Cohort Study

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Aetiology, clinical profile, management and outcome of acute pancreatitis at public hospitals in Addis Ababa, Ethiopia: a prospective observational study

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Background: Acute pancreatitis (AP) is a rare gastrointestinal pathology that has recently become increasingly common owing to lifestyle changes. Its clinical presentation ranges from mild discomfort to organ failure and death. Previous studies in Ethiopia reported that AP is rare. However, lifestyle changes have recently increased. Therefore, this study aimed to assess the aetiology, clinical profile, management, and outcomes of AP.

Methods: This prospective observational study included 59 adults diagnosed with AP using the Revised Atlanta Classification between November 2021 and August 2022 at five public hospitals in Addis Ababa. The data were analyzed using SPSS 25. The mean ± standard deviation and adjusted odds ratio (AOR) at 95% CI were used.

Results: The mean age was 38.2 (SD ± 11.5 years), mostly aged 30–44, with 67% males and 89.8% patients presenting with new-onset AP. Abdominal pain and nausea were the most common presentations in 93.2% of patients. More than 52.5% of AP cases were caused by alcohol, followed by gallstones (28.8%), and gallstones (47.1%) underwent cholecystectomy during the index admission. One patient (1.7%) died. The length of hospital stay ranges from 1–47 days and increases with the severity of AP. Patients with recurrent AP had a 2.4 folds increase in complications compared to new-onset AP (AOR = 2.4, 95% CI = 1.38, 15.71).

Conclusion: Most AP cases were caused by alcohol consumption, followed by gallstones, smoking, and hypertriglyceridemia. One death in a 60-year-old male with an alcohol and smoking history was diagnosed and triaged as severe AP with persistent multiple organ failure; BISAP score 4, his Creatinine = 2.55 mg/dl, haematocrit 72.6%; and left shift of WBC, was associated.

Keywords: acute pancreatitis, alcohol, clinical presentation, gallstones

Introduction

Acute pancreatitis (AP) is characterized by an inflammatory disease resulting from auto-digestion of the pancreatic gland[1,2]. AP is a rare gastrointestinal pathology but an increasing cause of morbidity and mortality worldwide[2,3]. Its incidence is increasing and high in the United States[4–6] Substantial variations in the burden of AP worldwide, but the overall burden of AP cases remains high[2]. While the majority of AP episodes are mild and self-limiting, up to a fifth of patients develop potentially severe attacks that can be fatal[7,8].

In recent years, the incidence of acute pancreatitis (AP) has increased, and there is an increased demand for resources, particularly for severe AP, because of the longer hospital duration,

HIGHLIGHTS

- Abdominal pain followed by nausea and vomiting were the most common presentation in 93.2% of patients.
- Recurrent acute pancreatitis (AP) had a 2.4 folds increase in complications compared with new-onset AP.
- More than half of the AP cases were caused by alcohol consumption, followed by gallstones, smoking, and hypertriglyceridemia.
- An increase in hospital stay was observed as AP severity increased, and multiple organ failure was a possible cause of death in this study.
- Preventive measures such as lifestyle modification (reducing alcohol consumption, maintaining a healthy weight, and avoiding smoking)-should be considered.

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which requires several weeks for treatment[9]. However, the incidence varies significantly among different populations. Gallstones and alcohol consumption are the most frequent etiologies of AP. Other causes include trauma, drugs, infections, hypertriglyceridemia, hypercalcemia, neoplasms, human immunodeficiency virus (HIV) infection, metabolic disorders, BMI, and idiopathic causes[5,10]. The incidence of AP seems to increase with differences in aetiology between and within countries, which may reflect differences in the prevalence of risk factors[11].

Despite technical advances in the medical and surgical fields, AP remains a major public health problem, with significant morbidity and mortality[2,4]. In the United States, hospital admissions have increased by 20% over the past 10 years[1,12]. The AP guidelines suggest that the aetiology should be determined in at least 80% of cases and that the idiopathic causes of AP should be no greater than 20%[13]. According to a study conducted in India, abdominal pain, followed by vomiting and fever, was the most common patient presentation, and alcohol was identified as 90% of the AP aetiological factor, followed by gallstones at 4%[14,15]. However, another study conducted in India showed that the aetiologic spectrum of mild AP was alcohol consumption (41.1%), gallstones (23.5%), trauma (17.6%), and idiopathic (11.7%[14]. Although gallstones and alcohol abuse continue to account for 70% of AP cases, with gallstones accounting for approximately 45% of cases, alcohol was the second most common, accounting for 35% of AP cases[16,17]. Based on a study conducted in Ethiopia, AP accounted for 0.23% of all adult emergency visits, and the diagnosis was based on clinical evaluation and serum amylase levels in only 60% of patients[18–20]. Further studies are required to understand AP in Ethiopia.

A survey of 142 AP cases was conducted at two major hospitals in Malaysia. Females outnumbered males in a ratio of greater than 3:1, and abnormalities in serum transaminases were found in 35% of patients, suggesting that occult gallstones or microlithiasis may be the cause of a significant proportion of patients, and 8.4% of cases fell into the category of severe AP, with a mortality rate of 2.1%[21]. Metabolic abnormalities are a rare cause of AP, and hypertriglyceridemia causes ~2–5% of cases[22,23].

Despite the reduction observed in different settings over time, patient mortality remains unchanged, and in severe AP cases can be as high as 30%[13,24]. However, the pancreatic guidelines by the Association of Surgeons of Great Britain recommend that mortality from AP should be less than 10% and, in severe cases, less than 30%. The international consensus on AP severity classification classifies AP into mild, moderate-to-severe, and severe AP, with or without local/systemic complications[25].

Several studies have been conducted to compare scoring systems and have shown that no single scoring system perfectly/accurately predicts the outcome; despite this limitation, they are important scoring systems devised for AP and patient triage[24]. Atlanta scoring and criteria rely on complications, such as local or organ failure[26], whereas the Ranson, APACHE II, and modified Glasgow scoring systems use laboratory and clinical data to assess systemic inflammation or complications[27–29].

Two previous studies in Ethiopia concluded that AP deserves attention[18]. Multicenter and prospective studies are recommended to determine the magnitude and outcomes of AP. This is because previous studies used secondary data and were outdated, which might have missed important data and resulted in less utilization of severity criteria in their study. In addition, the complexity of AP in the outcome makes us undertake this study to assess the clinical profile, aetiology, severity, management, and outcomes of AP, which would provide important recommendations by incorporating missing information using standardized scoring systems devised for AP, such as the revised Atlanta definition and classification Criteria[26].

Methods and materials

Study design, period and setting

This prospective observational study was conducted between November 2021 and August 2022 on adult patients admitted to the surgical and medical wards of five public hospitals in Addis Ababa, Ethiopia. Ethical approval was granted by the Ethics Review Board (No. -2/8/2022). Informed consent (both written and verbal) was obtained from the patients and their relatives for participation in accordance with the Declaration of Helsinki. The study was conducted according to the STROCSS 2023 criteria[30].

Source population

All patients admitted to the emergency unit, and the medical and surgical wards of a public Hospital in Addis Ababa were the source population for this study.

Study population

All the patients were admitted to the emergency, medical, and surgical wards with a diagnosis of AP at five public Hospitals in Addis Ababa, Ethiopia.

Inclusion and exclusion criteria

All patients (age >15 years) with acute pancreatitis who were admitted to hospitals or fulfilled two of the three criteria (Atlanta Classification) and were willing to stay during the study period were included. The exclusion criteria were as follows: critically ill patients, blunt abdominal injury, postoperative cases, post-endoscopic retrograde cholangiopancreatography (ERCP) pancreatitis, chronic pancreatitis based on medical records, and radiological findings.

Study variables

Dependent variable

Acute pancreatitis outcome.

Independent variables

Age, sex, aetiology, comorbidities, management options, and severity.

Operational definitions

The diagnosis of acute pancreatitis was based on (Revision of the Atlanta Classification) and definitions by the international consensus. Gut. 2013;62(1):102–11))[26].

Classifications of the severity of acute pancreatitis were classified according to the revised Atlanta criteria (2013)[15].

Adult patient: Different studies used different cuts of age to categorize a patient as adult, and among hospitals, there is no similar approach to admitting the patient to medical/surgical

wards as adult patients; therefore, we used patients aged older than 15 years.

Sample size and sampling technique

The initial sample size was calculated using a previous study conducted at Menilik-II Hospital in Addis Ababa, Ethiopia (Dansa and Koteso), and resulted in a sample size including a 10% non-response rate, which is a small sample size. We then preferred to increase the sample size, and consecutive sampling techniques were used to enrol all patients with acute pancreatitis who fulfilled the inclusion criteria during the study period. Additionally, we increased the number of hospitals to increase the sample size. Finally, the study included 59 eligible AP cases from five public hospitals in Addis Ababa. This multicenter study aimed to increase the sample size for acute pancreatitis (AP), a rare condition, within a fixed time frame. Previous studies on AP have a limited sample size and lack generalizability.

Data collection tools and data collection procedure

A detailed history, physical examination, complete blood count (CBC), serum electrolytes, renal function test (RFT), liver function test (LFT), serum amylase and/or serum lipase, and abdominal ultrasonography and computed tomography (CT) scans were performed during hospitalization for some patients. The acute pancreatitis severity index was determined on the first day of admission. The patients with mild AP had no local complications or organ failure. Patients with moderately severe AP experience transient organ failure and/or local complications, while those with severe AP experience persistent organ failure. Owing to its simplicity, repeatability, universal applicability across international centres, and ability to stratify disease severity easily and objectively, the modified Marshall scoring system with a score of 2 or moreover a period of more than 48 h for any one of the three organ systems (respiratory, renal, and cardiac) is defined as persistent organ failure, whereas if it is present for less than 48 h, it is known as transient organ failure.

All patients were managed in accordance with the patient management protocol, and severity assessments were performed using the modified Atlanta classification (RAC). RAC has been utilized in severity classification; however, it is not useful for early prediction of severity. The RAC system effectively defines the morphological types of pancreatitis, provides a more standardized system for grading disease severity, and classifies local retroperitoneal complications. The RAC system is relevant for clinical decision-making as it provides a more accurate and standardized method for diagnosing and classifying AP, which can help guide treatment decisions and improve patient outcomes.

Quality assurance and control

This study used a structured questionnaire adapted from previous studies. The questions aimed to gather information from patients regarding relevant socio-demographic characteristics of the patients, etiologies, management options, and outcomes of acute pancreatitis. The questionnaire was tested using a demonstration test, and necessary corrections were made before actual data collection began. Trained 10 data collectors were used for data collection. The principal investigator and four supervisors supervised the data collection process. They assured the understandability of the questions and clarified any ambiguity during data collection with the data collectors.

The principal investigator and supervisor overlooked the data on a daily basis, and the collected data were checked for completeness, accuracy, clarity, and consistency before entering into the data entry forms. Ambiguity or incompleteness was recorded and corrected immediately before proceeding to the next.

Data analysis

After the principal investigator and supervisor checked for completeness and accuracy, and the data were analyzed using the Statistical Package for Social Science (SPSS) version 25.0. Descriptive statistics, such as frequency, proportions, and appropriate graphic presentations, were used to describe and report the data. Pearson's chi-square test was used to analyze categorical data. Continuous variables were described as mean ± standard deviation, and an adjusted odds ratio (AOR) at 95% confidence intervals was used to determine statistical significance. Bivariate analysis was conducted using logistic regression between each variable, and variables with P values less than 0.25 were entered into multivariate analysis to determine the association between dependent and independent variables (to identify the independent predictors of morbidity and mortality) with statistical procedures, with a P value of less than 0.05 and considered statistically significant.

Results

Socio-demographic characteristics of patients with acute pancreatitis

A total of 59 patients participated in the study, and the majority were in the age group 30–44 years with a mean age of 38.2 (SD ± 11.5) years. Among the respondents, two-thirds (67%) were males, and 47.5% of the patients were Amhara. Seventy-nine percent of the patients were orthodox religious followers, and 52.5% were married. One-fourth of the patients had a degree in education, 44.1% were government employees, and 39 (66.1%) had a BMI in the range of (18.5–24.9) (Table 1).

Aetiologic characteristics of patients with acute pancreatitis

In this study, 89.8% of the study patients presented with new-onset AP; among them, 91.5% of the patients were diagnosed using the revised Atlanta criteria (clinically met at least two criteria). More than half (52.5%) of the AP cases were caused by alcohol, followed by gallstones (28.8%). Of the study participants who had acute pancreatitis caused by gallstones, two out of 17 (11.8%) had previously undergone cholecystectomy. This suggests that cholecystectomy does not completely prevent AP development or recurrence. This study did not examine the types of alcohol consumed by the participants, and the cases were confirmed as alcohol based on the patient's reports of binges/beer drinking before the presentation for AP. The amount of alcohol consumed (typically 100–150 g per day) and the frequency of alcohol consumption are more important than the type of alcohol consumed. Patients with alcohol-associated AP often have a history of excessive alcohol intake prior to their first attack.

Among the patients with AP due to gallstones, 8 (47.1%) underwent cholecystectomy during index admission. Of the patients who did not undergo cholecystectomy at index

Table 1

Sociodemographic characteristics of patients with acute pancreatitis

Variables	Category	Frequency	Percent
Age in years (mean and SD = 38.2 ± 11.5)	18–29	11	18.6
	30–44	33	55.9
	45–59	11	18.6
	≥ 60	4.0	6.80
Sex	Male	41	69.5
	Female	18	30.5
Ethnicity	Oromo	16	27.1
	Amhara	28	47.5
	Tigrie	12	20.3
	Silte	1.0	1.70
	Gurage	2.0	3.40
Religion	Orthodox	47	79.4
	Muslim	8.0	13.6
	Protestant	4.0	6.80
Marital status	Single	20	33.9
	Married	31	52.5
	Divorced	3.0	5.10
	Widowed	5.0	8.50
Educational status	Illiterate	6.0	10.2
	Primary	9.0	15.3
	Secondary	15	25.4
	Diploma	11	18.6
	Degree	18	30.5
Works	Civil servant	26	44.1
	Farmer	6.0	10.2
	Merchant	3.0	5.10
	Private employee	21	35.6
	Housewife	3.0	5.10
BMI	< 18.5	1.0	1.70
	18.5–24.9	39	66.1
	25–29.9	18	30.5
	≥ 30	1.0	1.70

admission, six (66.7%) were deemed unfit for the surgical procedure, followed by three (33.4%) who had severe disease. Meanwhile, 69.5% of patients were informed about the aetiology of AP and possible lifestyle modifications to prevent recurrence (Table 2).

The laboratory results of patients with acute pancreatitis

The laboratory findings showed that the mean and SD of WBC were 13.1 ± 5.3, Haematocrit (45.7 ± 5.9), Creatinine (1.27 ± 2.19), and platelets (273 ± 107.4) (Table 3).

The contrast-enhanced computed tomography characteristics

In this study, abdominal contrast-enhanced computed tomography (CECT) was performed in nearly a quarter of 14 (23.7%) patients with AP. Based on the CECT findings, five (33.3%) patients had acute necrotizing pancreatitis, followed by acute oedematous pancreatitis (21.3%), fat necrosis (7.1%), pseudocyst (7.1%), biliary duct dilatation (7.1%), suspected local complications (7.1%), hypoechoic lesions (7.1%), and severe local complications (7.1%).

Table 2

Etiologic characteristics of patients with acute pancreatitis

Variables	Category	Frequency	Percent
Patients clinical presentation	New onset of AP	53	89.8
	Recurrent AP	6.0	10.2
Diagnosis of AP	Clinical (at least met 2 criteria)	54	91.5
	Postoperative diagnosis	5.0	8.50
Causes of AP	Gallstone	17	28.8
	Alcohol	31	52.5
	Obesity	1.0	1.60
	Elevated TG	2.0	3.40
	Smoking history	10	17.0
	Idiopathic	13	22.0
Patients undergoing cholecystectomy	Yes	8.0	47.1
	No	9.0	52.9
Reasons for differing surgery	Severe disease	3.0	33.3
	Patient unfit for surgery	6.0	66.7
Does patient informed about aetiology of AP and life style modification	Yes	41	69.5
	No	18	30.5

Gall stone (U/S proved/ALT > 150) (1 case post cholecystectomy).
AP, acute pancreatitis; ALT, Alanine Aminotransferase.

The ultrasound results of patients with acute pancreatitis

Abdominal ultrasonography was performed in three-fourths of the patients with AP, and from those with ultrasound results, 17 (37.8%) showed features of AP and/or its complications. The remaining results included fluid collection in different spaces, fatty liver, and cholelithiasis as the possible causes of AP.

The clinical presentation of patients with acute pancreatitis

Abdominal pain and nausea/vomiting were the most common presenting symptoms, occurring in 93.2% and 94.3% of the AP cases, respectively, followed by fever (23%) and anorexia (19.9%). Jaundice was present in two (3.4%) cases. The most common signs were abdominal tenderness with or without distension (89.8%), followed by respiratory distress (57.8% and 18.6%, respectively) (Table 4).

Table 3

The laboratory result of patients with acute pancreatitis

Variable	Minimum	Maximum	Mean ± SD
WBC	2.80	25.6	13.1 ± 5.30
Neutrophils	25.0	93.3	79.8 ± 13.4
Hct	29.2	72.6	45.7 ± 5.90
Platelet	24.0	564	273 ± 107.4
AST	3.00	676	90.6 ± 144.4
ALT	6.00	319	72.8 ± 83.20
ALP	0.40	209	87.8 ± 63.10
Creatinine (Cr)	0.36	12.0	1.27 ± 2.19
BUN	4.00	1226	131.8 ± 314
Serum amylase	13.0	9383	696.2 ± 1389

ALP, Alkaline Phosphatase; ALT, Alanine Aminotransferase; ALP, Alkaline Phosphatase; AST, Aspartate Aminotransferase; BUN, Blood Urea Nitrogen; Hct, haematocrit; WBC, white blood cell.

Table 4

The clinical presentation of patients with acute pancreatitis.

Variables	Category	Frequency	Percent
Symptom of the patients	Abdominal pain	55	93.2
	Nausea and vomiting	56	94.3
	Fever	14	23.7
	Jaundice	2.0	3.40
	Anorexia	7.0	11.9
	Others	5.0	8.4
Sign of the patients	Abdominal distension	53	89.8
	Tachycardia	34	57.8
	Ileus	8.0	13.6
	Respiratory distress	11	18.6

Management of patients with acute pancreatitis

Out of the 59 study participants, 93% of the cases were managed conservatively (Patients who were clinically diagnosed with Acute Pancreatitis but not intervened surgically, including all severities of the disease) with fluid resuscitation, analgesics, and antacid/PPI. 32.2 Of the patients, 32.2% received prescribed antibiotics, with the majority administered for suspected/confirmed infections. More than 2/3 (71.2%) of the cases remained NPO at the time of initial admission. A mean of 3.7 l crystalloid was administered on the day of admission. A total of 57.6% of the participants' urine output was followed, and three (5.1%) of the patients had a history of oliguria due to pancreatitis. Laparotomy was performed in 11 (18.6%) cases, of which the major reason for 54.5% was AP. In the remaining five participants (45.5%), laparotomy was performed for unsettled/other diagnoses; out of the 59 study participants, five (8.5%) of the cases of acute pancreatitis were diagnosed postoperatively.

Management is individualized and depends on its severity and aetiology. Initially, all patients were admitted to the emergency department and triaged based on disease severity, kept nil per os (NPO), and administered intravenous fluids to maintain hydration and electrolyte balance. The pain was managed with analgesics, and nutritional support was initiated once the patient's condition stabilized. Management of nausea, vomiting, and dyspepsia was provided as required. Antibiotics were administered, and necresectomy/abscess drainage with a larger tube placement was performed as indicated. Severe cases of organ failure were managed in the ICU with close monitoring and organ support. In general, the standards were followed. Patients with gallstone pancreatitis who were suitable for surgery also underwent definitive intervention during the same admission.

Complication and severity classification

Almost all patients had no history of hemodynamic instability, but approximately half (49.2%) developed some form of a complication. Among those who developed complications, 27 (45.8%) developed local complications, and 10 (16.9%) developed systemic complications. Local complications included necrotic collection, ascites, acute peripancreatic fluid collection, pleural effusion, and pseudocysts (48.1%, 33.3%, 25.9%, and 22.2%, respectively) in descending order. Among those who developed systemic complications ($n = 10$), respiratory failure occurred in 60%, followed by acute kidney injury (AKI), which occurred in half of the cases (Table 5).

Table 5

Complication and severity classification.

Variable	Category	Frequency	percent
Hemodynamic instability	Yes	1.0	1.70
	No	58	98.3
Local /regional			
	Acute necrotic collection	13	48.1
	Acute peripancreatic fluid collection	7.0	25.9
	Pancreatic pseudocyst	6.0	22.2
	Splenic and portal vein thrombosis	3.0	11.1
	Infected pancreatic necrosis	2.0	7.40
	Infected WON	2.0	7.40
	Ascites	9.0	33.3
	Pleural effusion	7.0	25.9
	Wound site infection	1.0	3.70
Systematic complication		10	16.9
	AKI	5.0	50.0
	Respiratory failure	6.0	60.0
	Hyperkalemia	1.0	10.0
Patient's mortality risk based on BISAP score	0	20	33.9
	1	25	42.4
	2	11	8.60
	3	2.0	3.40
	4	1.0	1.70
Severity based on the Revised Atlanta classification	Mild AP	31	52.5
	Moderate AP	18	30.5
	Severe AP	10	17.0

Severe AP (Persistent organ failure (> 48 h); Revised Atlanta classification (use the modified Marshall score).
AKI, acute kidney injury; AP, acute pancreatitis; WON, Walled-off necrosis.

Revised Atlanta severity classification

According to the Revised Atlanta Classification, more than half (52.5%) of the patients had mild disease, six had severe acute pancreatitis, and the remaining 30.5% had moderately severe acute (Fig. 1).

Comorbidity of patients with acute pancreatitis

Nearly 18 (30.5%) patients had comorbid illnesses, of which hypertension was present in 11(61.1%), diabetes mellitus in

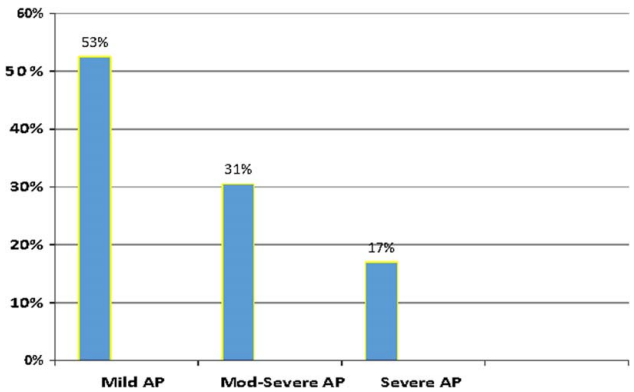

Figure 1. Severity classification of patients with acute pancreatitis (AP).

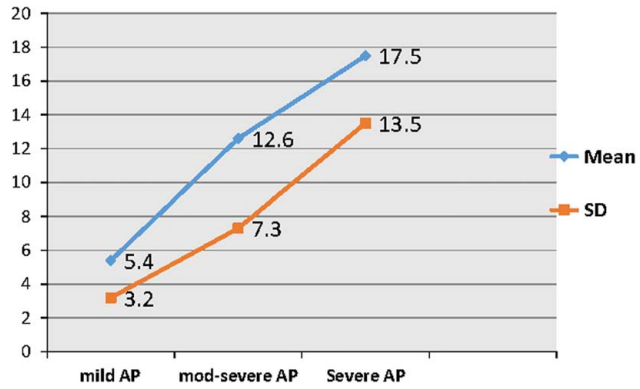

Figure 2. Duration of patients hospital stay by acute pancreatitis (AP) severity.

5 (27.8%), cardiac disease in 2 (11.1%), and dyslipidemia in 2 (11.1%).

The outcome of patients with acute pancreatitis

The maximum duration of hospital stay was 47 days, with a mean of 10 days (standard deviation (SD) ±8.8). The mean of patients with mild AP was 5.4 (SD± 3.2), the mean for moderately severe AP was 12.6 (SD± 7.3), and that for patients with severe AP was 17.5 (SD± 13.5). The study showed an increase in hospital stays as the severity of AP increased from mild to severe (Fig. 2).

Outcomes of patients at discharge improved in 53 (93.2%) patients and 4 (6.8%) patients were referred to a higher centre for better management (two cases for debridement of infected necrosis, one for cholecystectomy surgery, and one for (ERCP). In addition, 11 (18.6%) cases required ICU admission, except for one case due to a lack of ICU beds at the time. Indications for ICU admission were exclusively respiratory failure and acute kidney injury (AKI), which occurred in 54.5% and 45.5% of cases of acute pancreatitis, respectively. There was only one death (1.7%), with the possible cause of death being multi-organ failure (respiratory failure and AKI).

Multivariate risk factor analysis

Patients with recurrent AP had a 2.4 folds increase in complications compared to those with new-onset AP (AOR = 2.4, 95% CI = 1.38, 15.71), and patients who had gallstones had 2.4 folds increase in the chance of developing complications compared to those in the opposite compartment. In addition, patients who were not informed about lifestyle modification had 2.0-fold the likelihood of developing complications compared to the opposite compartment (AOR = 2, 95% CI = 1.58, 6.94). On the other hand, patients who were had/developed comorbid illness had 2.6 folds the likelihood of developing complications than those who did not have any comorbidity (AOR = 2.6, 95% CI = 1.74, 9.33) Table 6).

Discussion

In this study, of the total 59 AP cases, 69.5% were male, resulting in a male-to-female ratio of approximately two-thirds. This finding is comparable to that of a study conducted in the UK (13) and Ethiopia[18]. This finding is also in line with a retrospective study conducted on the clinical profile of patients with AP in India, in which 96% of the study subjects were male[15]. This may be because the aetiology of alcohol consumption (52.5%) and smoking (17%) was more prevalent in male patients than females. However, a study conducted at a public hospital in Addis Ababa, Ethiopia, reported a significantly higher male-to-female 5:1 ratio[19,20,31].

In this study, 53 (89.8%) of the study patients presented with new-onset AP, and the remaining were recurrent, while 54 (91.5%) of the diagnoses were made preoperatively, and the aetiology of AP was ascertained in 78% of the cases. Alcohol consumption (52.5%) was the most common, followed by gallstones (U/S confirmed or Alanine Aminotransferase > 150) and smoking (17%); 22% of the cases were unknown. This finding is comparable to a retrospective study conducted in Oman, 66% was due to alcohol[32], and in Ethiopia, 44.4% was due to alcohol[19,20].

A study conducted in Nagara, India, showed that alcohol accounted for 72% of cases, followed by gallstones (12%), idiopathic (8%), and others (8%)[26]. Moreover, in Tripura, alcohol accounted for 90% of AP cases, followed by gallstones (4%) (14). In contrast to this study, in Egypt, 56% of AP cases were secondary to gall bladder stones and alcohol in 26% and idiopathic stones in 12% of the cases[16,32]. Furthermore, a study by the American Gastroenterological Association (AGA) showed that gallstones accounted for 40–70% of AP cases[32]. Variations in the aetiology of AP in different countries may be due to disparities in sociocultural factors, including lifestyle, religious, and cultural factors that discourage/allow alcohol consumption.

The diagnosis of idiopathic AP is crucial for providing the most appropriate intervention and preventing recurrent attacks, leading to the development of chronic pancreatitis. Despite the availability of diagnostic technologies, the aetiology of AP remains unclear in 10–30% of cases. Studies have reported Idiopathic acute pancreatitis (IAP) is a common condition. For instance, a retrospective audit of 35 patients admitted with AP at the Aga Khan University Hospital from 2005 to 2007 showed IAP in 29% of patients. Similarly, a study conducted in King Fahd Central Hospital in Jizan, Saudi Arabia over a period of 12 years showed that IAP was diagnosed in 16 (26%) of 107 patients with AP. A cross-sectional, single-centre study of the epidemiological features of AP in a sample of Saudi patients by Lehibi and colleagues in the Atlantis Press Journal of Epidemiology and Global Health found that IAP was diagnosed in 25% of cases.

IAP is a clinically challenging issue with substantial socioeconomic consequences. Investigations are expensive and often provide little information regarding the causes of AP. Uncertainties surrounding IAP could impact the overall understanding of AP in the population by limiting the ability of healthcare professionals to identify the underlying cause of the disease. This could lead to delays in diagnosis and treatment as well as increased healthcare costs due to the need for more extensive testing and treatment. Little is known about the interactions between genetic, environmental, anatomical, and other factors that contribute to AP.

This study found that nearly 30.5% of the patients had comorbid illnesses, with hypertension being the most common (61.1%), followed by diabetes mellitus (27.8%) and cardiac disease. This was more than a two-fold increase from a 4-year retrospective study in Ethiopia (2012-2016), which reported only 12.3% comorbidity. Among the comorbid patients, 43.2% had

Table 6

The multivariate analysis of the risk factors

Variable	Frequency		P	COR with 95% CI	P	AOR with 95% CI
	Yes	No				
AP cases						
New onset	26	27	1		1	
Recurrent	4.0	2.0	0.042	2.1 (1.03–12.32)	0.034	2.4 (1.38–15.71)[a]
Gall stone/ATL > 150						
Yes	11	6.0	0.180	2.2 (0.69–7.12)	0.017	2.4 (1.18–4.59)[a]
No	19	23	1		1	
Life style						
Yes	19	22	1		1	
No	11	7.0	0.029	1.8 (1.58–5.63)	0.027	2.0 (1.58–6.94)[a]
Comorbidities						
Yes	12	6.0	0.112	2.6 (0.80–8.13)	0.013	2.6 (1.74–9.33)[a]
No	18	23	1		1	

AOR, adjusted odd ratio; AP, acute pancreatitis; COR, crude odd ratio.
[a]Shows Significance.

type II diabetes mellitus, and 28.3% had stage III or IV retroviral infections. This can be attributed to lifestyle changes and reduced physical activity.

According to the Revised Atlanta Classification[26], this study showed that more than half of the patients (52.5%) had mild acute pancreatitis (AP), 17% had severe AP, and 30.5% had moderately severe AP. This was consistent with a study conducted at the University Hospital, Egypt, which used Ranson's criteria and abdominal CT to assess AP severity. That study reported that 60% of the cases were mild ,28% were severe according to Ranson's criteria[27], and 50% were mild and 26% were severe on abdominal CT. The proportion of moderately severe AP on CT scans was similar in both studies (28% vs. 30.5%), but there was a large discrepancy in the proportion of moderately severe AP according to Ranson's criteria (18% vs. 30.5%). This indicates that all three methods are sensitive in detecting severe AP, but they may differ in identifying moderately severe AP. Moreover, RAC and abdominal CT showed almost comparable categorization of AP, which may be due to the fact that RAC incorporates local complications picked by imaging modalities. On the other hand, the low percentage of moderate AP by Ranson's score may be due to the fact that laboratory parameters might not always be arranged in the presence of local complications, which are essential components in assigning cases as moderately severe by RAC/CT. The studies also agree with a prospective study on the demographic profiles, aetiology, and management of patients presenting with AP in AIMS, B. G. Nagara; 32 (64%) patients developed mild AP, 14 (28%) had moderately severe AP, and 4 (8%) had severe AP. This study showed an increase in hospital stays as the severity of AP increased from mild to severe, with multiple possible causes of death.

The study showed that 49.2% of patients developed some form of complication. Among these complications, 45.8% were local, and 16.9% were systemic. Compared with a prospective study in AIMS, B. G. Nagara, out of a total of 50 patients, 44 (88%) patients developed complications, of which 30 patients developed local complications and 14 (28%) patients developed systemic complications, with a higher complication rate than our study. However, in a study conducted at the University Hospital in Egypt, 36 (72%) patients had no complications, including renal, respiratory, paralytic ileus, pancreatic abscess, diabetes mellitus (DM), and multi-organ failure occurred in three (6%), four (8%), three (6%), one (2%), one (2%), and two (4%) patients, respectively. This finding magnified the low rate of complication development compared to this study and a prospective study on the demographic profiles, aetiology, and management of patients presenting with AP in AIMS, B. G. Nagara, which may be due to differences in the aetiology of pancreatitis, disease presentation as new onset or recurrence, and differences in study participant characteristics such as demographics, presence of comorbidity, physician detection rate of complications, and differences in intervention. In a study conducted in Ethiopia, 37% of AP cases developed either a localized or systemic inflammatory response[18–20].

In this study, 93% of the cases were managed conservatively with fluid resuscitation, analgesics, and antacids/PPIs, which is consistent with a prospective study by B. G. Nagara in which out of 50 patients, 44 (88%) were managed conservatively. The findings showed that among cases of AP caused by gallstones ($n = 17$), cholecystectomy was performed in 8 (47.1%) patients at index admission, which showed a higher intervention rate for the prevention of recurrent gallstone pancreatitis as compared with the study in AIMS, B. G. Nagara, in which only 8% of patients underwent cholecystectomy before discharge.

In this study, hospital stays increased as the severity of the acute illness increased from mild to severe. For instance, patients with mild acute pancreatitis had a mean hospital stay of 5.4 days with an SD of 7.3, and respiratory failure and acute kidney injury were the main indications for ICU admission, with possible causes of death being multi-organ failure. This is almost comparable to the study conducted in India; nearly one-fifth (18.6%) of the cases required ICU admission, and in Ethiopia, 20.4%)[19,20]. Which showed A lower mortality rate 6 (11.1%) patients died, while 48 (88.9%) recovered from their illness.

To emphasize the death/ succumbed case, a 60-year-old male patient with alcohol and smoking was considered the aetiological factor of AP. He was diagnosed with severe AP with persistent MOF (respiratory and AKI (Cr = 2.55 mg/dl)), his BISAP score was 4 (four), and his complete blood count profile revealed a slight left shift and hemoconcentration (haematocrit = 72.6%).

The patient was admitted to the ICU and intubated with strict follow-up. Despite these measures, the patient died due to MOF.

This study found that recurrent AP was associated with a 2.4-fold increase in the risk of complications compared to new-onset AP (AOR = 2.4, 95% CI = 1.38, 15.71). This was consistent with a study by Oman that showed recurrence as a predictor of AP. Similarly, patients with gallstones have a 2.4-fold higher risk of developing complications than those without gallstones. However, a study in Egypt reported that aetiology was a predictor of mortality. Patients who were not informed about lifestyle modifications had a 2.0-fold higher likelihood of developing complications than those who were informed (AOR = 2, 95% CI = 1.58, 6.94). Moreover, patients with comorbid illnesses had a 2.6-fold higher likelihood of developing complications than those without comorbidities (AOR = 2.6, 95% CI = 1.74, 9.33), which agreed with the Egyptian study that showed increased risk factors of AP with age and multiple comorbidities.

The complication rate of AP was 49.2%, mostly local, which was lower than the rate reported in a prospective study in AIMS by B. G. Nagara, but higher than the rate reported in a study at a University Hospital in Egypt. Recurrent AP, gallstone aetiology, lack of lifestyle modification, and comorbid illness were associated with an increased risk of developing complications, consistent with previous studies in Oman and Egypt. AEtiology was a predictor of mortality in the Egyptian study but not in this study. These results emphasize the need for prompt diagnosis and management of AP and its risk factors, as well as the importance of high suspicion of AP to avoid complications, unnecessary operations, and drug prescriptions that could increase morbidity and mortality. Adhering to the guidelines for the management of Acute Pancreatitis (AP) is crucial to ensure uniformity in treatment across different services within the same institution. It also emphasizes the need for accurate and standardized methods for diagnosing and classifying AP, such as the Revised Atlanta Classification (RAC).

Strength and limitations

This prospective observational study assessed the aetiology, clinical profile, management, and outcomes of adult patients with AP in five public hospitals that are reflective of the adult population in Ethiopia. However, a lack of cholangiography, the 1 year study length, and referral hospital bias may have occurred because of referral hospitals. Despite this limitation, the study assessed and provided insights into AP cases in Ethiopia by using standards.

Conclusion

This study showed that the most commonly identified aetiology for AP was alcohol consumption (52.5%), followed by gallstones (28.8%), smoking, and hypertriglyceridemia, and more than 78% of the aetiology was preventable. Abdominal pain was the main clinical presentation, followed by nausea and vomiting. The complication rate of AP was 49.2% and was mostly local. Increased length of hospital stay, death, pancreatic necrosis, pleural effusion, and hypocalcemia were the main complications. Therefore, timely diagnosis and treatment are crucial when using criteria that are key to saving lives in patients with moderate-to-severe AP.

Recommendation

In this study, 78% of the patients had a preventable aetiology. Therefore, we recommend strengthening preventive measures such as lifestyle modification (reducing alcohol consumption, maintaining a healthy weight, and avoiding smoking). Awareness of AP may help prevent preventable aetiology. Finally, the study recommends prospective, nationwide research to identify additional risk factors, such as genetics, long-term outcomes of AP, and environmental factors, to develop more options for AP.

Ethical approval

Ethical approval was obtained from the Ethics Review Board of the Surgical Department. An official letter was then circulated to all the targeted hospitals via the Health Bureau. Data were collected using a meticulously designed questionnaire to fulfil the inclusion and exclusion criteria. All authors certify that they have obtained the appropriate patient consent forms.

Consent for publication

Not applicable.

Declaration of patient consent for participation

Written and verbal informed consent was obtained from all patients before administering the questionnaire. The interviews were conducted privately, and all the basic principles of human research ethics were in accordance with the Declaration of Helsinki. A copy of the written consent form is available for review by the Editor-in-Chief of the Journal upon request.

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Author contribution

The study was conducted in collaboration with all authors, and their contributions to the paper were confirmed as follows: M.S.H. conceived the idea of the title, developed the proposal, analyzed and interpreted the data, and finalized the research. A.F.I. assisted in data analysis, contributed highly of the writing, rewriting of the research, preparation of the manuscript, journal selection, and sent for publication. S.W. approved the idea of this title, assisted in data analysis, and contributed to supervision. Y.T., A.D.F., T.N., and H.M. were assisted in data analysis, in writing and rewriting the research. All authors have approved the manuscript.

Conflicts of interest disclosure

The authors declare that they have no conflicts of interest, financial or personal relationships that could influence the work reported in this study.

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Guarantor

The corresponding author (A.F.I.).

Availability of data and materials

The data and materials used to analyze the study are available from the corresponding author upon reasonable request.

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