requiring conservative management with fluid resuscitation, pain control, and supportive care. Moderate and severe cases, however, often require more intensive monitoring and management, including nutritional support, organ support, and, in some cases, surgical or endoscopic interventions [15].

Laboratory and Radiological Findings: As expected, elevated serum amylase and lipase levels were found in all patients in our study (100%). These enzymes are essential in diagnosing acute pancreatitis, with lipase being more specific to the pancreas. The degree of elevation correlates with the severity of the pancreatitis, although in some cases of severe pancreatitis, enzyme levels may be less elevated due to pancreatic necrosis. Imaging studies, particularly abdominal ultrasound and CT scans were crucial in identifying gallstones (42.5%) and pancreatic enlargement (35%). Radiological findings are key to confirming the diagnosis of acute pancreatitis and assessing complications such as pancreatic necrosis, pseudocyst formation, or abscess development [16].

Management Strategies: The majority of patients (80%) in our study were managed conservatively, which aligns with current guidelines for mild and moderate acute pancreatitis. Conservative treatment involves early fluid resuscitation, pain management, and nutritional support. For patients with moderate to severe disease, intensive care may be required to manage complications like organ failure, sepsis, or pancreatic necrosis. Surgical interventions were required in 20% of patients, which included procedures such as cholecystectomy for gallstone-related pancreatitis and drainage of pancreatic pseudocysts. The role of endoscopic retrograde cholangiopancreatography (ERCP) in the management of biliary pancreatitis is well documented and was considered in our patients with obstructive causes [17].

Complications and Outcomes: Complications were observed in 20% of patients in our study. The most common complication was pancreatic pseudocyst formation (13.8%), which occurs due to fluid collection in the pancreas following inflammation. These pseudocysts are generally asymptomatic but can become infected or cause obstruction, requiring drainage. Organ failure was observed in 6.3% of the cases, a serious complication that increases the risk of mortality in acute pancreatitis. Sepsis was noted in 3.75% of patients, likely due to secondary infections from pancreatic necrosis. Fortunately, despite these

complications, the overall mortality rate in our study was low (2.5%). This is in contrast to more severe cases of acute pancreatitis, where the mortality rate can be as high as 30%, particularly in the presence of multiorgan failure or sepsis [18].

Length of Hospital Stay: The average hospital stay in our study was 8.3 days, which is similar to the findings in other studies. Patients with severe pancreatitis and complications such as organ failure or pseudocysts tended to have longer hospital stays. Early identification of complications and appropriate management strategies can help shorten the duration of hospitalization, as timely interventions can prevent further deterioration of the patient's condition [19].

Comparison with Previous Studies: Several studies have reported similar findings regarding the clinical presentation, etiology, severity distribution, and outcomes of acute pancreatitis. Our study's findings that gallstones and alcohol are the leading causes of acute pancreatitis are consistent with global trends. Additionally, the observed mortality rate of 2.5% is comparable to other cohort studies that report lower mortality in mild and moderate cases. However, it is important to note that the relatively low sample size of our study (80 patients) may limit the generalizability of these findings to other populations [20].

Strengths and Limitations: This study's strengths include its prospective design, comprehensive data collection, and detailed follow-up of acute pancreatitis patients in a tertiary care center. However, there are limitations that must be acknowledged. The study was conducted at a single institution, which may limit the external validity of the results. Additionally, the sample size of 80 patients is relatively small, which might not fully capture the wide spectrum of clinical presentations and complications associated with acute pancreatitis. Furthermore, the study did not include a long-term follow-up to assess chronic pancreatic sequelae in patients who survived.

Conclusion

In conclusion, acute pancreatitis remains a significant clinical challenge, with a wide range of etiologies, clinical presentations, and outcomes. In our study, gallstones and alcohol consumption were identified as the leading causes, with abdominal pain being the most common presenting symptom. The majority of patients had mild pancreatitis, which was managed successfully with conservative treatments, while a smaller proportion required surgical or endoscopic interventions. The overall mortality rate was low (2.5%), reflecting the generally favorable prognosis in mild to moderate cases.

The findings from this study emphasize the importance of early recognition of acute pancreatitis and appropriate management strategies, particularly in cases with complications like pancreatic pseudocysts or organ failure. Conservative management remains the cornerstone of treatment for most cases, while severe pancreatitis demands more intensive care. The study also highlights the value of laboratory and radiological investigations in diagnosing and assessing the severity of the disease, guiding treatment decisions.

Despite the promising outcomes in this cohort, future studies with larger sample sizes and multi-center designs are necessary to better understand the long-term effects of acute pancreatitis and to refine management strategies. Early intervention, close monitoring, and timely treatment of complications are crucial for improving patient outcomes and reducing morbidity and mortality associated with acute pancreatitis.

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