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A Study on Assessment of Urinary Amylase in the Diagnosis of Acute Pancreatitis

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Abstract

Particularly in this nation where alcohol consumption is more prevalent, acute pancreatitis (AP) continues to be one of the most significant causes of severe abdominal discomfort that victims experience. With a 30-to 50% prevalence, gallstone disease is the most prevalent cause of the first attack. 20-40% of patients with AP have an alcohol relationship. Alcohol misuse (31.7%) and biliary tract illness (41%) are the two primary causes worldwide. 220 research subjects in all were used for this investigation. A total of 110 individuals were diagnosed with acute pancreatitis using clinical, radiological and investigative means. These patients were assigned to the study group, whereas 110 people were assigned to the control group. The gastrointestinal department admitted all of the patients who had acute pancreatitis. Before the trial began, each individual provided written informed consent. The majority of the patients ranged in age from 21-50. Between the cases and control group, the age mean was statistically non-significant ($p<0.05$). In a similar vein, the chi-square test revealed no statistically significant ($p>0.05$) difference in patient gender between cases and controls. Even though serum amylase is thought to be the most useful biochemical marker for acute pancreatitis diagnosis, it is not diagnostic in many situations, such as mild acute pancreatitis and those that manifest later in the illness. A more practical and accurate test for diagnosing acute pancreatitis is urinary amylase. Since urinary amylase has been shown to have similar sensitivity and specificity to serum amylase and serum lipase, it may be used to diagnose acute pancreatitis.

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Key Words

Pancreatitis, urinary amylase, serum lipase

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INTRODUCTION

With a 30-50% prevalence, gallstone disease is the most prevalent cause of the first attack. 20-40% of patients with AP have an alcohol relationship. Alcohol misuse (31.7%) and biliary tract illness (41%) are the two primary causes worldwide[1].

Clinical course may vary from moderate pain with low pancreatic inflammation (80%) to severe necrotizing pancreatitis (20%), which is accompanied by failure of many organ systems and mortality. We are thus able to distinguish acute abdominal syndrome (AP) from other causes of acute abdomen and determine the severity of the condition by meticulous clinical examination and the appropriate use of biochemical testing and radiological imaging[2]. More often than any other test, serum amylase is used to aid in the diagnosis of acute pancreatitis. When a patient has increased serum amylase readings or characteristic acute pancreatitis symptoms, the diagnosis of pancreatitis is often not problematic. Diagnostic challenges arise in acute cases presenting atypically, in instances that have partly resolved, or in atypical patients with normal or subclinical serum amylase levels[3].

In these situations, it's possible to misdiagnose pancreatitis, skip diagnostic testing, and decide against hospitalisation, which increases AP morbidity and death. As a result, a number of more recent tests, including urine trypsinogen-2, IL-6 and serum procalcitonin, are now utilised to diagnose acute pancreatitis. Acute pancreatitis is most often caused by alcohol misuse (30-45%) and gallstones (30-35%). Hypertriglyceridemia, hypercalcemia, congenital abnormalities (pancreatic divisum, annular pancreas, choledochocele, duodenal duplication cyst), drugs (azathioprine, mercaptopurine, didanosine), biliary parasites (ascaris), tumours, trauma, surgery, endoscopic retrograde cholangiopancreatography (ERCP) and viral infections (mumps, coxsackie) are less common causes. In 20% of instances, acute pancreatitis is idiopathic[4]. Because it is rapid, simple, reproducible, radiation-free and can be done at the patient's bedside, ultrasound is often the first imaging modality used in most centres to confirm the diagnosis of acute pancreatitis and rule out alternative causes of acute abdomen[5]. One benefit of ultrasonography in the early stages is that it may be used to assess the biliary system and gall bladder, as well as to look for gallstones and bile duct dilatation. Pancreatic enlargement and reduced parenchymal echogenicity as a result of interstitial edoema may be seen in thirty percent of patients. Focal, perhaps parenchymal, ill-defined hypo-or hyperechoic regions (edema/hemorrhage). It may be seen that the pancreatic outlines are blurred as a result of fluid accumulation in the peripancreatic area, particularly in the smaller sac and the left anterior pararenal space, and edoema of the surrounding adipose tissue. The fluid collections and the pseudo cysts contents are characterised using ultrasound[6,7].

When serum levels have returned to normal, urinary amylase levels may be high for seven to ten days following an episode of acute pancreatitis. As a result, it helps diagnose atypical instances with normal serum amylase levels as well as situations where AP manifests later in life.

In situations of hypertriglyceridemia and macroamylasemia, when serum amylase readings may be misguiding the diagnosis of AP, urinary amylase may also be helpful. In order to determine the importance of urine amylase levels and to compare them with serum lipase and amylase in patients of acute pancreatitis, this research is being conducted.

MATERIALS AND METHODS

220 research subjects in all were used for this investigation. A total of 110 individuals were diagnosed with acute pancreatitis using clinical, radiological and investigative means. These patients were assigned to the study group, whereas 110 people were assigned to the control group. The gastrointestinal department admitted all of the patients who had acute pancreatitis. Before the trial began, each individual provided written informed consent.

Following each patient's admission to the hospital, standard operating procedures were followed to gather data, including taking a history, conducting a thorough physical examination and conducting appropriate serological and radiological (USG) investigations. Since every patient had acute pancreatitis upon admission, investigations were conducted to determine the cause of the condition. All research participants were assessed for blood lipase, serum amylase and urine amylase levels in the study/cases and control groups. Serum lipase, urine amylase and serum amylase levels were compared between subjects with acute pancreatitis and control subjects in order to determine the sensitivity and specificity of each test. Using an automated biochemical analyzer, an enzymatic method was used to determine various biochemical parameters, including blood sugar, serum electrolytes, blood urea, serum creatinine, serum total protein, serum bilirubin, alkaline phosphate (SGPT), lipid profile, serum lipase and amylase, etc. The diagnostic kit was commercially available. A five-part haematological analyzer was used to evaluate the haematological parameters. It was planned to do USG on every research subject.

The current research eliminated individuals with uncontrolled blood sugar, diabetes, hypertension and chronic renal disease. It also excluded patients who were unwilling to participate in the study.

Table 1: Age Distribution

S.No	Age Groups (Years)	Study Group/Cases (n = 110)	Control Groups (n = 110)
1	<20 years	6 (5.4%)	6 (5.4%)
2	21-30 years	22 (20%)	24 (21.8%)
3	31-40 years	46 (41.8%)	50 (45.4%)
4	41-50 years	18 (16.3%)	14(12.7%)
5	>50 years	18 (16.3%)	14(12.7%)
6	Total	100 (100%)	100 (100%)

Table 2: Gender Distribution

Gender	Study Group/Cases	Control Groups	p-value
Male	89(80.9%)	41 (37.2%)	>0.552
Female	21 (19.0%)	69 (62.7%)	
Total	110 (100%)	110 (100%)	

Table 3: Baseline and USG Characteristics of cases and control subjects

Baseline and USG Characteristics		Study Group/Cases	Control Groups
Symptoms	Abdominal pain	110 (100%)	0 (0)
	Vomiting	83 (75.4%)	0 (0)
Habits (n = 110)	Alcohol	85 (77.2%)	23 (20.9%)
	Smoking	25 (22.7%)	31 (28.1%)
Co-morbidities	DM	10 (9.0%)	13(11.8%)
(n = 30)	HTN	6(5.4%)	10 (9.0%)
	IHD	11 (10%)	4 (3.6%)
	Obesity	3(2.7%)	8 (7.2%)
USG findings			
(n = 110)	Diffusely enlarged and hypo echoic pancreas	56 (50.9%)	0 (0)
	Diffusely enlarged and hypo echoic pancreas		
with cholelithiasis		11 (10%)	0 (0)
	Pancreas obscured by bowel gas	43 (39.0%)	0 (0)

Table 4: Diagnostic markers of acute pancreatitis in both groups

Diagnostic markers	Study Group/Cases (Mean±SD)	Control Groups (Mean±SD)	p-value
Serum amylase (U/l)	689.10±290.41	43.79±68.10	0.001
Serum lipase (U/l)	762.48± 211.14	51.11±36.52	0.001
Urinary amylase (U/l)	1577.2.62±457.82	298.13±352.17	0.001

Statistical Analysis: Version 20 of the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL) was used to analyse the data. For continuous variables, the mean±standard deviation is shown and the mean data from the study/cases and control groups was compared using the unpaired students' t test. When comparing categorical variables, the chi-square test and Fischer's exact chi-square test were used and the results were shown as a percentage. A $p<0.05$ was deemed significant.

RESULTS AND DISCUSSIONS

The age distributions of the control participants and acute pancreatitis patients in the current investigation are shown in [Table 1]. The majority of the patients ranged in age from 21-50. Between the cases and control group, the age mean was statistically non-significant ($p<0.05$). In a similar vein, the chi-square test revealed no statistically significant ($p>0.05$) difference in patient gender between cases and controls.

Patients with acute pancreatitis in our research reported experiencing vomiting and abdominal discomfort. Only 75.4% of the 100 patients reported vomiting, however all 100 patients (100%) reported abdominal discomfort. In the acute pancreatitis study group, 77.2% of patients had alcohol problems and 22.7% had smoking issues, in the control group, the percentages were 19.0% for alcohol problems and 26.3% for smoking issues. Among the study group, 2.7% of patients had IHD, 10% of patients were obese, 5.4% of patients with acute pancreatitis were hypertensive and 5.4% of patients had diabetes.

In this research, there was a statistically significant ($p<0.001$) rise in the mean levels of blood amylase, lipase and urine amylase among individuals with acute pancreatitis compared to those without the condition.

Undiagnosed moderate bouts may lead to a second, more severe attack. While the general death rate for acute pancreatitis remains constant at 1-2%, the mortality rate for severe acute pancreatitis may reach up to 30%.8

It's critical to diagnose acute pancreatitis as soon as possible in order to begin appropriate therapy. However, diagnosing acute pancreatitis remains a significant difficulty. The presentations are unusual and the clinical symptoms are non-specific. Since 1929, the most important factor in the diagnosis of acute pancreatitis has been the serum amylase value. For the enzyme, more than 200 tests exist and no upper limit on typical values has been established[9]. Serum amylase presents a number of challenges in the diagnosis of acute pancreatitis, while being the most useful test for the condition. Additionally, when acute pancreatitis has cleared up, serum amylase levels stay high for a maximum of one week. Additionally, increased serum amylase levels have been linked to a number of other illnesses, including appendicitis, cholecystitis, hepatitis, intestinal infractions and perforations and peritonitis[10].

In our research, 40 (80%) of the patients were between the ages of 21 and 50, while only 8 (16%) of the patients were older than 50, with 42 (84%) being men and 8 (16%) being women. Our findings are consistent with those of Chauhan *et al.,* who found that the most afflicted age group was 50-59 years old, with a mean age of 54. In their research, males were more impacted by acute pancreatitis than females. In an additional research conducted by Kandasami *et al.,* there were 56 female patients and 77 male patients with a mean age of 43.5 years (SD±14.7 years). Patients with acute pancreatitis in our research reported experiencing vomiting and abdominal discomfort. Only 78% of the 110 patients reported vomiting, however all 110 patients (100%) reported abdominal discomfort. Our results are similar to those of a research by Nehal Naik *et al.,* which found that 100% of patients had stomach pain as their primary symptom, with 66% also reporting vomiting and 30% presenting with abdominal distension[11].

According to Kandasami *et al.,* who identified alcohol as the primary risk factor for acute pancreatitis in their research, 63 patients (47.7%) were alcoholics, whereas 20 (20%) were smokers. Of the patients in our analysis, 80 (80%) were alcoholics. Only 69% of the individuals had blood amylase levels positive for acute pancreatitis out of all the participants who were clinically positive for the condition. While blood amylase levels were found to be normal in 17% of patients with clinically significant acute pancreatitis, they were found to be increased in 13.30% of participants. Ninety percent of the patients in the Bhimal *et al* research had increased amylase levels[10]. 35.9% of the 78 individuals with high blood amylase levels for acute pancreatitis also had positive USG results for the condition. Eight patients, or 53.3% of the group of 15 with elevated blood amylase levels, had positive USG results for acute pancreatitis. Six out of the twenty subjects with negative amylase levels had positive USG results for acute pancreatitis, accounting for 30% of the total.

CONCLUSION

Even though serum amylase is thought to be the most useful biochemical marker for acute pancreatitis diagnosis, it is not diagnostic in many situations, such as mild acute pancreatitis and those that manifest later in the illness. A more practical and accurate test for diagnosing acute pancreatitis is urinary amylase. Since urinary amylase has been shown to have similar sensitivity and specificity to serum amylase and serum lipase, it may be used to diagnose acute pancreatitis.

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