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COMPARATIVE ANALYSIS OF ACUTE PANCREATITIS IN HOSPITALIZED PATIENTS WITH AND WITHOUT DIABETES AT CALMETTE HOSPITAL, CAMBODIA: A RETROSPECTIVE STUDY

Diabetology

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ABSTRACT

Objectives: This study is aims to compare the demographics, clinical aspects, complications and management of acute pancreatitis in diabetic and non-diabetic patients. **Materials And Methods:** This retrospective study was conducted at Calmette Hospital of Cambodia from 1st December 2021 to 30th November 2023, reviewed medical records of hospitalized patients, categorizing them based on presence or absence of diabetes. Patient data were collected using a checklist and entered into Excel sheet, then exported to STATA Version 18.0 for analysis. **Results:** A total of 285 cases were included in the study, 137 (49F/88M) DM and 148 (63F/85M) non-DM), males showed a much higher prevalence in both groups (64.23% in DM vs 57.43% in non-DM). Mean age was significant higher in DM than non-DM (52.04±14.67 vs. 39.95±14.34, p-value <0.001). Mean BMI was also significant higher in DM than non-DM (25.59±3.72 vs. 24.28±3.83). Duration of any symptoms before admission is 3.00±1.80 days in DM group and 2.89±1.82 days in non-DM group. The most frequent symptoms were abdominal pain, presented more than 99%, followed by nausea and vomiting presented more than 90% from both groups. The majority of patients in both groups were classified as having edematous pancreatitis, with 83.94% in the DM group and 85.81% in the non-DM group. The leading etiological factors were alcohol, presented more than 38%, followed by gallstones presented more than 35% from both groups. and duration of hospitalization was significantly longer in DM vs non-DM, 10.37±3.53 days vs 8.36±3.18 days, p-value <0.001. **Conclusion:** In this study, we found that the DM with AP are older than those without diabetes. The DM group has more comorbidities and tends to stay in the hospital for a longer duration. While the incidence of AP is similar in both groups, the etiology, particularly hypertriglyceridemia is more common in the DM group. However, the socio-demographic factors, duration of the chief complaint, clinical manifestations, and forms of acute pancreatitis are similar in both groups.

KEYWORDS

Acute pancreatitis; Diabetes mellitus; Clinical features; Alcohol; Gallstones

INTRODUCTION

Acute pancreatitis (AP), a potential life-threatening medical emergency, is a most commonly and severe inflammatory disease of the pancreas, necessitating hospital admission, monitoring, and active management. AP is a complex disease with a variable course that is often difficult to predict early in its development. Approximately 80% of patients develop mild to moderately severe disease (absence of organ failure > 48 hours). However, one-fifth of patients develop severe disease, with a mortality rate of approximately 20% [1].

The most common etiological factors for AP in the general population are excessive alcohol use and gallstones. Other causes of pancreatitis include hypertriglyceridemia, hypercalcemia, obesity, trauma, anatomical obstructions and certain medications [2].

Obesity is a well-established risk factor for both the development and increased severity of acute pancreatitis. Mechanistically, obesity contributes through metabolic stress, chronic low-grade inflammation, and increased risk of hyperlipidemia and gallstone formation, which are common triggers for AP [3,4,5,6,7,8]. Elevated BMI is associated with higher risk of AP, and a significant proportion of this risk is mediated by elevated triglycerides and cholesterol [5,7]. Obesity also amplifies the systemic inflammatory response and worsens local and systemic complications in AP [6,8].

Older age independently increases both the incidence and severity of AP. The American College of Gastroenterology notes that older adults experience higher morbidity and mortality, longer hospital stays, and increased risk of organ failure, with severity rising linearly with age [9]. Meta-analyses confirm that advanced age is a strong predictor of poor outcomes, and the presence of comorbidities such as diabetes and cardiovascular disease further compounds these risks and complicates management [10,11].

The majority of diabetes cases, particularly type 2 diabetes, are often seen in older adults and individuals with obesity. As people age, the risk of developing insulin resistance and metabolic disorders increases, making older age a significant factor in the prevalence of diabetes [12,13,14,15].

Diabetes mellitus is not considered a direct risk factor for acute pancreatitis. However, individuals with diabetes may experience more severe manifestations of acute pancreatitis due to associated metabolic changes.

Therefore, we conducted the present study with the objective to compare the differences in socio-demographic, clinical, laboratory, radiological features and management among hospitalized diabetic and non-diabetic patients with acute pancreatitis at General Medicine and Hepato-Gastrointestinal Department of Calmette Hospital, Cambodia.

MATERIALS AND METHODS

Study Design And Patients

This is a retrospective comparative study of acute pancreatitis among diabetic and non-diabetic patients admitted to General Medicine and Hepato- Gastrointestinal department of Calmette Hospital, from 1st December 2021 to 30th November 2023. This study was approved by the National Ethics Committee for Health Research of Cambodia. Inclusion criteria were defined as follows: age ≥ 18 and confirmed diagnosis of AP. The exclusion criteria comprised the following: death, pancreatic tumors chronic pancreatitis, and pregnancy.

Data collected included: age, gender, body mass index (BMI), etiology (alcohol, cholelithiasis hyperlipidemia, idiopathic) and laboratory variables. Laboratory variables including white blood cell (WBC), neutrophil, hematocrit (HCT), platelet (PLT), platelet, blood sugar, glycated hemoglobin, creatinine, amylase, lipase, blood urea nitrogen (BUN). Abdominal Ultrasound and CT images were also recorded including CT grades, pleural effusion, abdominal effusion and lung infection. The scores of bedside index of severity in acute pancreatitis (BISAP) and SIRS score was calculated based on clinical and laboratory variables.

Statistical Analysis

The data were entered to Excel 2016 and double-checked to avoid the errors. They were then exported to STATA version18.0 (Stata Corp, College Station, Texas) to analyze statistically. Descriptive analyses were conducted for each variable to calculate frequency and proportion (%) for categorical variables and mean and Standard Deviation (SD) for continuous variables. Comparison between two groups was made by Student's t-test, Chi-square test or Fisher's exact test. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 311 patients were enrolled in this study. Based on the exclusion criteria, 26 patients were excluded and 285 patients with AP included. 137 patients in the DM group and 148 patients in the non-DM group were analyzed retrospectively (Fig. 1). The mean age of DM patients (52.04 ± 14.67) is significantly higher than that of non-DM (39.95 ± 14.34), with a p-value < 0.001. Non-DM patients are predominantly younger, with 23.65% aged 18-30 and 54.73% aged 31-50. In contrast, DM patients are more concentrated in older age groups: 40.88% are aged 31-50, 42.34% are 51-70, and 11.68% are over 70, a p-value < 0.001. Regarding gender distribution, male patients were slightly more prevalent in both groups, with no significant difference (64.23% in DM vs. 57.43% in non-DM, p >0.05).

Body Mass Index (BMI) was also a significant factor, with DM patients having a higher mean BMI of 25.59 kg/m² compared to 24.28 kg/m² in non-DM patients (p < 0.01).

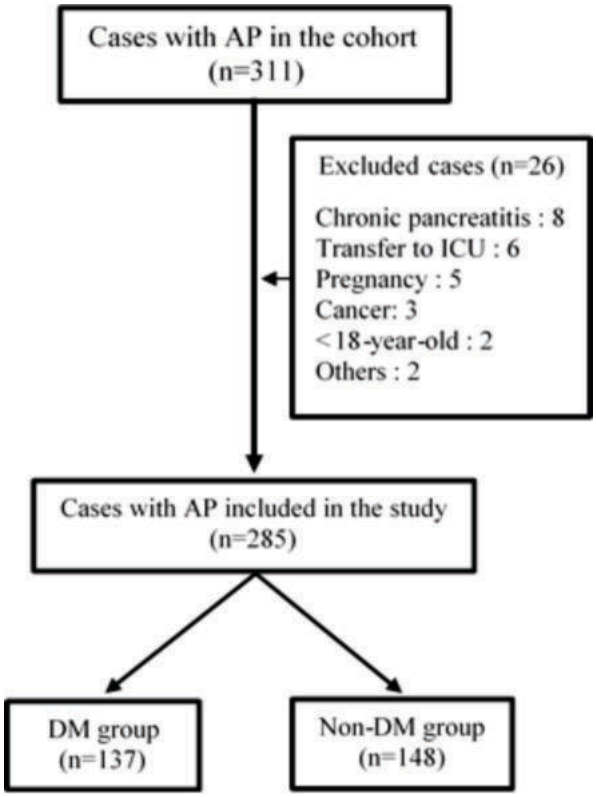

Figure 1: Flow Chart For Patient

Table 1: Demographic And Baseline Characteristics Of Patients With AP

Characteristics	DM (n=137)	Non-DM (n=148)	p-value
Age, years (mean ± SD)	52.04 (±14.67)	39.95 (±14.34)	<0.001
18 - 30	7 (5.11%)	35 (23.65%)	<0.001
31 - 50	56 (40.88%)	81 (54.73%)	
51 - 70	58 (42.34%)	27 (18.24%)	
> 70	16 (11.68%)	5 (3.38%)	
Male sex, n (%)	88 (64.23%)	85 (57.43%)	>0.05
BMI, kg/m2(mean ± SD)	25.59 (±3.72)	24.28 (±3.83)	<0.01
Underweight	1 (0.73%)	5 (3.38%)	<0.05
Normal	33 (24.09%)	51 (34.46%)	
Overweight/Obese	103 (75.18%)	92 (62.16%)	
Duration of symptoms before admission, days (mean ± SD)	3.00 (1.80)	2.89 (1.82)	>0.05

Furthermore, when categorizing BMI based on the Asian BMI classification, a greater percentage of overweight/obese individuals was found in the DM group (75.18% vs. 62.16%, p < 0.05). The duration of symptoms before admission was similar in both groups, with no significant difference (3.00 days for DM vs. 2.89 days for non-DM, p > 0.05) (Table 1).

Abdominal pain was nearly universal, occurring in 99.27% of DM patients and 100% of non-DM patients, with no significant difference (p = 0.481). Nausea and vomiting were reported by 94.16% of DM patients versus 88.51% of non-DM patients, although this difference was not statistically significant (p = 0.092). Fever was significantly more common in the DM group (54.01% vs. 37.84%, p = 0.006) (Table 2).

When we assessed the form of acute pancreatitis among patients with diabetes and those without using the revised Atlanta classification system. The majority of patients in both groups presented with the oedematous form of AP, with 83.94% in the DM group and 85.81% in the non-DM group, showing no significant difference (p = 0.946). Necrosis was reported in 16.06% of DM patients and 14.19% of non-DM patients. When examining the extent of pancreatic parenchymal necrosis, the findings indicated that the proportions of patients with necrosis less than 30%, between 30%-50%, and greater than 50% were similar across both groups: necrosis <30% was observed in 8.03% of DM and 8.11% of non-DM patients, necrosis 30%-50% in 5.84% of DM and 4.73% of non-DM patients, and necrosis >50% in 2.19% of DM versus 1.35% of non-DM patients (Table 3).

Alcohol consumption was cited as a cause in 36.50% of DM patients and 39.86% of non-DM patients, showing no significant difference (p = 0.559). Gallstone-related pancreatitis was reported similarly between the groups, with 35.77% in DM patients versus 34.46% in non-DM patients (p = 0.817). However, hypertriglyceridemia emerged as a significant factor, affecting 20.44% of DM patients compared to just 6.76% of non-DM patients (p < 0.001). Idiopathic cases were more frequent in non-DM patients (14.19%) compared to DM patients (4.38%), with a statistically significant difference (p < 0.05) (Table 4).

The study revealed that the mean serum amylase level in the diabetes mellitus (DM) group was 629.15 (±640.42) U/L, while in the non-DM group, it was 600.44 (±591.69) U/L, with no significant difference (p = 0.694).

Table 2: Clinical Presentation Of Patients With AP

Clinical Presentation	DM	Non-DM	p-value
Abdominal pain	136 (99.27%)	148 (100.00%)	0.481
Nausea and vomiting	129 (94.16%)	131 (88.51%)	0.092
Abdominal distension	43 (31.39%)	56 (37.84%)	0.253
Constipation	9 (6.57%)	10 (6.76%)	0.949
Fever	74 (54.01%)	56 (37.84%)	0.006
Jaundice	21 (15.33%)	15 (10.14%)	0.187
Dyspnea	5 (3.65%)	0 (0.00%)	0.025
Cough	2 (1.46%)	2 (1.35%)	1.000
Diarrhea	4 (2.92%)	0 (0.00%)	0.052
Somnolence	1 (0.73%)	2 (1.35%)	1.000

Table 3: The Form Of AP

Form of AP	DM	Non-DM	p-value
Oedematose	115 (83.94%)	127 (85.81%)	0.946
Necrosis	22 (16.06%)	21 (14.19%)	
Extent of pancreatic parenchymal necrosis			
Necrosis < 30%	11 (8.03%)	12 (8.11%)	
Necrosis 30%-50%	8 (5.84%)	7 (4.73%)	
Necrosis > 50%	3 (2.19%)	2 (1.35%)	

The mean serum lipase levels were 1054.89 (±1004.17) U/L for the DM group and 1060.47 (±1160.70) U/L for the non-DM group, also not significant (p = 0.966). In terms of serum amylase classification, 10.95% of DM patients had normal levels, compared to 8.11% in the non-DM group. The majority exhibited elevated amylase levels, with 54.01% in the DM group and 54.73% in the non-DM group having levels ≥ three times the upper limit of normal (p = 0.904). For lipase levels, 2.92% of DM patients had normal levels, versus 1.35% in the non-DM group, while elevated lipase levels were present in 91.24% of the DM group and 94.59% of the non-DM group, showing no significant difference (p = 0.534) (Table 5).

For the BISAP score, among patients with DM, 98 (71.53%) had

scores of 0-1, while 13 (28.47%) scored between 2-4. In the non-DM group, 135 patients (91.22%) scored 0-1, and 13 patients (8.78%) scored between 2-4, with results showing significant differences ($p < 0.001$). Additionally, the Balthazar score, which assesses the severity of pancreatic inflammation and necrosis, revealed a marked difference between the groups ($p < 0.001$). In the DM group, 71.53% were classified as grade E, indicating severe necrosis, compared to 47.97% in the non-DM group. Conversely, a higher percentage of non-DM patients had lower Balthazar scores, with 27.03% classified as grade C and 20.95% as grade D, while only 13.14% of the DM group fell into these categories (Table 6).

Table 4: The Etiology Of Patients With AP

Etiology	DM	Non-DM	P value
Alcohol	50 (36.50%)	59 (39.86%)	0.559
Gallstone	49 (35.77%)	51 (34.46%)	0.817
Hypertriglyceridemia	28 (20.44%)	10 (6.76%)	< 0.001
Idiopathic	6 (4.38%)	21 (14.19%)	< 0.05
Others*	4 (2.92%)	7 (4.73%)	0.544
* Others etiologies in DM group: Toxic 2 cases, parasite 1 case, cancer compression 1 case. Non-DM group : parasite 3 cases, toxic 2 cases, Post CPRE 2 cases			

Among the total of 285 patients, abdominal ultrasound was diagnostic in 45.26% of the DM group and 42.57% of the non-DM group. Conversely, a non-diagnostic result was observed in 54.74% and 57.43% of the DM and non-DM groups, respectively, ($p = 0.648$), indicating no significant difference between the groups (Table 7).

Table 5: The Serum Pancreatic Enzymes Of Patients With AP

Serum pancreatic enzymes	DM	Non-DM	p-value
Amylase (U/L)			
Normal	15 (10.95%)	12 (8.11%)	0.704
< 3 times	48 (35.04%)	55 (37.16%)	
≥ 3 times	74 (54.01%)	81 (54.73%)	
Lipase (U/L)			
Normal	4 (2.92%)	2 (1.35%)	0.534
< 3 times	8 (5.84%)	6 (4.05%)	
≥ 3 times	125 (91.24%)	140 (94.59%)	
Amylase and lipase ≥ 3 times upper limits of normal	74 (54.01%)	81 (54.73%)	0.904

Table 6: The Severity Scores Of Patients With AP

Severity scores	DM	Non-DM	p-value
BISAP score			< 0.001
0-1	98 (71.53%)	135 (91.22%)	
2-4	13 (28.47%)	13 (8.78%)	
Balthazar Score			< 0.001
A	0 (0.00%)	2 (1.35%)	
B	3 (2.19%)	4 (2.70%)	
C	18 (13.14%)	40 (27.03%)	
D	18 (13.14%)	31 (20.95%)	
E	98 (71.53%)	71 (47.97%)	

Table 7: The Abdominal Ultrasound Findings Of Patients With AP

Abdominal Ultrasound	DM	Non-DM	p-value
Diagnostic	62 (45.26%)	63 (42.57%)	0.648
Non-Diagnostic	75 (54.74%)	85 (57.43%)	

Among the total cohort, morphine was utilized by 17.52% of patients in the DM group and 10.81% in the non-DM group, ($p = 0.103$). Parenteral nutrition was administered to 89.78% of patients with DM, compared to 63.51% of those with non-DM. The p-value of <0.001 indicates a highly significant difference in the use of parenteral nutrition between the two groups. Among patients with AP and DM, 23.36% underwent ERCP. In comparison, 21.62% of patients with non-DM received the procedure, ($p = 0.726$) (Table 8).

Table 8: The Management Of Patients With AP

Management	DM	Non-DM	p-value
Morphine	24 (17.52%)	16 (10.81%)	0.103
Parenteral nutrition	123 (89.78%)	94 (63.51%)	< 0.001
ERCP	32 (23.36%)	32 (21.62%)	0.726

We also found that patients with diabetes had significantly hospitalized longer than non-diabetes with mean days of 10.37 (±3.53) vs 8.36 (±3.18), p-value < 0.001 which also explained the severity of AP in DM patients comparing to non-DM (Table 9).

Table 9: The Duration Of Hospitalization Of Patients With AP

Duration Of Hospitalization	DM	Non-DM	p-value
Mean days (±SD)	10.37 (±3.53)	8.36 (±3.18)	< 0.001

DISCUSSION

This study showed that the variation of age in our study, minimum age of 18 years and maximum of 88 years old. We observed that the average age of diabetic patients with AP were significantly higher than in non-diabetic patients 52.04 (14.67) vs. 39.95 (14.14) same as two comparative studies in Asia by Xiao B, et al. [16] and Urushihara H, et al. [17]. As we all knew, typically type 2 diabetes occurred mostly in adult older than 45 years old according to ADA and literature review, which also shown in our study population.

The analysis of the sex distribution revealed that in the DM group, 88 (64.23%) were male, and 49 (35.77%) were female. On the other hand, in the non-DM group, 85 (57.43%) were male, and 63 (42.57%) were female. The higher prevalence of acute pancreatitis in males compared to females can be linked to several factors, primarily lifestyle and behavioral differences. Males generally consume more alcohol than females, both in terms of frequency and quantity. Additionally, men are more likely to engage in behaviors that increase the risk of pancreatitis, such as smoking and poor dietary habits.

we also observed that the mean BMI was similar between the two groups, with DM group having a mean BMI of 25.59 (±3.72) kg/m² and the non-DM group having a mean BMI of 24.28 (±3.83) kg/m². Comparatively, Song K, et al.[18] reported mean BMIs of 25.44 kg/m² (±1.66) for the DM group and 25.92 kg/m² (±2.97) for the non-DM group in China, presenting higher averages than our findings. In contrast, Hossain M, et al.[19] documented lower BMIs of 23.30 kg/m² (±1.51) for patients with DM and 22.90 kg/m² (±1.72) for those without DM in Bangladesh. This highlights a potential distinction in body weight trends within different Asian populations, possibly influenced by varying dietary habits, lifestyle factors, and genetic predispositions.

Abdominal pain was reported by 99.27% of patients in the DM group, while the non-DM group showed a slightly higher prevalence at 100.00%. This indicates that abdominal pain is a nearly universal symptom in both groups, with no significant difference between them. Additionally, nausea and vomiting were the second most common presenting symptoms of acute pancreatitis in both groups, occurring in 94.16% of the diabetic group and 88.51% of the non-diabetic group. According to the literature review, abdominal pain was the most common presentation followed by nausea and vomiting [20]. Hossain M, et al.[19] also found that the percentage (82.35%) of patients with nausea and vomiting was higher in DM group than that of (64.71%) non-DM group.

The etiology of AP in this study aligns with other Asian findings, where gallstones and alcohol-related diseases are the leading causes. In this series, alcohol was identified as the cause in 36.50% of the AP with DM group and 39.86% of the AP-only (non-DM) group. Gallstone-related pancreatitis affected 35.77% of patients in DM group and 34.46% in the non-DM group.

While various predisposing factors, including cholelithiasis and alcohol use, impact the relationship between DM and AP, hypertriglyceridemia is a well-documented independent risk factor for AP in diabetic patients. Dysglycemia, insulin resistance, and metabolic syndrome are correlated with high triglyceride levels. This may explain the higher incidence of hypertriglyceridemia in our study, with 20.44% of DM patients with AP compared to 6.76% in non-diabetic AP ($P < 0.001$).

Abdominal ultrasounds were diagnostic in 45.26% of the DM group and 42.57% of the non-DM group, % ($p = 0.648$), indicating no significant difference between the groups. In literature review also illustrated that the pancreas was visualized inadequately in 30% of cases [21].

The use of analgesics, morphine was utilized by 17.52% of patients in the DM group and 10.81% in the non-DM group, ($p = 0.103$). This higher usage of morphine in the DM group may be attributed to the greater prevalence of severity and necrosis in this group.

The length of stay in hospital in this study was significantly longer in the DM group, with 10.37 (±3.53) days, compared to 8.36 (±3.18) days

in non-DM group, which was similar to that reported in other studies.

CONCLUSION

In this study, patients with AP and diabetes are older than those without diabetes. The DM group had more comorbidities, such as hypertension and dyslipidemia, and they stayed longer in the hospital. However, we did not find significant differences in socio-demographic profiles or clinical manifestations between the two groups. Additionally, the findings revealed that alcohol consumption is the leading cause of acute pancreatitis among patients admitted to Calmette Hospital. Notably, hypertriglyceridemia is more prevalent in diabetic patients.

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Conflict Of Interest

The authors have no conflict of interest in this article.

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