



## COMPARATIVE STUDY BETWEEN RANSON'S SCORE AND BISAP SCORE IN PREDICTING THE SEVERITY OF ACUTE PANCREATITIS

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### ABSTRACT

**Background and Objectives:** To assess the accuracy of BISAP scoring system vs Ranson's scoring system in predicting the Severity in an attack of acute pancreatitis.

**Methods:** The proposed study was a comparative study conducted in the Department of Surgery, JJM medical college and Bapuji Hospital, Davangere over a time period of 19 months from NOVEMBER 2016 to MAY 2018. 80 patients were included in the study who were diagnosed and admitted with acute pancreatitis based on clinical examination, biochemical and radiological investigations. In all 80 patients, BISAP score is calculated within 24 hours of admission and in the same patient Ranson's score is also calculated within 48 hours of admission and in both the scores, the severity of acute pancreatitis is determined and both scores are compared. We compared the accuracy of Ranson's scoring and BISAP system in predicting the severity of acute pancreatitis.

**Results:** p value of this study is 0.000 which is statistically significant.

**Interpretation and Conclusion:** BISAP score is equally effective in predicting the severity in patients with acute pancreatitis as Ranson's score. Every surgeon should first consider using BISAP score to assess severity of AP.

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### INTRODUCTION

Acute pancreatitis is an acute inflammation of the pancreas is an increasingly common abdominal disorder presenting as major surgical challenge<sup>1</sup> to general surgeons worldwide.<sup>2</sup> It is a complex process which varies from mild self-limiting inflammation to rapidly deteriorating condition<sup>3</sup> which poses a serious threat to life.<sup>4</sup> Acute pancreatitis has incidence of around 2.29%.<sup>5</sup> Based on severity, acute pancreatitis can be acute edematous; acute persistent; or acute hemorrhagic necrotizing.<sup>3</sup> Early identification of patients at risk of developing a severe attack has great importance for instituting therapeutic interventions and improved outcome.<sup>6</sup> About 10 and 20% of patients experience a Severe Attack of acute Pancreatitis (SAP)<sup>4</sup>; the rate of mortality in SAP is about 20% of all cases of acute pancreatitis.<sup>3</sup>

Accurate prediction of severity is important in order to improve survival. There are several assessment criteria in order to predict prognosis and severity of acute pancreatitis, which help in guiding patient triage and management.<sup>4</sup> However, nothing has been proven so far to perform significantly better in clinical settings than good clinical judgment.<sup>7</sup> Ideal predicting criteria should, therefore, be simple, non-invasive, accurate and quantitative and assessment tests are easily available.<sup>4</sup>

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Acute pancreatitis has widely variable clinical and systemic manifestations spanning the spectrum from a mild, self-limiting episode of epigastric pain to severe, life-threatening, multiorgan failure<sup>1</sup>.

Gall stones and alcoholism together account for 80% of acute pancreatitis. But recent studies show alcoholism as being the main aetiological factor causing acute pancreatitis. Patients with mild pancreatitis have a mortality rate of less than 1%, but in severe pancreatitis, this increases up to 10% to 30%.<sup>3</sup>

The most important determinant of the ultimate outcome is the presence or absence of local pancreatic complications like pancreatic necrosis and abscesses and systemic complications like multiorgan failure.<sup>2</sup> The most common cause of death in patients with severe pancreatitis is multiorgan dysfunction syndrome.

The Ranson's score, modified Glasgow score and APACHE II are amongst many scoring systems employed for assessment of the severity of acute pancreatitis and have been most widely used in clinical practice since 1980s.<sup>8</sup> However, these methods have important limitations. The Ranson's score and modified Glasgow score contain data not routinely collected at the time of hospitalization and require 48 hours to complete.<sup>9</sup> Ranson's score is accurate at extreme of scores (< 3 predicts survival and > 6 predicts death) but not at intermediate scores.<sup>3</sup> Recently, a new scoring system has been developed and validated to address these issues. This system of BISAP

(Bedside Index for Severity in Acute Pancreatitis) helps to identify patients at increased risk of mortality prior to the onset of organ failure.<sup>7,10</sup> BISAP score is accurate and reliable means of classifying patients with acute pancreatitis for clinical care and research.<sup>7</sup> This system is simpler than the Ranson's score and APACHE II screening and predictive accuracy of BISAP score did not differ significantly from that of the APACHE II score.<sup>10</sup>

BISAP scoring system offers an uncomplicated and quick assessment of disease severity on admission and there was significant trend towards higher mortality with increasing BISAP score, thus it will furnish valuable information in this regard and will help improve the management of these patients. The aim of study, therefore, was to investigate the prognostic significance of BISAP score in patients with acute pancreatitis and to compare the accuracy of Ranson's and BISAP scoring system in predicting the severity of disease.

## REVIEW OF LITERATURE

Pancreas lies in the retro-peritoneum just anterior to the first lumbar vertebrae and is anatomically divided into four portions, the head, neck, body and tail<sup>11</sup>. Pancreas develops from dorsal and ventral pancreatic buds<sup>12</sup>. Human pancreas has both exocrine and endocrine functions<sup>13</sup>.

Approximately 80% of cases of acute pancreatitis are associated with cholelithiasis or sustained alcohol abuse<sup>14</sup>. The cardinal symptom of AP is epigastric and/or periumbilical pain that radiates to the back. Up to 90% of patients have nausea and/or vomiting that typically does not relieve the pain. The nature of the pain is constant<sup>14</sup>.

### Scoring systems in acute pancreatitis

- Knaus *et al*, 1985, proposed the APACHE-II scoring system.<sup>15</sup>
- Balthazar E.J. *et al*, 1990, showed the value of CT in establishing prognosis of acute pancreatitis.<sup>16</sup>
- Atlanta Symposium, 1992, proposed a clinically based classification system for acute pancreatitis.<sup>17</sup>
- Recently, in 2008, B.U. Wu, Johannes R.L *et al*, developed a new scoring system and validated it to address these issues. This system of BISAP (Bedside Index for Severity in Acute Pancreatitis) helps to identify patients at increased risk of mortality prior to the onset of organ Failure<sup>18</sup>. BISAP score is accurate and reliable means of classifying patients with acute pancreatitis for clinical care and research. This system is simpler than the Ranson's score and APACHE II screening and predictive accuracy of BISAP score did not differ significantly from that of the APACHE II score<sup>18</sup>.

## METHODS

**Study Design:** Comparative Study

**Sample Size:** 80

**Timeline of the Study:** 19 months from NOVEMBER 2016 to MAY 2018

**Source of data:** All patients admitted to CG Hospital and Bapuji Hospital, attached to JJM Medical College, Davanagere with complaints of pain abdomen and diagnosed to have Acute

Pancreatitis on clinical examination and biochemical and radiological investigations.

- Consent was taken from all patients.
  - Demographic data: Name, Age, Sex, IP No., Address were recorded
- Diagnosis of Acute pancreatitis:
- Characteristic abdominal pain.
  - Increased levels of Serum amylase and/or lipase 3 times the normal value.
  - Ultrasonography of the abdomen within first 7 days of hospitalization demonstrating bulky edematous pancreas.

### Inclusion Criteria

- Patients with history and clinical findings suggestive of acute pancreatitis with evidence of bulky edematous pancreas on USG or CT abdomen.

### Exclusion Criteria

- Patients with Chronic pancreatitis
- Patients with No evidence of Bulky edematous pancreas on USG or CT abdomen
- Patients with evidence of Gallstone-induced ( Biliary) Pancreatitis
- Patients with other pre-existing co-morbid conditions like cardiac failure ,liver failure, renal failure or any lung pathology

### Components of Ranson's scoring system for Non-biliary (Alcoholic) Acute Pancreatitis

1. On Admission
  - Age > 55 years
  - WBC count > 16000 cells /mm<sup>3</sup>
  - Random Blood Sugar > 200 mg/dL
  - AST > 250 IU / L
  - LDH > 350 IU / L
2. Within 48 hours of admission
  - Hematocrit decrease >10%
  - BUN increase >5mg/dL
  - Base deficit >4 mEq/L
  - Fluid replacement >6 litres
  - Pao<sub>2</sub> <60 mmHg
  - Calcium <8 mg/dL

One point is given for each positive parameter for a maximum score of 11.

Sum of all the points within 48 hours of admission is taken as Ranson's score.

### Interpretation of Ranson's score :

- If the score  $\geq 3$ , severe pancreatitis likely.
  - If the score < 3, severe pancreatitis is unlikely
- OR
- Score 0 - 2 : 2% mortality
  - Score 3 - 4 : 15% mortality
  - Score 5 - 6 : 40% mortality
  - Score 7 or more : 100% mortality

### Components of BISAP scoring system

- BUN ( Blood Urea Nitrogen ) > 25 mg/dl
- Impaired mental status (Glasgow Coma Scale Score < 15)

- SIRS- Systemic Inflammatory Response Syndrome
- Age > 60 years
- Pleural effusion detected on imaging

**SIRS is defined as 2 or more of the following**

- Temperature of < 36 or > 38 ° C
- Respiratory rate > 20 breaths/min or PaCO2 < 32 mm Hg
- Pulse > 90 beats/min
- WBC < 4,000 or >12,000 cells/mm3 or >10% immature bands
- One point is assigned for each variable within 24 hrs of presentation
- Sum of all the points within 24 hours of admission is taken as BISAP score.

**Interpretation of BISAP score**

- 0-2 : Mild pancreatitis
- 3 or more: Severe pancreatitis with substantially increased risk for in-hospital mortality.

Each patient will undergo all the above investigations. With those results, BISAP score is calculated within 24 hours of admission and in the same patient Ranson’s score is also calculated within 48 hours of admission and in both the scores, the severity of acute pancreatitis is determined and both scores are compared.

**RESULTS**

Mean age in this study was 38.46 years with a minimum of 16 years and maximum of 78 years, standard deviation was 14.413. Out of the 80 patients in study, 76 (95%) were male and 4 (5%) were female. Male: Female ratio was 19:1.

11 (13.8 %) patients had BISAP score 0, 22 (27.5%) patients had BISAP score 1 , 28 (35%) patients had BISAP score 2 which was the most common score in the study, 14 (17.5%) patients had BISAP score 3, 5 (6.3%) patients had BISAP score 4 , which was the highest BISAP score in the study , within 24 hours of admission. 61 (76.25% ) patients had mild pancreatitis and 19 (23.75%) patients had severe acute pancreatitis according to BISAP score calculated within 24 hours of admission.

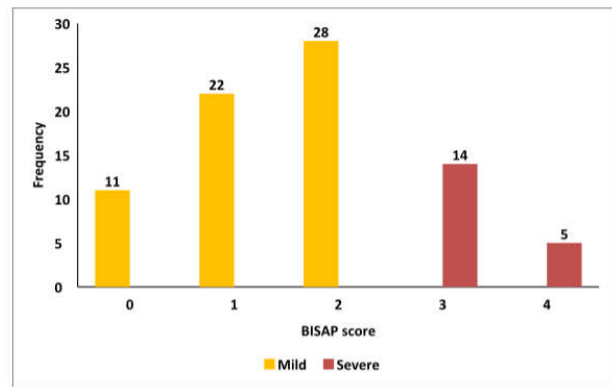
**Table 1** Comparative analysis between Ranson’s score and BISAP score

RANSON score	BISAP Score		Total	p value
	< 2	> 2		
< 2	58	1	59	0.000
> 2	3	18	21	
	4.9%	94.7%	26.25%	
Total	61	19	80	
	100.0%	100.0%	100.0%	

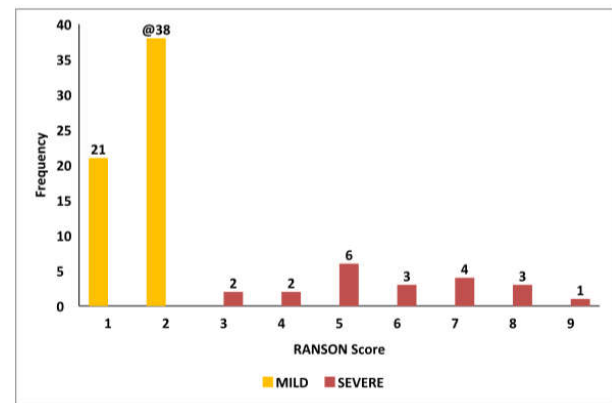
21 (26.3%) patients had Ranson’s score 1, 38 ( 47.5%) patients had Ranson’s score 2 which was the most common score in the study, 2 (2.5%) patients had Ranson’s score 3, 2 (2.5%) patients had Ranson’s score 4, 6 (7.5%) patients had Ranson’s score 5, 3 (3.8%) patients had Ranson’s score 6, 4 (5%) patients had Ranson’s score 7, 3 (3.8%) patients had Ranson’s score 8, 1 (1.3%) patient had Ranson’s score 9, which was the highest Ranson’s score in the study, within 48 hours of admission. 59 (73.75%) patients had mild pancreatitis and 21 (26.25%) patients had severe acute pancreatitis according to Ranson’s score calculated within 48 hours of admission.

**Table 2** Score-wise comparison between Ranson’s score and BISAP score

RANSON score	BISAP SCORE					Total	p value
	0	1	2	3	4		
1	7	7	7	0	0	21	0.000
	63.6%	31.8%	25.0%	0.0%	0.0%	26.3%	
2	4	13	20	0	1	38	
	36.4%	59.2%	71.4%	0.0%	20.0%	47.5%	
3	0	1	0	1	0	2	
	0.0%	4.5%	0.0%	7.1%	0.0%	2.5%	
4	0	0	1	1	0	2	
	0.0%	0.0%	3.6%	7.1%	0.0%	2.5%	
5	0	0	0	5	1	6	
	0.0%	0.0%	0.0%	35.7%	20.0%	7.5%	
6	0	0	0	2	1	3	
	0.0%	0.0%	0.0%	14.3%	20.0%	3.8%	
7	0	1	0	2	1	4	
	0.0%	4.5%	0.0%	14.3%	20.0%	5.0%	
8	0	0	0	2	1	3	
	0.0%	0.0%	0.0%	14.3%	20.0%	3.8%	
9	0	0	0	1	0	1	
	0.0%	0.0%	0.0%	7.1%	0.0%	1.3%	
Total	11	22	28	14	5	80	
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	



**Figure 1** BISAP – Score wise pancreatitis severity distribution



**Figure 2** RANSON’s score –wise pancreatitis severity distribution

**DISCUSSION**

Acute Pancreatitis (AP) is a major surgical challenge and assessment of severity of acute pancreatitis is important for early identification of patients at increased risk of complications and mortality<sup>1,4</sup> and also in improving outcome. The clinical presentation varies from case to case, depending on severity of acute pancreatitis and any underlying co-morbidities. A patient may present with minor complaints of pain epigastrium on one extreme and multi-organ system failure on the other end.<sup>1,4</sup> Mild acute pancreatitis presents

with minimal organ dysfunction and an uneventful recovery, while severe acute pancreatitis is associated with local and systemic complications and higher mortality.<sup>1,4</sup> Thus, it is important to identify patients having severe disease.

The ideal predictor of the severity of AP is described as being simple, highly sensitive, highly specific, safe, reproducible and cheap and can be rapidly performed.<sup>6</sup> The nature and purpose of this research work was to assess the predictive accuracy of BISAP score in finding out the frequency of severity in patients with acute pancreatitis, by comparing it with Ranson's score.

The present study was conducted on 80 cases, admitted to CG Hospital and Bapuji Hospital, attached to JJM Medical College, Davanagere, from the period of November 2016 to May 2018 with complaints of pain abdomen and diagnosed to have Acute Pancreatitis on clinical examination and biochemical and radiological investigations. In all patients, BISAP score is calculated within 24 hours of admission and in the same patient Ranson's score is also calculated within 48 hours of admission and in both the scores, the severity of acute pancreatitis is determined and both scores are compared. An attempt was also made to compare this study with previous similar studies done by others.

In our study, the mean age of patients was 38.46 years (range 16 to 78 years) with maximum number (n=24) of patients in age group of 31-40 years (30%) and n=19 in the age group of 21 - 30 years (23.8%). In Shabbir *et al*<sup>19</sup> study, the mean age was 46.89 ± 15.75 years with the minimum being 17 years, maximum being 81 years (range 17 - 81), which correlates closely with the present study. No age group was found immune to this disease, however, relatively middle age population is more frequently affected. In this study, most of the patients (30%) were in the 4th decade of life which supports the study conducted by Kaya *et al.* in Turkey.<sup>23</sup>

Out of the 80 patients in present study, 76 (95%) were male and 4 (5%) were female. Male: Female ratio was 19:1. This is in conformity with the study undertaken at Chennai, India in 2015 by J.Lalithkumar *et al*<sup>24</sup> where male: female ratio was 10:1. But, female predominance has been reported by most other studies in other parts of the world, which is not in conformity with this study.<sup>25,26</sup> This might probably be due to higher consumption of alcohol mostly by men in this part of India compared to other parts of the world where women also predominantly consume alcohol, which is the most common etiological factor for acute pancreatitis.

The p value of age-wise sex distribution was 0.346 which shows that there is no significant association between Age and sex regarding the incidence of acute pancreatitis.

The incidence of severe pancreatitis in this study was 26% which was higher than reported elsewhere (11.9%).<sup>25, 26</sup> Similar incidence (27.5%) was also reported in study conducted in Thailand and Heredia.<sup>27</sup> One possible reason for higher incidence of severe acute pancreatitis in this study is that it is a tertiary care hospital having better intensive care facility and it receives more referrals of patients from periphery with severe acute pancreatitis.

Out of 80 patients in present study, 61 (76.25%) patients had mild pancreatitis and 19 (23.75%) patients had severe acute pancreatitis according to BISAP score calculated within 24 hours of admission and 59 (73.75%) patients had mild

pancreatitis and 21 (26.25%) patients had severe acute pancreatitis according to Ranson's score calculated within 48 hours of admission. In J.Lalithkumar *et al*<sup>24</sup> study, out of 100 patients, 86 patients were diagnosed to have mild acute, and 14 patients found to have severe acute pancreatitis and all the 14 patients were correctly predicted by BISAP score. This is in conformity with our study in which out of 80 patients, BISAP score has correctly predicted 19 cases of severe acute pancreatitis. Due to the high mortality associated with severe acute pancreatitis, severe pancreatitis needs ICU admission and easy availability of better intensive care facility is needed in every tertiary care hospital to monitor severe pancreatitis patients, so that mortality can be minimized.

In this study, we compared the accuracy of Ranson's scoring system and the new BISAP system in predicting the severity of acute pancreatitis. p value of this present comparative study is 0.000 which is statistically significant.

One limitation of Ranson's criteria is that other scoring systems are superior in either sensitivity or specificity. The second limitation is that the score and severity of acute pancreatitis cannot be determined until 48 hours have passed since admission. This limits its utility in time-sensitive situations like the emergency department. Also there are 11 parameters, which makes it difficult to use conveniently.

The newly proposed BISAP index is an accurate means of stratifying patients with acute pancreatitis, within 24-hour from admission.<sup>28</sup> In this study, the BISAP score performed similar to the Ranson's scoring system. Thus, it is proved that BISAP score is equally effective to Ranson's score in predicting severity in patients with acute pancreatitis. BISAP scoring system can be used at any time and is utilized by emergency medicine physicians. This is in conformity with the studies conducted in Pakistan<sup>19</sup> and China.<sup>20</sup>

## CONCLUSION

Acute pancreatitis runs an unpredictable course. The early prediction of the severity of an acute attack has important implications for management and timely intervention. From this study, No age group was found immune to this disease, however, relatively middle age population is more frequently affected. The most common age groups of patients affected were in 4th decade of life. Males were more commonly affected than females with a ratio of 19:1 probably due to higher alcohol consumption by men compared to women in this part of India. Mild acute pancreatitis presents with minimal organ dysfunction and an uneventful recovery, while severe acute pancreatitis is associated with local and systemic complications and higher mortality, thus it is important to identify patients having severe disease. The incidence of severe pancreatitis in this study was 26% which was higher than reported elsewhere. In this study, the BISAP score performed similar to the Ranson's scoring system in assessing severity.

Thus it is proved that BISAP score is equally effective in predicting the severity in patients with acute pancreatitis as Ranson's score. Moreover, its components are easily available and it does not require 48 hours for completion of assessment as compared to Ranson's score. It is an accurate tool to classify patients into mild and severe disease; it is easy to perform and can be done on the bedside of patients with acute pancreatitis in every setup. Ranson's score is more time consuming, needs

48 hours from admission for calculation and is more expensive as it involves 11 investigations. Whereas BISAP is a simple bedside evaluation involving only 5 variables, can be done within 24 hours of admission, cost-effective and a quick rapid analysis of severity of acute pancreatitis can be made in the emergency setting. Every surgeon should first consider using BISAP score in evaluating the severity of acute pancreatitis, so that immediate rapid stratification of severity can be done without any delay and adequate appropriate treatment can be initiated based on the severity, so that mortality associated with severe acute pancreatitis can be prevented.

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