Correlation of Serum Lipase Level and APACHE II Score in Predicting Outcomes in Patients with Acute Pancreatitis in Western Nepal

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ABSTRACT

Background: Acute pancreatitis (AP) is a disease with highly variable outcomes and high mortality rate. There are various sets of scoring systems and biomarkers to make prediction of its outcomes, but they have some drawbacks. This encouraged us to study on simple tests which would help in making diagnosis as well as act as an indicator of the outcomes in a patient with AP. The aim of this study is to correlate noble scoring system like Acute physiology and chronic health evaluation II (APACHE II) with serum lipase level in predicting outcomes in a patient with AP.

Methods: Hospital based prospective descriptive study was done. The comparison of APACHE II score and Serum lipase level to predict the outcomes in terms of complications, length of hospital stay and in hospital mortality in AP was done using Pearson's correlation, chi square test, Fischer's exact test.

Results: Of 90 patients, 37.78% had severe disease and 4.4 % died. APACHE II score had statistically significant correlation and association with length of hospital stay, complication and in hospital mortality (i. e. $p<0.05$). Serum lipase had no statistically significant correlation and association with Length of hospital stay ($p=0.792$), complications($p=0.379$) and in hospital mortality($p=0.597$).

Conclusion: APACHE II can be used to predict the outcomes in the patients with AP. Serum lipase level cannot be used as a predictor of outcomes in AP although it is one of the noble biomarkers and for the diagnosis of AP and easily available in most of the health care centers.

Keywords: *acute pancreatitis; APACHE II score; outcome prediction; serum lipase*.

INTRODUCTION

Acute pancreatitis (AP) is a pancreatic parenchymal inflammation with widely varying consequences. In moderate cases, mortality is modest, however in severe cases, mortality is high.[1,2] The prevalence of acute pancreatitis is 34% and 25% of acute pancreatitis develops to severe acute pancreatitis.[3] Severity of AP has been categorized into mild, moderately severe and severe AP. This is based on the presence or absence of local complications and organ failure.[2,3] Severity can be predicted using a variety of techniques, including scoring systems and biochemical tests. The biochemical tests include measuring the levels of acute inflammation indicators such carbohydrate reactive protein (CRP), interleuin-6 (IL-6), and monocyte chemotactic protein-1 (MCP-1), as well as pancreatic enzymes such as serum amylase, lipase, and trypsinogen levels.[4-7] The APACHE II score was originally developed for patients in order to help calculate a score for the appropriate adjustments and interventions. [6]Many studies has been done correlating various scoring systems and laboratory markers for diagnosis and predicting the outcomes of patients with acute pancreatitis. However, no study has been done correlating serum lipase level and APACHE II score. Only a laboratory marker like serum lipase would be considered for predicting the outcomes in a case of acute pancreatitis. Knowing which patient will have severe pancreatitis could allow earlier triage to an intermediate care or intensive care unit and earlier initiation of effective therapy. We conducted this study to identify the correlation between serum lipase level and APACHE II Score in predicting outcomes in patients with acute pancreatitis.

METHOD

This cross-sectional study was conducted in the department of General Surgery, Manipal College of Medical Sciences, Pokhara from May 2024 to October 2024 only after the approval from the institutional review board.

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Sample size was calculated using standardized formula i.e.

Sample size (n)=Z 2*P*Q/e2

Z= reliability coefficient=1.96(at confidence interval 95%)

Where P= Prevalence = 34% .9

Q=1-P

e=margin of error=10%

Here sample size (n) =86.2

Minimum sample size=87

So, the data was collected from the 90 patients diagnosed with Acute Pancreatitis (AP) who met the inclusion criteria, for which written and informed consent was obtained from all cases . Whereas patient age <18 years ,patient who refused to give consent for study and refused the investigations required for APACHE II scoring were excluded from the study.

Diagnosis of acute pancreatitis, its severity, and local and systemic complications were defined as per the Revised Atlanta Classification 2012. The outcomes variables of AP in this study were length of hospital stay (LOS), in hospital mortality and presence of local and systemic complications. APACHE II was calculated using data from the 24 h after admission and serum lipase level was measured at the time of admission. Patients with APACHE- II score upto 8 are considered having mild to moderate disease and the score > 8 are considered having severe disease. Similarly, serum lipase level 600 or less are considered low and more than 600 are considered to be high.[10,11] The collected data was analyzed using of SPSS (Statistical Package for Social Science) Software; Version 25.0. The correlation was measured using Pearson's correlation coefficient for continuous variables whereas chi-square test and Fisher's Exact Test was applied to determine the association between categorical variables. A p value of <0.05 was taken as statistically significant.

RESULTS

Out of 90 cases patient's mean age was 47.86 + 17.1 (Range18 years to 83 years). The most common age group was 60+ years, i.e.,24 (26.7%) followed by 31-40 years, i.e., 19 (21.1%) with 53(58.89%) males and 37(41.11%) females. The etiologies of AP included biliary (43.3%), alcoholic (35.6%), idiopathic (16.7%), hypertriglyceridemia (3.4%), post-ERCP (1.12%). Most of the patient had mild AP (47.78%), followed by severe AP (37.78%) and moderate AP (14.44%). Thirty patients (33.3%) included in the study had at least one chronic disease. Most common was Hypertension (HTN) (11.1 %) followed by Diabetes mellitus Type II (DM II) (7.8%). The mean LOS was 4.8 + 2.63. LOS > 5 was considered as longer length of hospital stay. The Pearson product correlation of APACHE II score and LOS was found to be positive and statistically significant (r=0.342,p<0.01) (Table 1).

Table 1.Correlation of APACHE II score and LOS. (n=90)

Variables	APACHEII score	Length of hospital stay
APACHEII score		
Pearson Correlation	1	0.342**
p-value		0.001
Length of hospital stay		
Pearson Correlation	0.342**	1
p-value	0.001	
**. Correlation is significant at the 0.01 level (2-tailed).		

The Pearson product correlation of serum lipase level and length of hospital stay was found to be negative and statistically not significant (r=0.028, p>0.05 i.e. 0.792) (Table 2).

Table 2. Correlation of serum lipase level with LOS. (n=90)

Variables	Serum lipase	Length of hospital stay
Serum lipase		
Pearson Correlation	1	0.028
p-value		0.792
Length of hospital stay		
Pearson Correlation	0.028	1
p-value	0.792	

There was a statistically significant association between APACHE II score and the severity of acute pancreatitis (p<0.05) but no statically significant association between serum lipase level and severity of acute pancreatitis (p=0.34).Out of 90 patients, 2 pa-

tients with APACHEII score upto 8 developed SAP whereas 32 patients with APACHEII score developed SAP (Table 3).

Table 3. APACHEII score and Serum lipase level with Severity of AP. (n=90)

Variables	Mild AP	Moderate AP	Severe AP
APACHEII Score upto 8	41	6	2
APACHEII score>8	2	7	32
Serum lipase level upto 600	8	1	9
Serum lipase level>600	35	12	25

There was a statistically significant association between APACHE II score and the complications of acute pancreatitis (p<0.01) but no statically significant association between serum lipase level and complications of acute pancreatitis (p=0.379) (Table 4).

Table 4. APACHE II score and serum lipase level with complications. (n=90)

Variables	Value	df	p-value	p-value
APACHE II Score				
Pearson chi-square	14.907[a]	1	<0.001	
Continuity correction	13.116	1	<0.001	
Likelihood Ratio	15.471	1	<0.001	
Fisher's Exact test				<0.001
SERUM LIPASE				
Pearson chi-square	1.151[a]	1		
Continuity correction	600	1		
Likelihood Ratio	1.241	1		
Fisher's Exact test				0.379

There was a significant association between APACHE II score and in hospital mortality of acute pancreatitis (p<0.05) but there is an insignificant association between serum lipase level and in hospital mortality of acute pancreatitis (p=0.597) (Table 5).

DISCUSSION

In this study comparison was done between the APACHE II scoring system and Serum lipase level for prediction of outcomes in terms of LOS, development of early complications and in hospital mortality in acute pancreatitis. It was found that APACHEII score can predict the outcomes in patients with acute pancreatitis but serum lipase level was not useful in predicting the outcomes. In this study, 37.78% of patients had SAP and the overall mortality was

Table 5. APACHEII score and Serum lipase level by hospital mortality. (n=90)

Variables	Value	df	p-value	p-value
APACHE II Score				
Pearson chi-square	5.003[a]	1	0.025	
Continuity correction	2.969	1	0.085	
Likelihood Ratio	6.513	1	0.011	
Fisher's Exact test				0.04
SERUM LIPASE				
Pearson chi-square	0.065[a]	1	0.798	
Continuity correction	0	1	1	
Likelihood Ratio	0.062	1	0.803	
Fisher's Exact test				0.597

4.4%. The proportion of patients with severe disease and mortality in this study was lower as compared to a comparative study by Khanna et al. in which the mortality and proportion of severe disease were 12.5% and 43.1% respectively.[12] Most of the patients in this study had mild AP which could explain the lower mortality in comparison to previous studies.[12] The most common etiology of AP was found to be gallstones (43.33%) followed by alcohol (35.6%), idiopathic (16.7%), hypertriglyceridemia (3.4%) and post ERCP (1.12%). This was comparable to the results done by various previous studies.[10-15] The mortality rate in this study was 4.4% and all these cases had the APACHEII score >8 which depicts the severe disease. The mortality rate in low APACHEII (score upto 8) group and high APACHEII(score>8) group were 0% and 8.1% respectively. This result was comparable with many previous studies that have correlated a higher APACHE-II score with a higher mortality (<4% with an APACHE-II <8 and 11–18% with an APACHEII >8).[16-18] Hence, mortality could be predicted by higher APACHEII score in the patients with AP. In this study, the correlation of APACHEII score and length of hospital stay, mortality, complications and severity was found to be statistically significant (p<0.01). These results were comparable with some previous studies. Papachristou et al. concluded that APACHEII score could predict the severity of AP, pancreatic necrosis and mortality with sensitivity of 70.3,63.3 and 100 respectively at 95% CI.[19,20] Hence, APACHEII score could be

considered as one of the good scoring systems to predict the severity and outcomes early in a patient with AP. The correlation of serum lipase level with LOS and its association with in hospital mortality, complications and severity of disease was found to

be statistically insignificant, which is in contrast with the study carried out by Kim et al.[21] and Coffey et al.[22] (i.e serum lipase level is associated with severity of disease) and in line with the study carried out by Hedstrom et al. [23] In another study done by Saxena

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