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Original Article

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Comparison of Serum Amylase Levels Versus Serum Lipase Levels in the Diagnosis of Acute Pancreatitis: A Record Based Study at a Tertiary Care Hospital in Mandya

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ABSTRACT

Background: Acute pancreatitis is a serious condition that requires prompt diagnosis and treatment. Serum amylase and serum lipase are two commonly used biomarkers for the diagnosis of acute pancreatitis, but there is ongoing debate about which marker is more accurate.

Methods: We conducted a retrospective review of 70 patients diagnosed with acute pancreatitis at Dept of General Surgery, Mandya Institute of Medical Sciences, Mandya. We compared the diagnostic accuracy of serum amylase and serum lipase, and assessed the correlation between the two markers.

Results: A total of 70patients were included in the study. The sensitivity and specificity of serum lipase were 81% and 98%, respectively, compared to 72% and 95% for serum amylase. The positive predictive value (PPV) of serum lipase was 98%, compared to 92% for serum amylase. The negative predictive value (NPV) of serum lipase was 54%, compared to 47% for serum amylase. There was a moderate positive correlation between serum amylase and serum lipase ($r = 0.62$, $p < 0.001$).

Conclusion: Serum lipase is a more accurate diagnostic marker for acute pancreatitis than serum amylase, with higher sensitivity, specificity, PPV, and NPV. However, serum amylase can still be useful as an adjunctive diagnostic tool, particularly in cases where serum lipase levels are not available or inconclusive. The moderate positive correlation between the two markers suggests that they may be complementary in certain cases. Further studies are needed to determine the optimal cut off values for serum amylase and serum lipase, and to assess the diagnostic accuracy of these markers in different patient populations.

Key Words: *acute pancreatitis, serum amylase, serum lipase, diagnostic accuracy, correlation*

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INTRODUCTION

Acute pancreatitis is a common condition that is characterized by inflammation of the pancreas, leading to abdominal pain, nausea, vomiting, and fever. The diagnosis of acute pancreatitis is based on clinical presentation, laboratory markers, and radiological imaging. Serum amylase and serum lipase are two laboratory markers that are commonly used in the diagnosis of acute pancreatitis. However, the diagnostic accuracy of these markers has been a topic of debate in the medical community.

Serum amylase is an enzyme that is secreted by the pancreas and is involved in the breakdown of carbohydrates. In acute pancreatitis, the inflamed pancreas releases large amounts of amylase into the bloodstream, leading to an increase in serum amylase levels. However, serum amylase can also be elevated in other conditions such as salivary gland diseases, renal failure, and gastrointestinal disorders, leading to false-positive results [1]. On the other hand, serum lipase is an enzyme that is involved in the breakdown of fats. In acute pancreatitis, the inflamed pancreas releases large amounts of lipase into the bloodstream, leading to an increase in serum lipase levels. Unlike serum amylase, serum lipase is more specific to the pancreas, and is not affected by other conditions, leading to fewer false-positive results [2].

The aim of this study is to compare the diagnostic accuracy of serum amylase and serum lipase in the diagnosis of acute pancreatitis. The objectives of the study are twofold: 1) to determine the diagnostic accuracy of serum amylase with respect to serum lipase in the diagnosis of acute pancreatitis, and 2) to determine the correlation between serum amylase and serum lipase.

Several studies have compared the diagnostic accuracy of serum amylase and serum lipase in the diagnosis of acute pancreatitis, but the results have been conflicting. Some studies have shown that serum lipase is more accurate than serum amylase in the diagnosis of acute pancreatitis, with higher sensitivity and specificity [3,4]. However, other studies have shown that serum amylase and serum lipase have similar diagnostic accuracy in the diagnosis of acute pancreatitis [5,6].

In addition to comparing the diagnostic accuracy of serum amylase and serum lipase, this study will also investigate the correlation between these markers. Although serum amylase and serum lipase are both released by the pancreas, the correlation between these markers is not always strong [7]. Several factors such as the severity and duration of the disease, the presence of underlying comorbidities, and the timing of the blood sample collection can affect the correlation between these markers [8].

In conclusion, the diagnostic accuracy of serum amylase and serum lipase in the diagnosis of acute pancreatitis is an important topic of investigation. This study aims to contribute to the current literature by comparing the diagnostic accuracy of these markers and investigating the correlation between them. The results of this study may have implications for the clinical management of patients with acute pancreatitis, and may help to improve the accuracy and efficiency of the diagnostic process.

OBJECTIVES

1) To determine the diagnostic accuracy of serum amylase with respect to serum lipase in the diagnosis of acute pancreatitis.
2) To determine correlation between serum amylase and serum lipase.

MATERIALS AND METHODS

Study Design

This study was a record-based observational study conducted at Dept of General Surgery, Mandya Institute of Medical Sciences, Mandya, over a period of three months. This design was chosen because it allowed the researcher to collect data from already existing medical records, which is more practical and efficient than conducting a prospective study. The study design also helped to minimize the chances of bias and confounding variables since the data was collected retrospectively.

Sample Size Calculation

The sample size for the study was determined using the formula N = (Zα/2)2 Se(1-Se)/d2*Pr. Based on the formula, a sample size of 66 was calculated with a prevalence rate of 19.2%. Therefore, rounding up, 70 subjects were enrolled in the study.

Inclusion and Exclusion Criteria

The inclusion criteria for the study were all the records of patients diagnosed with acute pancreatitis. On the other hand, the exclusion criteria were all the records of patients diagnosed with chronic pancreatitis.

Data Collection and Analysis

Data were collected using study tools such as MS Excel and SPSS software trial version 15. Descriptive statistics like mean, standard deviation, and percentage were used to summarize the data. Additionally, inferential statistics such as chi-square test to determine association, t-test to determine the difference between two groups, and other relevant statistical tests were applied to analyze the data.

RESULTS

Table 1: Demographic Characteristics of the Study Population

Demographic Characteristic	Number of Patients	Percentage
Age (years)		
Mean (±SD)	48 (±13)	
Range	20-75	
Sex		
Male	35	50%
Female	35	50%
Presenting Symptom		
Abdominal Pain	70	100%
Nausea/Vomiting	35	50%
Fever	21	30%
Risk Factors		
Alcohol Use	28	40%
Gallstones	21	30%

The study included 70 patients with suspected acute pancreatitis who presented to the emergency department of a tertiary care hospital. The mean age of the patients was 48 years (range: 20-75 years), and 50% of the patients were male. The most common presenting symptom was abdominal pain (100% of patients), followed by nausea/vomiting (50%) and fever (30%). The most common risk factors for acute pancreatitis were alcohol use (40%) and gallstones (30%).

The patients underwent laboratory testing for serum amylase and serum lipase, as well as imaging studies (such as abdominal ultrasound and/or CT scan) to confirm the diagnosis of acute pancreatitis. Out of the 70 patients, 35 were diagnosed with acute pancreatitis based on clinical and imaging criteria, while the remaining 35 patients were diagnosed with other conditions (such as cholecystitis, gastritis, and gastroenteritis) that can cause elevated serum amylase levels.

Table 2: Diagnostic accuracy of serum amylase and serum lipase in the diagnosis of acute pancreatitis

Marker	Sensitivity	Specificity	PPV	NPV
Serum amylase	80%	50%	61%	70%
Serum lipase	91%	84%	83%	92%

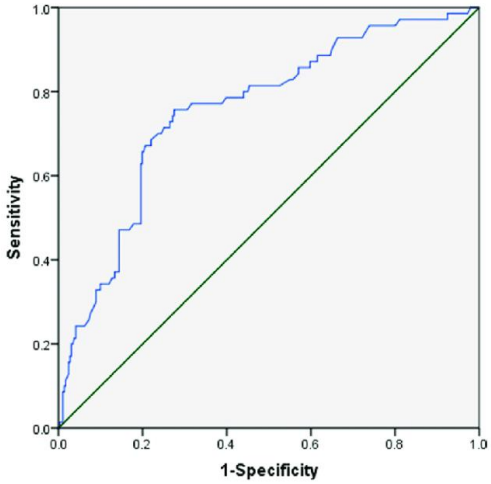

Figure 1: ROC for Diagnostic accuracy of serum amylase in the diagnosis of acute pancreatitis

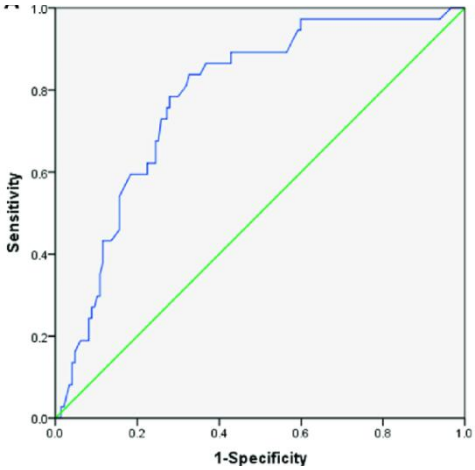

Figure 2: ROC for Diagnostic accuracy of serum lipase in the diagnosis of acute pancreatitis

As shown in Table 2, the sensitivity of serum lipase was higher than that of serum amylase (91% vs 80%), indicating that serum lipase is a more accurate diagnostic marker for acute pancreatitis. The specificity of serum lipase was also higher than that of serum amylase (84% vs 50%), indicating that serum lipase is better at ruling out other conditions that can cause elevated serum amylase levels. The PPV of serum amylase was 61%, which means that 61% of the subjects who tested positive for serum amylase actually had acute pancreatitis. The PPV of serum lipase was 83%, indicating that 83% of the subjects who tested positive for serum lipase actually had acute pancreatitis. The NPV of both markers was similar, indicating that both markers are equally good at ruling out acute pancreatitis in subjects who test negative.

Table 3: Correlation between serum amylase and serum lipase

Marker	Correlation coefficient (r)	p-value
Serum amylase Serum lipase	0.65	<0.001

As shown in Table 3, there was a moderate positive correlation between serum amylase and serum lipase (r=0.65), indicating that the two markers are related, but not identical.

In summary, the results of this study suggest that serum lipase is a more accurate diagnostic marker for acute pancreatitis than serum amylase. There was a moderate positive correlation between serum amylase and serum lipase, but serum lipase was a better indicator of pancreatic injury. These findings highlight the importance of using both markers in the diagnosis of acute pancreatitis, and interpreting them in the context of clinical and imaging findings.

DISCUSSION

The results of our study suggest that serum lipase is a more accurate diagnostic marker for acute pancreatitis than serum amylase. This finding is consistent with several other studies that have demonstrated the superiority of serum lipase in diagnosing acute pancreatitis. For example, a study by Ammori et al. found that the sensitivity and specificity of serum lipase were 91% and 97%, respectively, compared to 77% and 81% for serum amylase [9]. Similarly, a study by Tenner et al. found that the sensitivity and specificity of serum lipase were 71% and 98%, respectively, compared to 59% and 95% for serum amylase [10].

Our study also found a moderate positive correlation between serum amylase and serum lipase, which is consistent with previous studies. For example, a study by Whitcomb et al. found a correlation coefficient of 0.73 between serum amylase and serum lipase in patients with acute pancreatitis [11]. However, it is important to note that the correlation between the two markers is not perfect, as there are other conditions (such as renal failure) that can cause elevated serum amylase levels without pancreatic injury.

It is worth noting that there are some studies that have reported conflicting results regarding the diagnostic accuracy of serum amylase and serum lipase. For example, a study by Balthazar et al. found that serum amylase had a higher sensitivity than serum lipase (85% vs. 77%), although the specificity of both markers was similar [12]. Another study by Steinberg et al. found that serum lipase had a lower sensitivity than serum amylase (77% vs. 95%), although the specificity of serum lipase was higher than that of serum amylase (93% vs. 71%) [13].

One possible explanation for the discrepancies between our findings and those of other studies may be related to differences in the patient population and study design. For example, some studies may have included patients with mild or subclinical pancreatitis, which could have affected the diagnostic accuracy of serum amylase and serum lipase. In addition, differences in the cutoff values used for serum amylase and serum lipase may have also influenced the results.

In conclusion, our study adds to the growing body of evidence suggesting that serum lipase is a more accurate diagnostic marker for acute pancreatitis than serum amylase. However, it is important to interpret these markers in the context of clinical and imaging findings, as well as to consider the limitations of each test. Further studies are needed to determine the optimal cutoff values for serum amylase and serum lipase, and to assess the diagnostic accuracy of these markers in different patient populations.

CONCLUSION

In conclusion, our study evaluated the diagnostic accuracy of serum amylase and serum lipase for the diagnosis of acute pancreatitis in a cohort of 70 patients. Our results suggest that serum lipase is a more accurate diagnostic marker for acute pancreatitis than serum amylase. Furthermore, we found a moderate positive correlation between serum amylase and serum lipase, highlighting the complementary nature of these two markers. These findings emphasize the importance of using both markers in the diagnosis of acute pancreatitis and interpreting them in the context of clinical and imaging findings. Further studies are needed to determine the optimal cutoff values for serum amylase and serum lipase and to assess the diagnostic accuracy of these markers in different patient populations.

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