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BISAP Scoring System in Predicting Severity and Outcome in Acute Pancreatitis: A Prospective Study

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Abstract

Acute pancreatitis is a leading emergency admission worldwide and is associated with substantial morbidity and mortality. Early risk stratification is critical to guiding therapeutic interventions. This study evaluated the Bedside Index for Severity in Acute Pancreatitis (BISAP) score, a simple clinical tool, in predicting severity, organ failure, and in-hospital mortality among patients within 24 hours of presentation. Eighty consecutive patients admitted to a tertiary care center were prospectively assessed, and BISAP was calculated for each. Outcomes measured included severity (organ failure, necrotizing pancreatitis), duration of hospitalization, and mortality. BISAP ≥ 3 predicted severe disease, with higher scores strongly associated with necrotizing pancreatitis and death. BISAP enables early risk stratification, potentially improving patient outcomes through appropriate triage and management.

Keywords: *Acute Pancreatitis, BISAP, Morbidity.*

Introduction

Acute pancreatitis remains one of the most frequent reasons for emergency hospitalization and presents significant challenges to healthcare providers. Worldwide, incidence rates range from 5 to 80 per 100,000, with mortality for severe cases reaching 10-25% despite advances in critical care. The ability to identify high-risk patients early is essential for optimal management and favorable outcomes.

Traditional risk stratification tools–Ranson's criteria and APACHE-II–require 48 hours for calculation and include cumbersome biochemical evaluations. A newer tool, the BISAP score (Bedside Index for Severity in Acute Pancreatitis), uses five simple variables available at admission. This study aims to validate BISAP in a South Indian tertiary center, focusing on its role in predicting severity, organ failure, and in-hospital mortality within the first 24 hours of admission.

Materials and Methods

Study Design and Setting

A prospective observational study for a period of one year in the general surgery department I a tertiary care hospital. Approval was obtained from the institutional review board, and informed consent was secured from each patient.

Inclusion and Exclusion Criteria

Included were all adults (≥18 years) admitted with a confirmed or suspected diagnosis of acute pancreatitis, as defined by at least two of the following:

- Acute abdominal pain consistent with pancreatitis
- Serum amylase or lipase ≥3 times the upper normal limit
- Imaging evidence (ultrasound or contrast-enhanced CT) of acute pancreatitis

Excluded were individuals unwilling to participate and those with incomplete clinical data.

Data Collection

Demographic data, clinical history, examination findings, laboratory, and radiological data were collected. Each patient's BISAP score (range 0–5) was calculated within 24 hours, with the following parameters:

- Blood urea nitrogen (BUN) >25 mg/dL
- Impaired mental status (Glasgow Coma Scale <15)
- Systemic Inflammatory Response Syndrome (SIRS)
- Age >60 years
- Presence of pleural effusion

Severity of pancreatitis was classified as:

- Mild: Interstitial edematous pancreatitis, no local or systemic complications
- Severe: Presence of persistent organ failure, necrosis, abscess, or pseudocyst (Atlanta criteria)

Outcome Measures
- Duration of hospitalization
- Development of organ failure or necrotizing pancreatitis
- Requirement for ICU care or surgical intervention
- In-hospital mortality

Statistical Analysis
Descriptive statistics were used for demographic and clinical data. Association between BISAP scores and adverse outcomes was tested using chi-square and t-tests, setting significance at $p<0.05$. Sensitivity, specificity, and predictive values of BISAP ≥ 3 for severe disease were determined.

Results

Study Population
Eighty patients were enrolled, most commonly males (69, 86.25%) and predominantly in the 30–40-year age group (38, 47.5%). There was a marked prevalence among lower socioeconomic strata (67.5%) and those with a history of alcoholism (82.5%) or smoking (62.5%).

Clinical Presentation
- Majority presented within 7 days of symptom onset (60%)
- 46.25% had a prior episode of pancreatitis
- Presenting features included abdominal pain, vomiting, and clinical signs consistent with SIRS or local complications

BISAP Score Distribution

BISAP Score	Number of Patients (%)
<3	58 (72.5%)
≥3	22 (27.5%)

Elevated BUN, SIRS, impaired mental status, age over 60, and pleural effusion were all significantly associated with higher BISAP scores and adverse outcomes.

Risk of Severe Outcomes
Of the 22 patients with BISAP ≥ 3:

- All developed severe pancreatitis
- 11 (13.75%) developed necrotizing pancreatitis
- 3 (3.75%) died (all had BISAP of 5)

BISAP ≥ 3 was thus strongly predictive for severity, organ failure, and death.

Management
- Conservative management: 67 patients (83.75%)
- Drainage procedure for pancreatic abscess: 3 patients (3.75%)
- Necrosectomy for extensive necrosis: 3 patients (3.75%)
- Laparoscopic cholecystectomy for gallstone pancreatitis: 5 patients (6.25%); ERCP plus cholecystectomy: 2 patients (2.5%)

Patients with higher BISAP scores required more intensive interventions and ICU care.

Discussion

Demographics and Etiology
This cohort demonstrated a male preponderance, a peak in young adults (30-40 years), and strong links to alcohol abuse and smoking, congruent with global epidemiology. Most patients in lower socioeconomic groups reflected healthcare access and risk behavior trends.

BISAP Scoring Utility
BISAP's value lies in its simplicity—five readily available variables assessed within 24 hours. In this series, BISAP scores of 3 or higher correlated closely with the future development of severe acute pancreatitis, organ failure, necrotizing changes, and were highly predictive of mortality. These findings are consistent with international studies validating BISAP as a robust early predictor for triage and care escalation.

Comparison with Previous Systems
Unlike Ranson and APACHE-II, which require 48-hour reassessment and multiple investigations, BISAP can be completed on day one and identifies those most at risk of deterioration before complications manifest. The current data also demonstrate significant sensitivity and high negative predictive value for BISAP < 3 (none of the patients with BISAP < 3 developed organ failure or died).

Clinical Implications
Early identification of high-risk patients allows prompt ICU admission, aggressive resuscitation, and surgical or endoscopic interventions where indicated. Notably, conservative management was successful in most cases, but surgery and advanced procedures were essential in severe and complicated presentations.

Limitations

- Single center, moderate sample size
- No blinding, some bias potential in outcome ascertainment
- Limited follow-up beyond hospital discharge

Further research should focus on multicentric validation and integrating BISAP into regional clinical pathways.

Conclusion

The BISAP score is a reliable, simple tool for early risk stratification in acute pancreatitis. Scores of 3 or higher at admission predict severe disease, organ failure, and mortality with high sensitivity. Implementing BISAP in routine clinical practice can streamline triage and management, improving outcomes through targeted care escalation.

Declaration

Ethical Approval and Consent to participate

Ethical approval and informed consent obtained

Consent for publication

Obtained from all authors

Availability of supporting data

Available with the primary author

Competing interests

Funding Statement

Authors' contributions

Elilnambi: Conceptualization, Methodology Data curation, Formal analysis, Visualization, Writing – original draft
Mohanapriya Thyagarajan: Methodology, Writing – original draft
Nithila: Validation, Writing – review & editing
Sabu Jeyasekaran: Supervision, Project administration, Writing – review & editing
Bala: Supervision, Project administration, Writing – review & editing

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