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ORIGINAL ARTICLE

Evaluating the effectiveness of BISAP score in predicting severity of acute pancreatitis.

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ABSTRACT… Objective: To assess the efficacy of the BISAP score in predicting the severity of acute pancreatitis. **Study Design:** Cross Sectional, Retrospective. **Setting:** Surgical Unit, Mardan Medical Complex, KPK. **Period:** June 2022 to October 2024. **Methods:** A sample size of 192 was determined. The study included patients aged 18-60 years, of both genders, diagnosed with acute pancreatitis based on the American Pancreatic Association criteria. Data was collected using a standardized form and analyzed with SPSS version 22. **Results:** Among the 192 patients, males and females' ratio was 1.4: 1. with mean age of 35.89 ± 13.39 years. 31.2% had severe acute pancreatitis (score >3), while 68.75% had mild pancreatitis (p value < 0.001). The area under curve was 0.98, indicating strong diagnostic power. The study had a sensitivity 96.67%, specificity 93.2%, positive likelihood ratio (PPV) 86.6%, and true negative rate (NPV) of 98.43%. Overall diagnostic effectiveness for severity and mortality was 94.3% and 80.7%, respectively. **Conclusion:** The BISAP score is reliable, rapid, and cost-effective means for assessing severity, enabling effective patient stratification and prompt initiation of intensive management of severe patients to reduce mortality and morbidity.

Key words: BISAP score, Scoring Systems, Predictive Score, Severe Acute Pancreatitis.

INTRODUCTION

Acute pancreatitis is a serious gastrointestinal condition with considerable risks of mortality and morbidity worldwide.[1] Each year, it impacts about 5 to 80 individuals per 100,000 adults.[2] Although it is typically a self-limiting disease, approximately 25% of cases may develop complications.[3]

According to a research in Pakistan, 4% of patients having acute abdominal pain are diagnosed with acute pancreatitis.[3] Although numerous risk factors contribute to pancreatitis[4], acute pancreatitis is often associated with cholelithiasis in the subcontinent. In contrast, Western populations primarily attribute the condition to biliary issues and alcohol use, as well as infections.[5]

Acute pancreatitis can be classified according to severity: mild, moderate, and severe, according to Atlanta classification.[6] The mortality rate for severe acute pancreatitis (SAP) is notably high, estimated to be 25%-40%. Timely diagnosis and immediate implementation of aggressive supportive care can improve patient outcomes as, 50% of all fatalities occur within the first week of hospitalization.[7,8]

Several scoring systems, such as the Glasgow score, Ranson score, APACHE-II score, and Balthazar Computed Tomography Severity Index, have been created to identify early risk and estimate morbidity and mortality in acute pancreatitis patients[9], In 2008, Wu and colleagues introduced BISAP score[10] to help identify patients having risk of severe outcomes and mortality within the first 24 hours of admission.[11] This five-point scoring system consists of blood urea (levels > 25 mg/dL), cognitive impairment, presence of systemic inflammatory response syndrome, age more than 60, and pleural effusion.[12] One key advantage of the BISAP score is that the necessary data

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for its calculation can be readily obtained upon admission, making it simpler compared to other more complex scoring systems.[11]

This study aims to address the limited research on using the BISAP score to evaluate the severity of acute pancreatitis in our region. By evaluating its effectiveness in predicting disease severity, the findings aim to support the development of local guidelines to reduce mortality rates.

METHODS

This cross-sectional study was done at the surgical unit at Mardan Complex Hospital in KPK, following ethical approval from the institution (No.224/BKMC/24/1/2022) from June 2022-October 2024. Total of 192 participants were enrolled, calculated by taking sensitivity of 69%, specificity of 77%[12], prevalence of 50%[13], and absolute precision of 10%, with a margin of error of 5% and a 95% CI. Consecutive sampling was used for participant selection.

Inclusion Criteria

- All the patients with acute pancreatitis diagnosed on the basis of American Pancreatic Association Criteria
  The diagnosis of requires meeting two of three criteria:
- 1: Clinically upper abdominal pain
- 2: Laboratory (serum lipase or amylase > 3
- 3: Imaging (CT, MRI or Ultrasound)
- Both gender
- age 18 to 60 years

Exclusion Criteria

- Chronic pancreatitis, hereditary pancreatitis and malignancy (based on history, examination and labs)
- Patients with known cardiac, pulmonary, renal and psychiatric illnesses (as per history, examination and investigations)

The BISAP score is comprised of five criteria, each worth one point:[14]

1. Patient age over 60 years (1 point).
2. Altered mental status (GCS of < 15 (1 point).
3. Presence of systemic inflammatory response syndrome (1 point).
4. Presence of pleural effusion on X-ray (1 point).
5. Presence of blood urea nitrogen (BUN) > 25mg/dL

A BISAP score ≥3 is considered positive for severe acute pancreatitis (SAP). Patients are classified with Severe acute pancreatitis if they experience ongoing organ dysfunction lasting > 48 hours. Organ dysfunction can include respiratory failure, needing for respiratory support or an arterial PaO2 <60 mmHg with spontaneous breathing; cardiovascular collapse, defined as a systolic BP less than 90 mmHg; or renal failure, indicated by elevated serum creatinine (more than 2 mg/dL post hemodialysis or hydration therapy.[14] Additionally, Mortality data also include patients who die during hospitalization.

Data Collection

After signing informed written consent from participants, Routine investigations, detailed history, and physical examinations and vitals recording were carried out. Acute pancreatitis was diagnosed according to the criteria set by the American Pancreatic Association. Basic line investigations were performed upon admission, including white blood count, blood urea nitrogen, blood glucose level, LDH, AST, electrolytes, and chest X-ray. The BISAP score was assessed at time of admission, and all patients were monitored for complications and followed until discharge by a single author. Data was collected in specified Performa.

Data analysis was conducted using SPSS 22. Quantitative variables were analyzed by calculating their means and standard deviations. like age, BMI, and weight, while frequencies and percentages were determined for qualitative variables such as gender, severity of acute pancreatitis, and patient mortality. A 2x2 contingency table was employed to evaluate the sensitivity, specificity, true positive, true negative, and diagnostic accuracy of the BISAP score, with patient mortality as the gold standard. The results were presented through tables and graph.

RESULTS

Mean age recorded was 35.89 ± 13.39 years,

with mean weight 78.13 ± 5.51 kg and a BMI of 27.15 ± 2.36 kg/m^2.

Age distribution revealed that 43.1% of the patients (n=83) were in the age range of 18 - 30 years, 26.3% (n=50) were 30 - 45 years, and 30.5% (n=59) were between 46 and 60 years.

(χ2 16.31, df 2, p value <0.001) showing a highly significant result. Age distribution and mortality has been shown in Figure-1.

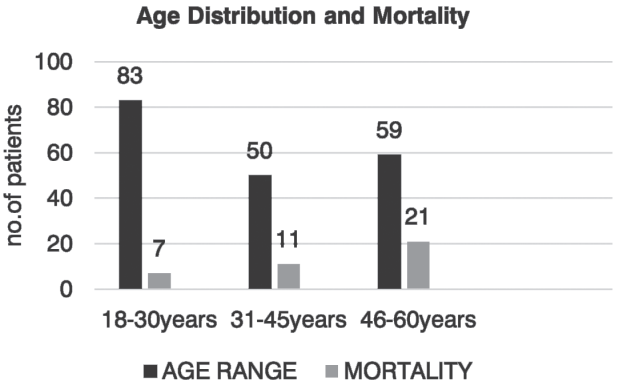

Figure-1. Showing distribution of age and mortality

Gender distribution showed a slight male predominance, with 58.3% of the patients (n=112) being male and 41.6% (n=80) female.

According to the BISAP score for acute pancreatitis severity, 31.2% of patients (n=60) had severe acute pancreatitis with BISAP score >3, while 68.75% (n=132) had mild pancreatitis (p value <0.001) showing highly significant result. Table-I

BISAP Score	Severe Acute Pancreatitis		P-Value
	Yes	No	
>3	58 (30.2%)	9	<0.001
<3	2	123	
Total	60	132	

Table-I. Distribution of severity of acute pancreatitis BISAP score >3

Graph (Figure-2) shows area under curve (AUC) for BISAP score to predict severe acute pancreatitis. The area under the curve is 0.98, indicating that the BISAP scoring system has strong diagnostic ability, with a p-value less than 0.01 i-e significant result.

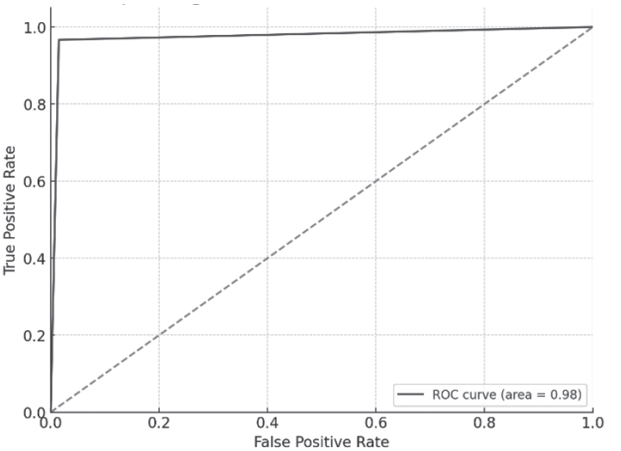

Figure-2. ROC curve for BISAP score in predicting severity of SAP

Among those with severe pancreatitis, 39 patients (34.9%) died within 10 days of admission. 2 patients had developed local complications; 1 patient was shifted to HDU due to single organ failure. However, they recovered with the conservative management.

The mortality rate was 25%. 20.3% patients with a BISAP score > 3 died, while 4.7% patients with a score < 3 also died, with a p-value of <0.001, indicating that the result is highly significant (as shown in Table-II).

BISAP Score	Mortality		P-Value
	Yes	No	
>3	39 (20.3%)	28 (14.5%)	<0.001
<3	9 (4.7%)	116 (60.4%)	
Total	48 (25%)	144 (75%)	

Table-II. 2x2 table of BISAP score with mortality

Overall diagnostic accuracy of BISAP in predicting mortality and severity was 80.73% and 94.3%, respectively. Sensitivity, specificity, negative predicative value, positive predicative value and diagnostic accuracy are given in Table-III.

Variables	Mortality	Severity
Sensitivity	81.25%	96.67%
specificity	80.56%	93.2%
Positive predicative value PPV	58.21%	86.6%
Negative Predictive Value (NPV)	92.80%	98.43%
Diagnostic Accuracy	80.73%	94.3%

Table-III. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy (DA) of BISAP

DISCUSSION

Acute pancreatitis is a prevalent gastrointestinal disorder with a notable mortality rate, varying from 3.8% to 21.3%. In severe cases (SAP), the mortality rate is even more alarming, with studies showing rates between 16.3% and 45.6%.[15,16] Therefore, early recognition and diagnosis of SAP are vital for identifying patients at greater risk of complications. And The BISAP score is a easy, reliable, cost-effective, and quick tool used to predict the severity of acute pancreatitis upon hospital admission.[17]

Our study observed a male predominance (61.3%), consistent with findings from other studies that reported similar male dominance (63.5%, 64.7%).[21,22] However, some studies have shown a higher prevalence of acute pancreatitis in females (59.1% and 66%).[4,20] we observed that acute pancreatitis was common in middle age i-e 35.89 ± 13.39 years, which is in line with the results in a study by Arif et al. and Shabir et al.[21,24]

Previous studies have demonstrated a strong relation between the BISAP score and the severity of acute pancreatitis[21], a finding that was clearly reflected in our study. In our study, 34.9% (n=67) of patients were diagnosed with severe acute pancreatitis, of which 58 patients (30.2%) had a BISAP score greater than 3 (p-value <0.001), indicating highly significant results. The BISAP scoring system showed a diagnostic accuracy of 96.6% and a sensitivity of 94.3% for predicting severe acute pancreatitis (SAP), results that align with other studies.[22,23] However, a research by Arif et al. reported a slightly lower accuracy of 76%.[25]

Therefore, BISAP can be effectively utilized as a clinical tool for evaluating the severity of acute pancreatitis, especially in under developed and developing countries. The clinical outcomes of SAP patients are influenced by the timely identification of disease severity and the implementation of severity-based management for patients with high risk.[26]

The mortality rate among individuals having a BISAP score greater than 3 was 20.3%, while 4.7% of patients with a BISAP score below three died (sensitivity 81.25%, diagnostic accuracy 80.73%, p-value <0.001). Other researches have similarly reported a high mortality in acute pancreatitis, with 7.1% overall and over 10% in patients with a score higher than 3, primarily in cases of severe acute pancreatitis (SAP).[4,27]

CONCLUSION

The BISAP score is an effective tool for assessing the severity of acute pancreatitis, offering simplicity, ease of use, and cost-effectiveness. This is especially important in low-income countries like ours, where access to high-resolution CT scans is limited. The score is particularly well-suited to our population, providing an accessible alternative for assessing disease severity in resource-constrained settings.

LIMITATIONS

Since this study is conducted solely in single surgical unit, multiple center studies with greater sample size are needed to further evaluate the diagnostic accuracy and effectiveness of the BISAP score in predicting the severity of acute pancreatitis.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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1	Sami Ul Haq	Concept & Design of study / Final approval.	
2	Abbas Ali Raza	Drafting / Data collection / Final approval.	
3	Saddam Hussain	Data analysis / Critical revision.	
4	Waseeq Ullah	Data collection & Compilation.	
5	Mahnoor Amjad	Drafting.	
6	Akif Ullah	Data collection & Compilation.	