

THE PREDICTIVITY OF SERUM BIOCHEMICAL MARKERS IN ACUTE BILIARY PANCREATITIS

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ABSTRACT

Acute pancreatitis (AP) is the most common gastrointestinal disease requiring hospital admission. Among the etiology of AP gallstones (45%) and alcohol abuse (20%) are the most frequent causes of AP. Sixty-nine patients of AP who met the inclusion criteria were evaluated from July 2021-June 2022. The predictivity of serum biochemical marker alanine transaminase (ALT) in acute biliary pancreatitis and the mean serum biochemical markers (ALT, aspartate transaminase, alkaline phosphatase, bilirubin, amylase and lipase level) in AP were evaluated. Total 69 patients with the diagnosis of AP were included. Forty-six (66.7%) were male and twenty-three (33.3%) were female out of which 12 (17.3%) were diagnosed as biliary pancreatitis and 57 (82.7%) had non-biliary pancreatitis. In non-biliary pancreatitis there were 41 male and 16 females. Non-biliary pancreatitis was more common in male and biliary pancreatitis was more common in female. There was no significant difference in mean levels of amylase in biliary and non-biliary pancreatitis (i.e. in non-biliary pancreatitis; mean \pm SD = 387.14 \pm 419.53, in biliary pancreatitis mean \pm SD = 535.5 \pm 533.51, p-value= 0.235 >0.05), the mean lipase was not significantly different in biliary and non-biliary pancreatitis (i.e. in non biliary pancreatitis; mean \pm SD=1287.75 \pm 894.37, in biliary pancreatitis mean \pm SD =1666.41 \pm 1150.47, p-value =0.289 > 0.05). There was a significant difference seen among the mean levels of all other parameters (Bilirubin T&D, ALT, AST and ALP) the mean was found to be significant in biliary and non-biliary pancreatitis (i.e. p-value=0.000<0.05). Liver function test mainly ALT may predict biliary etiology of AP.

KEYWORDS

Biliary pancreatitis, alanine transaminase, endoscopic retrograde cholangiopancreatography, cholelithiasis

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INTRODUCTION

Acute pancreatitis is the most common gastrointestinal disease requiring admission to hospital, with an annual incidence of 34 per 1,00,000 person-years in high income countries.¹ Acute pancreatitis is characterized by a local and systemic inflammatory response and has a varying clinical course. Patients mostly present with mild acute pancreatitis, which is self-limiting and usually resolves within a week. Approximately 20% of patients develop moderate or severe acute pancreatitis, with necrosis of the pancreatic or peripancreatic tissue or organ failure, or both, and a substantial mortality rate of 20–40%.²⁻⁵

Among the etiology of acute pancreatitis gallstones (45%) and alcohol abuse (20%) are the most frequent causes of acute pancreatitis.⁶ The least common causes are medication, endoscopic retrograde cholangiopancreatography (ERCP), hypercalcemia, hypertriglyceridemia, infection, genetics, autoimmune diseases, and (surgical) trauma. About 10% of patients have idiopathic pancreatitis, where no cause is found.

As per the revised Atlanta classification the diagnosis of acute pancreatitis requires two of the following three features: (1) abdominal pain consistent with acute pancreatitis (acute onset of a persistent, severe, epigastric pain often radiating to the back); (2) serum lipase activity (or amylase activity) at least three times greater than the upper limit of normal; and (3) characteristic findings of acute pancreatitis on contrast-enhanced computed tomography (CECT) and less commonly magnetic resonance imaging (MRI) or transabdominal ultrasonography.⁷

Several causes of AP have been reported; however, it is always difficult to be certain about the cause in a given patient. For example, in a patient with alcohol history and gallstones, either of the 2 factors or even a combination of both might be responsible for the etiology of AP. If the serum ALT level is elevated in such a patient, then gallstones as the cause may be even a stronger consideration. However, an attempt must be made in every patient to ascertain a cause by a thorough history and physical examination, laboratory tests, and imaging. Before labeling an episode as “idiopathic AP,” more specialized tests and procedures like secretin-MRCP, EUS, and genetic testing should be performed.

In our study, we aim to determine the predictivity of serum biochemical marker ALT (alanine transaminase) in acute biliary pancreatitis.

MATERIALS AND METHODS

This was a descriptive cross-sectional observational study among 69 patients with acute pancreatitis conducted at the National Academy of Medical Sciences, Bir Hospital, Kathmandu from September 2021 to August 2022. Ethical approval was obtained from the IRB of NAMS (Ref. No. 40/2079/2080). Informed consent was taken from all the participants. Diagnosis of acute pancreatitis was made as per the revised Atlanta classification. Adult patients ≥ 18 years with the diagnosis of acute pancreatitis were enrolled in this study.

Sample size was calculated by using the following formula:

$$n = Z^2 P(1-P) / d^2$$

Where n = required sample size,

Z = Statistic corresponding to level of confidence

P = Prevalence of biliary pancreatitis (prevalence of biliary pancreatitis = 28% in a study from TUTH)⁸

d = 5 (precision, corresponding to effect size).

Total number of pancreatitis admitted in our Department in Bir Hospital in 2076 were 65. In a view of less case load per year, corrected sample size formula was applied for our study.

Corrected sample size = Calculated sample size / (1 + Calculated sample / Estimated sample of disease per year).

$$= 53.7$$

The sample size calculated was 54.

*During the study period total patients who met the inclusion criteria were 69. And we included all patients in our study.

RESULTS

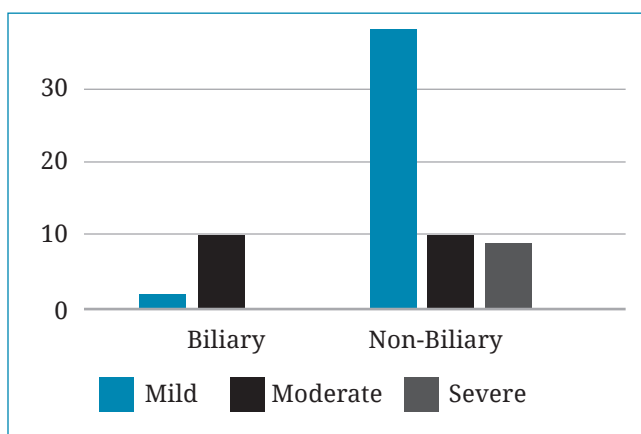
Total 69 patients with the diagnosis of acute pancreatitis were included in the study. Forty-six (66.7%) were male and twenty-three (33.3%) were female out of which twelve patients (17.3%) were diagnosed as biliary pancreatitis and fifty-seven patients (82.7%) had non biliary etiology of pancreatitis. Among non-biliary cause of

Table 1. Etiology of acute pancreatitis

| Types of Pancreatitis | Male | Female | n | % |
|-----------------------|------|--------|----|------|
| Biliary | 5 | 7 | 12 | 17.3 |
| Non-Biliary | 41 | 16 | 57 | 82.7 |
| Alcohol | | | 38 | 66.6 |
| Idiopathic | | | 13 | 22.9 |
| Hypertriglyceridemia | | | 2 | 3.5 |
| Recurrent/Familial | | | 4 | 7 |

Table 2: Distribution of biliary and non-biliary pancreatitis according to age and sex

| Age group (years) | Biliary pancreatitis | | | Non-biliary pancreatitis | | |
|-------------------|----------------------|--------------|-------|--------------------------|--------------|-------|
| | Male n (%) | Female n (%) | Total | Male n (%) | Female n (%) | Total |
| ≤20 | 0 | 0 | 0 | 1 (50.0) | 1 (50.0) | 2 |
| 21-30 | 0 | 0 | 0 | 13 (72.2) | 5 (27.8) | 18 |
| 31-40 | 0 | 0 | 0 | 11 (64.7) | 6 (35.2) | 17 |
| 41-50 | 2 (50.0) | 2 (50.0) | 4 | 9 (81.8) | 2 (18.2) | 11 |
| 51-60 | 0 (0.0) | 2 (100.0) | 2 | 1 (100.0) | 0 (0.0) | 1 |
| 61-70 | 2 (66.7) | 1 (33.3) | 3 | 2 (66.7) | 1 (33.3) | 3 |
| >70 | 1 (33.3%) | 2 (66.67%) | 3 | 4 (80%) | 1 (20.0) | 5 |

**Fig. 1: Severity of pancreatitis**

acute pancreatitis, the most common cause was alcohol consumption which present in thirty-eight patients (55.1%) followed by idiopathic in thirteen (18.8%), recurrent/familial in four (5.8%) and hypertriglyceridemia in two (2.9%).

Out of twelve patients diagnosed with biliary pancreatitis seven were female and five were male. Number of female patients were more in biliary pancreatitis. Whereas in non-biliary pancreatitis there were forty-one male and sixteen females. Non-biliary pancreatitis was more common in male than in female.

Patient with non-biliary pancreatitis most commonly presented within an age group

Table 3: Biochemical parameters in non-biliary vs. biliary pancreatitis

| Labs | Non-biliary | Biliary | p-value |
|-------------|------------------|-------------------|---------|
| Amylase | 387.14 ± 419.53 | 535.5 ± 533.51 | 0.235 |
| Lipase | 1287.75 ± 894.37 | 1666.41 ± 1150.47 | 0.289 |
| Bilirubin T | 2.1 ± 1.32 | 3.85 ± 1.17 | <0.001 |
| Bilirubin D | 0.97 ± 0.722 | 1.8 ± 0.54 | <0.001 |
| ALT | 74.75 ± 71.31 | 180 ± 96.20 | <0.001 |
| AST | 84.61 ± 73.89 | 146 ± 57.01 | <0.001 |
| ALP | 199.6 ± 63.71 | 395.5 ± 87.50 | <0.001 |

of 20-40 years whereas patients with biliary pancreatitis presented after the age of 40. In this study most common age group for biliary pancreatitis was 41-50.

No significant difference was found of mean amylase level in biliary and non-biliary pancreatitis (i.e. in non-biliary pancreatitis; mean \pm SD = 387.14 \pm 419.53, in biliary pancreatitis mean \pm SD= 535.5 \pm 533.51, p-value =0.235 >0.05), the mean of lipase was found to be not significant in biliary and non-biliary pancreatitis (i.e. in non biliary pancreatitis; mean \pm SD= 1287.75 \pm 894.37, in biliary pancreatitis mean \pm SD= 1666.41 \pm 1150.47, p-value =0.289 >0.05). In all other parameters (Bilirubin total and direct, ALT, AST and ALP) the mean was found to be significant (bilirubin T 2.1 \pm 1.32, 3.85 \pm 1.17; bilirubin D 0.97 \pm 0.722, 1.8 \pm 0.54; ALT 74.75 \pm 71.31, 180 \pm 96.20; AST 84.61 \pm 73.89, 146 \pm 57.01 ALP 199.6 \pm 63.71, 395.5 \pm 87.50) in biliary and non-biliary pancreatitis (i.e. p-value <0.001).

DISCUSSION

Among 69 patients with the diagnosis of acute pancreatitis alcohol related (55.2%) and biliary pancreatitis (17.3%) are the most common causes followed by idiopathic (18.8%) recurrent/? familial (5.8%) and hypertriglyceridemia seen in (2.9%). In this study biliary pancreatitis represents only 17.3% of the patients which was much less in comparison with western data where gall stone pancreatitis is present in around 45-50% of the patients.⁹ However, similar study done in Nepal at TUTH the prevalence of gallstone pancreatitis was 28%.⁸ The mean age of the patient with biliary pancreatitis in their study was 60, which was similar to western studies.

Pain abdomen was the commonest presentation which was present in 69 (100%) of patients followed by nausea and vomiting in 62 (89.9%) respectively. Referred pain was seen in 49 (71.1%).

Distinguishing gallstone pancreatitis from other causes of acute pancreatitis is important since gallstone pancreatitis needs intervention in the form of ERCP and cholecystectomy to prevent complications and recurrent episode of pancreatitis. Laboratory investigations and radiological procedures are critical for diagnosis as well as prediction of prognosis when a patient presents with gallstone pancreatitis.

Liver function test can help distinguish biliary pancreatitis. The specificity of a serum ALT level

of more than 150 IU/L for diagnosing gallstone pancreatitis was 96% with the sensitivity of only 48%.¹⁰ Tenner *et al*¹¹ performed a meta-analysis of studies that used liver enzymes (bilirubin, alkaline phosphatase, ALT and aspartate transaminase) in the prediction of a biliary origin of an attack of acute pancreatitis found that the rise of serum of ALT threefold or high had a PPV of 95% in diagnosing ABP, the higher the value the greater its specificity and positive predictive value in diagnosing gallstone pancreatitis. At ALT levels greater than or equal to 150 IU/L (approximately a 3-fold elevation), the probability of gallstone pancreatitis is 95%. In current study, the mean value of ALT level in patients with biliary pancreatitis was 180.16 \pm 96.20 IU/l and 74.75 \pm 71.31 in non-biliary pancreatitis. Out of all twelve patients with biliary pancreatitis eleven patients had serum ALT level >150 IU/l and only one patient had ALT level <150IU/L. In western literature also 10-15% of patients with ABP present with normal serum liver enzymes (bilirubin and ALT).¹² In our study, not only ALT level but other biochemical parameters like AST, ALP and bilirubin levels were also high in patients with biliary pancreatitis than in non-biliary pancreatitis. In parameters like bilirubin total and direct, ALT, AST and ALP the mean were found to be significant in biliary and non-biliary pancreatitis (i.e. p-value <0.001).

Of all twelve patients with biliary pancreatitis, choledocholithiasis was seen in 9 patients by using abdominal ultrasound, magnetic resonance cholangiopancreatography and Endoscopic ultrasound. Cholelithiasis was only seen in 2 patients and gallbladder sludge was seen in 1 patient. Most of the patients with biliary pancreatitis were female (58.33%). In a study done by Bohora *et al*¹³ in Nepal (63.33%) and (36.66%) had biliary and non-biliary etiology respectively. In their study biliary pancreatitis was more common in females (25 vs. 3).

The limitation of this study was that 18.8% patients have idiopathic pancreatitis since MRCP and EUS was not done in all patients and we didn't have facility to screen for genetic causes of acute pancreatitis.

Liver function test mainly ALT may predict biliary etiology of AP, which is rapid and low of cost. EUS/MRCP may need to detect biliary cause of AP when suspected by liver function test.

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