

Clinical Profile, Etiology, and Outcome of Acute Pancreatitis: Experience at a Tertiary Care Center

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Abstract

Background: Acute pancreatitis (AP) is an inflammatory process of the pancreas with varying degree of involvement of regional tissues. This was a population-based study on the incidence of AP. We aimed to determine the incidence, etiology, and outcome of AP. **Materials and Methodology:** This prospective study was conducted in the Department of Medicine, King George's Medical University, Lucknow, India, on 120 patients of AP. Clinical history, examination, and laboratory investigations were done. Severity of AP was assessed using the modified Atlanta classification. **Results:** A total of 120 patients comprising of 88 men (73.33%) and 32 women (26.66%) were recruited. The mean age of study participant was 36.96 ± 13.44 years. The most common presentation was abdominal pain followed by vomiting. The leading etiological factors were alcohol in 85 patients (70.8%) and gallstones in 25 (20.8%). It was idiopathic 5 patients (4.1%). Mortality was seen in three (2.5%) patients, all of which had severe pancreatitis. Patients with body mass index (BMI) ≥ 25 kg/m², Hematocrit (HCT) $\geq 44\%$ and C-reactive protein (CRP) ≥ 150 mg/l had an increased risk of developing a severe AP. **Conclusions:** Alcohol and gallstones were the most common etiological factors of AP, whereas HCT, CRP, and BMI were the useful predictors of severe pancreatitis.

Keywords: Acute pancreatitis, clinical profile, etiology, outcome

Résumé

Contexte: La pancréatite aiguë (PA) est un processus inflammatoire du pancréas avec divers degrés d'implication des tissus. Il s'agissait d'une étude basée sur la population sur l'incidence de la PA. Nous visons à déterminer l'incidence, l'étiologie et le résultat de la PA. **Matériaux et méthodologie:** Cette étude prospective a été menée au Département de médecine de l'Université de médecine du roi George, Lucknow, Inde, sur 120 patients atteints de PA. Les antécédents cliniques, les examens et les analyses de laboratoire ont été effectués. La gravité de la PA a été évaluée en utilisant la classification modifiée d'Atlanta. **Résultats:** Un total de 120 patients comprenant 88 hommes (73,33%) et 32 femmes (26,66%) ont été recrutés. L'âge moyen des participants à l'étude était de $36,96 \pm 13,44$ ans. La présentation la plus courante était une douleur abdominale suivie de vomissements. Les principaux facteurs étiologiques étaient l'alcool chez 85 patients (70,8%) et les calculs biliaires chez 25 (20,8%). Il s'agissait de patients idiopathiques 5 (4,1%). Mortalité a été observée chez trois (2,5%) patients, tous atteints de pancréatite sévère. Patients ayant un indice de masse corporelle (IMC) ≥ 25 kg / m², HCT $\geq 44\%$ et La protéine C-réactive (CRP) ≥ 150 mg / l avait un risque accru de développer une PA sévère. **Conclusions:** L'alcool et les calculs biliaires étaient les plus facteurs étiologiques communs de la PA, tandis que la HCT, la CRP et l'IMC étaient les prédicteurs utiles de la pancréatite sévère.

Mots-clés: pancréatite aiguë, profil clinique, étiologie, issue

INTRODUCTION

Acute pancreatitis (AP) is defined as the inflammation of the pancreatic tissue, characterized by parenchymal edema and necrosis caused by auto-digestion by its own glandular enzymes leading to multi-organ failure or death.^[1] In the

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past few decades, there have been many advancements in the intensive care of patients with AP due to its association with high morbidity and mortality.^[2] As per the Indian data, no multicentric studies available only sporadic data were analyzed, thus the exact prevalence could not be assessed. The incidence was calculated from the patients admitted at different tertiary care centers all over the country.^[3]

For the management and prevention of recurrence of the disease, its etiology is to be ascertained. The two most common etiological factors, namely alcohol and gallstones contribute 80% of the cases, with alcoholic pancreatitis being much more common.^[4-7] Recent recommendations state that the etiology of AP should be established in at least 80% of cases with not more than 20% being classified as idiopathic.^[8] Planning the management and delivery of care for AP requires the knowledge of the etiology as well as severity of the disease.

The severity of pancreatitis varies from mild and self-limiting to severe and fatal.^[1] Severity is an important indicator of mortality and the need for intensive care, nutritional support, urgent surgical intervention, and antibiotic usage.^[8] Various scoring systems have been devised for AP such as the Atlanta Criteria,^[9] which relies on evidence of organ failure and/or local complications as well as Acute Physiology And Chronic Health Evaluation II (APACHE II).^[10] Ranson *et al.*^[11] and modified Glasgow^[12] scores based on clinical and laboratory values that assess systemic inflammation and the Balthazar Score which is based on computerized tomography (CT) findings.^[13] For the diagnosis and prognostication contrast-enhanced scoring system is good because it improves the identification at early stage with high sensitivity (100%) and accuracy (87%) by the detection of extended areas of necrosis within the pancreatic region.^[13]

Severe AP occurred in 20% patients of AP with mortality rates of 10%–30%.^[7] Patients with AP have a high risk of morbidity due to local complications include pancreatic pseudocyst, pleural effusion, peritoneal collection, and pancreatic necrosis with superimposed infection, which has the highest mortality rate of 30%.^[13] The systemic complications are either single or multiorgan failure (MODS). Deaths from pancreatitis occurring during the first 2 weeks of the illness are due to multiple organ dysfunction syndrome (MODS),^[14-16] whereas deaths after 2 weeks are generally caused by pancreatic necrosis with superimposed infection.^[13] According to the recent guidelines, mortality from AP should be <10% overall and <30% in severe cases.^[8] Furthermore, all patients with severe pancreatitis or with organ failure should be managed in the high dependency unit or intensive care unit.^[8]

Due to the lack of prevalence data of the disease in our country, changing trends of severity, complexity of the disease, and changing trends in the outcome, prompted us to undertake this study with aim to determine the demographic profile, etiology, severity, and outcome of AP.

MATERIALS AND METHODOLOGY

- This prospective study was conducted in King George's Medical University, Lucknow, Uttar Pradesh, India, for 1 year from August 2018 to July 2019 in the department of medicine in collaboration with the department of radiology. Ethical clearance was obtained from the Institutional Ethics Committee, Research Cell, King George's Medical University, Lucknow, and a written (or verbal) informed consent for participation was obtained from the patients (or their relatives). A total of 129 cases of AP were enrolled in this study. Nine patients were critically ill and not willing to stay further in the study, so they were excluded. All patients age >15 years and admitted in indoor and fulfilling two out of three criteria. (i) Abdominal pain characteristic of AP, (ii) serum amylase and/or lipase levels at least three times the upper limit of normal, and (iii) characteristic findings of AP on abdominal ultrasonography and/or CT scan were included in the study as per the Atlanta Classification 2012.^[9]

Patients who were suffering from chronic pancreatitis based on their hospital records or had radiological findings of pancreatic calcifications, dilated pancreatic duct, areas of atrophy, and pseudo cysts were excluded from the study.

After detailed history and physical examination, laboratory investigations requested at the time of admission included arterial blood gas analysis, hematocrit, kidney function test, liver function test, serum electrolytes, serum amylase, serum lipase, and complete hemogram. Abdominal ultrasonography was done at the time of admission and contrast-enhanced pancreatic CT scan was done after 72 h of hospitalization.

Patients were subsequently examined daily, and relevant laboratory investigations such as complete hemogram, blood sugar, serum amylase, serum lipase, and serum calcium were done on every 48 h; bedside index for severity in acute pancreatitis (BISAP) was calculated within first 24 h of admission, while Ranson's score was evaluated within first 48 h of admission. Moreover, APACHE II score was evaluated for each patient after 72 h of admission were calculated.

Patients with mild AP had neither local complications nor organ failure. Patients with moderately severe AP had transient organ failure or local complications or both, whereas patients with severe AP had persistent organ failure. Organ failure was defined based on the Modified Marshall scoring system. A score of ≥ 2 for more than 48 h was considered as persistent organ failure, whereas a score of ≥ 2 for <48 h was considered transient organ failure. Local complications included pancreatic necrosis, acute fluid collections, pseudo cyst, acute necrotic collections, and walled off necrosis. All the patients were managed as per the standard protocol.

Statistical methods

The statistical analysis was done using IBM SPSS (Statistical Package for the Social Sciences) Version 21.0 Armonk, NY, USA; IBM Corp. Continuous variables were described as

mean \pm standard deviations at 95% confidence intervals. Categorical variables were presented as proportions. Student's *t*-tests, one-way analysis of variance, and Pearson Chi-squared tests were used in the univariate analysis to evaluate statistical associations. Multiple logistic regression was utilized to identify the independent predictors of mortality based on which odds ratios were calculated. Risk factors that are found to be significant in univariate analyses are considered in the multiple regression model. A two-sided $P < 0.05$ was considered statistically significant.

RESULTS

During a period of 1 year, 12,338 patients were admitted in indoor wards. Out of these total 129 (1.04%) patients with acute abdomen, who were diagnosed with AP based on elevated serum amylase and/or lipase levels and radiological findings on ultrasound and CT abdomen were included in this study. Age of patients ranged from 14 to 70 years, with a mean age of 36.96 ± 13.44 years. Majority of the patients 62 (51.66%) were between 41 and 60 years. There were more males (75.6%) than females (24.4%) with a male-to-female ratio of 2.75:1. The mean body mass index (BMI) of patients was 24.73 ± 2.40 kg/m² [Table 1].

The mean length of hospital stay was 10.30 ± 4.50 days for the entire study cohort. Based on the severity of AP, the mean length of hospital stay in patients with mild AP was 5.89 ± 2.30 days, 7.84 ± 3.84 for moderate AP, and 10.79 ± 4.98 for severe AP. Majority of the patients were successfully discharged 117 (97.5%) from the hospital after treatment of their acute condition while death occurred in 3 (2.5%) of the study population due to multiple organ failure. Out of the three patients who died during the study period, 2 (3.8%) patients had severe pancreatitis and 1 (3.3%) patient had moderate pancreatitis. Disease severity was determined on the basis of the BISAP score at the time of admission and after 48 h (based on CT severity index score). CT scan was performed in 90 cases, out of which 20 (22.2%) had mild AP, 25 (27.77%) had moderate AP, while 45 (50.0%) cases had severe form of the disease [Table 1].

Among etiological factors, alcohol was the most common cause found in 85 (70.8%) patients, followed by gallstones in 25 (20.8%), idiopathic in 5 (4.1%) patients, hypertriglyceridemia in 3 (2.5%), and one case (0.8%) each of autoimmune etiology and postendoscopic retrograde cholangiopancreatography AP. All (100%) of the patients had a history of abdominal pain. Other presenting symptoms and signs were nausea and vomiting in 66.7%, fever in 50%, jaundice in 37.5%, pleural effusion in 20.8%, ascites in 25%, and abdominal tenderness in 100% of the study population. In the subgroup analysis, jaundice, pleural effusion, and ascites were absent in mild AP [Tables 2 and 3].

The sensitivity, specificity, positive predictive value, and negative predictive value of BMI ≥ 25 kg/m² in predicting acute severe pancreatitis at admission was 60%, 73.2%, 36.16%,

Table 1: Demographic profile of patients with acute pancreatitis (n=120)

Parameters	Values (%)
Age range (years) mean	36.96 \pm 13.44
14-40	38 (31.66)
41-60	62 (51.66)
>60	20 (16.66)
Male/female ratio	88/32 (26.6)
Rural	64 (53.3)
Urban	56 (46.6)
Average BMI (kg/m ²)	24.73 \pm 2.40
Severity	
Mild AP	38 (31.67)
Moderate severe	30 (25.0)
Severe AP	52 (43.3)
Modified CT severity index (n=90)	
Mild	20 (22.2)
Moderate	25 (27.77)
Severe	45 (50.0)
Duration of hospital stay (day) average	10.30 \pm 4.50
Mild AP	5.89 \pm 2.30
Moderate AP	7.84 \pm 3.84
Severe AP	10.79 \pm 4.98
Outcome	
Improved	117 (97.5)
Death	3 (2.5)

BMI=Body mass index, AP=Acute pancreatitis, CT=Computerized tomography

Table 2: Etiology and symptoms of patients with acute pancreatitis

	n (%)
Etiology	
Alcohol	85 (70.8)
Gallstone	25 (20.8)
Idiopathic	5 (4.1)
Hypertriglyceridemia	3 (2.5)
Post-ERCP	1 (0.8)
Autoimmune	1 (0.8)
Symptoms and signs	
Pain abdomen	120 (100)
Abdomen tenderness	120 (100)
Vomiting	80 (66.7)
Fever	60 (50.0)
Jaundice	45 (37.5)
Hypoxia	32 (26.7)
Pleural effusion	25 (20.8)
Ascites	30 (25.0)

ERCP=Endoscopic Retrograde Cholangiopancreatography

and 80.20%, respectively. Serum C-reactive protein (CRP) level at the time of admission for the detection of severity of AP showed a sensitivity, specificity, positive predictive value, negative predictive value, of 70.61%, 92.45%, 75.5%, and 92.71%, respectively. Serum HCT level at admission for the detection of severity of AP showed the sensitivity, specificity,

Table 3: Subgroup analysis of various parameters with severity in patients of acute pancreatitis

Parameters	Mild AP (n=38), n (%)	Moderate severe AP (n=30), n (%)	Severe AP (n=52), n (%)
Pain abdomen	38 (100)	30 (100)	52 (100)
Vomiting	10 (26.3)	25 (83.3)	45 (86.5)
Jaundice	0	14 (46.7)	31 (59.6)
Fever	5 (13.1)	15 (50.0)	40 (76.9)
Pleural effusion	0	8 (26.7)	17 (32.6)
Ascites	0	12 (40.0)	18 (34.6)
BMI >25 kg/m ²	10 (26.3)	14 (46.7)	25 (48.0)
Hypoxia	0	12 (40.0)	20 (38.4)
HCT >44 mm in 1 st h	2 (5.2)	11 (36.7)	24 (46.1)
CRP >150 mg/dl	1 (2.6)	6 (20.0)	22 (42.3)
Outcome			
Recovered	38 (100)	29 (96.7)	50 (96.1)
Expired		1 (3.3)	2 (3.8)
Hospital stay (weeks)			
<1	30 (78.9)	18 (60.0)	10 (19.2)
>1	8 (21.1)	12 (40.0)	42 (80.7)

AP: Acute pancreatitis, BMI: Body mass index, HCT: Hematocrit, CRP: C-reactive protein

Table 4: Comparison of body mass index, hematocrit, and C-reactive protein at admission to determine severity of acute pancreatitis

Parameters	BMI (%)	CRP (%)	HCT (%)
Sensitivity	60.0	70.61	68.75
Specificity	73.2	92.45	84.30
Positive predictive value	36.16	75.5	59.65
Negative predictive value	80.20	92.71	91.20

BMI: Body mass index, CRP: C-reactive protein, HCT: Hematocrit

positive predictive value, and negative predictive value was 68.75%, 84.30%, 59.65%, and 91.20%, respectively [Table 4].

DISCUSSION

AP is a relatively common disease with the incidence of 5–80 per 100,000 population worldwide. The spectrum of the disease is wide, varying from mild attacks with mild epigastric discomfort to multiorgan dysfunction and death. The mild attacks often go undiagnosed leading to recurrence. The overall mortality of AP is static at 1%–2% but increasing to 10%–30% in severe AP.^[7] Although its prevalence varies in different countries and even indifferent areas of a given country, there has been a significant increase in the number of new cases in recent years.^[17] Early diagnosis and prompt treatment are the mainstay of the therapy in AP to significantly decrease morbidity and mortality.

In this study, the mean age of the patients was 36.96 ± 13.44 years which is lower than the findings in the studies done by Negi *et al.*^[18] and Raghu *et al.*^[19] that reported mean ages of 42.89 ± 12.5 years and 42.9 ± 15.9 years, respectively. Majority of the patients in our study were in the age group of 41–60 years (51.66%) followed by patients between 14–40 years (31.66%) and 20 (16.66%) patients were above 60 years of age. Majority

of the patients presented in the middle age, a period when alcohol consumption is more common especially in males; hence, the higher number of males than females presenting with AP. The male-to-female ratio of 2.75:1 recorded in this study is comparable with the studies of Uhl,^[20] with a male to female ratio of 1.85:1 and de Beaux *et al.*,^[21] where male-to-female ratio was 1:6.1.

In our study, abdominal pain was the common presenting complaint in all patients (100%), and this is similar to what was reported by Negi *et al.*^[18] and Rao^[22] also reported similar pattern of vomiting, fever, and pleural effusion, as found in this study.

The male predominance of alcoholic pancreatitis in north India is likely due to the fact that alcoholism is quite common among middle age men. Negi *et al.*^[18] in their study found alcohol as major cause of pancreatitis in 59.35% of their patients. Mukherjee *et al.*,^[23] in their study reported alcohol as a major etiology of AP in Eastern India. Macro^[24] observed that the most common etiology was alcohol consumption (39.3%) followed by gallstones (24.1%).

Out of the 120 patients in this study, 117 patients recovered and 3 patients died showing an overall mortality of 2.5%. All deceased patients had severe pancreatitis showing an overall mortality of 5.6%. This correlates with the study done by Bota *et al.*,^[25] where overall mortality rate was 4.6%. Recent guidelines suggest that mortality from AP overall <10% overall.^[8] This mortality rate of 2.5% in our study was significantly lower in comparison to large epidemiological studies of pancreatitis done in other countries.^[7,26]

In our study, with BMI >25 kg/m², 48% of the patients had severe pancreatitis, 46.7% had mild to moderate pancreatitis, and 26.3% had mild pancreatitis. The sensitivity, specificity, positive predictive value, and negative predictive value of

BMI ≥ 25 kg/m² in predicting acute severe pancreatitis at admission was 60%, 73.2%, 36.16%, and 80.20%, respectively. Our study is comparable to a study done by Negi *et al.*^[18] who reported obesity as a risk factor for severe AP. Another study done by Chen *et al.*^[27] showed that obese patients (BMI ≥ 25) had a significantly increased risk of severe AP compared with nonobese patients.

In our study, the evaluation of serum HCT level at admission for the detection of severity of AP showed the sensitivity, specificity, positive predictive value, and negative predictive value was 68.75%, 84.30%, 59.65%, and 91.20%, respectively. Brown *et al.*^[28] reported comparable values for sensitivity, specificity, positive predictive value, and negative predictive value of 72%, 83%, 68%, and 85%, respectively. Our study is also comparable to the study done by Negi *et al.*^[18] who found that the sensitivity, specificity, positive predictive value, and negative predictive value was 67.86%, 85.26%, 57.57%, and 90%, respectively.

In our study, serum C-reactive protein (CRP) level at the time of admission for the detection of severity of AP showed a sensitivity, specificity, positive predictive value, negative predictive value, of 70.61%, 92.45%, 75.5%, and 92.71%, respectively. Our results were comparable with study done by Gurda-Duda *et al.*^[29] and Pongprasobchai *et al.*^[30] Our study is also comparable with the study by Negi *et al.*^[18] who found sensitivity, specificity, positive predictive value, negative predictive value, of CRP for predicting severity of illness was 67.86%, 93.67%, 76%, and 90.8%, respectively.

Limitation of study

This was a single-center study in tertiary care center, and findings may have been due to referral bias and not reflective of the community. Serum HCT and serum CRP were done only at the time of admission. Despite the limitation, the study provides an insight into the validity of the different prognostic indicators in the assessment of severity of AP.

CONCLUSIONS

In this study, it is found that BMI, serum CRP, and HCT might be used as prognostic factors in AP. Till date the conservative management is the main stay of treatment; therefore, timely establishment of diagnosis, etiology, and severity of the disease is crucial in the management and is the key for saving life in patients with severe AP.

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Conflicts of interest

There are no conflicts of interest.

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