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Elevated Serum Amylase and Lipase Levels without Pancreatic Involvement in Diabetic Ketoacidosis – An Observational Study

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Abstract: Diabetic ketoacidosis (DKA) is a life-threatening complication of diabetes mellitus, commonly associated with hyperglycemia, metabolic acidosis, and ketosis. While elevated serum amylase and lipase levels are traditionally linked to acute pancreatitis, recent studies suggest that they can be elevated in DKA patients without pancreatic involvement. This study aims to investigate the frequency and possible causes of elevated amylase and lipase levels in DKA patients and assess their correlation with metabolic parameters and clinical outcomes.

Keywords: *Diabetic Ketoacidosis, Amylase, Lipase, Pancreatitis, Metabolic Derangements, Serum Enzymes, Insulin Deficiency*.

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I. INTRODUCTION

Diabetes mellitus (DM) is a global health concern with increasing prevalence. One of its most severe complications, diabetic ketoacidosis (DKA), occurs due to insulin deficiency and excess counter-regulatory hormones, leading to uncontrolled lipolysis, ketogenesis, and metabolic acidosis.

Serum amylase and lipase are enzymes primarily produced by the pancreas, and their elevation is typically considered a diagnostic marker for acute pancreatitis. However, several studies have reported that these enzymes may be elevated in patients with DKA even in the absence of pancreatic disease. The clinical significance of this observation remains unclear, as distinguishing between DKA-related enzyme elevation and true acute pancreatitis is crucial for appropriate management.

This study aims to determine the frequency of elevated serum amylase and lipase levels in DKA patients, explore possible mechanisms for their elevation, and assess correlations with laboratory parameters and clinical outcomes.

II. MATERIALS AND METHODS

A. Study Design and Setting : -

This was a prospective observational study conducted in the Department of General Medicine, Osmania Medical College, Hyderabad, over a period of 18 months.

B. Study Population

A total of 100 patients diagnosed with diabetic ketoacidosis (based on blood glucose >250 mg/dL, arterial pH <7.3, serum bicarbonate <15 mEq/L, and positive ketonuria/ketonemia) were enrolled.

➢ *Inclusion Criteria*

- Patients >18 years of age.
- Diagnosed with Type 1 or Type 2 diabetes mellitus.
- Patients who provided informed consent for participation.

➢ *Exclusion Criteria*

- Patients with known acute or chronic pancreatitis.
- Patients with alcohol use disorder.
- Patients with pancreatic tumors or trauma.
- Patients with renal failure or chronic kidney disease (as amylase and lipase clearance is affected).
- Patients with conditions associated with elevated amylase and lipase such as intestinal obstruction, cholecystitis, or bowel perforation.

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C. Data Collection and Laboratory Analysis

Detailed clinical history and physical examination were performed for all patients.

D. Laboratory Investigations Included:

- Serum amylase and lipase levels
- Blood glucose levels
- Serum electrolytes (Na+, K+, Cl−, HCO3−)
- Renal function tests (urea, creatinine)
- Serum osmolality
- Arterial blood gas (ABG) analysis
- Complete blood count (CBC)
- Liver function tests (LFTs)

To confirm or rule out acute pancreatitis, ultrasound (USG) abdomen and contrast-enhanced computed tomography (CECT) abdomen were performed in patients with significantly elevated enzyme levels.

III. RESULTS

A. Baseline Characteristics :

The mean age of the study population was 43.86 years, with 68% males and 32% females. Type 2 diabetes was more common (78%), while 22% had Type 1 diabetes.

B. Precipitating Factors for DKA

- Incompliance with insulin therapy – 28%
- Urinary tract infections (UTI) – 17%
- Pneumonia – 15%
- Myocardial infarction – 5%
- Diabetic foot infections – 7%
- Acute cerebrovascular accident (CVA) – 4%
- Other causes – 24%

C. Serum Amylase and Lipase Levels

- Elevated serum amylase levels (≥80 U/L) were found in 63% of patients, with a mean value of 122.84 U/L.
- Elevated serum lipase levels (≥160 U/L) were found in only 4% of patients, with a mean value of 237 U/L.

Despite these elevations, none of the patients had clinical or radiological evidence of acute pancreatitis on USG or CECT abdomen.

D. Correlation with Other Parameters

- Serum amylase and lipase levels did not show significant correlation with blood glucose, serum electrolytes, renal function markers, or serum osmolality.
- No mortality was observed in this study.

IV. DISCUSSION

A. Potential Mechanisms of Enzyme Elevation in DKA

➢ *Non-Pancreatic Sources of Amylase and Lipase*

- Amylase is produced by salivary glands, lungs, kidneys, and intestines, while lipase is found in gastric and hepatic tissues.
- DKA may induce cellular stress and systemic inflammation, leading to increased enzyme production.

➢ *Decreased Clearance of Enzymes*

- Dehydration and renal dysfunction in DKA can impair the clearance of amylase and lipase, causing their accumulation in serum.

➢ *Hypoperfusion-Induced Tissue Injury*

- Severe dehydration in DKA may cause splanchnic hypoperfusion, leading to ischemic injury of the gastrointestinal tract, which could result in enzyme leakage into circulation.

➢ *Inflammatory Response and Metabolic Stress*

- Elevated cytokines and oxidative stress in DKA may contribute to increased release of amylase and lipase from non-pancreatic tissues.

B. Comparison with Previous Studies :

- Ajaydas et al. (2013) reported amylase/lipase elevations in 16-25% of DKA cases.
- Nair et al. (2000) found amylase elevation in 21% and lipase elevation in 29% of DKA patients.
- Chandra et al. (2022) observed elevated amylase in 18% and lipase in 26% of DKA cases, with no evidence of acute pancreatitis.
- Our study found a higher prevalence of amylase elevation (63%) but lower lipase elevation (4%), reinforcing that amylase may be more commonly elevated in DKA without pancreatitis.

C. Clinical Implications :

- Elevated amylase and lipase levels should not be automatically attributed to pancreatitis in DKA.
- Radiological confirmation (USG/CECT abdomen) is essential to rule out pancreatitis before initiating unnecessary treatments.
- Serum lipase may be a more specific marker for pancreatic involvement, as isolated amylase elevations are frequently non-pancreatic.

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V. CONCLUSION

This study confirms that serum amylase and lipase levels can be elevated in DKA without pancreatic involvement. The elevation is likely due to non-pancreatic sources, metabolic stress, and impaired enzyme clearance rather than acute pancreatitis. Clinicians should carefully evaluate enzyme elevations in DKA and rely on imaging to confirm pancreatitis before making treatment decisions.

REFERENCES

[1]. American Diabetes Association. “Diabetic ketoacidosis (DKA): Pathophysiology and treatment.” Diabetes Care, 2022.
[2]. Nair, S., Yadav, D., Pitchumoni, C.S. (2000). “Association of diabetic ketoacidosis and acute pancreatitis: Observations in 100 cases.” Pancreas, 30(2), 198-203.
[3]. Ajaydas, R., et al. (2013). “Serum amylase and lipase levels in diabetic ketoacidosis: Incidence and clinical significance.” Indian Journal of Endocrinology and Metabolism, 17(5), 803-806.
[4]. Chandra, P., et al. (2022). “Amylase and lipase elevation in diabetic ketoacidosis without acute pancreatitis.” Journal of Diabetes Research, 2022, 1-7.
[5]. Umpierrez, G.E., et al. (2002). “Diabetic ketoacidosis and hyperglycemic hyperosmolar syndrome.” New England Journal of Medicine, 346(11), 794-800.
[6]. Banks, P.A., Freeman, M.L. (2006). “Practice guidelines in acute pancreatitis.” American Journal of Gastroenterology, 101(10), 2379-2400.