



# Acute pancreatitis: A 7 year retrospective cohort study of the epidemiology, aetiology and outcome from a tertiary hospital in Jamaica



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## HIGHLIGHTS

- This is the first known epidemiological study on acute pancreatitis in the Caribbean and found a case fatality rate of 2%.
- This is the first report of a female preponderance in acute pancreatitis.
- Biliary pancreatitis was the predominant aetiology in both males and females.
- Transfer status, overweight/obesity, idiopathic aetiology and post-ERCP status increased duration of hospitalisation.
- Disease severity was mild in 61.1%, and severe in 12.2% of patients, with severe cases more likely to have an idiopathic aetiology, post-ERCP status and higher burden of overweight/obesity.

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## ABSTRACT

**Background:** Acute pancreatitis (AP) is a significant cause of acute abdominal pain, morbidity and hospitalisation. There was previously a dearth of studies exploring the incidence, risk factors and outcome of AP in the Caribbean region.

**Materials and methods:** All patients with a diagnosis of AP admitted to the University Hospital of the West Indies (UHWI) between 2006 and 2012 were reviewed. The epidemiological profile, risk factors, clinical presentation and outcomes of patients with AP were retrospectively studied.

**Results:** There were 70 females and 21 males with a median age of 44 years (range 2–86). The median age of males was significantly higher than that of females ( $p = 0.041$ ). The incidence of AP was 74 per 100,000 admissions per year. Vomiting and abdominal tenderness were noted in the majority of patients. The most common aetiology was biliary disease (71.4%), idiopathic (12%), post-ERCP (6.6%) and alcohol (5.5%). Alcoholic pancreatitis was only seen in males whereas idiopathic and post-ERCP pancreatitis only occurred in females. The mean duration of hospitalisation was  $9.51 \pm 8.28$  days. Disease severity was mild in 61.1%, moderately severe in 26.7%, and severe in 12.2% of patients. Factors associated with more severe disease included overweight/obesity, idiopathic aetiology and post-ERCP status. The case fatality rate was 2%.

**Conclusion:** The incidence of AP was 74/100,000 hospital admissions annually. There was an unusual female preponderance, with biliary pancreatitis being the most common type occurring at an equal frequency among males and females. Only 12.2% of the total cases seen were severe. The case fatality rate was 2%. Local health policy should target timely interventions for biliary pancreatitis and should also address the local factors affecting disease severity.

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## 1. Introduction

Acute pancreatitis (AP) is an important cause of abdominal pain which is the most common presenting complaint in the emergency

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department (ED) [1–5]. Examining trends in ED visit rates for AP in the United States (US), the average annual visit rate was 18.5 per 10,000 ED visits for 1993–2003, which corresponds to 68 per 100,000 population [6]. In a review of the burden of gastrointestinal diseases in the US, AP was the most common reason for hospitalisation [7]. In addition to its impact on ED care, AP places significant economic burden on health systems [8].

Although there are large geographical differences, the incidence of AP has been increasing globally, especially in Europe, North America and parts of Asia [9–13]. The lowest incidence has been reported in the Netherlands and the United Kingdom (UK), whilst the highest incidence occurs in Scandinavia and the US [14].

In AP, there is an acute inflammatory process that results in variable clinical presentations [15]. The American College of Gastroenterology and the revised Atlanta Classification state that the presence of at least two of the following three features are required to satisfy the definition of AP: 1) characteristic abdominal pain, 2) an appropriate elevation of pancreatic enzymes in the serum to at least three times the upper limit of normal, and 3) specific computed tomography (CT) findings (but may also include transabdominal ultrasonographic or magnetic resonance findings) [1,8,16,17].

Risk factors and the aetiology of the disease influence the outcome of patients with AP. Consequently, establishing the aetiology of AP is important for its management and secondary prevention. In the UK and Southern Europe, biliary disease is most common, whereas alcohol consumption is dominant in the US and Northern Europe [10,14]. The overall increased frequency of AP has been attributed to the increased incidence of biliary pancreatitis and the obesity epidemic is believed to be a contributing factor [8]. In the Caribbean region, there is a dearth of studies exploring the incidence of AP and its risk factors to elucidate relevant predictors of the disease. In 1970, there was a report on an isolated cause of AP in Trinidad and Tobago, and in Jamaica, there has been only one study on chronic pancreatitis [18,19]. The results of this study will therefore delineate the factors which predispose to AP at the University Hospital of the West Indies (UHWI) and serve to guide health education and hospital policy with regards to the management of these patients. This study seeks to describe the epidemiological profile, the patient characteristics including the presence of established risk factors, the clinical presentation and outcomes of acute pancreatitis in Jamaica.

## 2. Methods

The study was conducted at the University Hospital of the West Indies (UHWI) which is in the urban area of Kingston, Jamaica. It is the major referral institution in Jamaica with specialties and sub-specialties including gastroenterology and hepatobiliary surgery.

A retrospective review of all relevant patient records at the UHWI for the study period January 1, 2006 to December 31, 2012 was performed. Records were reviewed for consecutive patients, with a discharge diagnosis of AP as defined by the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10).

Patients were deemed to have AP if they fulfilled at least two of the following three defining criteria as outlined in the modified 2012 revision of the Atlanta Classification outlined above. Regarding pancreatic enzymes, the normal range for amylase at the UHWI is 18–98 U/L. The qualifying value for the diagnosis of AP used was 294 U/L or greater, which is at least three times the upper limit of the normal range. Lipase values were not utilised since this investigation was not routinely available.

If recurrent episodes were noted for any patient within the study interval, only the initial one was utilised since the

epidemiological data for that patient would remain unchanged. Other exclusion criteria included: 1) patients who had a discharge diagnosis of AP as determined by the ICD coding but did not fulfil the previously outlined diagnostic criteria, 2) admissions for chronic pancreatitis and 3) patients for whom no medical record was located.

Data extraction was performed by a trained physician in the emergency department with the use of a standardized form which was developed for this study. This data included patient demographics, geographic location, year of admission, clinical presentation, past medical history and substance abuse. According to the address provided, a designation was made as to whether the patient was from an urban or rural area, as per determinations by the Statistical Institute of Jamaica. In addition, laboratory and radiological investigations, clinical management, complications, severity and outcome (as measured by length of hospital stay, intensive care unit (ICU) admission, surgical intervention, and mortality) were further determined. All extractions were validated by checking the abstracted information against the patient record before data entry. The aetiology was taken as that documented by the team of doctors managing the patient. Disease severity was determined according to the revised Atlanta Classification.

Statistical analyses were performed using SPSS version 16.0, for Windows. Means and proportions for the various risk factors for AP were obtained within and across gender by socio-demographic and other factors. The Pearson's  $\chi^2$  test was used to examine associations between AP and risk factors, and the students' *t*-test for comparing differences in means. Age-related data was categorized into twenty year bands and statistical significance set at alpha of 0.05. Case fatality was calculated as the percentage of persons diagnosed as having acute pancreatitis who died as a result of AP within the seven year period of the retrospective study.

The study was approved by the ethics committee of the Faculty of Medical Sciences of the University of the West Indies, Mona campus.

## 3. Results

A total of 144 patients admitted to the UHWI on 174 occasions with a diagnostic code of AP were assessed for eligibility. Of these, 91 patients fulfilled the study criteria for AP, and were included in the study. Overall, 79% had characteristic abdominal pain, 90% had significantly elevated amylase and 21% had evidence of AP on ultrasonography while CT was diagnostic of AP in 46%. Most patients (66%) had CT done greater than 48 hours after symptom onset, as recommended.

Of the 91 patients, 70 (76.9%) were female and 21 (23.9%) male. The mean patient age was  $45.68 \pm 19.64$  (median 44 years) and range 2–86 years. The median age of males was statistically higher than females. When patients under 20 years were excluded the adjusted median age was 45 years (range: 20–86 years) and mean age  $48.45 \pm 17.71$  years.

The majority (80%) of patients was direct admissions, from an urban area, and reported non-drinkers. Fourteen patients were transferred from other institutions, of which 50% were from a private hospital. Three patients (21%) were transferred from other parishes and two (14%) were transferred from outside Jamaica.

Cumulative incidence was 74 patients per 100,000 hospital admissions with a notable decrease in the incidence rate over the study period.

Table 1 outlines the clinical features and investigations. The duration of symptoms on presentation was 1–21 days, with the majority of patients (54%) presenting within the first 24 h and 68% within 48 h. Males presented later than females. More females experienced abdominal pain compared to their male counterparts

**Table 1**  
Clinical Features and Investigations.

Clinical Feature	Male % (n)	Female % (n)	Total% (n)
<b>Characteristic abdominal pain</b>			
Yes	57.1% (12)	85.7% (60)	79.1% (72)
No	33.3% (7)	7.1% (5)	13.2% (12)
Not Documented	9.5% (2)	7.1% (5)	7.7% (7)
<b>Vomiting</b>			
Yes	71.4% (15)	80.0% (56)	71.8% (71)
No	28.6% (6)	17.1% (12)	19.8% (18)
Not Documented	0	2.9% (2)	2.2% (2)
<b>Fever</b>			
Yes	23.8% (5)	14.3% (10)	16.5% (15)
No	71.4% (15)	80.0% (56)	78.0% (71)
Not Documented	4.8% (1)	5.7% (4)	5.5% (5)
<b>Examination</b>			
<b>Abdominal tenderness</b>			
Yes	100% (21)	85.7% (60)	96.7% (88)
No	0	2.9% (2)	2.2% (2)
Not Documented	0	1.4% (1)	1.1% (1)
<b>Blood Investigation</b>			
<b>Amylase <math>\geq</math> 294 (3 <math>\times</math> ULN)</b>			
Yes	81.0% (17)	95.7% (67)	90.1% (82)
No	19.0% (4)	7.1% (5)	9.9% (9)
<b>Radiological Imaging</b>			
Ultrasound done	71.4% (15)	78.6% (55)	76.9% (70)
CT done	61.9% (13)	54.3% (38)	56.0% (51)
MRI done	0	4.3% (3)	3.3% (3)
<b>Clinical Severity Score</b> (APACHE II score)			
0–7	47.6% (10)	47.1% (33)	47.3% (43)
$\geq$ 8	47.6% (10)	24.3% (17)	29.7% (27)
Not Documented	4.8% (1)	28.6% (20)	23.1% (21)

Standard Deviation (SD); Times the upper limit of normal (X ULN); Computed Tomography (CT); Magnetic Resonance Imaging (MRI); Acute Physiology and Chronic Health Evaluation (APACHE).

(85.7% versus 57.1%). Vomiting, and abdominal tenderness were noted in the majority of patients. There were no cases of documented retroperitoneal haemorrhage. Ultrasound was the most commonly utilised imaging modality, 80% of patients, whereas approximately 50% received a CT scan. On admission, disease severity as determined by an APACHE II score was calculated for 77% of patients, with the majority of these (61%) predicted to have a mild disease course.

Biliary tract disease was the most commonly identified aetiology, occurring in 71.4% of patients, followed by post-ERCP in 6.6% and alcoholic in 5.5%. Whereas there was an equal proportion of males and females with biliary pancreatitis, alcoholic pancreatitis only occurred in men (23.8%). The converse was true for post-ERCP pancreatitis which was only seen in females (8.6%). In 13.2% of patients, all female, there was no aetiology identified and these were regarded as being idiopathic (Table 2).

**Table 2**  
Aetiology by Gender.

Aetiology	Male % (n) N = 21	Female % (n) N = 70	Total% (n) N = 91
Biliary	71.4 (15)	71.4 (50)	71.4 (65)
Alcoholic	23.8 (5)	0.0 (0)	5.5 (5)
Idiopathic	0.0 (0)	17.1 (12)	13.2 (12)
Hypertriglyceridemia	4.8 (1)	1.4 (1)	2.2 (2)
Post-viral	0.0 (0)	1.4 (1)	1.1 (1)
Post-ERCP	0.0 (0)	8.6 (6)	6.6 (6)
Drug-induced	0.0 (0)	0.0 (0)	0.0 (0)

Biliary tract disease was the most common aetiological factor across all age groups. Alcoholic pancreatitis was most prominent in the 40 to 59 years age group. Idiopathic pancreatitis was the most common aetiology in younger patients (under 40 years of age). Hypertriglyceridemia was identified in the 60 years and over age group only. This distribution of aetiology across and within age-groups was not statistically significant ( $p = 0.319$ ).

The mean duration of hospitalisation was  $9.51 \pm 8.28$  days. The hospitalisation period was longer for patients who were transferred ( $p = 0.004$ ) and those had recent ERCP ( $p = 0.005$ ). The mean duration of hospitalisation was longest for patients with post-ERCP AP ( $18.5 \pm 10.64$ ) followed by idiopathic pancreatitis ( $12.67 \pm 10.71$ ) ( $p = 0.04$ ). Overweight/obese patients and current alcoholic drinkers also had a longer length of stay in hospital (not statistically significant, NS). Approximately 10% of patients were admitted to the intensive care unit (ICU), more frequently among males (14.3%) compared to females (8.6%) (NS).

Local complications, defined as the presence of acute peripancreatic fluid collection (APFC), pancreatic pseudocyst, acute necrotic collection and walled off necrosis, were observed in 25% of patients. Pancreatic necrosis occurring in 15% of patients was the most common local complication. The proportion of pancreatic necrosis was greater in females than in males (16.9% versus 10%), (NS). Organ failure occurred in 22% of patients, with an even split between transient and persistent organ failure. Respiratory (66.7%) and renal (14.3%) failure was most common. Multi-organ failure occurred in 19.1% of the patients with organ failure.

Cholecystectomy was done in six patients. ERCP was performed in 12.1% of patients. This number includes the six cases of post-ERCP pancreatitis.

Disease severity was mild in 61.1% of patients. Males had more moderately severe disease compared to females (38.1% versus 23.2%) whereas severe disease was more common in females (13.0% versus 9.5%). The case fatality rate was 2.2% arising from two deaths in the study population of 91 patients. There was no significant difference in disease severity relative to the time of presentation. The majority of patients across all age groups had mild to moderately severe acute pancreatitis. Severe AP was highest in the 20–39 age-group (16.9%). A higher proportion of patients reported as overweight/obese experienced severe AP compared to the non-overweight group. The majority (83%) of patients who had post-ERCP pancreatitis also experienced moderately severe to severe disease compared to their non ERCP counterparts. Ten of the twenty-seven patients predicted to have severe pancreatitis according to APACHE II scores, had mild pancreatitis. Ten had moderately severe disease and only six had severe pancreatitis.

The distribution among mild, moderately severe and severe categories was not significantly different across aetiology ( $p = 0.376$ ). Patients with post-ERCP AP and idiopathic aetiology were more likely to have severe disease (33.3% and 25% respectively). Conversely, the mild form of the disease was present in the majority of patients with biliary and alcoholic pancreatitis and all

**Table 3**  
Aetiology and Disease Severity.

Aetiology	Disease severity (%) ( $p = 0.376$ )		
	Mild	Moderately severe	Severe
Biliary (n = 65)	65.6	25.0	9.4
Alcoholic (n = 5)	60.0	40.0	0.0
Idiopathic (n = 12)	50.0	25.0	25.0
Hypertriglyceridemia (n = 2)	100.0	0.0	0.0
Post-viral (n = 1)	100.0	0.0	0.0
Post-ERCP (n = 6)	16.7	50.0	33.3

patients with hypertriglyceridemia and post-viral pancreatitis (Table 3).

#### 4. Discussion

There is wide variation in the incidence of AP amongst several countries, ranging from a low of 5.38/100,000 in the United Kingdom to a high of 40.1–80/100,000 in the US and Finland [15,16]. This dissimilarity may represent the difference in the risk factors [16,17]. Whereas other studies examined the prevalence of AP according to the general population, in this study the incidence was calculated as 74 per 100,000 hospital admissions with a decline in the incidence over the study period. This decline in the local incidence of AP with time is in contrast to the increasing incidence reported by other investigators [18–23]. The steep decline in 2012, the last year of the study, could be explained by missing records from that year or an unexplained low yield year.

In this study the female preponderance of 3:1 greatly contrasts with the results of other studies in which there was either an equal prevalence or more commonly, a male preponderance [10,14,24–31]. The finding in this study may be due to the predominance of females in the overall hospital admissions at the UHWI and the number of females with biliary disease. However, there may also be unknown factors related to the gender predisposition to AP, as in the study on chronic pancreatitis in Jamaica, a male preponderance of 4:1 was noted [19].

The median age of the study population of 44 years appears significantly lower compared to other studies in which the median age of AP was in the sixth decade [6,10,24,28,30,32]. A possible explanation of the lower age in this study is the inclusion of children which is not commonly seen in the literature. A 2007 Chinese study, in which the age of the patients ranged from 13 to 82 years, noted a mean age of 43 years [29]. Another explanation for the relatively younger population encountered in this study may lie in the variations between ethnic groups. Comparison is limited by the lack of available data on predominantly black populations similar to this study. The study finding of a significantly higher median age of males compared to females also contrasts with the reported literature [24,30,32] which is possibly influenced by the inclusion of children in the sample, the majority of whom were female. It is also plausible that this is due to an ethnic disparity.

Seven paediatric cases (age less than 20 years) were identified in this study. AP is known to be less common in this age group [31]. It is more difficult to establish the diagnosis of AP in children due to non-specific abdominal pain as well as the hesitation to use computed tomography in unclear cases due to the concern of ionising radiation exposure [33].

Although the aetiology of AP varies, gallstones and alcohol consumption predominate in most countries [9,10,24,28,34,35]. However, the finding of the high proportion of biliary pancreatitis of over 70% in both males and females is unique to the current study. Only Asian studies approximate to these numbers, a possible reflection of the mixed ethnicity of the patients at the study institution [24,34]. Lifestyle practices of the patients in this study may also contribute to the large proportion of biliary pancreatitis cases.

There is considerable variety in the practice of biliary pancreatitis as noted in current literature [36,37]. In the past, there had been no universal consensus on the timing of cholecystectomy in uncomplicated biliary AP, and interval cholecystectomy was promoted [38]. However, newer studies and guidelines indicate improved patient outcomes with acute decompression and cholecystectomy [36–40]. Given the preponderance of biliary pancreatitis in this study, the choice of and time to definitive treatment should be reviewed since fewer than 10% of patients with biliary AP had index cholecystectomy. Improvement in the in the targeted

management of biliary pancreatitis, including index laparoscopic cholecystectomy, is necessary.

The frequency of alcoholic pancreatitis in this study of 5.5% was quite low relative to the greater prevalence of 13–60% in other studies [10,29]. The most likely reason is the lower number of males in this study, given that alcoholic pancreatitis more commonly occurs in males [41]. Another factor is the relatively higher median age of 53 years (sixth decade) in the males of this study, considering that alcoholic pancreatitis is more common in the fifth decade [8,10,31,34]. In the Jamaica Health and Lifestyle Survey, alcohol use declined with age and there was a sharp decline in alcohol use at the median age of our study population, as compared with younger age groups [41]. In addition, the local economic climate may also influence the drinking pattern in the males studied. Alcohol use in Jamaica has been associated with higher socioeconomic levels [41]. However, in recent years there has been an increase in the local poverty rate [42].

The proportion of post-ERCP pancreatitis in this study of 6.6% is higher than other studies which report a proportion of less than 3% [10,30,34]. Also, given the high prevalence of biliary disease which was documented in 80% of the study population, there is a higher likelihood of interventions such as ERCP being performed. In a previous local study it was noted that post-ERCP pancreatitis occurred in 5.3% of the cases performed at the UHWI in Jamaica [43]. It is important therefore for clinicians managing patients undergoing ERCP to closely monitor them for this possible complication.

Although the proportion of patients with idiopathic pancreatitis (13.2%) falls within the expected range of 10–30% [8], it is lower than the proportion seen in the other studies reviewed [10,24,28,29]. A surprising finding in the current study was that idiopathic cases only occurred in females.

The duration of hospitalisation in the patients in this study was in keeping with data available from other studies [10,32,34]. The factors which were noted to prolong the duration of hospitalisation in the current study (transferred patients, post-ERCP status, being overweight or obese, and alcohol use) is probably explained by the disease severity.

The proportion of severe cases in this study of 12.2% is close to the published expected figure of 15% [44]. The factors associated with severe AP in this study, (obesity, post-ERCP status and idiopathic aetiology) were also noted in other studies [26]. The increasing prevalence of obesity worldwide may contribute to an increased incidence of AP [8]. In this study, the APACHE II score did not accurately predict disease severity. This may in part be due to incomplete data which may have hindered the overall accuracy of this tool. It may therefore be advantageous for local clinicians to adopt more useful predictors of disease severity such as the bedside index of the severity of AP (BISAP) score which can easily be calculated in the emergency department [45,46].

The mortality rate of AP is usually 5–8% but may be as high as 20% in severe disease [14,47]. There were only two deaths in the current study despite less access to ICU care. Risk factors for mortality in AP include genetic make-up, male gender and advanced age (greater than age 55) [20,48–51]. The low case fatality rate in this study may be explained by unknown ethnic peculiarities, the small proportion of male patients and the relatively younger age of the female patients which made up the majority of the study population.

The major limitation of this study is the retrospective design. One consequence of this is missing data and the inability to validate severity scores. Another limitation of this study is that it was conducted in a single centre. As the UHWI is a tertiary institution, there might have been referral bias influencing the incidence and severity.

Although there was only a small number of patients analysed in this single-centre study, to our knowledge, this work provides the first known regional description of the epidemiology, clinical presentation, aetiology and outcome of acute pancreatitis. Due to institutional and population similarities, this may represent the status of Jamaica, the Caribbean or other developing countries in general. Regional multicentre, prospective studies are recommended to expand the knowledge gained from this study.

## 5. Conclusion

This is the first known study on acute pancreatitis in Jamaica and the Caribbean. The incidence was 74/100,000 hospital admissions. This is the first known study on AP to report such a large female preponderance. Biliary aetiology was most common with an equal frequency among males and females. Duration of hospitalisation and disease severity were worse in patients who were overweight or obese and in those with post-ERCP and idiopathic pancreatitis. The case fatality rate was 2%. A multicentre, prospective study should be conducted to expand the knowledge gained from this study. Lifestyle modification and public education are recommended for prevention.

## Ethical approval

The study was approved by the Ethics Committee of the Faculty of Medical Sciences of the University of the West Indies, Mona campus.

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## Author contribution

GP Reid - study design, data collection, data analysis, writing, final corrections.

EW Williams - study design, data analysis, writing, final corrections.

DK Francis - study design, data analysis, writing, final corrections.

MG Lee - data analysis, writing, final corrections.

All authors approved the final version of the manuscript for submission.

## Conflicts of interest

The authors have no conflicts of interest.

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