



A PROSPECTIVE OBSERVATIONAL STUDY :ATHEROGENIC INDEX OF PLASMA AS A POTENTIAL BIOMARKER FOR SEVERE ACUTE PANCREATITIS

General Surgery

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KEYWORDS

INTRODUCTION

- ✓ Acute pancreatitis is a common and challenging disease that can develop both local and systemic complications.
- ✓ Its hall-mark is acute pancreatic inflammation associated with little or no fibrosis.
- ✓ It ranges from a mild self-limiting inflammation of the pancreas to critical disease characterized by infected pancreatic necrosis, multiple organ failure and a high risk of mortality
- ✓ Accurately predicting acute pancreatitis severity is important in making triage decisions about whether a patient should be transferred to a tertiary hospital, or admitted to an intensive care unit, and in making decisions about fluid therapy.
- ✓ There is a long history of attempts to find prognostic or predictive markers that accurately stratify the risk, with the most widely used being the Ranson's criteria or modified Glasgow criteria. Both use clinical and biochemical parameters scored over the first 48 hours of admission
- ✓ There are many other approaches to predicting severity. At 24 hours after admission an APACHE II score of 8 or more or a serum C-reactive protein level of $>150\text{mg/dl}$ has a similar accuracy in predicting severity as Ranson's criteria
- ✓ The more recently proposed Bedside Index for Severity of Acute Pancreatitis (BISAP) is calculated from blood urea nitrogen ($>25\text{ mg/dl}$), impaired mental status (GCS <15), presence of systemic inflammatory response syndrome (SIRS), age >60 years, and pleural effusion
- ✓ The atherogenic index of plasma(AIP) reflects the TG and HDL levels calculated as $\log(\text{TG}/\text{HDL})$.
- ✓ AIP is a biomarker for dyslipidemia ,metabolic syndrome , coronary syndrome.
- ✓ Low HDL level and elevated TG level is a well known risk factor for persistent organ failure in acute pancreatitis.
- ✓ Since there is a close relationship between impaired lipid metabolism and severity of pancreatitis ,AIP may be a predictor .

AIMS AND OBJECTIVES

- Relationship between the AIP and the severity of AP remains unknown.
- Therefore, we determined the relationship between the AIP and the severity of AP and evaluated the predictive ability of the AIP for the severity of AP compared with other scoring systems.

MATERIALS AND METHODS

- Study Design: Prospective observational study.
- Study Location: MVJ Medical College and Research Hospital.
- Study Duration: 24 months, March 2024 to February 2026.
- Sample Size: 250
- Written informed consent was obtained from all the patients .

Data Collection

- Clinical and blood samples were obtained from patients diagnosed with acute pancreatitis Hemoglobin, hematocrit, white blood cell (WBC) count, blood urea nitrogen, creatinine, lactate dehydrogenase, aspartate aminotransferase, CRP, amylase, and lipase were recorded at the time of admission.
- Abdominal computed tomography (CT) scans were performed to diagnose AP and differentiate AP from other diseases. Once AP was diagnosed, the TG and HDL levels were measured as soon as possible.
- Additionally, scoring systems such as the Ranson score, BISAP, and CTSI were calculated. The AIP was defined as $\log(\text{TG}/\text{HDL})$.
- The severity of AP was evaluated according to the 2012 revised Atlanta classification and recorded as mild, moderately severe, or severe AP [4]. Mild AP is defined by the absence of OF and local or

systemic complications. Moderately severe AP is described as transient OF that resolves within 48 h.

- SAP is described as persistent OF.
- Non-SAP included mild AP and moderately severe AP.

Inclusion Criteria

- (1) upper abdominal pain
- (2) serum amylase and/or lipase ≥ 3 times the upper normal limit
- (3) characteristic imaging on a radiological study.

The etiology of AP included gallstones, alcohol consumption, and high TG

Exclusion Criteria

- (1) Age <18 years old
- (2) Idiopathic pancreatitis
- (3) Patients with incomplete lipid profile data
- (4) Chronic pancreatitis,
- (5) Recurrent pancreatitis.

RESULTS

- BASELINE CHARACTERISTICS OF PATIENTS:
- The study included 85 patients with acute pancreatitis based on the diagnostic criteria . Table 1 describes the participants characteristics. The mean age was 54.4 ± 18.7 and 58 patients were male and 27 female respectively. The causes of acute pancreatitis was gallstone ,alcohol consumption, hypertriglyceridemia in 40 patients,34 patients & 11 patients respectively.
- According to the revised Atlanta classification ,acute pancreatitis was mild, moderate, severe in 47 patients ,29 patients & 9 patients respectively in this study.
- Ranson's score, BISAP was higher in severe acute pancreatitis (SAP) group. The number of ICU admissions, mortality, and length of hospital stay was higher in the SAP group.
- Similarly the Atherogenic Index of plasma(AIP) was significantly higher in the SAP group.
- AIP and Scoring systems for predicting SAP
- The area under the curve(AUC) of various scoring systems and AIP was calculated for predicting SAP.(Table 2)
- The AUC of AIP for prediction of SAP was 0.812. The AIP was positively correlated with CRP,BMI,WBC and Atlanta classification.

| VARIABLE | TOTAL PATIENTS | SAP | NON -SAP | p Value |
|-----------------------------------|----------------|-----------|------------|---------|
| Gender (M:F) | 85(58:27) | 9(6:3) | 74(52:24) | 0.213 |
| Age (years) | 54.4±18.7 | 55.8±19.5 | 53.4±18.1 | 0.453 |
| Aetiologies | | | | 0.172 |
| • Gallstone | 40(47.05%) | 4(44.4%) | 36(48.6%) | |
| • Alcohol | 34(40%) | 3(33.3%) | 31(41.89%) | |
| • Hypertriglyceridemia | 11(12.9%) | 2(22.2%) | 9(12.15) | |
| • Smoking | 38(44.7%) | 8(21.05%) | 30(78%) | 0.521 |
| BMI | 24.8±3.8 | 26.8±3.1 | 23.8±3.7 | 0.212 |
| Atlanta Classification | | | | |
| • Mild | 47(55.2%) | | | |
| • Moderate | 29(34.11%) | | | |
| • Severe | 9(10.58%) | | | |
| Ransons | 2.8±1.8 | 4.8±1.7 | 2.2±1.3 | <0.001 |
| BISAP | 1.2±1.3 | 3.2±1.8 | 1.9±1.1 | <0.001 |
| Mortality | 4(4.7%) | 3(3.5%) | 1(1.2%) | <0.001 |
| Lab findings | | | | |
| • CRP(mg/dl) | 4.1±5.1 | 6.2±5.1 | 3.7±6.1 | 0.321 |
| • HDL(mg/dl) | 30.4±19.5 | 33±19.5 | 39.4±17.5 | 0.182 |
| • TG LEVELS(mg/dl) | 280±543 | 350±520 | 260±442 | 0.084 |
| ATHEROGENIC INDEX OF PLASMA (AIP) | 0.7±0.6 | 0.7±0.6 | 0.7±0.6 | <0.001 |

- Area under the curve for predicting SAP

| Variable | AUC | Standard Error | p- value |
|----------|-------|----------------|----------|
| AIP | 0.812 | 0.053 | <0.001 |
| TG | 0.543 | 0.049 | 0.004 |
| HDL | 0.412 | 0.056 | 0.031 |

| | | | |
|----------------|-------|-------|--------|
| RANSON'S SCORE | 0.723 | 0.035 | <0.001 |
| BISAP | 0.889 | 0.042 | <0.001 |

DISCUSSION

- In this study we correlated the relationship between AIP and severity of Acute Pancreatitis
- It was found that AIP was higher in patients with severe AP compared to patients with mild and moderate level of severity.
- It was also seen that AIP is positively correlated with the Revised Atlanta classification.
- It was analysed that AIP was an independent predictor for severe acute pancreatitis when compared to HDL and TG levels independently.
- Very few studies have been carried out to explore the relationship between AIP and Acute Pancreatitis.
- Hence the study suggests that AIP may be a simple biomarker for predicting the severity of acute pancreatitis.

Study Limitations

- ✓ The number of cases were from a small population
- ✓ Study was conducted at a single institution
- ✓ We cannot determine the cause and effect relationship effect because of the study design.
- ✓ Inflammatory markers such as Tumor necrosis factor and interleukin6 were not measured.

CONCLUSION

- In this study ,atherogenic index of the plasma is significantly associated with the severity of acute pancreatitis.
- Impaired lipid metabolism has positive correlation with the severity of acute pancreatitis.
- Since the parameters are easily available and can be tested at all centre ,it can be easily employed in our clinical practice for all diagnosed case of acute pancreatitis.

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