Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-9, Issue-4 | July- August 2023
DOI: 10.53339/aimdr.2023.9.4.24
Page no- 197-202 | Section- Research Article (Medicine)

A Comparative Study of Bedside Index for Severity in Acute Pancreatitis (BISAP) and Acute Physiology and Chronic Health Evaluation II (Apache II) Score in Assessing the Severity of Acute Pancreatitis

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Received: 11 April 2023
Revised: 08 May 2023
Accepted: 23 May 2023
Published: 30 June 2023

Abstract

Background: Acute pancreatitis is a common gastrointestinal disorder with substantial burden on the healthcare system. Since 1974, various scores have been developed using clinical and radiological parameters to assess the severity of acute pancreatitis. BISAP and APACHE II score have been developed for evaluation and to assess the severity of patients with acute pancreatitis. To evaluate BISAP and APACHE II score of patients with acute pancreatitis, compare sensitivity and specificity of BISAP and APACHE II score and to see predictive accuracy of BISAP and APACHE II score to analyse severity in acute pancreatitis. **Material & Methods:** The study was conducted in the department of General Surgery, GGS Medical College and Hospital, Faridkot, on 40 diagnosed patients of acute pancreatitis. **Results:** The ROC analysis for organ failure showed BISAP score has AUC of 0.927, sensitivity of 100%, specificity of 75%, PPV of 30%, NPV 100% and diagnostic accuracy of 77.5%; whereas APACHE II score has AUC 0.983, sensitivity of 100%, specificity of 94.4%, PPV of 66.6%, NPV of 100% and diagnostic accuracy of 95%. The ROC analysis for pancreatic necrosis showed BISAP score has AUC of 0.882, sensitivity of 100%, specificity of 75%, PPV of 30.7%, NPV 100% and diagnostic accuracy of 77.5%; whereas APACHE II score has AUC 0.924, sensitivity of 100%, specificity of 77.7%, PPV of 33.3%, NPV of 100% and diagnostic accuracy of 80%. The ROC analysis for prediction of mortality has AUC (0.730, 0.735), sensitivity (66.6, 66.6%), specificity (73.53%, 79.41%), PPV (30.7%,33.6%), NPV(92.59%,93.1%)and diagnostic accuracy(72.5%, 77.5%), for BISAP and APACHEII scores, respectively. **Conclusion:** BISAP score was found to have sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy as close to APACHE II score in predicting the severity of acute pancreatitis. Even though APACHE II score is stronger to predict organ failure than BISAP but BISAP being simple, easy to calculate, economical and reliable can be used as preliminary tool to stratify patients and to manage accordingly for better outcome. Hence, using BISAP score, patients having probability of progressing to severe disease can be assessed earlv.

Keywords:- Acute pancreatitis, BISAP, APACHE II.

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INTRODUCTION

Acute pancreatitis is common disorder with substantial burden on the healthcare system.[1] Acute pancreatitis has variable clinical features ranging from mild self-limiting pain in epigastric region to severe, life threatening multi organ failure. Estimated prevalence rate in India was 7.9 per 100000.[2] Mortality due to pancreatitis is approximately 1%.[3] However, in severe pancreatitis mortality can be 30%– 40%.[4]

The assessment of severity is important because of quick progression of disease. Initial management includes adequate fluid replacement, correcting electrolyte imbalance and prevention of local & systemic complications but severe pancreatitis requires intensive monitoring of clinical parameters, specific therapeutic interventions, as early recognition of the severity of pancreatitis can improve survival and prognosis.

Many scoring systems have been developed clinically and radiologically like Ranson, Glasgow scoring system, simplified acute physiology score, Sequential organ failure assessment, Multiple organ dysfunction syndrome, Balthazar modified CT severity index score, Bedside index for severity in acute pancreatitis, Modified marshall scoring system.

APACHE II scoring system was formulated as an intensive care instrument, and requires multiple factors to assess severity of acute pancreatitis. APACHE II score developed by Knaus et al in 1985 constitutes 12 physiological variables. Score is calculated by assigning values 0-4 to all 12 variables. The score is composed of three parts:

1. Acute Physiological Score (0 to 60 points)
2. Age points (0 to 6 points)
3. Chronic health points (0 to 5 points).

Total score calculated ranges from 0 to 71. Patients with score more than 30 have 70% mortality.[5]

The Bedside Index for Severity in Acute Pancreatitis (BISAP) score was developed in 2008 to identify patients with higher risk of mortality.[6] BISAP consists of 5 parameters to assess the severity of acute pancreatitis which are: BUN , impaired mental status, systemic inflammatory response syndrome (SIRS), age > 60 years, and pleural effusion . BISAP is easy to work compared to other scoring systems.[7]

This study aims at evaluating the predictive value of BISAP scoring in comparison to APACHE II score.

Aims and Objectives

To evaluate BISAP and APACHE II score of patients with acute pancreatitis, compare sensitivity and specificity of BISAP and APACHE II score and to see predictive accuracy of BISAP and APACHE II score to analyse severity in acute pancreatitis.

MATERIAL AND METHODS

The present study was conducted in the department of General Surgery, GGS Medical College and Hospital, Faridkot, after approval by Hospital Ethical Committee.

All the patients with diagnosis of acute pancreatitis presenting to emergency of Guru Gobind Singh Medical College and Hospital were admitted after routine evaluation. 40 patients with diagnosis of acute pancreatitis were considered for the study. Cases were

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included and excluded in the study on the basis of exclusion and inclusion criteria. All patients with diagnosis of acute pancreatitis above 20 years and less than 60 years were included and patients with chronic pancreatitis and pancreatitis because of trauma were excluded from the study.

Detailed history was recorded. Detailed general physical examination and systemic examination was performed along with routine biochemical investigations and radiological investigations. Diagnosed patients were assessed by APACHE-II and BISAP scoring system to see severity and comparision between their sensitivity, specificity and positive predictive value was carried out and documented separately.

RESULTS

The age group of patients enrolled in this study ranges from 20 to 60 years. The peak incidence of the disease was noted in the 5th decade of life.

Out of 40 patients included in study 25 patients were male and 15 were female.

Male to female ratio was 1.6:1.

52% of male and 33% of female were from 5th decade of life.

History of consumption of alcohol and the possibility of it being the etiological factor were found in 47.5% patients. Gall stone disease was attributed in 40% patients. No cause could be attributed in rest of the 12.5 %patients.

On clinical presentation, 97.5% of patients were presented with abdominal pain as chief complain. Fever was the presenting symptom in 37.5% of the patients.

The length of hospital stay ranges from 1 day to 20 days. The mean length of hospital stay was 12.03 ± 6.8 days.

Table 1:

	Patients	Organ failure	Pancreatic Necrosis	Mortality
BISAP				
<3	27	0	0	2
>3	13	4	4	4
APACHE				
<8	23	0	0	2
>8	17	4	4	4

Out of 40 patients, 23 patients presented with mild acute pancreatitis and 17 patients presented with severe acute pancreatitis. Out of 17 with severe attack, 4 patients expired.

Out of 40 patients 27 patients had BISAP < 2 and 13 had BISAP >3. 4 Patients with BISAP >3 had organ failure and pancreatic necrosis. The outcome of organ failure and pancreatic necrosis correlates well with p value 0.008.

Out of 40 patients 23 patients had APACHE II <8 and 17 had APACHE II >8. 4 Patients with APACHE >8 had organ failure and pancreatic necrosis. The outcome of organ failure and pancreatic necrosis correlates well with p value 0.026.

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Here, 4 out of 13 patients with BISAP >3 and 4 out of 17 patients with APACHE II >8, developed organ failure. APACHE II score could predict organ failure with 95% accuracy and BISAP could predict organ failure with 77.5% accuracy.

Here, 4 out of 13 patients with BISAP >3 and 4 out of 17 patients with APACHE II >8, developed pancreatic necrosis. APACHE II score could predict pancreatic necrosis with 77.5% accuracy and BISAP could predict pancreatic necrosis with 80% accuracy. APACHE II score could predict pancreatic necrosis with better accuracy than BISAP.

Here 2 out of 27 patients with BISAP <2 and 2 out of 23patients with APACHE <8 died.

4 out of 13 patients with BISAP >3 and 4 out of 17 patients with APACHE II > 8 died.

APACHE score could predict mortality with 77.5% accuracy and BISAP could predict mortality with 72.5% accuracy. APACHE II score could predict mortality with better accuracy than BISAP.

All the 4 patients with BISAP score > 3 and APACHE >8, developed major organ failure.

Local complications like pancreatic necrosis developed in 10% patients.7.5% developed multi organ dysfunction dysfunction syndrome (MODS), 2.5% developed septicemia and 5% developed pulmonary edema and 2.5% developed acute respiratory distress syndrome (ARDS).

Of 4 deaths, all patients died of multi organ failure.

Out of 40 patients, there were 34 survivors and 6 non-survivors.

DISCUSSION

Acute pancreatitis is a common gastrointestinal disorder presents with clinical features that ranges from acute abdomen to multi organ failure.

In present study, the receiver operating characteristic curve (ROC) analysis for organ failure showed BISAP score has area under curve (AUC) of 0.927, sensitivity of 100%, specificity of 75%, PPV of 30%, NPV 100% and diagnostic accuracy of 77.5%; whereas APACHE II score has AUC 0.983, sensitivity of 100%, specificity of 94.4%, positive predicted value (PPV) of 66.6%, NPV of 100% and diagnostic accuracy of 95%. This correlates well with the study done by Papachristou et al,[1] where the ROC analysis for organ failure showed BISAP score has AUC of 0.81, specificity of 92.4%, PPV of 57.7%, NPV 84.3% and; whereas APACHE II score has AUC 0.78, specificity of 71.9%, PPV of 40%, negative predictive value (NPV) of 90.1%. The result obtained by Theerthegowda AN et al,[8] showed BISAP has sensitivity of 90.28%, specificity of 80.62%, PPV of 72.22%, NPV 93.69%; whereas APACHE II score has sensitivity of 84.72%, specificity of 93.2%, PPV of 87.17%, NPV of 91.60%.

In this study, out of 13 patients with BISAP score >=3 four patients developed necrosis and 4 patients out of 17 patients with APACHE II >= 8 developed pancreatic necrosis. The ROC analysis for pancreatic necrosis showed BISAP score has AUC of 0.882, sensitivity of 100%, specificity of 75.%, PPV of 30.7%, NPV 100%

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and diagnostic accuracy of 77.5%; whereas APACHE II score has AUC 0.924, sensitivity of 100%, specificity of 77.7%, PPV of 33.3%, NPV of 100% and diagnostic accuracy of 80%.This correlates with the previous study done by Papachristou et al,[1] where AUC was 0.78, specificity was 90.6%, PPV was 46.2%, NPV was 84.9% for BISAP; whereas APACHE II score has AUC 0.72, specificity of 68.5%, PPV of 29.2%, NPV of 90.1%.

In this study, out of 6 patients who expired, 4 had severe acute pancreatitis. All four deaths were predicted by BISAP score and APACHE II. The ROC analysis for prediction of mortality has AUC (0.730, 0.735), sensitivity (66.6, 66.6%),specificity (73.53%, 79.41%), PPV (30.7%, 36.3%), NPV (92.59%,93.1%) and diagnostic accuracy (72.5%, 77.5%), for BISAP and APACHEII scores, respectively. In a study done by Deepan jain et al,[9] BISAP score has 100% NPV in assessing severity and mortality, 100% sensitivity, 87.15% specificity, 68.75% PPV and APACHE II has 100%, 100%, 97.43%, 91.67% respectively which was comparable to present study.

In this study, 10%patients developed pancreatic necrosis (most common), 7.5% developed MODS, 2.5% developed septicemia and 10% developed other complications like ARDS, UI bleed, etc. These complications were more likely seen in patients with BISAP ≥ 3 and APACHE ≥ 8.

This result was comparable with study done by Bhattarai S et al where pancreatic necrosis (21%) was most common complication.[10]

In the present study, Acute pancreatitis was found to be more common in males (62.5%) than females (37.5%). This was comparable to study done by Banday IA et al where 66% patients were male and 34% were female.[11] In a study done by Baig SJ et al 73% of acute pancreatitis cases occurred in males.[12]

In the present study, most common etiological factor found was alcohol which was present in 47.5% cases, followed by gallstones(40%).The result obtained was comparable with study done by Bidarkundi et al,[13] where alcohol was identified as causative factor in 46.67%of cases.

In the present study, the most common clinical presentation in patients with acute pancreatitis was abdominal pain (97.5%), followed by fever (37.5%), vomiting (30%) & other manifestations.

The results obtained in our study were comparable to study done by KU Ahmed et al where abdominal pain was presenting symptom in 96% of patients with acute pancreatitis.[14]

The results obtained in our study showed higher percentage(42%) of patients progressing to severe acute pancreatitis compared to studies done earlier. In a study done by Leppäniemi et al 20-30% patients developed severe pancreatitis.[15]

CONCLUSIONS

APACHE II can predict severity and outcome better but BISAP holds strong place where prompt treatment is necessary, as easy to calculate, less time consuming.
BISAP ≥ 3 has significant correlation with prediction of organ failure and pancreatic necrosis.
BISAP score was found to have sensitivity, specificity, positive predictive value, negative

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predictive value and diagnostic accuracy as close to APACHE II score in predicting the severity of acute pancreatitis. Even though APACHE II score is stronger to predict organ failure than BISAP but BISAP being simple, easy to calculate, economical and reliable can be used as preliminary tool to stratify patients and to manage accordingly for better outcome.

Hence, using BISAP score, patients having probability of progressing to severe disease can be assessed early.

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Source of Support: Nil, Conflict of Interest: None declare