

COMPARATIVE STUDY OF BEDSIDE INDEX FOR SEVERITY IN ACUTE PANCREATITIS (BISAP) AND APACHE II SCORING SYSTEMS IN ASSESSING THE SEVERITY OF ACUTE PANCREATITIS

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ABSTRACT

Introduction: There is a significant strain on healthcare resources due to the prevalence of acute pancreatitis. Acute pancreatitis can cause a broad variety of symptoms, from moderate epigastric pain that goes away on its own to serious, life-threatening multiorgan failure.

Aim: The purpose of this study is to evaluate and contrast the predictive efficacy of two acute pancreatitis severity measures: the Bedside Index of Severity in Acute Pancreatitis (BISAP) and the Acute Physiology and Chronic Health Evaluation (APACHE) II.

Methods: This descriptive and comparative study was conducted in the Department of General Surgery at Sri Siddhartha Medical College and Hospital, Tumkur, to predict the severity of acute pancreatitis using the Acute Physiology and Chronic Health Evaluation (APACHE) II and the Severity in Acute Pancreatitis (BISAP). To find out how well BISAP and APACHE-II scores predict acute pancreatitis, we will use receiver operating curves (ROC) to calculate their area

under the curve (AUC), sensitivity, and specificity. Significant results were defined as P values less than 0.05.

Results:In conclusion, our study found that alcohol was the leading cause of acute pancreatitis (AP), affecting 66.7% of participants. around 81.5% of individuals had moderate AP, and around 18.5% had severe AP. While 53.3% of the individuals did not encounter any local difficulties, 46.7% did. The APACHE-II scoring system was far better than the BISAP score at predicting severe pancreatitis, and the death rate within the study group was 6.2%.

Keyword:BISAP, Acute pancreatitis, BISAP, APACHE II

1. INTRODUCTION

Acute pancreatitis is a prevalent ailment that significantly strains the healthcare infrastructure. The clinical manifestations of acute pancreatitis can vary greatly, ranging from moderate, self-limiting pain in the epigastric area to severe, potentially fatal multiorgan failure. In India, the estimated prevalence rate was 7.9 per 100,000 people. About 1% of deaths are related to pancreatitis. Death rates from severe pancreatitis, however, can range from 30% to 40%. The condition progresses quickly, making the assessment of severity crucial. The prevention of local and systemic complications, adequate fluid replacement, and electrolyte imbalance correction are all part of the initial management of pancreatitis. However, severe pancreatitis necessitates close monitoring of clinical parameters and targeted therapeutic interventions because early detection of pancreatitis severity can improve prognosis and survival.

Glasgow, Ranson, Simplified Acute Physiology Score, Balthazar Modified CT Severity Index Score, Bedside Index for Severity in Acute Pancreatitis, Ranson, and Modified Marshall are some of the clinical and radiological scoring systems that have been developed over the years. The Atlanta Classification has been the gold standard for AP severity classifications worldwide since its inception in 1992. The original Atlanta Classification had certain nebulous categories, especially "severity," which has been widely recognized as a problem over time. A primary focus of the 2012 revision to the Atlanta categorization was persistent organ failure.

Acute pancreatitis severity is assessed using the APACHE II grading system, which takes into account multiple criteria. Its primary function is in the field of critical care. The APACHE II score, which was created in 1985 by Knaus et al., depends on twelve different physiological factors. To calculate the score, a value between zero and four is assigned to each of the twelve variables. There are three sections to the score:

1. Score for Acute Physiology (0–60 points)
2. Points for age (0–6 points)
3. Points for chronic health (0 to 5 points).

The total score that is computed ranges from 0 to 71. More than thirty deaths had taken place in approximately 70% of the patients. To differentiate between patients who were at more risk of dying, a tool called Bedside Index for Severity in Acute Pancreatitis (BISAP) was formulated in 2008. SIRS, pleural effusion, age above 60, poor mental status, and BUN are the five markers under BISAP. Using the metrics, the severity of acute pancreatitis is assessed. The ease in comparison is made easier with BISAP in comparison to other ranking systems. This study was performed for an assessment of the predictive value of BISAP scoring related to the APACHE II score."

2. AIM

The purpose of this study is to compare and contrast the accuracy of two acute pancreatitis severity assessment tools: the Bedside Index of Severity in Acute Pancreatitis score and the Acute Physiology and Chronic Health Evaluation II.

3. OBJECTIVE OF THE STUDY

- To each patient with acute pancreatitis who is admitted will have their BISAP and APACHE II scores applied, and their progress will be continuously tracked.
- To ascertain the BISAP score system for evaluating the acute pancreatitis severity predictability
- To ascertain the APACHE II score system for evaluating the acute pancreatitis severity predictability

- To evaluate the severity of acute pancreatitis using the BISAP and APACHE II scoring systems.

4. RESEARCH METHODOLOGY

Using 81 patients with acute pancreatitis, this descriptive study compared the predictive power of the BISAP and APACHE-II grading systems. APACHE-II demonstrated better predictive performance, elevating it to a more dependable instrument for early identification and treatment.

4.1. Study Design and Setting

In respect of the permission given from the institutional ethical council of Sri Siddhartha Medical College and Hospital, this research was conducted by the General Surgery Department, Tumkur. Primarily, we want to see how well the Bedside Index for Severity in Acute Pancreatitis (BISAP) and the Acute Physiology and Chronic Health Evaluation (APACHE-II) can predict outcomes.

4.2. Study Participants

Patients of either gender 18 years of age and older who had abdominal tenderness, elevated serum levels of lipase and or amylase level were 3 times the normal amount, radiological presentation suggested acute pancreatitis, or patient's clinical suspicion suggested inclusion in the study. The main reason for exclusion was: known hereditary pancreatitis, known chronic pancreatitis, known cancer of the pancreas or history of previous surgical operations on the pancreas. Every study participant gave written consent after informed consent.

4.3. Sampling and Sample Size

Consecutive sampling was employed to enroll 81 participants during the study period, calculated based on the proportion of acute pancreatitis cases (75%), the sensitivity of APACHE-II (88.56%), an error margin of 8%, and a 95% confidence interval.

4.4. Study Procedure

A pre-validated proforma was used for data collection, which included demographic information, medical history, and results. The projected accuracy of both the BISAP and APACHE-II scoring systems was evaluated by following the patient's clinical development after they had their scores

determined. Hospital and intensive care unit stays, death, SIRS, local complications, pancreatitis severity, and other outcomes were evaluated.

4.5. Data Analysis

Sociodemographic analysis revealed a male predominance (71.6%), with the majority aged 41–60 years (50.6%). Alcohol was the leading etiology (66.7%), and most cases (81.5%) experienced mild acute pancreatitis. Local complications occurred in 46.7% of patients, SIRS in 34.5%, and mortality was 6.2%. The mean durations of hospital and ICU stays were 8.4 and 11.5 days, respectively.

4.6. Comparison of Scoring Systems

APACHE-II demonstrated superior predictive accuracy (AUC: 0.943, sensitivity: 91.7%, specificity: 86.3%) compared to BISAP (AUC: 0.740, sensitivity: 72.4%, specificity: 69.1%). These findings highlight the greater reliability of APACHE-II in identifying severe pancreatitis, supporting its utility for early detection and clinical management.

5. DATA ANALYSIS

The study involved 81 participants with a diverse sociodemographic profile. The age distribution revealed that the majority were between 41-60 years old (50.6%), followed by those under 40 years (28.4%), and those over 61 years (20.9%). There was a predominance of male participants, accounting for 71.6%, while females comprised 28.4%. Diabetes accounted for 48.2% of comorbidities, with hypertension (33.3%), coronary artery disease (CAD) (16.1%), and chronic kidney disease (CKD) (11.1%) following closely behind. The participants' average body mass index (BMI) was 24.5, with a standard deviation of 4.4, suggesting that the group's BMI values varied. In terms of aetiology, alcohol was the predominant cause of acute pancreatitis (AP), affecting 66.7% of participants. Biliary causes accounted for 20.9%, while hypertriglyceridemia and other causes were less common at 2.5% each. A small percentage of cases were idiopathic (7.5%). The severity of acute pancreatitis was assessed, revealing that 81.5% of participants experienced mild AP, while 18.5% had severe AP.

Table 1: Sociodemographic distribution of the study participants (N=81)

Characteristics	Subcategory	Percentage (%)
Age Group	<40 years	28.4
	41 – 60 years	50.6
	>61 years	20.9
Sex	Male	71.6
	Female	28.4
Co-morbidities	Hypertension	33.3
	Diabetes	48.2
	CAD	16.1
	CKD	11.1
BMI	Mean (SD)	4.4
Aetiology	Biliary	20.9
	Alcohol	66.7
	Hypertriglyceridemia	2.5
	Idiopathic	7.5
	Others	2.5
Severity	Mild AP	81.5
	Severe AP	18.5

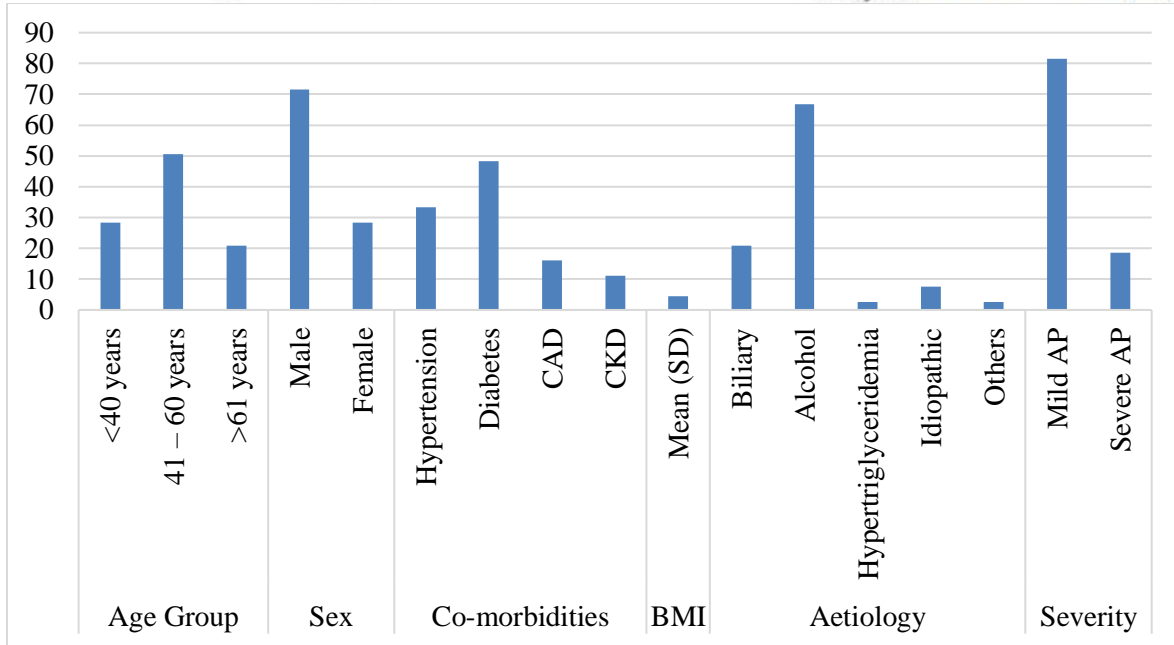


Figure 1: Graphical Representation of Sociodemographic distribution of the study participants (N=81)

The study analyzed outcomes among 81 participants with acute pancreatitis, focusing on local complications, systemic inflammatory response syndrome (SIRS), hospital and ICU stay durations, and mortality. Local complications were observed in 46.7% of the participants, while 53.3% did not experience any such complications. A significant portion of the cohort (34.5%) developed SIRS, whereas 65.5% did not. The average duration of hospital stay was 8.4 days, with a standard deviation of 2.4 days, indicating variability in the length of hospitalization among patients. Intensive Care Unit (ICU) stays averaged 11.5 days, with a standard deviation of 4.7 days, reflecting the critical nature and extended care required for some patients. The mortality rate within the study group was 6.2%, with 5 patients succumbing to their condition, while the majority (93.8%) survived.

Table 2: Distribution of outcome across the study participants (N=81)

Characteristics	Subcategory	Percentage (%) / Mean (SD)
Local Complications	Yes	46.7
	No	53.3
SIRS	Yes	34.5
	No	65.5
Hospital Days	Mean (SD)	2.4
ICU Days	Mean (SD)	4.7
Death	Yes	6.2
	No	93.8
APACHE - II	Mean (SD)	1.5
BISAP	Mean (SD)	0.9

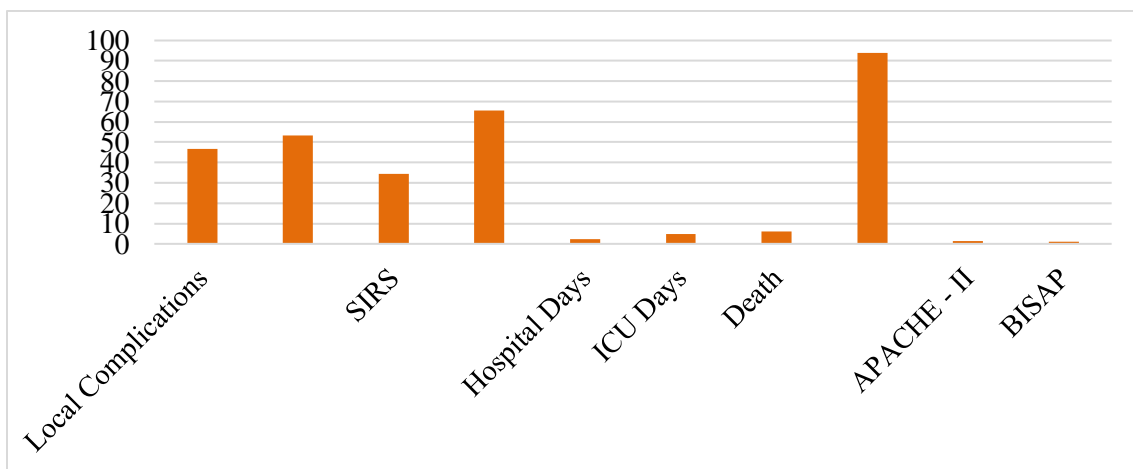


Figure 2: Graphical Representation of Distribution of outcome across the study participants (N=81)

Using 81 subjects, the research evaluated the BISAP and APACHE-II grading systems for severe pancreatitis prediction. The APACHE-II score had better predictive accuracy (AUC=0.943, sensitivity=91.7%, and specificity=86.3%), whereas the BISAP score had inferior predictive performance (AUC=0.740, sensitivity=72.4%, and specificity= 69.1%). Based on these findings, the APACHE-II scoring system outperforms the BISAP score in predicting the severity of pancreatitis. With its high sensitivity and specificity, APACHE-II is a trustworthy tool for identifying patients at risk of acute pancreatitis and managing them appropriately. This could result in improved clinical outcomes and more efficient use of healthcare resources.

Table 3: Comparison of predictive AUC values of BISAP and APACHE-II in predicting severe pancreatitis (N=81)

Characteristics	AUC	Sensitivity	Specificity
APACHE-II	0.943	91.7	86.3
BISAP	0.740	72.4	69.1

6. DISCUSSION

It produces acute pancreatitis (AP), which is an inflammatory condition of the pancreas that may develop to MODS and SIRS, by triggering the premature activation of pancreatic enzymes. Most are mild; however, 20–25% of cases advance to severe forms that necessitate critical care. In this study, it was evaluated if BISAP and APACHE II scoring systems were useful predictors for the severity of patients diagnosed with AP at Sri Siddhartha Medical College, Tumkur. The biggest share was ascribed to alcoholism (66.7%). Among the comorbid diseases, diabetes was the most frequent comorbidity, whereas more males were affected by it. Out of participants, SIRS was noticed in 34.5%, and local issues occurred in 46.7% of them. With a 6.2% death rate, the study found that 18.5% of the patients had severe AP. Because of the severity of severe cases, the average number of days in the hospital and intensive care unit was 8.4 and 11.5 days, respectively.

The APACHE II scoring system demonstrated superior predictive accuracy (AUC: 0.943) compared to BISAP (AUC: 0.740), with higher sensitivity (91.7%) and specificity (86.3%). APACHE II's comprehensive assessment of physiological and biochemical parameters provided better insights into systemic complications like MODS and renal impairment, making it particularly effective for alcohol-induced pancreatitis. BISAP, though simpler and quicker, showed limitations in capturing the full extent of physiological derangements. The study recommends the widespread adoption of APACHE II in resource-rich settings and the use of BISAP in emergencies or resource-limited environments. Further research on biomarkers and cost-effectiveness studies is advised to enhance early detection and improve patient outcomes.

7. CONCLUSION

Finally, 66.7% of individuals developed acute pancreatitis (AP) due to alcohol. As for the severity of the condition, 81.5% of participants had mild AP and 18.5% had severe AP. Nearly half of the individuals (46.7%) reported local problems, while nearly half (53.3%) reported no such issues at all. Compared to the BISAP score, the APACHE-II scoring system was much better at predicting severe pancreatitis, and the study group had a 6.2% mortality rate. Therefore, in order to make these score systems more accurate predictors, future studies should look into other biomarkers. Considering the potential benefits of early intervention and reduced morbidity and mortality, studies should also assess the cost-effectiveness of deploying these technologies in diverse healthcare settings.

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