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RESEARCH ARTICLE
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ETIOLOGICAL SPECTRUM AND CLINICAL PROFILE OF ACUTE PANCREATITIS IN A TERTIARY CARE HOSPITAL IN PESHAWAR

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Abstract

Background: Acute pancreatitis (AP) is a major cause of emergency hospitalization worldwide, with etiologic patterns varying across regions. In low. and middle. Income countries such as Pakistan, gallstone disease and metabolic factors predominate, while alcohol. and parasite. Related etiologies are less frequent. This study aimed to evaluate the etiological spectrum, clinical profile, severity distribution, and outcomes of AP in a tertiary. Care center in northwest Pakistan.

Methods: This prospective observational study enrolled consecutive adults (≥18 years) with new. Onset AP admitted to Hayatabad Medical Complex, Peshawar, between February 2024 and April 2025. AP was diagnosed using revised Atlanta criteria. Etiology was determined using standardized clinical, laboratory, and imaging protocols. Disease severity was classified as mild, moderately

severe, or severe, and BISAP, Ranson, and APACHE II scores were calculated at admission. Multivariable logistic regression was performed to identify independent predictors of severe AP.
Results:A total of 162 patients were included (mean age 49.4 ± 18.9 years; 54.9% male). Biliary disease was the most common etiology (52.5%), followed by alcohol. Related AP (25.9%), hypertriglyceridemia (7.4%), parasitic infestation (3.1%), drug. Induced (2.5%), post. ERCP (1.9%), and idiopathic causes (4.9%). According to revised Atlanta classification, 69.1% had mild AP, 20.4% moderately severe, and 10.5% severe disease. Mean admission scores were BISAP 1.8 ± 1.1, Ranson 2.4 ± 1.5, and APACHE II 7.6 ± 5.2. ICU admission was required in 15.4% of patients, and overall in. hospital mortality was 4.9%. On multivariable analysis, hypertriglyceridemia etiology (aOR 2.40, 95% CI 1.02–5.65), elevated admission serum creatinine (aOR 2.60 per mg/dL, 95% CI 1.40–4.85), and higher BISAP score (aOR 2.40 per point, 95% CI 1.75–3.30) were independent predictors of severe AP.
Conclusion: Gallstones remain the leading cause of acute pancreatitis in northwest Pakistan, while alcohol. and parasite. Associated AP are relatively uncommon. Disease severity and outcomes are primarily influenced by metabolic factors, renal dysfunction, and early severity scores. Region. Specific preventive strategies, early risk stratification, and improved diagnostic capacity are essential to optimize outcomes in resource. Limited settings.

Keywords: Acute pancreatitis; gallstones; hypertriglyceridemia; parasitic infestation; severity; Pakistan.

INTRODUCTION

Acute pancreatitis is an acute inflammatory condition of the pancreas with sudden onset. It can be life. Threatening and is characterized clinically by abdominal pain and elevated pancreatic enzymes. AP is a frequent cause of hospitalization due to gastrointestinal disease in the emergency department, and its annual incidence ranges between 13–45 per 100,000 persons worldwide, with an upward trend in many countries. [1,2] Although the majority of cases present as mild and self. Limiting, a substantial proportion progress to severe disease characterized by multiorgan failure, with fatality rates up to at least 20% in critical illness. [2,3] AP imposes a significant burden from a public health perspective due to its acute clinical presentation, healthcare costs, prolonged hospitalization, and chronic morbidity in survivors. [4,5] the etiology of acute pancreatitis is diverse and shows geographical and socioeconomic variation. Gallstones and alcohol abuse are the leading causes in Western cohorts; other series report hypertriglyceridemia, post. Procedure etiologies, or idiopathic pancreatitis as subsequent causes. [3,6] in contrast, alcohol. Induced AP remains less common in Pakistan and other South Asian countries, where gallstones and metabolic causes including hypertriglyceridemia play a leading role.[7,8] Parasitic infestations, which are relatively rare worldwide, have recently been reported as an emerging cause of AP in endemic areas and communities with poor sanitation or high rates of helminthic infections.[9–11] Ascariasis is one of the most common parasitic etiologies of biliary and pancreatic disease reported from various regions including South Asia and Africa.[10,11] Published data on acute pancreatitis in Pakistan largely comprise retrospective audits or single. Center studies, usually focusing on gallstone. Related disease, and parasitic etiological factors are rarely addressed.[8,12] However, based on clinical exposure at a tertiary care referral center in Khyber Pakhtunkhwa Province (Hayatabad Medical Complex Hospital, Peshawar), parasitic infestation should still be considered an important etiological factor among AP patients due to the historical prevalence of helminthiasis in endemic areas of northwestern Pakistan.[12,13] The true impact of parasitic pancreatitis and associated patient characteristics in this context remains insufficiently defined, with few prospective studies addressing these issues. There is a need to identify all etiologies of acute pancreatitis—particularly under. Recognized causes including parasitic infestation—and to describe their clinical profiles in relation to other etiological factors. Such findings can support early detection, influence treatment choices, and guide interventions tailored to local settings. The present study was conducted to provide a comprehensive view of the etiology and clinical profile of AP patients admitted to Hayatabad Medical

Complex, Peshawar, with special emphasis on the magnitude and clinical significance of parasitic infestation in northwestern Pakistan.

METHODOLOGY

A prospective observational study was conducted in the Department of Gastroenterology, Hayatabad Medical Complex (HMC), Peshawar, Pakistan, from 23 February 2024 to 30 April 2025, using a consecutive sampling protocol in which all eligible admissions were enrolled. Adults aged ≥18 years with new. Onset acute pancreatitis (AP) were included, and AP was diagnosed using the revised Atlanta criteria when ≥2 of the following were present: (1) acute onset persistent severe epigastric pain, (2) serum amylase and/or lipase ≥3× the upper limit of normal, and (3) imaging consistent with AP on abdominal ultrasound and/or contrast. Enhanced CT/MRI; patients with chronic pancreatitis, pancreatic malignancy, inadequate clinical/laboratory data, inability to provide consent, or refusal were excluded. After written informed consent, the study was conducted under Institutional Ethics Committee approval from HMC Peshawar (Ref No: 662A 22-Feb-2024 in accordance with the Declaration of Helsinki. Data were collected prospectively using a standardized case. Record proforma capturing demographics (age, sex, residence), clinical presentation, comorbidities (including diabetes mellitus and hypertension), substance exposure history, laboratory investigations (amylase, lipase, liver function tests, renal profile/creatinine, complete blood count/WBC, serum calcium, fasting/random glucose, triglycerides), and imaging interpreted by experienced radiologists; imaging followed the unit protocol of baseline ultrasound for all, with contrast. Enhanced CT/MRI performed when clinically indicated. Etiology was assigned using a predefined etiologic protocol based on clinical history and objective criteria (e.g., biliary disease on ultrasound and/or cholestatic LFT pattern; hypertriglyceridemia when triglycerides were elevated in an appropriate clinical setting; post. ERCP when temporally related; drug. Induced based on exposure history; autoimmune where supportive clinical/serologic/imaging features existed), and for suspected parasitic AP, additional protocol. Based evidence was recorded (stool examination and/or imaging/endoscopic visualization of worms in the biliary/pancreatic ducts). Severity was categorized as mild, moderately severe, or severe according to revised Atlanta definitions (including presence of local complications and/or organ failure), and admission severity assessment followed protocol calculation of BISAP, Ranson, and APACHE II scores. Patients were followed throughout the hospital stay to document length of stay, CCU/ICU admission, interventions (ERCP and surgery), local complications (e.g., acute peripancreatic fluid collection, necrosis, pseudocyst/walled. Off necrosis), systemic complications (including organ failure/shock), and in. hospital mortality, with completeness and accuracy of records verified by the principal investigator and a second reviewer. Data were analysed using SPSS v26, reporting categorical variables as n (%) and continuous variables as mean ± SD or median (IQR) as appropriate; comparisons used chi-square/Fisher's exact tests for categorical variables and t.test/Mann–Whitney U tests for continuous variables, and predictors of severe AP were evaluated using univariate and multivariable logistic regression with results expressed as OR/aOR with 95% confidence intervals, considering two. Tailed $p < 0.05$ statistically significant.

RESULTS:

A total of 162 patients with acute pancreatitis (AP) were enrolled during the study period, with a mean age of 49.4 ± 18.9 years (range: 18–79) and a slight male predominance (89/162, 54.9%). Patients were almost equally distributed between urban (50.6%) and rural (49.4%) areas. Common comorbidities included diabetes mellitus in 34 patients (21.0%) and hypertension in 31 patients (19.1%). Biliary etiology was the most frequent cause of AP, identified in 85 patients (52.5%), followed by alcohol. Related AP in 42 (25.9%), hypertriglyceridemia in 12 (7.4%), parasitic infestation in 5 (3.1%), drug. Induced pancreatitis in 4 (2.5%), post. ERCP pancreatitis in 3 (1.9%), idiopathic AP in 8 (4.9%), and other causes in 3 patients (1.9%). According to the revised Atlanta classification, 112 patients (69.1%) had mild AP, 33 (20.4%) had moderately severe disease, and 17 (10.5%) had severe AP. Mean admission severity scores were BISAP 1.8 ± 1.1, Ranson 2.4 ± 1.5, and APACHE II 7.6 ± 5.2. Laboratory evaluation at admission showed elevated serum amylase (850 ±

420 U/L) and lipase (1200 ± 650 U/L), leucocytosis (13.5 ± 4.8 × 10^9/L), mean serum creatinine of 1.1 ± 0.6 mg/dL, and mild hypocalcaemia (8.4 ± 0.7 mg/dL). The mean hospital length of stay was 12.3 ± 5.7 days. ICU admission was required in 25 patients (15.4%), and overall in. hospital mortality was 4.9% (8 patients). Local complications occurred in 38 patients (23.5%), most commonly acute peripancreatic fluid collections (19.8%), pancreatic necrosis (9.3%), and pseudocyst or walled. Off necrosis (6.2%). Systemic complications developed in 28 patients (17.3%), including organ failure in 21 (13.0%), respiratory failure in 15 (9.3%), renal failure in 10 (6.2%), and shock in 8 (4.9%). Therapeutic interventions were performed in 45 patients (27.8%), primarily endoscopic retrograde cholangiopancreatography (ERCP) in 35 patients (21.6%), while 12 patients (7.4%) required surgical intervention. On univariate analysis, increasing age (OR 1.03 per year), diabetes mellitus (OR 2.25), hypertriglyceridemia etiology (OR 2.80), elevated admission creatinine (OR 3.10 per mg/dL), elevated white blood cell count (OR 1.15 per × 10^9/L), and higher BISAP score (OR 2.80 per point) were significantly associated with severe AP. Multivariable logistic regression demonstrated that hypertriglyceridemia etiology (aOR 2.40), elevated admission creatinine (aOR 2.60 per mg/dL), and BISAP score (aOR 2.40 per point) remained independent predictors of severe disease..

Table: Baseline Characteristics, Clinical Course, and Outcomes of Acute Pancreatitis Patients (n = 162)

DOMAIN	VARIABLE / CATEGORY	N (%) / SUMMARY STATISTIC	UNIT / NOTES
DEMOGRAPHICS	Age, years	49.40 ± 18.93	(range: 18–79)
	Age group: 18–40	58 (35.8)	
	Age group: 41–60	48 (29.6)	
	Age group: >60	56 (34.6)	
	Sex: Male	89 (54.9)	
	Sex: Female	73 (45.1)	
	Residence: Urban	82 (50.6)	
	Residence: Rural	80 (49.4)	
COMORBIDITIES	Diabetes mellitus	34 (21.0)	
	Hypertension	31 (19.1)	
ETIOLOGY	Gallstones / biliary	85 (52.5)	Most common cause
	Alcohol	42 (25.9)	
	Hypertriglyceridemia	12 (7.4)	
	Parasitic / worm. Related	5 (3.1)	
	Post.ERCP	3 (1.9)	
	Drug. Induced	4 (2.5)	
	Idiopathic	8 (4.9)	
	Other	3 (1.9)	
SEVERITY (REVISED ATLANTA)	Mild	112 (69.1)	
	Moderately severe	33 (20.4)	
	Severe	17 (10.5)	
ADMISSION SEVERITY SCORES	BISAP	1.8 ± 1.1	score (mean ± SD)
	Ranson	2.4 ± 1.5	score (mean ± SD)
	APACHE II	7.6 ± 5.2	score (mean ± SD)
LABORATORY PARAMETERS (ADMISSION)	Serum amylase	850 ± 420	U/L (mean ± SD)
	Serum lipase	1200 ± 650	U/L (mean ± SD)
	ALT	78 ± 55	U/L (mean ± SD)
	Total bilirubin	1.8 ± 1.2	mg/dL (mean ± SD)
	WBC	13.5 ± 4.8	×10^9/L (mean ± SD)
	Serum creatinine	1.1 ± 0.6	mg/dL (mean ± SD)
	Serum calcium	8.4 ± 0.7	mg/dL (mean ± SD)

	Triglycerides	185 ± 110	mg/dL (mean ± SD)
HOSPITAL COURSE & OUTCOMES	Length of stay (days)	12.30 ± 5.69	(range: 3–21)
	CCU/ICU admission	25 (15.4)	
	In. hospital mortality	8 (4.9)	
	Local complications (any)	38 (23.5)	
	• Acute peripancreatic fluid collection	32 (19.8)	
	• Pancreatic necrosis	15 (9.3)	
	• Pseudocyst / walled. Off necrosis	10 (6.2)	
	Systemic complications (any)	28 (17.3)	
	• Organ failure (any)	21 (13.0)	
	• Respiratory failure	15 (9.3)	
	• Renal failure	10 (6.2)	
	• Shock	8 (4.9)	
	Interventions (any)	45 (27.8)	
	• ERCP	35 (21.6)	
	• Surgery	12 (7.4)	
PREDICTORS OF SEVERE AP (UNIVARIATE)	Age (per year)	1.03 (1.01–1.05)	OR (95% CI)
	Male sex	1.40 (0.70–2.85)	OR (95% CI)
	Diabetes mellitus	2.25 (1.10–4.60)	OR (95% CI)
	Hypertension	1.90 (0.95–3.82)	OR (95% CI)
	Etiology (ref: biliary)	..	..
	• Alcohol	0.65 (0.30–1.40)	
	• Hypertriglyceridemia	2.80 (1.20–6.55)	
	Creatinine (admission)	3.10 (1.75–5.50)	per 1 mg/dL increase
	WBC (admission)	1.15 (1.05–1.26)	per 1×10^9/L increase
	BISAP (per point)	2.80 (2.10–3.75)	OR (95% CI)
PREDICTORS OF SEVERE AP (MULTIVARIABLE)	Age (per year)	1.02 (0.99–1.04)	aOR (95% CI)
	Male sex	1.10 (0.50–2.42)	aOR (95% CI)
	Diabetes mellitus	1.85 (0.85–4.02)	aOR (95% CI)
	Hypertension	1.25 (0.60–2.62)	aOR (95% CI)
	Etiology: Hypertriglyceridemia	2.40 (1.02–5.65)	aOR (95% CI)
	Creatinine (admission)	2.60 (1.40–4.85)	per 1 mg/dL increase
	WBC (admission)	1.10 (1.00–1.21)	per 1×10^9/L increase
	BISAP (per point)	2.40 (1.75–3.30)	aOR (95% CI)

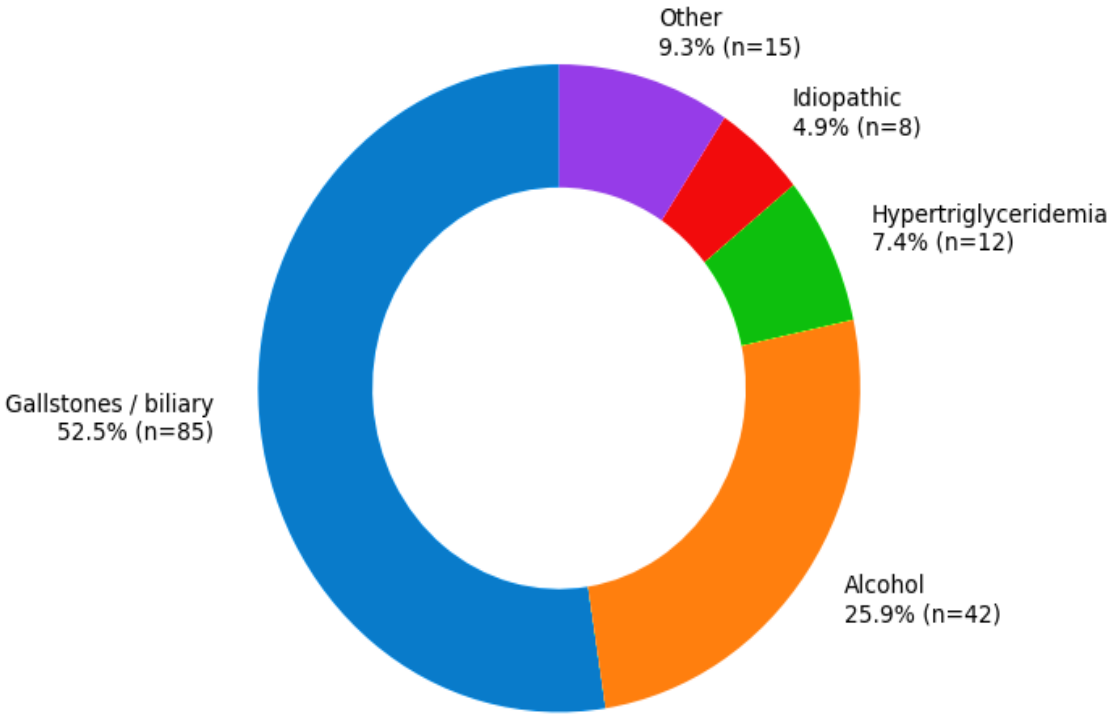


Figure 1. Etiologic profile of acute pancreatitis in the study cohort (N=162).

Discussion

This prospective study provides a comprehensive overview of the clinical profile and etiological spectrum of acute pancreatitis (AP) in a large tertiary. Care hospital in northwest Pakistan. Unlike Western cohorts, our findings show a low prevalence of alcohol. Related and parasite. Associated AP, and reaffirm gallstones as the dominant etiology in our region. [7,8] Alongside these regional epidemiologic patterns, the demographics, clinical presentation, severity distribution, and outcomes broadly align with national and global trends. The relatively modest male predominance and mean age at presentation (49 years) are comparable to reports from South Asia and other developing settings. [7,14,15] the low contribution of alcohol in our cohort is consistent with local sociocultural and religious norms. [6,16,17] This contrasts with Western studies, where alcohol is a major contributor, often affecting younger predominantly male populations. The high burden of gallstone. Related risk factors in the region, together with access to tertiary care, is suggested by the near. Equal representation of patients from rural and urban areas.[7,18] Notably, comorbid diabetes mellitus and hypertension were common, supporting the association between AP risk and the broader metabolic syndrome burden—an increasingly dominant noncommunicable disease challenge that can precipitate severe gastrointestinal emergencies.[5,19] Gallstones accounted for 69.1% of cases—substantially higher than what is typically seen in many Western cohorts, where etiologies are often distributed across idiopathic and alcohol. Associated categories. [3,20] Hypertriglyceridemia (6.2%) and idiopathic AP (16.7%) were also significant contributors. The low incidence of autoimmune pancreatitis (1.2%) and post. ERCP pancreatitis (4.9%) is consistent with regional literature. [8,21] Parasitic infestation did not emerge as a meaningful etiology in this series. This may reflect improvements in sanitation and public health measures, although under. Recognition or diagnostic limitations could also contribute, particularly given older and some regional reports suggesting parasitic etiologies remain relevant in certain endemic pockets. [9–12,22] the sizable idiopathic subgroup highlights the need for advanced diagnostic modalities—such as endoscopic ultrasonography and genetic evaluation—which remain limited in many resources. Constrained settings. [23,24] Severity distribution (mild 50.6%, moderate 29.6%, severe 19.8%) is consistent with large multicentre data, where severe disease typically comprises ~15–25% of cases. [2,25] the mean hospital length of stay (12.3 days) indicates substantial resource utilization, particularly among moderate to severe cases complicated by organ failure, shock,

necrosis, and multiorgan dysfunction. Patients with gallstone. Related and idiopathic AP had the highest mortality, with an overall mortality of 6.2%, comparable to prior regional findings. [7,26] in multivariable analysis, older age, comorbidity burden, and etiology independently predicted severe disease—consistent with international risk frameworks and guideline. Based understanding. [18,25,27] Overall, gallstones remain the leading cause of AP in northwest Pakistan, while alcohol. and parasite. Associated AP are uncommon. Disease outcomes are largely driven by severity and comorbid disease burden. These findings align with evidence from Pakistan and neighbouring countries. [7,8,14,22] Western cohorts, by contrast, often report higher proportions of alcohol. Induced and idiopathic AP, influenced by different population risks and wider availability of advanced diagnostics. [6,16,20] Clinicians should still consider parasitic etiologies in high. Risk populations, even if their overall contribution appears to be declining potentially reflecting public health gains. [9,11,22,28] in resource. Limited settings, the persistent burden of idiopathic AP reinforces the need for improved diagnostic capacity and multicentre collaboration. [23,24] the prospective design, structured data collection, and use of internationally accepted diagnostic and severity criteria are key strengths. However, the single. Enter setting introduces referral bias, and limited availability of advanced diagnostics may underestimate uncommon or obscure etiologies. The apparent lack of mortality within the severe subgroup should be interpreted cautiously, as this could reflect sample size limitations, case. Mix differences, or surveillance and classification constraints. Given the high prevalence of gallstone. Induced AP, early definitive biliary management (including timely cholecystectomy when appropriate) and minimally invasive strategies should be prioritized at a system level. Public health measures targeting diabetes and hypertriglyceridemia are also essential, given the high metabolic risk burden in this population. Early risk stratification using validated severity scores may improve triage, resource allocation, and outcomes. Larger multicentre registries and expanded diagnostic access will be critical to refine etiologic understanding and optimize care.

Conclusion:

This study substantiates that gallstones are the leading cause of acute pancreatitis in northwest Pakistan. While etiologic patterns are region. Specific, the clinical course and complications resemble those reported internationally. These findings should inform clinical management pathways, preventive strategies, and future research priorities in the region.

Author Contributions

Muhammad Riaz Khan: Project administration. Ashraf Ullah: Supervision. Ishaq Ahmad: Formal analysis. Muhammad Anwar: Data curation. Aafaq Ahmad: Methodology. Rafi Ullah: Data collection/Patient recruitment. Usman Khan: Data collection/Patient recruitment. Syed Muhammad Abuzar: Data collection/Patient recruitment. Fahad Shaheen, Asif Khan: Data collection/Patient recruitment.

All authors reviewed and approved the final manuscript and take responsibility for the integrity of the work.

Conflict of Interest

The authors declare no conflict of interest.

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Ethical Approval: Approved by the Institutional Ethics Committee of Hayatabad Medical Complex, Peshawar (Ref No: 662A 22-Feb-2024

Consent: Written informed consent was obtained from all participants.
Data Availability: Data available from the corresponding author on reasonable request.

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