International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Comparison Of BISAP and Ranson's Scores in Predicting Severity of Acute Pancreatitis: A Prospective Observational Study

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Received: 02-05-2026
Accepted: 24-05-2026
Available online: 10-06-2026

ABSTRACT

Background Acute pancreatitis is a common gastrointestinal emergency with a clinical spectrum ranging from mild self-limiting disease to severe pancreatitis associated with significant morbidity and mortality. Early identification of patients at risk of severe disease is crucial for timely intervention and optimal utilization of healthcare resources. This study aimed to compare the predictive performance of the Bedside Index for Severity in Acute Pancreatitis (BISAP) score and Ranson's score in assessing the severity of acute pancreatitis.

Methods This prospective observational study was conducted in the Department of General Surgery, Jorhat Medical College and Hospital, Assam, over one year. Ninety adult patients diagnosed with acute pancreatitis were enrolled. BISAP score was calculated within 24 hours of admission, while Ranson's score was assessed at admission and after 48 hours. Disease severity was classified according to the Revised Atlanta Classification. The predictive performance of both scoring systems was evaluated using sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), diagnostic accuracy, and receiver operating characteristic (ROC) curve analysis.

Results Among the 90 patients studied, gallstone disease was the most common etiology (76.67%), followed by alcohol-related pancreatitis (17.78%). Severe acute pancreatitis occurred in 23 patients (25.56%). A BISAP score ≥3 demonstrated a sensitivity of 91.30%, specificity of 82.09%, and diagnostic accuracy of 84.44% for predicting severe acute pancreatitis. A Ranson's score ≥3 showed a sensitivity of 95.65%, specificity of 79.10%, and diagnostic accuracy of 83.33%. The area under the ROC curve was 0.9552 (95% CI: 0.8948–1.0000) for BISAP and 0.9841 (95% CI: 0.9476–1.0000) for Ranson's score. Both scoring systems showed significant associations with disease severity, ICU admission, and mortality ($p<0.05$).

Conclusion Both BISAP and Ranson's scores demonstrated excellent predictive ability for severe acute pancreatitis. Although Ranson's score showed marginally superior sensitivity and ROC performance, BISAP provided comparable diagnostic accuracy with the advantage of early bedside assessment, making it a practical tool for routine clinical use.

Keywords*: Acute pancreatitis, BISAP score, Ranson's score, Severity prediction, Prognostic assessment.*

INTRODUCTION

Acute pancreatitis (AP) is one of the most common gastrointestinal emergencies encountered in surgical practice and is associated with considerable morbidity and mortality. The global incidence ranges from 13 to 45 cases per 100,000 population annually and continues to rise worldwide. [1,2] Although most patients experience a mild and self-limiting disease course, approximately 20% develop moderately severe or severe acute pancreatitis, which may result in persistent organ

failure, local complications, prolonged hospitalization, and increased mortality.[3] Mortality rates in severe acute pancreatitis may reach 20–40%.[4]

The progression of acute pancreatitis from a localized inflammatory process to systemic disease is mediated by pancreatic autodigestion, release of inflammatory mediators, and development of systemic inflammatory response syndrome (SIRS). Persistent organ failure remains the principal determinant of mortality and adverse outcomes.[3,4] Therefore, early risk stratification is essential for appropriate triage, timely intensive care management, and optimization of healthcare resources.[5]

Several prognostic scoring systems have been developed to predict disease severity and clinical outcomes in acute pancreatitis. Among these, Ranson's score has remained one of the most widely used prognostic tools.[6] However, its clinical applicability is limited by the requirement of multiple laboratory parameters and completion of assessment after 48 hours of admission.

To overcome these limitations, Wu et al. introduced the Bedside Index for Severity in Acute Pancreatitis (BISAP) score in 2008.[7] BISAP is a simple five-point scoring system incorporating blood urea nitrogen level, impaired mental status, presence of SIRS, age greater than 60 years, and pleural effusion. The score can be calculated within the first 24 hours of admission, thereby facilitating early clinical decision-making.

Several studies have demonstrated that BISAP possesses predictive accuracy comparable to more complex scoring systems while offering the advantages of simplicity and rapid bedside application.[8–10] Nevertheless, variations in diagnostic performance have been reported across different populations and healthcare settings. Furthermore, comparative data evaluating BISAP against traditional scoring systems such as Ranson's score remain limited in many regions.

Therefore, the present study was undertaken to compare the performance of BISAP and Ranson's scores in predicting the severity of acute pancreatitis using the Revised Atlanta Classification as the reference standard. In addition, the study evaluated their ability to predict clinically relevant outcomes including ICU admission, duration of hospital stay, and mortality.

MATERIALS AND METHODS

Study Design and Setting

This hospital-based prospective observational study was conducted in the Department of General Surgery, Jorhat Medical College and Hospital, Assam, after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants before enrolment.

Study Population

A total of 90 consecutive adult patients diagnosed with acute pancreatitis were included.

Inclusion Criteria

- Age ≥18 years
- Diagnosis of acute pancreatitis based on at least two of the following:
    - Characteristic abdominal pain suggestive of acute pancreatitis
    - Serum amylase and/or lipase ≥3 times the upper limit of normal
    - Imaging findings consistent with acute pancreatitis

Exclusion Criteria

- Chronic pancreatitis
- Acute-on-chronic pancreatitis
- Previous pancreatic surgery
- Previously treated episodes of acute pancreatitis
- Incomplete clinical or laboratory data

Data Collection

Clinical history, demographic characteristics, laboratory parameters, imaging findings, and outcome measures were recorded using a predesigned proforma.

Baseline investigations included complete blood count, renal and liver function tests, serum electrolytes, serum amylase, serum lipase, arterial blood gas analysis, coagulation profile, and C-reactive protein.
All patients underwent abdominal ultrasonography. Contrast-enhanced computed tomography (CECT) abdomen was performed after 72 hours in patients with severe clinical presentation, suspected complications, diagnostic uncertainty, or failure to improve with conservative management.

Severity Assessment

BISAP Score

BISAP score was calculated within 24 hours of admission using:

- Blood urea nitrogen >25 mg/dL
- Impaired mental status
- Presence of SIRS
- Age >60 years
- Pleural effusion

A score ≥3 was considered predictive of severe acute pancreatitis.

Ranson's Score

Ranson's score was calculated at admission and after 48 hours using standard criteria. A final score ≥3 was considered predictive of severe disease.

Outcome Assessment

Organ failure was assessed using the Modified Marshall Scoring System. Disease severity was classified according to the Revised Atlanta Classification (2012) into:

- Mild acute pancreatitis
- Moderately severe acute pancreatitis
- Severe acute pancreatitis

Outcome Measures

Primary outcome:

- Severity of acute pancreatitis

Secondary outcomes:

- Local complications
- Organ failure
- ICU admission
- Duration of hospital stay
- Mortality

Statistical Analysis

Statistical analysis was performed using SPSS software. Sensitivity, specificity, PPV, NPV, and diagnostic accuracy were calculated. ROC curve analysis was performed, and AUC values were determined. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 90 patients diagnosed with acute pancreatitis were included in the study. The majority of patients belonged to the 41–60 years age group (66.67%), and there was a near-equal sex distribution with 46 males (51.11%) and 44 females (48.89%). Gallstone disease was the most common etiology, accounting for 76.67% of cases, followed by alcohol-related pancreatitis (17.78%) and idiopathic pancreatitis (5.56%) (Table 1).

According to the Revised Atlanta Classification, 41 patients (45.56%) had mild acute pancreatitis, 26 patients (28.89%) had moderately severe acute pancreatitis, and 23 patients (25.56%) had severe acute pancreatitis (Table 2).

Peripancreatic fluid collection was the most frequently observed local complication, occurring in 24 patients (26.67%), followed by pancreatic necrosis in 23 patients (25.56%). Thirty-five patients (38.89%) required intensive care unit admission, and the overall mortality rate was 6.67% (6/90 patients).

Higher BISAP and Ranson scores were associated with worse clinical outcomes. Patients with BISAP score ≥3 or Ranson score ≥3 demonstrated significantly higher rates of ICU admission, prolonged hospital stay, and mortality compared with patients having lower scores (Table 3).

Both scoring systems showed excellent performance in predicting severe acute pancreatitis. A BISAP score ≥3 demonstrated a sensitivity of 91.30%, specificity of 82.09%, positive predictive value of 63.64%, negative predictive value of 96.49%, and overall diagnostic accuracy of 84.44%. Similarly, a Ranson score ≥3 demonstrated a sensitivity of 95.65%, specificity of 79.10%, positive predictive value of 61.11%, negative predictive value of 98.15%, and diagnostic accuracy of 83.33% (Table 4).

Receiver operating characteristic (ROC) curve analysis revealed excellent discriminatory ability for both scoring systems. The area under the curve (AUC) for BISAP was 0.9552 (95% CI: 0.8948–1.0000), whereas the AUC for Ranson's score was 0.9841 (95% CI: 0.9476–1.0000), indicating outstanding predictive performance for severe acute pancreatitis

Table 1. Baseline demographic and etiological characteristics of the study population.

VARIABLE	NUMBER (%)
Male	46 (51.11)
Female	44 (48.89)
Age 18–40 years	1 (1.11)
Age 41–60 years	60 (66.67)
Age >60 years	29 (32.22)
Gallstone pancreatitis	69 (76.67)
Alcohol-related pancreatitis	16 (17.78)
Idiopathic pancreatitis	5(5.56)

Table 2. Severity distribution according to the Revised Atlanta Classification

Severity	Number (%)
Mild	41 (45.56)
Moderately Severe	26 (28.89)
Severe	23 (25.56)

Table 3. Clinical Outcomes According to Severity Score.

Outcome	BISAP <3	BISAP ≥3	Ranson <3	Ranson ≥3
ICU Admission	3	32	1	34
Mortality	1	5	1	5
Mean Hospital Stay (days)	6.32 ± 2.98	13.79 ± 3.43	5.96 ± 2.47	13.69 ± 3.48

Table 4. Diagnostic performance of BISAP and Ranson scores for predicting severe acute pancreatitis.

Parameter	BISAP ≥3	Ranson ≥3
Sensitivity (%)	91.30	95.65
Specificity (%)	82.09	79.10
PPV (%)	63.64	61.11
NPV (%)	96.49	98.15
Diagnostic Accuracy (%)	84.44	83.33
AUC	0.9552	0.9841

DISCUSSION

Early prediction of severe acute pancreatitis is essential for guiding clinical management and improving patient outcomes. In the present study, gallstone disease was the predominant etiology, accounting for 76.67% of cases, followed by alcohol-related pancreatitis. These findings are consistent with previous epidemiological studies reporting gallstones and alcohol as the leading causes of acute pancreatitis worldwide.[1,11]

Severe acute pancreatitis was observed in 25.56% of patients according to the Revised Atlanta Classification. Both BISAP and Ranson scores showed strong associations with disease severity. Patients with scores ≥3 were significantly more likely to develop severe disease, require ICU admission, experience prolonged hospitalization, and suffer mortality. Similar observations have been reported by Papachristou et al., Cho et al., and Khanna et al.[8,13,14]

The diagnostic performance of both scoring systems was excellent. BISAP demonstrated a sensitivity of 91.30% and specificity of 82.09%, while Ranson's score demonstrated a sensitivity of 95.65% and specificity of 79.10%. These findings are comparable to those reported in previous studies and recent meta-analyses evaluating the predictive utility of BISAP and Ranson scores.[12,20]

A notable finding of the present study was the excellent ROC performance of both systems. Although Ranson's score demonstrated a slightly higher AUC, BISAP achieved comparable diagnostic accuracy while allowing assessment within the first 24 hours of admission. This advantage is particularly relevant in resource-limited settings where early clinical decision-making is critical.

The simplicity of BISAP, requiring only five readily available clinical parameters, makes it an attractive bedside tool for early risk stratification. While Ranson's score remains a reliable prognostic instrument, its dependence on a 48-hour evaluation period limits its utility for immediate clinical decision-making.

CONCLUSION

Both BISAP and Ranson's scoring systems demonstrated excellent performance in predicting severe acute pancreatitis and were significantly associated with ICU admission, duration of hospital stay, and mortality. Although Ranson's score showed marginally higher sensitivity and discriminatory ability, BISAP achieved comparable diagnostic accuracy while allowing assessment within the first 24 hours of admission.

Given its simplicity, rapid applicability, and reliable predictive performance, BISAP may serve as an effective bedside tool for early risk stratification and clinical decision-making, particularly in resource-constrained healthcare settings.

LIMITATIONS

This study was conducted at a single tertiary care center with a relatively small sample size, which may limit the generalizability of the findings. The predominance of gallstone-induced pancreatitis may not reflect the etiological profile of other regions. Additionally, long-term outcomes beyond hospital discharge were not evaluated. Larger multicenter studies are required to validate these findings.

ACKNOWLEDGEMENT

The authors express their sincere gratitude to the Department of General Surgery, Jorhat Medical College and Hospital, Assam, for providing the necessary facilities and support for conducting this study. The authors also thank all patients who participated in the study.

ETHICAL APPROVAL

Approval was obtained from the Institutional Ethics Committee of Jorhat Medical College and Hospital. Written informed consent was obtained from all participants.

FUNDING

Nil.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Dr. Dawipayan Deb: Conceptualization, data collection, statistical analysis, manuscript drafting.
Dr. Nayanjyoti Das: Study supervision, methodology, critical review of manuscript.
Dr. Hemendra Chandra Nath: Overall supervision, manuscript revision, final approval.

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