

## Assessment of the necessity of serum amylase in diagnosis of acute pancreatitis: A Retrospective study

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### ABSTRACT

**OBJECTIVES:** To assess the need of serum amylase and lipase in acute pancreatitis. **STUDY:** Retrospective observational study **PARTICIPANTS:** Patients admitted with acute pancreatitis in surgery department from February 2014 to January 2016 were included in the study. **METHODS:** Data from previous records that included demographics, laboratory results and etiology. **RESULTS:** Among 96 acute pancreatitis (AP) patients, gallstones (n=42) were the most common cause. The majority patients (62.5%) with AP had raised levels of both amylase and lipase. Raised lipase levels only were observed in additional 16.66% and 31.81% of patients with gallstone induced and alcohol-induced pancreatitis, respectively. Overall, raised lipase levels were seen in between 96.66% and 100% of patients based on aetiology. Sensitivity and specificity of lipase in the diagnosis of AP was 97.89% and 99.7%, respectively. In contrast, the sensitivity and specificity of amylase in diagnosing AP were 73.68% and 99.2%, respectively. **CONCLUSIONS:** Serum lipase level estimation alone is sufficient to diagnose AP.

**keywords:** Serum amylase, serum lipase, acute pancreatitis (AP)

### INTRODUCTION

Acute pancreatitis (AP) is an inflammatory condition of pancreas. It is sudden in onset with limitless agony and the mortality attended upon render it one of the most formidable catastrophes<sup>1</sup>. The annual incidence of AP in the USA ranges from 13 to 45/100,000 persons and is on the rise<sup>2</sup>. Depending on its severity, it can have severe complications and high mortality despite treatment<sup>1</sup>. Gall stones and alcohol abuse are the most common underlying causes, with gallstones being more frequently seen in women. The American College of Gastroenterology guidelines states that two of these three findings should be present for the diagnosis of AP: (I) elevated serum lipase (s. lipase) or serum amylase (s. amylase)

greater than or equal to three times the upper limit; (II) characteristic abdominal pain; (III) computed tomography (CT) evidence of AP<sup>3</sup>. In the US, serum pancreatic enzymes estimations in emergency have been increased by more than 60% over a 10-year period<sup>2</sup>. Traditionally, s. amylase was widely estimated as it was cheaper and readily available than the lipase<sup>4</sup>. Now a days there has been shown no additional benefit of estimating s. amylase over s. lipase<sup>4,5</sup>. The current guidelines for the management of AP has also suggested a preference towards the lipase estimation for the diagnosis of pancreatitis<sup>4</sup>. Both these tests are used to confirm the diagnosis of pancreatitis irrespective of etiology, but cannot predict the severity of the disease<sup>6</sup>. The study was aimed to check the diagnostic accuracy of serum amylase and lipase for AP in the patients admitted to the surgical units.

### MATERIAL AND METHODS

A total of 455 patients with acute abdominal pain suspected of having AP under gone measurement of s. amylase and s. lipase during 2 years period from

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January 2014 to December 2015 were taken from hospital record of Department of surgery, PDU medical college, Rajkot. Out of them 96 diagnosed as AP and 24 as chronic pancreatitis, remaining 335 patients had no pancreatitis. Remaining 335 patients falsely, two patients had elevated s.lipase and three patients had elevated s.amylase levels. After radiological investigations, all the 335 patients were diagnosed to have no pancreatitis. The details of patient was retrospectively reviewed including demography, clinical data, Laboratory investigations biochemical, radiological investigations. The normal range for serum lipase was 0 - 60 U/L and that for serum amylase 28 - 110 U/L. AP was diagnosed on the basis of clinical features with concurrent elevation of s. amylase and/or s. lipase (three times of the normal). Ultrasonography (USG) of Abdomen done in all patients to identify gallstones. In cases where other acute abdominal pathology was suspected, an abdominal CT scan was performed. Patients with a history of alcoholism, with a negative USG abdomen for gallstones were considered to have alcohol-induced pancreatitis.

**Statistical analysis:** Results were tabulated on an Excel sheet and statistical

**Table1: Levels of amylase and lipase with respect to underlying aetiology of acute pancreatitis**

Acute pancreatitis (n=96)	Raised lipase and amylase levels	Raised lipase with normal amylase levels	Normal lipase and amylase levels	Overall raised lipase levels
Gallstone (n=42)	33 (78.57%)	7 (16.66%)	2 (4.76%)	40 (95.23%)
Alcohol (n=22)	15 (68.18%)	7(31.81%)	0 (0%)	22 (100%)
Idiopathic (n=30)	22(73.33%)	7(23.33%)	0 (0%)	29 (96.66%)
Tumour (n=1)	0 (0%)	1(100%)	0 (0%)	1 (100%)
Trauma (n=1)	0 (0%)	1 (100%)	0 (0%)	1 (100%)

There were no patients with pancreatitis in this cohort that had an elevated amylase level with a normal lipase level. Overall, there were four patients that had normal levels of both s. lipase and s. amylase, and these patients were diagnosed with AP following CT scan. A total of 335 patients, suspected of having AP had s. amylase and s. lipase measured. Amongst them, two patients had an elevation of s. lipase and three patients had an elevation of s. amylase more than three times the upper limit did not have acute pancreatitis. Acute pancreatitis in all these

analysis was done using SPSS software. Frequency and proportion(%) were calculated. Sensitivity and specificity of s. amylase and s. lipase levels in diagnosing AP were calculated. Patients that did not have AP who had an elevation of three or more times the normal range of amylase or lipase were included in the specificity analysis.

**RESULTS**

Total 96 patients diagnosed as AP in various units of surgery department, PDU medical College and Hospital, Rajkot Gujarat- India of which respect sex ratio to patients with AP, 54(%) patients were males and 42 (%) females, and the median age of presentation was 42 (20–78) years. There were 7 in-patient deaths. A etiology The underlying etiology for patients with AP were gallstones (n=42, 43.75%), alcohol (n=22, 22.92 %), idiopathic (n=30, 31.25 %), post ERCP (n=1, 1.04%) and trauma (n=1, 1.04 %). S. amylase and s. lipase levels The majority of patients with AP had raised levels of both s. amylase and s. lipase (n=113, 97%). Raised lipase only was observed in additional 12% and 23% of patients with gallstone and alcohol-related pancreatitis, respectively. Overall, raised lipase levels were seen between 95% and 100% of patients based on etiology.

patients excluded by CT Scan that detected other pathology. With respect to patients admitted with AP, the overall sensitivity and specificity of s. lipase levels in diagnosing pancreatitis was 97.89% and 99.4%, respectively. In comparison with s. amylase levels, the overall sensitivity and specificity in diagnosing AP were 78.6% and 99.1%, respectively.

**DISCUSSION**

Acute pancreatitis presents with severe, constant upper abdominal pain occasionally radiate to the back and be associated with nausea and vomiting.

There is a wide differential diagnosis, confirmatory tests are required to confirm/exclude the diagnosis of AP<sup>7,8</sup>. Three enzymes derived from pancreatic acinar cells—amylase, lipase, and the proenzyme trypsinogen—have been tested as biochemical markers of AP. Serum amylase is the most commonly used of these in clinical practice<sup>7</sup>. In Acute Pancreatitis s. amylase rises in the first 24 hours of onset of symptoms and returns to normal in 3-5 days<sup>9</sup>. However, depending on the severity, it may remain in circulation for 5-10 days<sup>10</sup>. While Serum Lipase level increases within 4-8 hours, peaks at 24 hours and stays in circulation for 1-2 weeks<sup>11</sup>. A diagnosis of acute pancreatitis can be made if s. lipase (or s. amylase) levels  $\geq 3$  times the upper limit of normal<sup>10</sup>.

#### **Accuracy of amylase and lipase levels:**

Use of these enzymes in this context is subject to an understanding of their imperfections. The first one is the lack of specificity i.e. these enzymes are also elevated (mildly, one or two times rarely very high mainly amylase) in intra-abdominal disorders such as decreased glomerular filtration, diseases of the salivary glands, and in abdominal conditions associated with inflammation, including acute appendicitis, cholecystitis, intestinal obstruction or ischemia, peptic ulcer disease and gynecological pathology<sup>8</sup>. Many authors have suggested that a cut-off level of three times of normal increases the specificity of the enzymes for AP<sup>4,12</sup>. Lipase and amylase are both very specific laboratory tests for the diagnosis of AP when the suggested cut-off level is used<sup>13</sup>. In late AP, s. amylase tends to return normal while s. lipase remains elevated longer<sup>4</sup>. Current data shows resemblance of low sensitivity of s. amylase (78.6%) compared to s. lipase including specificity to other studies<sup>14,15,16</sup>. This means amylase fails to satisfy the proposed criteria for AP in 22.4% patients<sup>17</sup>. This requires further CT scan to avoid surgical intervention. Lipase (sensitivity 97.89%) tends to keep CT scan to a minimum to confirm the diagnosis of AP thereby reducing the cost for the management. Sensitivity of combined both

enzyme estimations was 73.68% , lower as compared to s. lipase alone. Although some authors have proposed that both tests are necessary to effectively diagnose pancreatitis<sup>18</sup>, current study shows no added advantage of both the enzyme estimations together and unnecessarily increasing the cost which was in agreement with other studies<sup>4,19</sup>. Although the majority of patients with AP had raised levels of both amylase and lipase, raised lipase levels with associated normal s. amylase concentrations was observed in an additional 16.66% and 31.81% of patients with gallstone and alcohol-related pancreatitis, respectively. Hence, patients with pancreatitis would have potentially been missed if serum amylase alone was measured. A high specificity reported in this study may be due to the strict inclusion of only patients without pancreatitis that had an elevation of three times the upper limit of the normal range of pancreatic enzymes. Nevertheless, the above results suggest that measurement of s. lipase levels forms an important part of the diagnostic work-up of patients suspected of having AP, especially in cases where the s. amylase concentrations are normal.

#### **CONCLUSION**

S. amylase and s. lipase both enzymes used to diagnose the acute pancreatitis but measurement of s. lipase alone is sufficient to diagnose patients with acute pancreatitis and cost savings can be made if measured alone.

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