LEVELS OF S. LIPASE AND S. AMYLASE IN ASSESSING SEVERITY AND CAUSE OF ACUTE PANCREATITIS

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ABSTRACT

BACKGROUND

Alcoholic acute pancreatitis may present with a wide spectrum of symptoms ranging from mild chronic abdominal discomfort to a presentation that of an acute abdomen. Diagnosing it sometimes becomes a challenge to physician.

Objectives- To investigate the role of Serum Lipase to Serum Amylase ratio in differentiating alcoholic cause of acute pancreatitis from non-alcoholic acute pancreatitis, and whether levels can be correlated with CT abdomen severity score.

MATERIALS AND METHODS

A total of 55 patients of acute pancreatitis (AP) were admitted in Medicine Department from January 2015 to August 2016, of which 47 patients were included in the study. S. amylase and S. lipase were measured in first 48 hours simultaneously after admission and thus calculating the L/A ratio. CECT abdomen was done in 3 - 5 days after admission and grading was done by Balthazar criteria.

RESULTS

Among these, the lipase/ amylase ratio in alcoholic AP ranged from was significantly higher than non-alcoholic AP (mean L/A ratio in alcoholic AP was 4.03 ± 1.44; and non-alcoholic AP was 2.27 ± 0.85 with p= 0.0001), but L/A ratio was unable to distinguish between various degrees of severity in the acute pancreatitis.

CONCLUSION

S. lipase/ S. amylase ratio could help in differentiating the alcoholic and non-alcoholic cause of acute pancreatitis, but it does not correlate with the CT score severity of acute pancreatitis.

KEYWORDS

Alcoholic Acute Pancreatitis, Lipase Levels, Amylase Levels, Lipase/ Amylase Ratio.

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BACKGROUND

Acute pancreatitis (AP) is one of the most common diseases of the gastrointestinal tract leading to tremendous emotional, physical and financial human burden.[1]

It is usually a short-lived inflammatory response to pancreatic gland injury. Typical symptoms include abdominal pain, nausea and vomiting.

As atypical presentations of acute pancreatitis are frequent and there is a wide differential diagnosis, confirmatory tests are required to confirm the diagnosis as well as assess the severity of acute pancreatitis.

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Three enzymes derived from pancreatic acinar cells- amylase, lipase and the proenzyme trypsinogen have been tested as biochemical markers of acute pancreatitis; and although elevated serum pancreatic enzymes support clinical diagnosis of acute pancreatitis, numerous reports however describe the lack of usefulness of serum enzyme levels to determine the prognosis in acute pancreatitis as well.[2-5]

Currently, serum amylase and serum lipase are the most commonly used of these in clinical practice.[6]

Although, Cherry and Crandal[7] first described an association between pancreatic injury and elevated serum lipase levels in 1932, the routine study of serum lipase levels gained widespread popularity quite later.

There are many causes of acute pancreatitis of which gall stone is the commonest (30% - 60%) followed by alcohol (15% - 30%). In the Western countries alcohol is the most common cause of acute pancreatitis,[8-12] but a diagnostic workup must be undertaken to identify treatable causes.[13]

Identification of gallstones as the aetiology should prompt referral for cholecystectomy to prevent recurrent attacks and potential biliary sepsis.[14,15]

However, alcohol-induced pancreatitis often manifests as a spectrum ranging from discrete episodes of acute pancreatitis to chronic irreversible silent changes.[15]

From a clinical point of view, the course of alcoholic and biliary AP is the same; however, because endoscopic retrograde cholangiopancreatography associated with endoscopic sphincterotomy can prevent further complications in patients with severe biliary pancreatitis, it is important to recognise early the biliary origin of the disease.

On the other hand, identification of alcoholic origin of pancreatitis can prevent interventional procedures not useful in this kind of patients. Gumaste et al proposed that the serum lipase/ amylase ratio of greater than 2 could differentiate acute episodes.[16]

It was reported that patients with acute alcoholic pancreatitis had serum concentrations of amylase lower than those with non-alcoholic pancreatitis, but the serum lipase concentrations were similar in the both forms of the disease. The serum lipase/ amylase (L/A) ratio was significantly higher in alcoholic acute pancreatitis than in the non-alcoholic form of the disease.[17]

So, we decided to investigate these findings in Indian setup and whether the S. lipase/ amylase ratio could be correlated with CT abdomen severity in case of acute pancreatitis.

MATERIALS AND METHODS

- Study was done among the patient admitted in the KPS Institute of Medicine, GSVM Medical College, Kanpur.
- The study was conducted from January 2015 to September 2016.
- The diagnosis of Acute Pancreatitis is based on the evidence of two or more combination of the following presentations-
    - At least three folds increase in serum amylase and/or lipase levels in addition to history of-
    - Upper abdominal pain and further confirmed by ultrasonography and/or CT performed during the hospital stay.

Study Design

Cross-sectional study.

Study Subjects

All patients of acute pancreatitis admitted in KPS Institute of Medicine, LLR Hospital, GSVM Medical College, Kanpur.

Inclusion Criteria

- All the patients of acute pancreatitis above 18 years of age.
- Aetiology of AP was considered alcoholic when mean alcohol consumption was more than 80 gm per day.

Exclusion Criteria

- Patients with acute renal failure.
- All patients with other possible abdominal conditions, chronic pancreatitis such as pancreatic calcifications, pancreatic duct dilatation and malabsorption syndrome etc.

Investigations

S. amylase and S. lipase were measured in first 48 hours of onset of symptoms. The serum amylase and lipase concentration were checked simultaneously after admission and thus calculating the L/A ratio. S. amylase was measured by chromogenic substrate method (Ref. range 25 - 125).[18] S. lipase was done by colorimetric method of Imamura.

- Blood sample for random blood sugar, CBC, S. ionised calcium, S. urea and creatinine and LFT were drawn in first 48 hrs. of onset of symptoms.
- CECT abdomen was done in 3 - 5 days after admission.
- Balthazar criteria[19]: CECT grading of acute pancreatitis.
- Grade A normal pancreas.
- Grade B focal or diffuse enlargement.
- Grade C intrinsic gland anomaly abnormality recognised by haziness on CT scan.
- Grade D single ill-defined collection or Phlegmon.
- Grade E two or more ill-defined collections or presence of gas in nearby pancreas.

According to the Balthazar Criteria, we classified patients with Acute Pancreatitis into Three Groups:

Grade Mild

Normal, local or diffuse enlargement of the pancreas.

Grade Moderate

Pancreatic gland abnormalities associated with peripancreatic inflammation.

Grade Severe

Fluid collection in one or more location and/or the presence of gas in or adjacent to the pancreas.

The relationship of L/A ratio with CT findings for indirectly evaluating the severity of pancreatitis in patients was also analysed.

Statistical Methods

Statistical analysis was done by student's 't' test using SPSS version 18.0. Continuous variables were presented as means and standard deviation. Severity correlation was done using ANOVA test.

RESULTS

A total of 55 patients of acute pancreatitis (AP) were admitted in Medicine Department from January 2015 to August 2016, of which 47 patients were included in the study. Among these patients, 27 were non-alcoholic and 20 were alcoholic.

Among the non-alcoholic aetiology, most of the patients (25) were found to have underlying biliary cause. One patient was found to have hypertriglyceridaemia as a cause of AP, another patient was found to have hypercalcaemia as cause of AP.

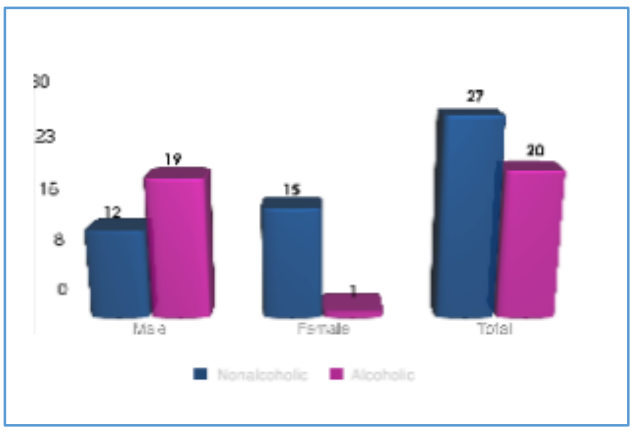

Figure 1. Distribution of the Patients in Both Groups

Parameter	Non-Alcoholic	Alcoholic
Male	12 (25%)	19 (40%)
Female	15 (31%)	1 (2.1%)
Total	**27**	**20**

Table 1. Distribution of Patients in Both Groups

	S. Lipase	S. Amylase
Non-alcoholic AP	3271 ± 1927	1650 ± 1150
Alcoholic AP	2096 ± 1200	628 ± 436
P value	0.0206	0.0005

Table 2. Mean Value of S. Lipase and S. Amylase in Both Groups

Groups	L/A Ratio
Non-alcoholic AP	2.27 ± 0.09
Alcoholic AP	4.03 ± 0.54

Table 3. L/A Ratio in Alcoholic and Non-Alcoholic Acute Pancreatitis

Serum lipase values in non-alcoholic AP ranged from 820 to 7800 U/L (median, 2409 U/L) and in alcoholic AP from 370 to 4060 U/L (median, 1892 U/L).

Serum amylase values in non-alcoholic AP ranged from 309 to 4432 U/L (median, 1227 U/L) and in alcoholic AP from 161 to 2006 (median, 612 U/L).

The mean serum lipase levels in non-alcoholic AP (3271 ± 1927) were significantly higher in comparison to alcoholic AP (2096 ± 1200) (p= 0.0206). Serum amylase values were significantly lower in alcoholic group (628 ± 436) in comparison to non-alcoholic AP (1650 ± 1150) (p= 0.0005) 25.

	Mild	Moderate	Severe
Non-alcoholic AP	6	5	4
Alcoholic AP	5	6	2
Age	37 ± 12	30 ± 11	39± 12
S. Lipase	1448 ± 469	3770 ± 1489	2498 ± 458
S. Amylase	727 ± 728	1429± 1182	1207 ± 458
Ratio	1.98 ± 1.05	2.63 ± 1.25	2.03 ± 1.02

Table 4. Correlation between CT Severity and S. Lipase/S. Amylase Levels

Using ANOVA test, first we compared the severity correlation for both alcoholic and non-alcoholic pancreatitis, where mean for S. amylase, S. lipase, S. lipase/ amylase ratio, all were compared with CT abdomen Balthazar score; there was no significant difference in amylase, lipase and L/A ratio among them (p value > 0.05 for both).

The L/A ratio > 4.0 was present in 15 of the 20 patients with alcoholic pancreatitis, in 22 of the 27 (82%) patients with non-alcoholic pancreatitis, and the sensitivity and specificity in determining the alcoholic acute pancreatitis were 75% and 17.6% respectively (Table 5).

The sensitivity and specificity to predict pancreatitis between the non-severe (mild and moderate: L/A= 2 - 4.2) and severe (L/A > 5) group were also compared (Table 6).

	Alcoholic AP		Total
	Absent	Present	
Test Positive	2	15	**17**
Test Negative	25	5	**30**
Total	**27**	**20**	**47**

Table 5. S. Lipase/ Amylase Ratio (> 4) Sensitivity for Diagnosing Alcoholic Pancreatitis

Sensitivity and specificity were calculated as 75% and 92.5%.

Lipase/ Amylase Ratio	> 2	> 4.2	> 5
Sensitivity	26.5	21.5	21.3
Specificity	34	40	42

Table 6. Sensitivity and Specificity to Predict Pancreatitis between the Non-Severe and Severe

At the L/A ratio > 2.0 the sensitivity and specificity in determining acute pancreatitis in the severe group were 26.5% and 34.0%, respectively; positive and negative predictive values were 41.5% and 20.8%.

Using the L/A ratio > 4.2, the sensitivity and specificity were 21.5% and 40.0%, respectively; the positive and negative predictive values were 26.5% and 33.8%.

Using the L/A ratio > 5.0, the sensitivity and specificity were 21.3% and 42.0%, respectively; the positive and negative predictive values were 24.5% and 37.7%.

DISCUSSION

Previous studies showed that the increase in serum concentration of amylase in patients with alcoholic acute pancreatitis was significantly lower than that of patients with biliary pancreatitis,[6,10] but that serum lipase concentrations were not significantly different. However, our results showed that the lipase elevations were also significantly lower in the alcoholic AP than the non-alcoholic AP.

The mean L/A ratios in the non-alcoholic AP ranged from 0.81 to 5.2, whereas the lipase/ amylase ratio in alcoholic AP ranged from 0.19 to 6.7. Mean L/A ratio in alcoholic AP (4.03 ± 1.44) was significantly higher than non-alcoholic AP (2.27 ± 0.858), p= 0.0001.

We found similar results in the previous studies 6, 20, 23. The L/A ratio > 4.0 was present in 15 of 20 (75%) patients with alcoholic AP, 2 of the 25 (7.4%) patients with non-alcoholic AP, and the sensitivity and specificity in determining the alcoholic AP were 75% and 92%, respectively; positive and negative predictive values were 36% and 63%.

Out of 47 patients, CECT abdomen was available in 28 patients. On the basis of Balthazar criteria 11 patients were found to have mild AP, 11 had moderate AP and other 6 had severe AP.

Our results showed that L/A ratio is unable to distinguish between various degrees of severity in the acute pancreatitis, since there was no statistical difference in the values between mild and moderate/ severe pancreatitis.

The serum lipase/ amylase ratio was found to be highest in moderate AP. In severe AP due to widespread inflammatory reactions and tissue destruction, the clinical course is more severe and hence the pancreatic enzyme levels are lower.

CONCLUSION

The mean S. lipase and amylase were significantly higher in non-alcoholic AP as compared to alcoholic AP and the mean L/A ratio was significantly higher in alcoholic AP than non-alcoholic AP. However, the L/A ratio is unable to distinguish between various degrees of severity in the acute pancreatitis.

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