

## ORIGINAL ARTICLE

## BISAP Versus Ranson's scores in predicting the severity of acute pancreatitis.

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**ABSTRACT... Objective:** To determine the diagnostic accuracies of BISAP and RANSON's scores in predicting the severity of acute pancreatitis, taking the Revised Atlanta classification as a gold standard. **Study Design:** Cross-sectional Study Validation study. **Setting:** Department of Emergency and ICU, Mayo Hospital, Multan. **Period:** May 20<sup>th</sup>, 2025, to November 19<sup>th</sup>, 2025. **Methods:** This research included 200 acute pancreatitis (AP) patients of either gender. After informed consent and patient characteristics, all patients received laboratory tests, chest X-ray, USG abdomen, and CT scan to diagnose acute pancreatitis and compute BISAP and RANSON scores. The Revised Atlanta Classification (RAC) determined the AP severity. Severe AP patients with Atlanta, BISAP, and RANSON scores >3 were labeled as True Positive. The diagnostic accuracy of both criteria was determined using a 2x2 table. **Results:** The mean age of the study population was 44.3±15.9 years, comprising 60% females. Biliary etiology was the cause of AP in 72.5% of patients. According to the RAC, 64 patients (32%) had severe AP. Compared to the BISAP criteria, RANSON correctly identified actual positive cases (96.9% vs 68.8%). The overall diagnostic accuracy of the RANSON criteria was better than the BISAP criteria (95% vs 85%). **Conclusion:** The diagnostic accuracy of the RANSON criteria surpassed that of the BISAP score in forecasting the severity of acute pancreatitis, using the Revised Atlanta classification as the gold standard.

**Key words:** Acute Pancreatitis, Atlanta Classification, BISAP Score, Diagnostic Accuracy, Prognosis, Ranson Criteria, Risk Assessment, Severity of Illness Index, Sensitivity and Specificity.

**Article Citation:** Sattar E, Muhammad Y, Khan SA, Ahmad M, Ameen A, Shamim ul Husnain M. BISAP Versus Ranson's scores in predicting the severity of acute pancreatitis. Professional Med J 2026;33 (04):662-666. <https://doi.org/10.29309/TPMJ/2026.33.04.10283>

### INTRODUCTION

Acute pancreatitis (AP) is a common medical condition marked by pancreatic inflammation, which may impact adjacent tissues and various organ systems.<sup>1</sup> Approximately 80% of acute pancreatitis cases are mild and self-limiting, leading to no sequelae.<sup>2</sup> Serious illness occurs in approximately 10–20% of cases, leading to necrosis of parts of the pancreas and surrounding tissues. These individuals experience an initial inflammatory response that progresses to systemic inflammatory response syndrome, resulting in multi-organ failure and death.<sup>3</sup> The death rate for acute pancreatitis (AP) varies between 3% and 10%. In cases of severe AP, the mortality rate increases to 36% to 50%. Additionally, moderate AP can progress to severe AP without appropriate treatment.<sup>4</sup> Early recognition and assessment of AP severity are essential for optimal care. Severe cases can occasionally progress from moderate ones, resulting in high mortality rates. Due to the absence of laboratory or

diagnostic tests, various risk rating methods have been developed to determine the AP.<sup>5</sup>

Various scoring systems have been established to identify severe acute pancreatitis, such as RANSON's, APACHE-II, CTSI, MOSS, and GLASGOW scores.<sup>6</sup> The RANSON score has been utilized for over thirty years. The classification of patients by severity is moderately accurate; however, it necessitates a full 48 hours for completion, potentially missing an essential early therapeutic window.<sup>7</sup> In 2008, Wu and colleagues from the United States introduced the "Bedside Index of Severity in Acute Pancreatitis" (BISAP) score. The score was designed to predict in-hospital mortality and severity of acute pancreatitis within the initial 24 hours of admission. The BISAP score offers an advantage over more complex scoring systems due to the ease of obtaining the necessary data upon admission.

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Article received on:

11/11/2025

Accepted for publication:

24/01/2026



This information can be gathered through physical examination, vital signs, and minimal laboratory tests, along with a chest radiograph to identify pleural effusion.<sup>8</sup>

A study indicated that the BISAP score predicted SAP with an accuracy of 76.2%, while RANSON's score achieved 82.2% accuracy. RANSON scores predicted SAP with greater sensitivity than BISAP scores (97.4% vs 69.2%). Both scores demonstrated comparable predictive ability for SAP in terms of specificity. 78.4% compared to 77.4%.<sup>9</sup> A separate study indicated that the incidence of severe acute pancreatitis (SAP) was 41 cases, representing 32.8%. A BISAP score greater than 3 demonstrated a sensitivity of 63.41%, specificity of 94.05%, and diagnostic accuracy of 84.6% for predicting SAP.<sup>10</sup>

Several Pakistani studies assess the BISAP and Ranson's score in acute pancreatitis, yet findings vary across clinical settings and patient populations. Updated and region-specific validation of the Revised Atlanta Classification is necessary in tertiary care emergency and ICU settings. This study aimed to evaluate the comparative diagnostic accuracy of BISAP and Ranson's scores in the local population. This study aimed to determine the diagnostic accuracies of BISAP and RANSON's scores in predicting the severity of acute pancreatitis, using the Revised Atlanta classification as the gold standard.

## METHODS

After the approval of the institutional ethical review committee and final approval of synopsis from the CPSP (CPSP/RUE/EMD-2021-066-241; dated 19-05-2025), a cross-sectional validation study was conducted at the emergency and ICU department of Mayo Hospital, Lahore, over a period of 6 months (May 20<sup>th</sup>, 2025, to November 19<sup>th</sup>, 2025). Following informed consent, 200 patients were enrolled in the study, exceeding the minimum required sample size of 171. The sample size was determined using the WHO sample size calculator, with an expected sensitivity of 82%<sup>11</sup>, expected specificity of 78.4%<sup>10</sup>, disease prevalence of 32.8%<sup>10</sup>, and a significance level of 5%. The study included patients aged 20 to 70 years, regardless of gender, who

presented with acute pancreatitis within 48 hours. Individuals with a previous diagnosis of pancreatitis, pancreatic cancer, or any other condition leading to hyperamylasemia were excluded from the study.

After approval from the informed, patients fulfilling the study's inclusion criteria were included. The acute pancreatitis was diagnosed based on the presence of abdominal pain, amylase and/or lipase levels at least 3X the upper limit of normal, and a CT finding consistent with AP. The Revised Atlanta Classification (RAC)<sup>12</sup> was used to classify acute pancreatitis into mild (no organ damage, no complication) and severe acute pancreatitis (SAP) (transient organ failure <48 hours ± local or systemic complications). All patients' BISAP levels were calculated using 24-hour data. The BISAP criteria included: age >60 years; altered sensorium; BUN >25 mg/dl; pleural effusion; and systemic inflammatory response syndrome (SIRS). Each variable was given one score, and the total BISAP Score was calculated. A score of more than three was labeled as positive for SAP. The first 48 hours of data determined RANSON's score. The RANSON Criteria were age >55, WBCs > 16,000/mm<sup>3</sup>, RBS > 200 mg/dl, AST > 250 IU/l, and LDH >350. Each criteria received 1 point for the RANSON Score. Positive SAP scores above 3. Patients positive for SAP on the Atlanta classification, BISAP, and RANSON were labelled True Positive. Patients with negative SAP on Atlanta classification but positive on BISAP and RANSON were labelled False positive (FP). Patients negative for SAP on Atlanta classification, BISAP, and RANSON were labelled as True Negative (TN). While patients positive for SAP on the Atlanta classification, but negative on BISAP and RANSON, were labelled as false negatives (FN). Patients with SAP were admitted to the ICU and were managed using standard protocols.

Data were input and analyzed using SPSS version 26. Following descriptive statistics, a 2x2 contingency table was used to compute sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy, using the Revised Atlanta Classification as the gold standard. Effect modifiers, including age, gender, etiology, and comorbidities, will be managed by stratification.

### RESULTS

The study included 200 patients with a mean age of 44.34 ± 15.93 years. Females comprised a higher proportion of the cohort (60.0%) compared to males (40.0%). Biliary etiology was the most common cause of acute pancreatitis, observed in 72.5% of patients. Demographic statistics are described in Table-I. In this study, RANSON positivity was observed in 70 patients (35.0%), and 54 patients (27.0%) were classified as BISAP positive. According to the Revised Atlanta Classification, 64 patients (32.0%) were identified as having severe acute pancreatitis. (Figure-1).

While calculating the diagnostic accuracy of BISAP and RANSON criteria, taking RACSAP as the gold standard, both criteria showed a strong and statistically significant association with RACSAP. Compared to the BISAP criteria, RANSON correctly identified actual positive cases (96.9% vs 68.8%). The overall diagnostic accuracy of RANSON criteria was better than BISAP criteria (95% vs 85%) [Table-III]. When data were stratified in terms of age groups, gender, and diabetes status, the RANSON criteria showed uniformly very high diagnostic accuracy in all groups, as shown in Table-III.

### DISCUSSION

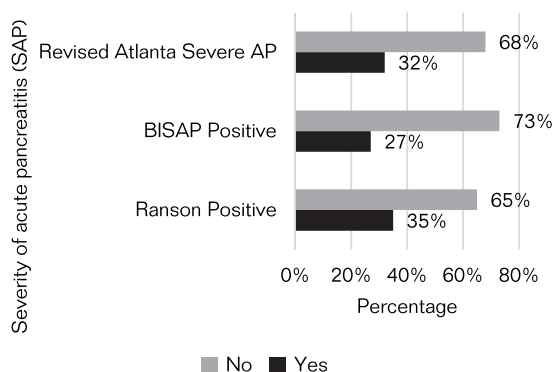
This study assessed the diagnostic performance of two scores (BISAP and RANSON) for severe acute pancreatitis using the Revised Atlanta Classification as the reference standard. The cross-sectional validation study design and assessment

in a < 48-hour assessment allowed early severity stratification, which is crucial for ICU triage.

**TABLE-I**  
**Baseline clinical characteristics of patients with acute pancreatitis**

Variables	Category	Frequency (%)
Age Groups	20-45 Years	109 (54.5%)
	46-70 Years	91 (45.5%)
Gender	Male	80 (40%)
	Female	120 (60%)
Etiology	Biliary	145 (72.5%)
	Alcohol	20 (10%)
	Hypertriglyceridemia	22 (11%)
Diabetes Mellitus	Idiopathic/Other	26 (13%)
	Yes	10 (5%)

**FIGURE-1**  
**Severity distribution of acute pancreatitis according to SAP classification**



**TABLE-II**  
**Comparison of BISAP versus RANSON criteria for severity prediction**

RANSON Criteria	RAC for SAP		Total	Test of Sig.
	Yes	No		
Yes	62 (96.9%)	8 (5.9%)	70 (35%)	p<0.001
No	2 (3.1%)	128 (94.1%)	130 (65%)	
Total	64 (100%)	136 (100%)	200 (100%)	
Sensitivity=96.8%; Specificity=94.1%; PPV=88.57; NPV=98.46%; Diagnostic Accuracy=95%;				
BISAP Criteria	RAC for SAP		Total	Test of sig.
	Yes	No		
Yes	44 (68.8%)	10 (7.4%)	54 (27%)	p<0.001
No	20 (31.3%)	126 (92.6%)	146 (73%)	
Total	64 (100%)	136 (100%)	200 (100%)	
Sensitivity=68.8%; Specificity=92.7%; PPV=81.5%; NPV=86.3%; Diagnostic Accuracy=85%;				

TABLE-III

## Subgroup-wise Diagnostic Performance of RANSON Criteria

Variable	Category	Sensitivity	Specificity	PPV	NPV	Diagnostic Accuracy
Age (years)	20-45	94.4%	94.5%	90.2%	96.9%	94.5%
	46-70	100%	93.7%	89.5%	100%	96.6%
Gender	Male	100%	93.3%	93.1%	100%	96.3%
	Female	93.1%	94.5%	86.1%	97.4%	94.2%
Diabetes	Yes	100%	100%	100%	100%	100%
	No	94.7%	93.8%	89.4%	98.1%	94.7%

Similar study designs have been applied both internationally and locally, which ensures methodological comparability.<sup>13-15</sup> Use of standard cut-off values of BISAP (>3) and RANSON (>3) increased internal validity. However, the single-center setting and consecutive sampling may limit external generalizability, which is also reported in Pakistani validation studies done at tertiary-care hospitals.<sup>9,10,16</sup>

In the present study, the mean age was 44.3±15.9 years, females accounted for 60%, 72.5% had biliary etiology, and 32% had severe acute pancreatitis in patients. As per local Pakistani studies, closely similar background (baseline) profiles have been reported. Shaikh et al. from Karachi had described a mean age of 43.8±14.6 years, biliary etiology in 69.2%, and severe disease in 30.1% of cases.<sup>17</sup> The incidence of biliary pancreatitis in another local study as 66.7% and severe disease as 33.3% of the patients.<sup>18</sup> One study from Kashmir reported that severe acute pancreatitis occurred in 87% of cases, with gallstones.<sup>19</sup> These local findings are similar to international data, where severe disease is 40-70%, with biliary etiology being dominant<sup>20</sup>, thus confirming the representation of the present cohort.

Regarding the diagnostic accuracy, the score of RANSON had superior performance in this study, with 96.8% sensitivity, 94.1% specificity, and 95% diagnostic accuracy compared to BISAP's sensitivity of 68.8% and accuracy of 85%. Pakistani data are pretty consistent with these findings.<sup>9,10,16</sup> RANSON sensitivity and diagnostic accuracy were reported to be above 90% in the above-mentioned

studies, consistent with our study results. BISAP sensitivity was 66.7%, and accuracy was 84.2%. In an international study, the Ranson score sensitivity was close to 100%, while the BISAP score sensitivity was around 87%, comparable to our study results.<sup>21</sup> In a recent meta-analysis, the pooled sensitivity of the Ranson and BISAP was 95% and 67%. In comparison, the pooled AUC of the Ranson and BISAP was 95% and 94%.<sup>22</sup> Although the simplicity and early applicability of BISAP are appealing, the consistent superiority of RANSON's score in sensitivity and accuracy in both local and international literature is in favour of its continued reliability in severity prediction in resource-limited tertiary care settings. Our study has a few limitations, such as the sample size being smaller, it is a single-center study, and there is no follow-up for MACE. Further multicenter study with follow-up is recommended.

## CONCLUSION

In this study, both BISAP and RANSON's scores showed a significant association with severe acute pancreatitis when compared with the Revised Atlanta Classification. However, RANSON's score showed a better sensitivity, specificity, and overall diagnostic accuracy compared to the BISAP score.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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## AUTHORSHIP AND CONTRIBUTION DECLARATION

1	Eesha Sattar: Concept.
2	Yar Muhammad: Data collection.
3	Shahzad Alam Khan: Data interpretation.
4	Muhammad Ahmad: Manuscript writing.
5	Awais Ameen: Data interpretation.
6	Muhammad Shamim ul Husnain: Concept.