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COMPARATIVE STUDY OF BISAP SCORE AND CT SEVERITY INDEX SCORE IN ACUTE PANCREATITIS

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ABSTRACT

Background:

Early prediction of disease severity in acute pancreatitis is essential for timely intervention and reducing morbidity and mortality. While the Computed Tomography Severity Index (CTSI) is a well-established imaging-based tool, the Bedside Index for Severity in Acute Pancreatitis (BISAP) score provides a simple, early clinical alternative.

Aim:

To compare the efficacy of BISAP score and CTSI in predicting severity and clinical outcomes in patients with acute pancreatitis.

Materials and Methods:

This prospective observational study included 50 patients diagnosed with acute pancreatitis at a tertiary care center. BISAP scores were calculated within 24 hours of admission, and CTSI was assessed using contrast-enhanced CT performed between days 3–5. Correlation between the two scoring systems and their association with clinical outcomes such as ICU admission, complications, and mortality were analyzed using appropriate statistical methods.

Results:

The mean age was 42.8 ± 12.3 years; 68% were male. Alcohol was the most common etiology (60%). BISAP score ≥3 was significantly associated with severe disease, ICU stay, and mortality ($p < 0.01$). CTSI scores ≥7 were also linked to poor outcomes. A strong positive correlation was observed between BISAP and CTSI scores ($r = 0.76$, $p < 0.001$).

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BISAP demonstrated 81.8% sensitivity, 86.4% specificity, and 94.4% negative predictive value in identifying severe cases.

Conclusion:

BISAP score is a reliable, early, and non-invasive tool for predicting the severity of acute pancreatitis. Its strong correlation with CTSI and clinical outcomes supports its utility in initial patient assessment and triage, especially where advanced imaging is delayed or unavailable.

Keywords: Acute pancreatitis, BISAP score, CT Severity Index, disease severity, early prediction.

Introduction

Acute pancreatitis (AP) is a common gastrointestinal emergency characterized by inflammation of the pancreas, presenting with a wide spectrum ranging from mild, selflimiting illness to severe disease associated with organ failure and mortality [1]. Early and accurate assessment of severity is crucial for predicting outcomes, guiding treatment decisions, and improving prognosis [2].

Various scoring systems have been developed to assess the severity of acute pancreatitis, including the Bedside Index for Severity in Acute Pancreatitis (BISAP) Score and the CT Severity Index (CTSI). The BISAP score is a simple, bedside clinical tool that evaluates five parameters: blood urea nitrogen levels, impaired mental status, systemic inflammatory response syndrome (SIRS), age over 60 years, and pleural effusion. Studies have demonstrated that BISAP is effective in predicting mortality and severity in AP patients. The Bedside Index for Severity in Acute Pancreatitis (BISAP) is a simple, quick, and costeffective tool that uses five variables measured within 24 hours of admission. Studies have shown that the BISAP score has good predictive value for morbidity and mortality [4].

On the other hand, the CT Severity Index (CTSI) is a radiological scoring system that combines the Balthazar grading of pancreatic inflammation and the extent of necrosis observed on contrast-enhanced computed tomography (CECT) [5]. While the CTSI is considered more accurate in assessing pancreatic and peripancreatic complications, it is dependent on imaging availability and carries risks related to contrast exposure [6].

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Comparative analysis of these two scoring systems is valuable, particularly in resourceconstrained settings where early clinical risk stratification may help reduce dependence on imaging. Several studies have explored the utility of BISAP in predicting outcomes comparable to radiological indices [7]. However, there remains a need for further studies, particularly in the Indian setting, to evaluate the reliability and correlation of BISAP with radiological findings such as CTSI.

Aim

To compare the prognostic value of BISAP score and CT Severity Index score in predicting the severity and clinical outcomes in patients with acute pancreatitis.

Objectives

1. To assess the severity of acute pancreatitis using BISAP and CT Severity Index scores in patients admitted with acute pancreatitis.
2. To correlate BISAP scores with CT Severity Index scores and clinical outcomes such as duration of hospital stay, ICU admission, and complications.
3. To evaluate the diagnostic performance (sensitivity, specificity, and predictive values) of BISAP in predicting severe acute pancreatitis compared to CT Severity Index.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study conducted over a period of 12 months.

Study Population

A total of 50 patients diagnosed with acute pancreatitis based on clinical presentation, elevated serum amylase/lipase (≥3 times the upper limit of normal), and radiological evidence (USG or CT) were included in the study.

Inclusion Criteria

- Age ≥18 years
- Patients admitted with a confirmed diagnosis of acute pancreatitis
- Availability of both BISAP score parameters within 24 hours of admission

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- Patients who underwent contrast-enhanced CT (CECT) within 3–5 days of admission

Exclusion Criteria

- Patients with chronic pancreatitis
- Patients with pancreatic malignancy
- Pregnant women
- Patients with incomplete clinical or radiological data
- Patients not willing to provide consent

Sample Size

A total of 50 participants were included based on convenience sampling during the study period.

Data Collection Procedure

- BISAP Score was calculated within the first 24 hours of admission based on five parameters:
    - Blood urea nitrogen (BUN) >25 mg/dL ○
    Impaired mental status (GCS <15) ○ Systemic
    inflammatory response syndrome (SIRS) ○ Age
    >60 years ○ Presence of pleural effusion
- CT Severity Index (CTSI) was calculated using contrast-enhanced CT scan performed between days 3 and 5. ○ It included Balthazar grading (A–E) for pancreatic inflammation and extent of necrosis:
        - 0: No necrosis
        - 2: <30% necrosis
        - 4: 30–50% necrosis
        - 6: >50% necrosis ○ Final CTSI score ranged from 0 to 10.

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Outcome Measures

- Correlation between BISAP and CTSI scores
- Severity stratification: Mild, Moderate, and Severe acute pancreatitis (based on Revised Atlanta Classification)
- Clinical outcomes: length of hospital stay, ICU admission, complications, and mortality

Statistical Analysis

- Data were analyzed using SPSS version 25.0.
- Descriptive statistics were used for baseline demographic data.
- Pearson correlation coefficient (r) was used to assess correlation between BISAP and CTSI scores.
- Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated for BISAP using CTSI and clinical outcomes as reference.
- p-value <0.05 was considered statistically significant.

RESULTS

Table 1: Baseline Demographic and Clinical Characteristics of Study Population (n = 50)

Variable	**Value / n (%)**
Mean Age (years)	42.8 ± 12.3
Gender (Male:Female)	34 (68%) : 16 (32%)
Most common symptom	Abdominal pain (100%)
Alcohol as etiology	30 (60%)
Variable	**Value / n (%)**
Gallstones	14 (28%)

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Hypertriglyceridemia	4 (8%)
Idiopathic	2 (4%)
Mean hospital stay (days)	6.2 ± 2.4

Interpretation: Majority of patients were male with alcohol-induced pancreatitis being the most common etiology.

Table 2: Distribution of Patients by BISAP Score and Associated Outcomes

BISAP Score	No. of Patients (%)	Severe AP (%)	ICU Admission (%)	Mortality (%)
0–1	24 (48%)	1 (4.1%)	1 (4.1%)	0
2	12 (24%)	3 (25%)	2 (16.7%)	0
3–5	14 (28%)	9 (64.3%)	6 (42.9%)	2 (14.3%)

Chi-square test, $p < 0.01$

Interpretation: Higher BISAP scores were significantly associated with severe pancreatitis, ICU admissions, and mortality.

Table 3: Distribution of Patients by CT Severity Index (CTSI)

CTSI Score Range	No. of Patients (%)	Severity Classification
0–3	22 (44%)	Mild
4–6	18 (36%)	Moderate
7–10	10 (20%)	Severe

Interpretation: Most patients had mild to moderate CTSI scores, but 20% had severe CT findings.

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Table 4: Correlation Between BISAP Score and CT Severity Index

Parameter	Mean BISAP Score	Mean CTSI Score
Mild (Atlanta Criteria)	1.2 ± 0.5	2.1 ± 1.3
Moderate	2.4 ± 0.6	5.2 ± 1.1
Severe	3.6 ± 0.7	7.8 ± 1.4

Pearson's correlation coefficient r = 0.76, p < 0.001

Interpretation: There was a strong positive correlation between BISAP and CTSI scores, indicating that both scores increase with disease severity.

Table 5: Diagnostic Performance of BISAP in Predicting Severe Pancreatitis (CTSI ≥ 7)

Parameter	Value (%)
Sensitivity	81.8%
Specificity	86.4%
Positive Predictive Value (PPV)	64.3%
Negative Predictive Value (NPV)	94.4%
Accuracy	85%

Interpretation: BISAP showed high sensitivity and specificity in predicting severe cases as defined by CT findings. The high NPV suggests its usefulness as a screening tool to rule out severe disease.

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DISCUSSION

In this study, we evaluated and compared the clinical utility of BISAP and CT Severity Index (CTSI) scores in predicting the severity and outcomes of acute pancreatitis. Our findings demonstrate that the BISAP score, which relies on bedside clinical and biochemical parameters, significantly correlates with radiological severity assessed by CTSI and clinical outcomes such as ICU stay, complications, and mortality.The mean age of the study population was 42.8 years, and the majority were males with alcohol being the most common etiology. This demographic pattern is consistent with other Indian studies where alcohol has been reported as a major cause of acute pancreatitis in younger males [8,9].

Our study revealed that BISAP scores of ≥3 were significantly associated with severe disease and adverse clinical outcomes, including ICU admission and mortality. Similar findings were reported by Singh et al. and Papachristou et al., who established that BISAP is a reliable early predictor of severity and mortality in AP patients [10,11].CTSI has traditionally been considered the standard for radiological grading of AP severity. In our study, 20% of patients had CTSI scores indicating severe disease (score ≥7), and these cases showed strong correlation with BISAP scores ($r = 0.76$, $p < 0.001$). This is consistent with the findings of Wu et al., who reported that BISAP had comparable performance to CTSI for early risk stratification [12].While CTSI offers detailed imaging-based assessment, it is limited by timing (ideally after 72 hours), cost, and availability of contrast-enhanced CT. BISAP, being simple and based on easily obtainable variables, can be used at the time of admission, especially in resource-limited settings [13].Furthermore, our study found that the BISAP score had a sensitivity of 81.8% and specificity of 86.4% in predicting severe pancreatitis as defined by CTSI, with an overall diagnostic accuracy of 85%. These findings are in agreement with the study by Garcea et al., who observed BISAP's comparable efficacy with CTSI for early risk assessment [14].The high negative predictive value (94.4%) of the BISAP score in our study emphasizes its utility in ruling out severe disease in early presentations, potentially avoiding unnecessary imaging and guiding timely interventions [15].

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CONCLUSION

This study demonstrates that both the BISAP score and CT Severity Index (CTSI) are effective tools in assessing the severity of acute pancreatitis. However, the BISAP score offers the advantage of early risk stratification using simple clinical and laboratory parameters within the first 24 hours of admission. It showed a strong positive correlation with CTSI and was significantly associated with adverse clinical outcomes such as ICU admission and mortality.

Given its simplicity, ease of application, and high negative predictive value, the BISAP score can be effectively used as a bedside tool to triage patients, guide clinical decision-making, and prioritize imaging and intensive care resources, especially in resource-limited settings.

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