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Research Article

# PROGNOSTIC VALUE OF THE BISAP SCORING SYSTEM IN STRATIFYING ACUTE PANCREATITIS AT A RURAL PERIPHERAL MEDICAL COLLEGE IN KASHMIR

**Dr. Naveed Nabi[1], Dr. Showkat Ali Bhat[2], Dr. Haris Hussain Khan[3], Dr. Mohammad Iqbal Bhat[4].**

[1]Assistant Professor, Department of General Surgery, Government Medical College, Handwara, UT Jammu & Kashmir. Orcid ID-0000-0003-0712-8640

[2]Assistant Professor, Department of General Surgery, Government Medical College, Handwara, UT Jammu & Kashmir. Orcid ID: 0009-0004-9478-8739

[3]Junior Resident, Department of General Surgery, Government Medical College, Handwara, UT Jammu & Kashmir.

[4]Assistant Professor, Department of Radiodiagnosis Government Medical College, Handwara, UT Jammu & Kashmir.

*Corresponding Author
Dr. Showkat Ali Bhat
Email ID :
docshowkat34@gmail.com

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**Abstract:** ***Introduction:*** Acute pancreatitis is a common gastrointestinal emergency with a clinical spectrum ranging from mild self-limiting disease to severe pancreatitis associated with organ failure and mortality. Early identification of high-risk patients is essential for appropriate management. The Bedside Index for Severity in Acute Pancreatitis (BISAP) is a simple and validated scoring system that facilitates early risk stratification.**Aim:** To evaluate the prognostic value of the BISAP scoring system in stratifying acute pancreatitis and predicting clinical outcomes in patients admitted to a rural peripheral medical college in Kashmir.**Materials and Methods:** This prospective observational study was conducted in the Department of General Surgery, Government Medical College (GMC), Handwara, Jammu and Kashmir, India, over a period of 2.5 years (November 2023–April 2026). A total of 74 patients diagnosed with acute pancreatitis were included. BISAP scores were calculated within 24 hours of admission. Patients were followed for disease severity, organ failure, HDU/ICU admission, and mortality. Statistical analysis was performed using SPSS version 27.0, with $p<0.05$ considered statistically significant.**Results:** The majority of patients were aged 51–60 years (27.0%). Gallstone disease was the most common etiology (45.9%), followed by idiopathic pancreatitis (41.9%). A BISAP score of 2 was the most frequent score at admission (29.7%). Higher BISAP scores showed a significant association with increasing disease severity ($p<0.001$). Organ failure occurred in 54.2% of patients with BISAP scores ≥3 compared with only 3.6% among those with scores 0–1 ($p<0.001$). Clinical outcomes also worsened significantly with increasing BISAP scores, with higher rates of HDU/ICU admission and mortality observed in patients with BISAP scores ≥3 ($p<0.001$).**Conclusion:** BISAP is a simple, rapid, and effective bedside scoring system for early prediction of disease severity, organ failure, and adverse clinical outcomes in acute pancreatitis. Its routine use at admission may facilitate early risk stratification, timely intervention, and improved patient management.

**Keywords**: Acute pancreatitis; BISAP score; Severity prediction; Organ failure; Gallstone disease; Clinical outcome; Prognosis.

## INTRODUCTION

Acute pancreatitis (AP) is one of the most common gastrointestinal emergencies encountered in surgical and medical practice worldwide. It is characterized by acute inflammation of the pancreas resulting from premature activation of pancreatic enzymes, leading to autodigestion of pancreatic tissue and varying degrees of local and systemic inflammatory responses. The clinical presentation ranges from a mild, self-limiting illness to severe acute pancreatitis associated with persistent organ failure, pancreatic necrosis, and death. Although nearly 80% of patients experience a mild disease course, approximately 20% develop severe disease with significant morbidity and mortality, making early risk stratification an essential component of management [1,2].

The burden of acute pancreatitis has been increasing globally over the last two decades, leading to substantial healthcare utilization, prolonged hospital stays, and increased economic costs. Gallstone disease remains the most common etiological factor, followed by idiopathic pancreatitis. Hypertriglyceridemia, drug-induced pancreatitis, infections, trauma, and post-ERCP pancreatitis are other recognized causes[3]. The Revised Atlanta Classification categorizes acute pancreatitis into mild, moderately severe, and severe forms based on the presence and duration of organ failure and local complications, thereby emphasizing the importance of early identification of high-risk patients [4].

Timely prediction of disease severity allows clinicians to optimize fluid resuscitation, determine the need for intensive monitoring, and initiate appropriate therapeutic interventions. Over the years, several prognostic scoring systems such as Ranson's criteria, Acute Physiology and

Chronic Health Evaluation-II (APACHE-II), Glasgow score, and Computed Tomography Severity Index (CTSI) have been developed for this purpose. However, many of these systems are complex, require numerous variables, or necessitate a waiting period of 48 hours before accurate assessment can be performed, limiting their usefulness in emergency settings [5].

The Bedside Index for Severity in Acute Pancreatitis (BISAP) score was developed as a simple and practical tool for early prediction of severity and mortality in patients with acute pancreatitis. The score incorporates five readily available clinical parameters assessed within the first 24 hours of hospitalization: blood urea nitrogen >25 mg/dL, impaired mental status, systemic inflammatory response syndrome (SIRS), age greater than 60 years, and presence of pleural effusion. Each parameter contributes one point, resulting in a total score ranging from 0 to 5 [6]. Numerous studies have demonstrated that higher BISAP scores are associated with increased risks of severe pancreatitis, organ failure, pancreatic necrosis, prolonged hospitalization, and mortality [7,8].

Recent evidence suggests that the predictive performance of BISAP is comparable to more complex scoring systems while maintaining the advantages of simplicity, rapid application, and cost-effectiveness [8–10]. These characteristics are particularly valuable in resource-limited healthcare settings and rural peripheral medical colleges where advanced investigations and intensive care resources may not be readily available. In the Kashmir region, where healthcare accessibility can be challenged by geographical and infrastructural constraints, an accurate bedside prognostic tool could significantly improve clinical decision-making and patient outcomes.

The aim of this study was to evaluate the prognostic value of the Bedside Index for Severity in Acute Pancreatitis (BISAP) scoring system in patients with acute pancreatitis admitted to a rural peripheral medical college in Kashmir. The objectives were to assess the ability of BISAP score to predict disease severity, organ failure, local and systemic complications, duration of hospital stay, and mortality, and to determine its usefulness as an early bedside risk stratification tool.

# MATERIALS AND METHODS

**Study Design:** Hospital-based prospective observational study.

**Study Population:** All patients diagnosed with acute pancreatitis and admitted to the Department of General Surgery, Government Medical College (GMC), Handwara, Jammu and Kashmir, during the study period.

**Sample Size:** A total of 74 patients with acute pancreatitis were included in the study.

Study Duration: 2.5 years (November 2023 to April 2026).

**Study Place:** Department of General Surgery, Government Medical College (GMC), Handwara, Jammu and Kashmir, India.

**Inclusion Criteria:**

- Patients aged ≥18 years.
- Patients diagnosed with acute pancreatitis based on at least two of the following Revised Atlanta criteria:
    - Characteristic abdominal pain suggestive of acute pancreatitis.
    - Serum amylase and/or lipase levels ≥3 times the upper limit of normal.
    - Radiological evidence of acute pancreatitis on ultrasonography, contrast-enhanced CT, or MRI.
- Patients admitted within 24 hours of symptom onset.
- Patients willing to provide informed written consent.

**Exclusion Criteria:**

- Patients with chronic pancreatitis or acute exacerbation of chronic pancreatitis.
- Patients with pancreatic malignancy.
- Patients transferred from another hospital after more than 24 hours of initial treatment.
- Patients with incomplete clinical, laboratory, or radiological data required for BISAP score calculation.
- Pregnant women.
- Patients who declined to participate or were unable to provide consent.

**Statistical Analysis**

The collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software version 27.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. The association between categorical variables was assessed using the Chi-square test or Fisher's exact test, as appropriate. The relationship between BISAP scores and clinical outcomes such as disease severity, organ failure, HDU/ICU admission, and mortality was evaluated using appropriate comparative statistical tests. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated where applicable. A p-value of less than 0.05 was considered statistically significant. The predictive performance of the BISAP scoring system was assessed by analyzing its association with the severity of acute pancreatitis and adverse clinical outcomes.

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# RESULTS

**Table 1. Distribution of Age among Study Participants**

| Age Group (Years) | Number of Patients | Percentage (%) | P-value |
|---|---|---|---|
| ≤30 | 8 | 10.8 | 0.028 |
| 31–40 | 14 | 18.9 | |
| 41–50 | 18 | 24.3 | |
| 51–60 | 20 | 27 | |
| >60 | 14 | 18.9 | |
| Total | 74 | 100 | |

**Table 2. Etiological Distribution of Acute Pancreatitis**

| Etiology | Number of Patients | Percentage (%) | P-value |
|---|---|---|---|
| Gallstone Disease | 34 | 45.9 | 0.001 |
| Idiopathic | 31 | 41.9 | |
| Hypertriglyceridemia | 6 | 8.1 | |
| Post-ERCP | 3 | 4.1 | |
| Total | 74 | 100 | |

**Table 3. Distribution of BISAP Scores at Admission**

| BISAP Score | Number of Patients | Percentage (%) | P-value |
|---|---|---|---|
| 0 | 10 | 13.5 | <0.001 |
| 1 | 18 | 24.3 | |
| 2 | 22 | 29.7 | |
| 3 | 14 | 18.9 | |
| ≥4 | 10 | 13.5 | |
| Total | 74 | 100 | |

**Table 4. Association Between BISAP Score and Severity of Acute Pancreatitis**

| BISAP Score | Mild AP n (%) | Moderately Severe AP n (%) | Severe AP n (%) | P-value |
|---|---|---|---|---|
| 0–1 | 25 (89.3) | 3 (10.7) | 0 (0.0) | <0.001 |
| 2 | 14 (63.6) | 6 (27.3) | 2 (9.1) | |
| ≥3 | 4 (16.7) | 8 (33.3) | 12 (50.0) | |
| Total | 43 | 17 | 14 | |

**Table 5. Association Between BISAP Score and Organ Failure**

| BISAP Score | Organ Failure Present n (%) | Organ Failure Absent n (%) | P-value |
|---|---|---|---|
| **0–1 (n=28)** | **1 (3.6)** | **27 (96.4)** | **<0.001** |
| 2 (n=22) | 4 (18.2) | 18 (81.8) | |
| ≥3 (n=24) | 13 (54.2) | 11 (45.8) | |
| Total | 18 | 56 | |

**Table 6. Association Between BISAP Score and Clinical Outcome**

| BISAP Score | Recovered n (%) | HDU/ICU Admission n (%) | Mortality n (%) | P-value |
|---|---|---|---|---|
| 0–1 (n=28) | 27 (96.4) | 1 (3.6) | 0 (0.0) | <0.001 |
| 2 (n=22) | 19 (86.4) | 2 (9.1) | 1 (4.5) | |
| ≥3 (n=24) | 13 (54.2) | 7 (29.2) | 4 (16.6) | |
| Total | 59 | 10 | 5 | |

**Figure: 1. Etiological Distribution of Acute Pancreatitis**

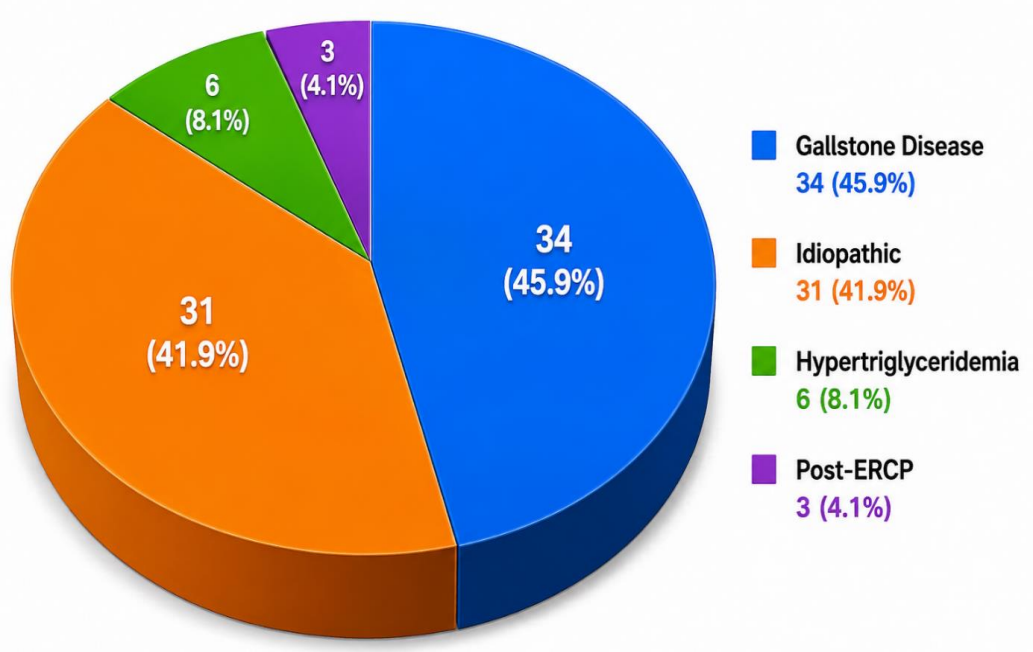
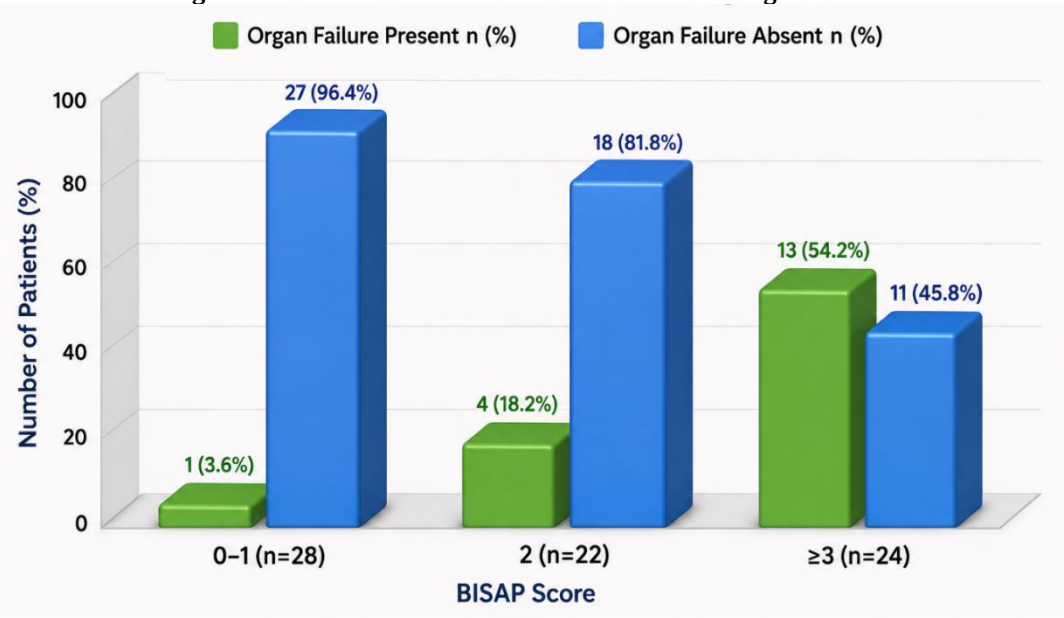



**Figure: 2. Association Between BISAP Score and Organ Failure**




**A total of** 74 patients with acute pancreatitis were included in the study. The majority of patients belonged to the 51–60 years age group, accounting for 20 (27.0%) cases, followed by the 41–50 years age group with 18 (24.3%) patients. Patients aged 31–40 years and those older than 60 years each constituted 14 (18.9%) cases, while the youngest age group (≤30 years) comprised 8 (10.8%) patients. The age-wise distribution was statistically significant (p = 0.028), indicating that acute pancreatitis was more frequently observed among middle-aged individuals in the present study.

Among the 74 study participants, gallstone disease was identified as the most common etiology of acute pancreatitis, accounting for 34 (45.9%) patients. Idiopathic pancreatitis was the second most common cause, observed in 31 (41.9%) patients. Hypertriglyceridemia was responsible for 6 (8.1%) cases, whereas post-endoscopic retrograde cholangiopancreatography (post-ERCP) pancreatitis was the least common etiology, affecting 3 (4.1%) patients. The etiological distribution showed a statistically significant difference (p = 0.001), highlighting gallstone disease and idiopathic pancreatitis as the predominant causes in the present study.

The distribution of BISAP scores at admission demonstrated that a score of 2 was the most frequently observed, occurring in 22 (29.7%) patients. This was followed by a BISAP score of 1 in 18 (24.3%) patients and a score of 3 in 14 (18.9%)

patients. Scores of 0 and ≥4 were each recorded in 10 (13.5%) patients. The overall distribution of BISAP scores was highly statistically significant ($p < 0.001$), indicating considerable variation in disease severity at the time of presentation. A significant association was observed between BISAP score and the severity of acute pancreatitis ($p < 0.001$). Among patients with BISAP scores of 0–1, 25 (89.3%) had mild acute pancreatitis, while only 3 (10.7%) developed moderately severe disease, and none had severe pancreatitis. In patients with a BISAP score of 2, 14 (63.6%) had mild disease, 6 (27.3%) had moderately severe disease, and 2 (9.1%) developed severe acute pancreatitis. Conversely, among patients with BISAP scores of ≥3, only 4 (16.7%) had mild disease, whereas 8 (33.3%) had moderately severe pancreatitis and 12 (50.0%) had severe acute pancreatitis. Overall, of the 74 patients, 43 had mild, 17 had moderately severe, and 14 had severe acute pancreatitis, demonstrating a progressive increase in disease severity with increasing BISAP scores.

The occurrence of organ failure increased significantly with higher BISAP scores ($p < 0.001$). Among patients with BISAP scores of 0–1, organ failure was observed in only 1 (3.6%) patient, while 27 (96.4%) had no organ failure. In patients with a BISAP score of 2, organ failure occurred in 4 (18.2%) patients, whereas 18 (81.8%) remained free from organ failure. In contrast, among patients with BISAP scores of ≥3, organ failure was present in 13 (54.2%) patients and absent in 11 (45.8%) patients. Overall, organ failure developed in 18 patients, while 56 patients did not experience organ failure, indicating a strong positive relationship between increasing BISAP scores and the risk of organ failure.

Clinical outcomes were significantly associated with BISAP scores ($p < 0.001$). Among patients with BISAP scores of 0–1, 27 (96.4%) recovered successfully, only 1 (3.6%) required HDU/ICU Admission, and no deaths were recorded. For patients with a BISAP score of 2, recovery was achieved in 19 (86.4%) patients, while 2 (9.1%) required HDU/ICU Admission and 1 (4.5%) patient died. Among patients with BISAP scores of ≥3, recovery was observed in 13 (54.2%) patients, whereas 7 (29.2%) required HDU/ICU Admission and 4 (16.6%) died. Overall, 59 patients recovered, 10 required HDU/ICU Admission, and 5 patients succumbed to the disease. These findings demonstrate that higher BISAP scores were associated with poorer clinical outcomes, including an increased need for intensive care and higher mortality.

## DISCUSSION

In the present study, the highest proportion of patients belonged to the 51–60 years age group (27.0%), followed by 41–50 years (24.3%). This finding indicates that acute pancreatitis predominantly affects middle-aged and older adults, possibly due to the increasing prevalence of biliary tract disease and metabolic disorders with advancing age. Similar findings were reported by Sharma et al., who observed that most patients were between 40 and 60 years of age. Likewise, Cho et al. demonstrated that increasing age is associated with greater disease severity and poorer clinical outcomes, and age above 60 years is included as one of the components of the BISAP score because of its prognostic significance. These observations support the age distribution observed in the present study and emphasize the importance of early risk stratification in elderly patients.[11,12]

Gallstone disease was the leading cause of acute pancreatitis (45.9%) in the present study, followed by idiopathic pancreatitis (41.9%), whereas hypertriglyceridemia (8.1%) and post-ERCP pancreatitis (4.1%) were relatively uncommon. These findings are consistent with studies from regions where biliary pancreatitis predominates because of the high prevalence of gallstone disease. Gao et al. reported that gallstone pancreatitis remains one of the most frequent etiologies worldwide and is associated with better outcomes when recognized and treated early. Similarly, recent prospective studies evaluating BISAP have reported gallstone disease as the predominant etiology in hospital-based populations. The relatively high proportion of idiopathic pancreatitis in the present study may reflect limitations in identifying uncommon etiologies despite standard diagnostic evaluation.[13,14]

The majority of patients had a BISAP score of 2 (29.7%), followed by scores of 1 (24.3%) and 3 (18.9%). Only 13.5% of patients had BISAP scores of 4 or higher, suggesting that most patients presented with low-to-intermediate risk disease. These findings closely resemble those reported by Kumar et al., who observed that most patients had BISAP scores below 3, while only a smaller proportion belonged to the high-risk category. Aggarwal et al. also demonstrated a similar distribution and concluded that BISAP is a simple bedside tool capable of identifying patients at risk within the first 24 hours of admission, allowing timely intervention.[15,16] A highly significant association was observed between increasing BISAP score and disease severity ($p<0.001$). Nearly 90% of patients with BISAP scores of 0–1 had mild acute pancreatitis, whereas half of the patients with BISAP scores ≥3 developed severe acute pancreatitis. This progressive increase in disease severity with increasing BISAP score is consistent with previous reports. Khanna et al. demonstrated that BISAP scores of 3 or more strongly predict severe acute pancreatitis, persistent organ failure, and prolonged hospitalization. Similarly, Cho et al. found that BISAP possesses predictive accuracy comparable to APACHE II and Ranson's criteria while remaining much simpler to calculate during the initial assessment. [12,17]

The incidence of organ failure increased markedly with rising BISAP scores. Organ failure was observed in only 3.6% of patients with BISAP scores of 0–1 but increased to 54.2% among patients with scores ≥3. These findings

reinforce the usefulness of BISAP as an early predictor of systemic complications. Karki et al. similarly reported that patients with BISAP scores ≥3 had significantly higher rates of organ failure and intensive care requirement. Furthermore, the meta-analysis by Gao et al. concluded that BISAP is a reliable predictor of persistent organ failure and severe acute pancreatitis across diverse populations, supporting the observations of the present study.[13,18]

Clinical outcomes worsened progressively with increasing BISAP scores. Recovery was highest among patients with BISAP scores of 0–1 (96.4%), whereas patients with BISAP scores ≥3 had substantially higher rates of HDU/ICU admission (29.2%) and mortality (16.6%). These findings indicate that increasing BISAP scores are associated with adverse clinical outcomes and poorer prognosis. Swetha et al. similarly demonstrated that higher BISAP scores were associated with increased mortality, prolonged hospitalization, and greater need for intensive care. A recent systematic review and meta-analysis by Zhu et al. further confirmed that BISAP provides good diagnostic accuracy for predicting mortality and severe acute pancreatitis, making it an effective bedside prognostic tool for routine clinical practice.[19,20]

## CONCLUSION

The present study demonstrates that the Bedside Index for Severity in Acute Pancreatitis (BISAP) is a simple, rapid, and reliable scoring system for the early assessment of patients with acute pancreatitis. Gallstone disease was identified as the most common etiology, followed by idiopathic pancreatitis, with most patients belonging to the middle-aged population. Increasing BISAP scores showed a significant association with greater disease severity, higher incidence of organ failure, increased requirement for HDU/ICU admission, and higher mortality. Patients with low BISAP scores (0–1) experienced predominantly mild disease and favorable clinical outcomes, whereas those with scores of 3 or more were at substantially higher risk of severe acute pancreatitis and adverse outcomes. These findings highlight the usefulness of BISAP as an effective bedside prognostic tool that can be applied within the first 24 hours of admission to facilitate early risk stratification, optimize resource utilization, guide timely therapeutic interventions, and improve overall patient management and clinical outcomes in acute pancreatitis.

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