Serum Amylase and Lipase estimation in diabetic ketoacidosis (DKA)

Payal Gamit¹, Himanshu Chauhan², Margeyi Mehta³

¹Tutor, Biochemistry, ²Assitant Professor, Biochemistry, Government Medical College and SSG hospital, Baroda, Gujarat, ³Tutor, Physiology, GMERS medical college, Gotri, Baroda, Gujarat

INTRODUCTION

DKA is a common complication among patients with diabetes that occurs when there is an absolute or relative deficiency in insulin. It can also be the initial presentation of the disease. Although more common among patients with type 1 diabetes, it can also occur in patients with type 2 diabetes. Acute pancreatitis can be a precipitating factor for DKA in patients with diabetes. Several hormonal derangements contribute to the hyperglycemia. There is a significant drop in insulin production because of the pancreatic damage. Acute pancreatitis is associated with an increase in glucagon levels. Finally, the elevated levels of glucose counterregulatory hormones such as cortisol, catecholamines, and growth hormone may not be counterbalanced because of the decreased insulin levels. In addition, a state of ketosis is induced by acute pancreatitis. Besides the lipolytic effect of decreased insulin, the elevated lipase level causes breakdown of local adipose tissue.

MATERIALS AND METHOD

This cross sectional study was conducted on 35 known cases of DM with multiple episodes of DKA (Group I), 35 patients with type 1DM without DKA (Group II) & 35 normal individual as control (Group III). Serum amylase (direct substrate method) and S.lipase (kinetic chromogenic substrate method) were analyzed on fully autoanalyzer at SSG Hospital & Medical College Baroda.

RESULTS: Mean of Serum amylase, lipase and random plasma glucose for Group I is 149 IU/L, 95 IU/L, 461 mg/dl; Group II is 118 IU/L, 91 IU/L, 318 mg/dl and Group III is 52 IU/L, 41 IU/L, 104 mg/dl respectively. Normal value of amylase is <90 IU/L & lipase is <60 IU/L. Serum amylase and lipase were significantly high in group I as compared to group III which is statistically significant (p<0.0001).

CONCLUSION: Significant elevations of S. amylase & S. lipase are more specific for pancreatitis may also accompany DKA.

Key words: amylase, lipase, plasma glucose, diabetic ketoacidosis.
July to November 2014 at shri sayjirao general hospital, vadodara.
In our study 35 known cases of DM in the with multiple episodes of DKA were taken as Group I, 35 patients with DM without DKA as Group II & 35 normal individual were taken as Group III. Age group taken was of 18-75 years patients, both males and females.

Informed consent were taken from all the patients.

Serum amylase and serum lipase were analyzed on fully autoanalyzer at SSG Hospital & Medical College Baroda.

Serum amylase (direct substrate method):

**Principle:**
α Amylase catalyses the hydrolysis of a 2-chloro-4 nitro phenol salt to chloro nitrophenol (CNP). The rate of hydrolysis is measured as an increase in absorbance due to the formation of chloro nitrophenol, which is proportional to the α Amylase activity in the sample.

\[
\text{CNP - Gal - G2 + H}_2\text{O} \rightarrow \text{CNP + Gal - G2}\alpha \text{ amylase}
\]

Serum lipase (kinetic methylresourufin method):

**Principle:**

The pancreatic lipase in presence of colipase, desoxycholate and calcium ions, hydrolyses the substrate 1-2-O-dilauryl-rac-glycero-3-glutaric acid-(6’-methylyresorufin)-ester. The sequence of reactions involved in the enzymatic direct lipase determination is the following:

\[
1-2-O-dilauryl-rac-glycero-3-glutaric-(6’-lipase methylresorufin)-ester \rightarrow 1-2-O-dilauryl-rac-glycerol + Glutaric-6’-methylresorufin-ester \rightarrow \text{Glutaric acid + Methylresorufin OH}
\]

Statistical analysis was done by using t-test to find out significance of difference between two groups and correlation coefficient to find out statistical correlation between two variables and its significance. Interpretation was done according to p-values.

**RESULTS**

Table 1 shows mean and SD of serum amylase, serum lipase and plasma glucose in three groups.

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMYLASE (IU/L)</td>
<td>149</td>
<td>118</td>
<td>52</td>
</tr>
<tr>
<td>LIPASE (IU/L)</td>
<td>95</td>
<td>91</td>
<td>41</td>
</tr>
<tr>
<td>PLASMA GLU (mg/dl)</td>
<td>461</td>
<td>318</td>
<td>104</td>
</tr>
</tbody>
</table>

Serum amylase and lipase were significantly high in group I as compared to group II and III which is statistically significant (p< 0.0001). Results were analysed with medcal software by using student’s t-test for statistical significance.

**DISCUSSION**

Acute Pancreatitis is more likely to be associated with a severe episode of DKA with marked acidosis and hyperglycemia. Elevation of serum lipase and amylase occur in DKA, and elevation of lipase levels appears to be less specific than amylase levels for the diagnosis of Acute Pancreatitis in the diagnosis of DKA. The concurrent diagnosis of these 2 conditions has several important clinical implications. It is important to consider AP in the differential diagnosis of any patient with severe prolonged abdominal pain, particularly in association with DKA. Early imaging of the pancreas is recommended.

Other explanations for elevated enzymes in DKA are Subtle injury to the pancreatic acinar cells may liberate them into the circulation. Another possibility is an extrapancreatic origin triggered by the
Serum Amylase and Lipase estimation in diabetic ketoacidosis (DKA)

dysmetabolic state, like release of salivary gland amylase, or its accumulation secondary to suboptimal excretion in the urine. Increase in lipase may be due to release of nonpancreatic lipolytic enzymes into the bloodstream from sources such as the stomach, liver, small bowel, tongue, esophagus, etc.\(^1\)


Further we can correlate blood gas analysis findings to check for metabolic derangement in DKA patients.

REFERENCES