



Research Article

Evaluation of Serum Amylase and Lipase in 100 Cases of Acute Abdomen

Authors

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Introduction

The term 'Acute abdomen' refers to signs and symptoms of abdominal pain and tenderness, a clinical presentation that may require emergency surgical therapy. This challenging scenario requires a thorough and expeditious workup to determine the need for operative: intervention and to initiate appropriate therapy. Many diseases, some of which are not surgical or intra-abdominal, can produce acute abdominal pain and tenderness. Therefore, every attempt is made to make a correct diagnosis so that the chosen therapy, often a laparoscopy or laparotomy, is appropriate.¹

Acute abdomen is a broad term which includes many conditions, some requiring surgical management and others a conservative approach, e.g. conditions like perforated peptic ulcer, internal strangulation, perforation of hollow viscera, acute appendicitis etc need immediate surgical intervention, whereas in conditions like acute pancreatitis treatment is essentially conservative. Clinically it may be difficult to differentiate between these conditions as well as

many other abdominal crisis. Hence the need for investigations may be biochemical, radiological or others.²

Need of the Study

Acute abdomen embraces a large group of pathological conditions which have very little in common with each other except that most of them present with acute abdominal pain and call for prompt diagnosis and treatment i.e. acute intestinal obstruction, acute appendicitis, perforated peptic ulcer, acute pancreatitis, renal colic, diverticulitis and gastritis.³ The variable presentation and severity of illness make it necessary to arrive at a provisional diagnosis on which a surgeon can act upon. Conditions like internal strangulation and perforation of hollow viscera demand immediate surgical intervention. At the same time there are other cases of acute abdomen of equally serious magnitude like acute pancreatitis, where the treatment is essentially conservative.⁴

Aims and Objectives

To determine and co-relate levels of serum amylase and lipase in acute abdomen.

Material and Methods

The present study was conducted on 100 patients admitted in MMIMS&R Hospital, Mullana (Ambala), with acute abdomen and 50 individuals, free from any ailment which could alter the required parameter, were taken as controls. All the cases of acute abdomen were included in the study which were finally diagnosed as:

- 1) Acute pancreatitis
- 2) Acute cholecystitis
- 3) Peritonitis
- 4) Intestinal obstruction
- 5) Acute appendicitis
- 6) Renal and ureteric colic
- 7) Abdominal trauma
- 8) Miscellaneous group (APD, gastritis, amoebic colitis, gastric outlet obstruction, pseudocyst pancreas)

Exclusion Criteria

The following cases were excluded from the study:

- 1) Worm infestation
- 2) Diseases of vertebrae and spinal cord

Methods of Study

On admission of the patient the following investigations were carried out and records were made:

- 1) Complete clinical history
- 2) Complete physical examination
- 3) All relevant investigations to prove, the diagnosis Hb, BT, CT, TLC and DLC, Urine complete examination, Biochemical investigations like blood urea, serum creatinine, serum alkaline phosphatase, serum bilirubin, SGOT and SGPT, USG whole abdomen (if required)

Blood Sample Collection

In all the patients of acute abdomen blood sample was drawn for serum amylase and lipase at the time of admission, on day 5 and on day 10. The

blood sample of 5 ml was obtained by venepuncture by a sterilized and dry syringe. The collection was done with meticulous care so that no haemolysis of blood could occur. Serum enzyme estimation, was done within twenty four hours of admission.

Precautions

Sweat and saliva contain amylase. To avoid possible contamination the ends of the pipettes were plugged with cotton and contact of pipette tips and reagent with skin was avoided.

Amylase Estimation

Serum amylase was determined by Infinite alfa amylase reagent set based on kinetic method using Gal G3-uCNP.

Principle

Amylase test involves the use of a chromogenic substrate Gal G3OCNP (2-chloro-4-nitrophenyl linked with malto trioside). The direct action of amylase with this substrate results in the release of more than

90% of 2-chloro-4-nitrophenyl, which can be monitored by kinetic assay at 405 nm and read on semi auto analyser. The increase in absorbance is directly proportional to the amylase activity in sample.

10G3-uCNP a Amylase) 9-CNP +CNP-G2 + 9maltotrios

Preparation of Working Solution

Reagent storage and stability: The kit should be stored at 2° -8° C and is stable till the expiry date indicated on the label. Contamination and freezing of the reagent should be strictly avoided. Components and concentration of working solution the following components are present:

Component Concentration

- Buffer, pH 6.0 50 mmol/l
- Gal G2-a CNP 2.60 mmol/l
- SCN 140 mmol/l
- Activators and stabilizers

Normal Range: 40-140 IU/ml

Lipase Estimation

Serum lipase was estimated by the Euro Lipase UV kit based on the turbidimetric UV test.

Principle

Lipase enzyme hydrolyses fats into fatty acid and glycerol. The liberated fatty acids are then determined as a measure of the amount of hydrolysis.

Triolein + 2H₂O Lipase) Monoglyceride + 2 Oleic acid

The decrease in turbidity was read by an auto analyser at 340 nm.

Sample

5 ml of serum or heparin plasma was taken. Contamination of samples was prevented by not pipetting by mouth. Assay procedure

DISPENSE	CALIBRATOR	TEST
MONOREAGENT	1000µl	1000µl
CALIBRATOR	50µl	
SAMPLE		50µl

Sample was mixed carefully (not shaken), incubated at 20,30 or 37 °C for 4 mins and absorbance read at 340 nm. The stopwatch was started and after exactly 5 mins. Absorbance was read again to determine.

Results

Table-1 shows the comparison of routine investigations of study and control group.

Haemoglobin: The mean of the haemoglobin of study and control group was 10.90 gm% ± 2.14 and 10.62 gm % ± 1.58 respectively. The data was found to be non significant. Blood urea: The mean of the blood urea of study and control group was 40.61 mg% ± 20.70 and 33.31 mg% ± 12.12 respectively. The data was found to be significant statistically. Fasting Blood Sugar: The mean of the fasting blood sugar of study and control group was 100.13 mg% ± 32.46 and 95.86 mg% ± 29.18 respectively. The data was found to be non significant and the values were well within the normal range. TLC: The mean TLC of study and control group was 10343/cumm ± 3723.98 and

9026.6/cumm ± 2308.53. The values were higher in the study group and the data was significant.

Table 2 Coefficient of Correlation between Serum Amylase and Serum Lipase in Abdominal Trauma Group

Parameter	No. Of Patient	Coefficient of Correlation	P valve
Amylase	3	0.999	0.000 HS
Lipase	3		

Table-3 Coefficient Of Correlation between Serum Amylase and Serum Lipase in Miscellaneous Group

Parameter	No. Of Patient	Coefficient of Correlation	P valve
Amylase	7	0.982	0.000 HS
Lipase	7		

Discussion

1. **Age and Sex** In our study the minimum age was 6 years and maximum age was 80 years and the majority of the cases belonged to 41-60 years age group. Mean age of patients was 42.79 years. Male to female ratio was 65:35. Majority of the patients in the acute pancreatitis group were males 65.22%. Out of these 47.28% were in the age group 21-40 years. This is similar to the figures given by Bailey and Love (2004) which states that the disease may occur at any age, with a peak in young men and older women.

According to Dati et al (1983) at birth low lipase concentrations are measured, thereafter lipase levels increase progressively with age and remain constant between three and forty years of age and they also did not observe any sex predilection. In control group also no marked difference of serum amylase and lipase was detected at different ages and both the sexes.⁵⁹

2. **Acute Cholecystitis** In our study eighteen cases of acute cholecystitis were included Out of eighteen cases, five (27.7%) showed high levels of serum amylase and four (22.2%) had high levels of serum lipase. Of these five patients one had jaundice and ultrasonography showed prominent common bile duct at porta

with evidence of sludge and gravel in common bile duct and thickening of gall bladder with echo genic specks along the walls of the gall bladder suggestive of cholelithiasis with choledocholithiasis with obstructive jaundice. In this case on exploration common bile duct was found to be dilated and choledochotomy was done. Burnett and Ness (1955) found modest elevations of serum amylase in 12(52.17%) out of 23 cases of acute cholecystitis.⁴⁰

3. Acute Pancreatitis

Twenty three cases of acute pancreatitis were studied. Serum amylase and serum lipase estimations were done in all the cases showed 100% elevation in serum lipase and 91.35% elevation in serum amylase levels. The relative incidence of increased amylase and lipase levels on samples taken from acute pancreatitis cases on admission or within 24 hours is shown in the following table during various studies by different authors. This is similar to the reports by Ticktin et al (1965), Keirn et al (1998) and Smith et al (2005). The two cases who had normoamylasemia showed serum lipase levels of 168 and 126 U/L⁹⁵

Summary and Conclusions

This study was conducted on one hundred patients of acute abdomen and fifty healthy individuals were taken up as controls. A detailed clinical history and complete general physical examination was done in all the cases. The blood samples were taken before starting any treatment and estimations of serum amylase and serum lipase were performed within twenty four hours and on fifth and tenth day. The radiological investigations and operative measures were carried out wherever required. After the estimation of serum amylase and lipase in these patients immediately the following conclusions were drawn:

1. Serum amylase was raised in 53% of the patients with acute abdomen and serum lipase was raised in 43% of the patients with acute abdomen.

2. Serum amylase was raised in 91.35% of cases of acute pancreatitis while serum lipase was raised in all cases indicating that serum lipase is more specific than serum amylase in these cases.

3. Highest levels of serum amylase and serum lipase were obtained in acute pancreatitis cases.

4. Besides acute pancreatitis, serum lipase was also elevated in acute cholecystitis, intestinal obstruction, peritonitis, pancreatic trauma, renal and ureteric calculi patients.

5. The incidence of alcoholic pancreatitis in the present study was 46.67%.

6. Serum amylase and lipase levels have not shown any marked differences related to age and sex.

7. Current study strongly suggests that lipase is the more accurate test in acute pancreatitis.

8. In emergency department where both tests are available, we recommend that lipase in addition to amylase be done for acute pancreatitis.

9. Serum amylase may be high or low irrespective of the seriousness of the disease.

10. Current study suggests there is a strong correlation between serum amylase and lipase in both pancreatic and non-pancreatic conditions. Hence, in any acute abdominal condition the general principle must be emphasized, that no laboratory determination should be accepted as the only certain method of clinical diagnosis. The decision as to whether the patient needs an emergency surgical intervention is a crucial one. In making such decisions, all factors must be taken into account which include an accurate history, clinical examination and radiological evidence in addition to elevated levels of serum amylase and lipase.

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