ISSN: 2320-7159
IJMR
INTERNATIONAL JOURNAL OF MEDICAL RESEARCH

ORIGINAL RESEARCH ARTICLE

A Clinical Study of Etiopathogenesis and Outcome of Acute Pancreatitis

Naresh Chaudhary[1*], Anil Negi[2]

[1,2]Department of Surgery, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, India

*Dr Naresh Chaudhary (Email: naresh.chaudhary25@gmail.com)

DOI: https://doi.org/10.55489/ijmr.1204202433

Citation: Chaudhary N, Negi A. A Clinical Study of Etiopathogenesis and Outcome of Acute Pancreatitis. Intl J Med Res 2024;12(4):86-92. DOI: 10.55489/ijmr.1204202433

Received: September 18, 2024
Accepted: September 29, 2024
Published: October 01, 2024

Funding: Non-Declared.

Conflict of interests: The authors have declared that no conflict of interests exists.

Publisher: Medsci Publications, India

ABSTRACT

Introduction: Acute pancreatitis (AP) is a sudden inflammatory condition of the pancreas, ranging from mild to severe, with significant morbidity and mortality worldwide. The etiology is multifactorial, with common causes being gallstones and excessive alcohol consumption. This study explores the clinical presentation, etiopathogenesis, and outcomes of acute pancreatitis, aiming to identify factors influencing disease progression and patient survival.

Method: A prospective observational study was conducted at Shri Ram Murti Smarak Institute of Medical Sciences from August 2022 to January 2024. Sixty adult patients diagnosed with acute pancreatitis were enrolled based on clinical, biochemical, and radiological criteria. The severity was assessed using the BISAP score and CT severity index (CTSI), while outcomes were tracked through clinical evaluation and imaging findings.

Result: The majority of patients were aged 31-40 (23.3%) and 51-60 (23.3) years with a higher incidence in males (61.7%). Alcohol consumption (48.3%) and biliary factors (38.3%) were the most common etiologies. Severe outcomes, including organ failure and mortality, were associated with higher CTSI scores and alcoholic etiology.

Conclusion: Alcoholism and biliary causes were predominant in acute pancreatitis cases. The CTSI was a strong predictor of mortality and organ failure. Early diagnosis and appropriate management strategies, including conservative care, are crucial for improving patient outcomes.

Keywords: Acute pancreatitis; Etiology; Alcoholism; CT severity index; Organ failure; Mortality; Conservative management

INTRODUCTION

Acute pancreatitis is a sudden inflammatory condition of the pancreas that can range in severity from mild, self-limiting episodes to severe, life-threatening systemic complications. It remains a significant cause of morbidity and mortality worldwide, with its incidence showing a rising trend over recent decades. Acute pancreatitis poses a substantial burden on healthcare systems due to its unpredictable course, varying severity, and diverse etiological factors.[1]

The etiopathogenesis of acute pancreatitis involves the premature activation of digestive enzymes within the pancreas, leading to autodigestion, inflammation, and potential necrosis. The condition has a multifactorial origin, with the most common etiological factors being gallstones and excessive alcohol consumption. Other contributing factors include hypertriglyceridemia, drug-induced pancreatitis, infections, post-endoscopic retrograde cholangiopancreatography (ERCP) complications, and idiopathic causes. Emerging evidence also highlights the roles of genetic predispositions and metabolic disorders in the development of acute pancreatitis. [2,3]

The clinical presentation of acute pancreatitis varies widely, ranging from mild abdominal pain to severe systemic inflammatory response syndrome (SIRS), multi-organ failure, and death. Accurate and timely diagnosis is crucial for managing the disease and preventing complications. Advances in imaging modalities and biochemical markers have improved the diagnostic accuracy, but challenges remain in predicting disease severity and outcomes.[4,5]

This study aims to explore the etiopathogenesis of acute pancreatitis in a clinical setting and evaluate the short-term and long-term outcomes associated with the condition. By analyzing the underlying causes, clinical presentations, and progression of the disease, we hope to provide insights that will aid in better management strategies, targeted interventions, and improved patient outcomes.

MATERIALS AND METHODS

This study was conducted on patients with acute pancreatitis in the Department of General Surgery at Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, from August 1, 2022, to January 31, 2024, after obtaining ethical approval from the institute. It was designed as a clinical prospective observational study. A total of 60 participants were included in the study, selected based on specific inclusion and exclusion criteria.

The inclusion criteria encompassed adult patients over the age of 18 years diagnosed with acute pancreatitis by meeting at least two of the following three diagnostic criteria: abdominal pain consistent with acute pancreatitis, a serum amylase or lipase activity three times higher than the upper limit of normal, and radiological evidence of pancreatitis documented via sonography or CT scan. Additionally, patients presenting within 48 hours of symptom onset, those with co-morbidities such as obesity, and individuals willing to participate in the study by providing informed consent were included. The exclusion criteria comprised patients above 80 years, pregnant and lactating women, patients with psychiatric conditions like alcohol dependence syndrome, individuals with incomplete medical records within the first 48 hours, and those with recurrent acute pancreatitis.

Sampling was conducted during the study period, and the sample size was calculated using the formula n = [(z)^2 p(1 − p)]/d^2, where Z is the statistic corresponding to the level of confidence, p is the expected prevalence (10.0%), [6]and d is the precision (8%). With an assumed dropout rate of 10%, the final sample size was adjusted to 60 participants.

All patients underwent thorough clinical evaluation by an expert clinician and a supportive medical team. Detailed clinical histories were collected, including demographic details such as age, sex, residence, employment, marital status, BMI, and habits. Laboratory investigations included serum amylase, lipase, BUN, blood sugar, serum triglycerides, serum calcium, and total leukocyte count. Radiological examinations began with X-rays and ultrasonography (USG) and were followed by computed tomography (CT) scans for further evaluation. The diagnosis of acute pancreatitis was

based on the revised Atlanta classification criteria, requiring at least two of the following: radiological evidence of pancreatitis, a threefold increase in serum amylase or lipase levels, and acute onset of severe abdominal pain.

The severity of pancreatitis was assessed using the BISAP score, with patients scoring less than three categorized as having moderate disease and those scoring three or more as having severe disease.[7] Additionally, the CT Severity Index (CTSI) was calculated using the Balthazar grading and necrosis score derived from abdominal imaging findings on NCCT and CECT. Patients with CTSI scores less than seven were classified as having mild disease, while those scoring seven or more were considered severe cases. Outcomes were recorded in terms of discharge status, including successful discharge, Left Against Medical Advice (LAMA), referral for further management, or death.

Ethical considerations were upheld throughout the study, with informed consent obtained from all participants and ethical approval secured from the Institutional Ethical Committee. Patient confidentiality was maintained. Although reliability statistics such as Cronbach's alpha were not calculated, expert opinions and reputable literature were used to select clinical parameters, ensuring the validity of the study's methodology. Data collection involved detailed clinical assessments and investigations methodically documented in a structured proforma. Plans for data analysis were made to evaluate the findings systematically and comprehensively.

RESULTS

The majority of patients were aged between 31-50 years, with a higher percentage of males (61.7%). A significant portion of patients reported alcohol consumption (48.3%), and more than half were vegetarians (55%). The majority of patients stayed for less than 10 days (60%), with a mean hospital stay of 10.34 days. Only a small percentage (5%) stayed for more than 20 days. (Table 1)

The aetiology of acute pancreatitis, with alcoholism (48.3%) being the most common cause, followed by biliary issues (38.3%). The most frequent chief complaints included abdominal pain (91.7%), nausea/vomiting (80%), and abdominal distension (78.3%). Ultrasound findings showed that a majority of patients had pancreatic enlargement and peripancreatic fat stranding, while CT findings revealed diffuse pancreatic enlargement in 33.3% of patients and pancreatic necrosis in 30%. (Table 2)

Table 3 shows the relationship between the aetiology of acute pancreatitis and organ failure, as well as the CT severity index (CTSI). It found that biliary cases had the highest rate of single organ failure (30.4%), particularly pulmonary and renal failure, while idiopathic cases had minimal severe outcomes. The CTSI was significantly associated with aetiology, showing that severe cases were more frequent in alcoholic aetiology.

The results indicate that patients who underwent conservative management had better survival rates (29.3% survival in conservative management vs. 100% non-survival in non-conservative management). Single and multiple organ failure were significantly linked to non-survival, with biochemical factors such as blood glucose, amylase, and lipase showing no significant difference in survival rates. (Table 4)

Table 1: Patient Demographics and History

Category	Frequency (%)
Age	
≤30 years	13 (21.7)
31-40 years	14 (23.3)
41-50 years	11 (18.3)
51-60 years	14 (23.3)
>60 years	8 (13.4)
Gender	
Male	37 (61.7)
Female	23 (38.3)
Personal History	
Vegetarian	33 (55.0)
Non-Vegetarian	27 (45.0)
Smoking	21 (35.0)
Alcohol Intake	29 (48.3)

Table2: Distribution of Patients Based on Aetiology, Chief Complaints, USG and CT Findings

Category	Pregnancy (%)
Aetiology	
Alcoholism	29 (48.3)
Biliary	23 (38.3)
Idiopathic	8 (13.4)
Chief Complaints	
Abdominal Pain	55 (91.7)
Abdominal Distension	47 (78.3)
Nausea/Vomiting	48 (80)
Jaundice	10 (16.7)
Fever	24 (40)
Tachycardia	10 (16.7)
Dyspnoea	5 (8.3)
Tachypnoea	8 (13.3)
USG Findings	
Normal Pancreas	26 (43.3)
Swollen/Enlarged Pancreas	28 (46.7)
Cholelithiasis	21 (35)
Choledocholithiasis	4 (6.7)
Ascites	7 (11.7)
Enlargement in Size of Pancreas	57 (95)
Peripancreatic Fat Stranding	59 (98.3)
Peripancreatic Fluid Collection	52 (86.7)
Pancreatic Necrosis	28 (46.7)
Main Pancreatic Duct Dilatation	6 (10)
Presence of Gas	1 (1.7)
Presence of Hemorrhage/Calcification	2 (3.3)
CT Findings	
Not Done	17 (28.3)
Diffuse Enlarged Pancreas	20 (33.3)
Peripancreatic Inflammation	17 (28.3)
Single Fluid Collection	11 (18.3)
Multiple Fluid Collections	5 (8.3)
Pancreatic Necrosis	18 (30)

Table3: Association of Organ Failure, Single Organ Failure, and CTSI with Aetiology (Transposed)

Factors	Alcoholism (%) (n=29)	Biliary (%) (n=23)	Idiopathic (%) (n=8)	Total (%)
Multiple Organ Failure (%)	3 (10.3)	0 (0.0)	1 (12.5)	4 (6.7)
Single Organ Failure (%)	3 (10.0)	7 (30.4)	1 (12.5)	11 (18.3)
Pulmonary Failure (%)	0 (0.0)	4 (17.4)	0 (0.0)	4 (6.7)
Renal Failure (%)	0 (0.0)	3 (13.0)	0 (0.0)	3 (5.0)
Hepatic Failure (%)	3 (6.9)	0 (0.0)	0 (0.0)	3 (5.0)
Gastrointestinal Failure (%)	0 (0.0)	0 (0.0)	1 (12.5)	1 (1.7)
Mild CTSI (%)	2 (100)	0 (0.0)	0 (0.0)	2 (3.3)
Moderate CTSI (%)	18 (62.1)	6 (26.1)	7 (87.5)	30 (50.0)
Severe CTSI (%)	9 (31.0)	5 (21.7)	0 (0.0)	14 (23.3)
P-Value (CTSI with Aetiology)	<0.001	<0.001	<0.001	

It shows that patients with severe CTSI had a 100% mortality rate, while moderate cases had a much lower mortality rate. Surgical interventions were more common in severe cases. (Table 5)

DISCUSSION

In this study, the mean age of the patients was 42.25 ± 12.77 years. The largest age group (23.3%) fell within the 31 to 40 and 51-60-year range, followed by the 41 to 50-year group at 18.3%. The youngest patient was 23 years old, while the oldest was 70 years. At least 8% of the patients were older than 60 years. Similar findings were reported in

Table4: Association of Patient Factors, Aetiology, and Biochemical Profile with Outcome in Acute Pancreatitis

Factors	Survive (%) (n=58)	Non-survive (%) (n=2)	P-Value
Conservative Management (%)	17 (29.3)	2 (100.0)	<0.001
Avg. Length of Stay (days)	10.34 ± 2.2	36.5 ± 3.7	-
Single Organ Failure (%)	11 (19.0)	0 (0.0)	0.012
Multiple Organ Failure (%)	2 (3.4)	2 (100.0)	0.012
Aetiology			
Alcoholism (%)	27 (43.6)	2 (100.0)	0.331
Biliary (%)	23 (39.7)	0 (0.0)	0.331
Idiopathic (%)	8 (13.8)	0 (0.0)	0.331
Biochemical Profile			
Hb (%)	28 (48.3)	1 (50.0)	0.964
Blood Glucose (mg/dL)	34 (58.6)	2 (100.0)	0.420
Amylase (U/L)	41 (70.7)	2 (100.0)	0.636
S. Lipase (U/L)	45 (77.6)	2 (100.0)	0.803
S. Bilirubin (mg/dL)	37 (63.8)	2 (100.0)	0.503
S. Calcium (mg/dL)	19 (32.8)	1 (50.0)	0.618

Table 5: Association of CTSI and Aetiology with Outcome

CTSI Findings	Mild (n=2)	Moderate (n=32)	Severe (n=26)	P-Value
Aetiology				
Organ Failure	0.0%	26.7%	73.3%	
Mortality	0.0%	0.0%	3.3%	0.827
Surgical Intervention	0.0%	36.6%	63.4%	

The leading cause of acute pancreatitis in this study was alcohol consumption, observed in 29 patients (48.3%), followed by biliary pancreatitis in 23 patients (38.3%), and idiopathic pancreatitis in 8 patients (13.4%). These findings are consistent with those of Thandassery RB, who also identified alcohol as the primary cause of acute pancreatitis,[10] and Negi N, who reported similar results.[11]

Abdominal pain was the most common complaint, reported by 91.7% of patients, followed by nausea/vomiting (80.0%), abdominal distension (78.3%), and fever (40.0%). These results align with Negi N's study, which also found abdominal pain to be the predominant complaint. [11] Alkareemy EAR's study also indicated abdominal pain (100%), vomiting (78%), and fever (64%) as the most common symptoms.[12]

In terms of imaging, only 43.3% of patients had a normal pancreas on ultrasound, while the majority showed peri-pancreatic fat stranding/inflammation (98.6%), followed by pancreatic enlargement (95.0%), peri-pancreatic fluid collection (86.7%), pancreatic necrosis (46.7%), and cholelithiasis (35.0%). Ascites was the least common finding, present in only 11.7% of patients. These results are similar to those of Ahmed KU, who reported 11.11% ascites, 11% choledocholithiasis, and 27.8% obscured pancreas. Reddy MS found that 45% of patients had altered echotexture and 67% had an enlarged pancreas.[13]

CT scans revealed a diffusely enlarged pancreas in 33.3% of patients, peripancreatic inflammation in 28.3%, and peripancreatic fluid collections in 26.6% (18.3% with single collection, 8.3% with multiple collections). Pancreatic necrosis was detected in 30.0% of patients. This is a novel finding, as previous studies did not provide similar detailed CT-based reports on acute pancreatitis.

Organ failure was noted in 25.0% of patients, with 4 cases of multiorgan failure and 11 cases of single organ failure. Alcoholism accounted for 3 cases of multiorgan failure, idiopathic pancreatitis for 1 case, and no cases were related to biliary issues. For single organ failure, 3 cases were linked to alcoholism, 7 to biliary issues, and 1 to idiopathic pancreatitis. Zhu AJ's study found 47 patients with organ failure, with 20 cases of multiple organ failure and 27 cases of single organ failure, which is similar to our findings.[8]

Among the 11 cases of single organ failure, the majority involved pulmonary failure (4 cases), followed by renal and hepatic failure (3 cases each), and 1 case of gastrointestinal

failure. Zhu AJ's study similarly found pulmonary failure to be the most common, followed by hepatic failure.

In terms of hospital stay, 60.0% of patients stayed for less than 10 days, 35.0% stayed 10-20 days, and only 5.0% stayed for more than 20 days. Negi N's study reported that 59.0% of patients were hospitalized for less than a week, with the remaining patients staying longer. The mean duration of stay for severe acute pancreatitis was 11.6 days, while it was 4.89 days for moderately severe pancreatitis.[11]

The majority of patients in this study survived (96.7%), while 3.3% of patients died. Zhu AJ's study also reported a high survival rate, while Negi N found an overall mortality rate of 5.7%, with 5 of 7 deaths occurring in severe pancreatitis cases. This aligns with the findings in the present study.

Among the 11 patients with single organ failure, 19.0% survived. All 23 patients with biliary pancreatitis survived, while 13.8% of those with idiopathic pancreatitis survived. The mean hospital stay for survivors was 10.34 days, while those who did not survive had a mean stay of 36.5 days. Garg PK's study found similar results, with non-survivors having a significantly longer hospital stay.[14]

Among the 2 patients with mild pancreatitis, none experienced organ failure, mortality, or required surgical intervention. In the moderate pancreatitis group (32 patients), 26.7% developed organ failure, but there were no fatalities. A significant portion (36.6%) required surgical intervention. In the severe pancreatitis group (26 patients), 73.3% experienced organ failure, and all deaths occurred in this group. The majority (63.4%) required surgical intervention. In contrast, Ignatavicius P's study reported a higher prevalence of mild acute pancreatitis, followed by moderate and severe cases.[15]

Conclusion

In conclusion, the study highlights the significant impact of patient demographics, aetiology, organ failure, and CT severity index (CTSI) on the outcomes of acute pancreatitis. Alcoholism was the most common cause of the disease, and abdominal pain, nausea, and vomiting were the most frequent symptoms. Severe organ failure, as indicated by the CTSI, was strongly associated with increased mortality, particularly in patients with alcoholic aetiology. Conservative management was associated with better survival outcomes, and prolonged hospital stays were more common in severe cases.

Authors Contribution

NC: Study conception, design, data collection, data analysis, interpretation, and manuscript preparation.; **AN:** Involved in study design and manuscript preparation.

Bibliography

1. Zerem E, Kurtcehajic A, Kunosić S, Malkočević DZ, Zerem O. Current trends in acute pancreatitis: Diagnostic and therapeutic challenges. World J Gastroenterol 2023;29:2747. https://doi.org/10.3748/WJG.V29.I18.2747.
2. Forsmark C, Pham A. Chronic pancreatitis: review and update of etiology, risk factors, and management. F1000Res 2018;7:607. https://doi.org/10.12688/F1000RESEARCH.12852.1.
3. Wang GJ, Gao CF, Wei D, Wang C, Ding SQ. Acute pancreatitis: Etiology and common pathogenesis. World Journal of Gastroenterology : WJG 2009;15:1427. https://doi.org/10.3748/WJG.15.1427.
4. Szatmary P, Grammatikopoulos T, Cai W, Huang W, Mukherjee R, Halloran C, et al. Acute Pancreatitis: Diagnosis and Treatment. Drugs 2022;82:1251–76. https://doi.org/10.1007/S40265-022-01766-4.
5. Leppäniemi A, Tolonen M, Tarasconi A, Segovia-Lohse H, Gamberini E, Kirkpatrick AW, et al. 2019 WSES guidelines for the management of severe acute pancreatitis. World Journal of Emergency Surgery 2019 14:1 2019;14:1–20. https://doi.org/10.1186/S13017-019-0247-0.
6. Thakur S, Kaur R, Bhatia L, Bansal R, Singh A, Singh J. Acute Pancreatitis: Clinical Profile of 60 Patients. Cureus 2023;15. https://doi.org/10.7759/CUREUS.51234.
7. Akdur G, Bardakcı O, Das M, Akdur O, Beyazit Y. Diagnostic utility of hematological indices in predicting adverse outcomes and severity of acute pancreatitis based on BISAP and modified Glasgow score. Turkish Journal of Trauma & Emergency Surgery 2022;28:268. https://doi.org/10.14744/TJTES.2020.26348.

8. Zhu AJ, Shi J Sen, Sun XJ. Organ failure associated with severe acute pancreatitis. World J Gastroenterol 2003;9:2570. https://doi.org/10.3748/WJG.V9.I11.2570.

9. Jha PK, Chandran R, Jaiswal P, Seema K. A clinical study of risk factors of acute pancreatitis in a tertiary care centre in north India. International Surgery Journal 2017;4:1878–83. https://doi.org/10.18203/2349-2902.ISJ20172053.

10. Thandassery RB, Yadav TD, Dutta U, Appasani S, Singh K, Kochhar R. Dynamic nature of organ failure in severe acute pancreatitis: the impact of persistent and deteriorating organ failure. HPB (Oxford) 2013;15:523–8. https://doi.org/10.1111/J.1477-2574.2012.00613.X.

11. Negi N, Mokta J, Sharma B, Sharma R, Jhobta A, Bodh V, et al. Clinical Profile and Outcome of Acute Pancreatitis: A Hospital-Based Prospective Observational Study in Subhimalayan State. Journal of Association of Physicians of India 2018 Mar;66(3):22-4. PMID: 30341863

12. Alkareemy EAR, Ahmed LA-W, El-Masry MA, Habib HA, Mustafa MH. Etiology, clinical characteristics, and outcomes of acute pancreatitis in patients at Assiut University Hospital. The Egyptian Journal of Internal Medicine 2020 32:1 2020;32:1–6. https://doi.org/10.1186/S43162-020-00025-W.

13. Reddy MS, Ramana PV, C.Bhavani. A Study on Etiology, Severity, Management and Outcome of Acute Pancreatitis in Tertiary Care Teaching Hospital. International Journal of Research and Review 2020;7:534–44.

14. Garg PK, Sharma M, Madan K, Sahni P, Banerjee D, Goyal R. Primary conservative treatment results in mortality comparable to surgery in patients with infected pancreatic necrosis. Clin Gastroenterol Hepatol 2010; 8. https://doi.org/10.1016/J.CGH.2010.04.011.

15. Ignatavicius P, Gulla A, Cernauskis K, Barauskas G, Dambrauskas Z. How severe is moderately severe acute pancreatitis? Clinical validation of revised 2012 Atlanta Classification. World J Gastroenterol 2017; 23: 7785. https://doi.org/10.3748/WJG.V23.I43.7785.