ORIGINAL ARTICLE

# Comparison of BISAP Score with Ranson's Score in Determining the Severity of Acute Pancreatitis

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## Abstract

**Objective:** To determine the accuracy of BISAP score in finding out the frequency of severity and mortality in patients with acute pancreatitis by comparing it with Ranson's score.

**Study Design:** Crosse-sectional study.

**Place and Duration of Study:** Department of Surgery, Pakistan Institute of Medical Sciences, Islamabad, from April to December 2010.

**Methodology:** A total of 80 patients who presented in emergency with acute pancreatitis were included by consecutive non probability sampling technique. Cases of acute pancreatitis were classified as mild or severe based on the organ failure criteria and/or local complications according to the Atlanta Symposium. All patients were scored according to both Ranson's score and BISAP score.

**Results:** Out of 80 patients, 35 (44%) were males and 45 (56% ) were females. The mean age was 46.89 ± 15.75 years. Twenty five patients (31.25%) were classified as severe acute pancreatitis and 3 patients (3.75%) had evidence of pancreatic necrosis on CT scan. The duration of hospital stay was 1 - 54 days with a mean of 13.12 ± 12.83 days and mortality rate was 5%. The number of patients with a BISAP score of ≥ 3 was 15 and Ranson's score ≥ 3 was 25. The observed incidence of severe disease stratified by the BISAP score has ($p < 0.001$) and by Ranson's score has ($p < 0.001$). In regards to mortality, patients having BISAP score ≥ 3 has p=0.003, while patients having Ranson's score ≥ 3 has p=0.002, both are statistically significant.

**Conclusion:** The newly proposed BISAP score is a simple and accurate tool for severity stratification and is equally effective in finding out frequency of severity and in turns mortality in patients with acute pancreatitis as Ranson's score.

**Key Words:** *Acute pancreatitis. Triage. Prognosis. APACHE. BISAP score. Ranson's score. Mortality.*

## INTRODUCTION

Acute pancreatitis is an acute inflammation of the pancreas is an increasingly common abdominal disorder presenting as major surgical challenge[1] to general surgeons worldwide.[2] It is a complex process which varies from mild self limiting inflammation to rapidly deteriorating condition[3] which poses a serious threat to life.[4] Acute pancreatitis has incidence of around 2.29%.[5] Based on severity, acute pancreatitis can be acute edematous; acute persistent; or acute hemorrhagic necrotizing.[3] Early identification of patients at risk of developing a severe attack has great importance for instituting therapeutic interventions and improved outcome.[6]

About 10 and 20% of patients experience a Severe Attack of acute Pancreatitis (SAP)[4]; the rate of mortality in SAP is about 20% of all cases of acute pancreatitis.[3] 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.[4] However, nothing proven to perform significantly better in clinical settings than good clinical judgment.[7] Ideal predicting criteria should, therefore, be simple, non-invasive, accurate and quantitative and assessment tests are easily available.[4]

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.[8] 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.[9] Ranson's score is accurate at extreme of scores (< 3 predicts survival and > 6 predicts death) but not at intermediate scores.[3] 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.[7,10] BISAP score is accurate and reliable means of classifying patients with acute pancreatitis for clinical care and research.[7] 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.[10]

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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.

## METHODOLOGY

This cross-sectional study was conducted in Department of Surgery, Pakistan Institute of Medical Sciences (PIMS), Islamabad, from April to December 2010. Prior permission was obtained from the ethical committee of the hospital to carry out the study. Eighty patients were collected by consecutive non probability sampling technique. All acute pancreatitis patients of either gender over 14 years of age reporting to accident and emergency department were included in the study. Patients not consenting to participate in the study and who have known pre-existing disorders of renal, respiratory or cardiovascular systems were excluded from study. Data was collected through proforma. Patients fulfilling the inclusion criteria were included in the study. Informed consent was taken from all the patients. The patients were assessed by adequate history, thorough examination and investigations. Blood samples for determination of blood sugar level, TLC count, ALT, LDH and hematocrit levels, blood urea nitrogen, serum calcium, arterial blood gases analysis for $PaO_2$ and base deficit estimation and Plain X-rays chest in all patients, other investigations such as ultrasound abdomen, CT scan abdomen where indicated. All patients were scored according to both Ranson's score and BISAP score. BISAP was scored on a scale of 0 - 5, based on how many of the following characteristics the patient had within 24 hours of presentation: blood urea nitrogen level > 25 mg/dL, impaired mental status, systemic inflammatory response syndrome, age > 60, and pleural effusion on imaging studies. The BISAP score was calculated using data from the first 24-hour from admission and the Ranson's score using data from the first 48-hour. Patients were classified as mild AP or severe AP, based on the presence of organ failure for more than 48-hour. Organ failure included shock (systolic blood pressure < 90 mm Hg), pulmonary insufficiency (arterial $PO_2$ < 60 mmHg at room air or the need for mechanical ventilation), or renal failure (serum creatinine level > 2 mg / dl). Patients with acute edematous pancreatitis are managed in general ward while those with severe disease (Ranson and BISAP score > or =3) are admitted to high dependency unit or intensive care unit. All patients were managed according to standard management protocols and monitored till discharge for outcome.

All the data was subjected to statistical analysis to measure the objectives. SPSS version 10 was used for analysis and various descriptive statistics were used to calculate ratios, frequencies, percentages, median, means and standard deviation. Tables were used for data presentation, while the categorical data such as gender and comparison of BISAP score with Ranson's score and patient outcome etc. will be expressed as frequency and percentages using chi-square test/ Fisher's exact test. P-value of < 0.05 was taken as significant.

## RESULTS

A total of 80 patients (n=80) with Acute Pancreatitis (AP) received in accident and emergency department of PIMS were accessed during 9 months period. Data within 24 hours from the initial admission were collected in all patients and used for the calculation of the BISAP and Ranson's score on admission, again data was collected at 48 hours for completion of Ranson's score.

The mean age was 46.86 ± 15.75 years with the minimum being 17 years, maximum being 81 years (range 17 - 81), with 43.75% male (n=35) and 56.25% female (n=45) with male to female ratio of 1:1.2. All patients presenting with features of acute pancreatitis underwent CECT (Contrast Enhanced Computerized Tomography) on third day of their hospitalization. Twenty five patients (31.25%) developed persistent organ failure for ≥ 48 hours and were classified as SAP (multiorgan failure). Three patients (3.75%) had evidence of pancreatic necrosis on CECT. The duration of hospital stay was 1 - 54 days with a mean of 13.12 ± 5.83 days.

The proportion of subjects with severe disease, pancreatic necrosis, and mortality stratified by the BISAP point score is presented in Table I. A result for disease severity, PNec, and mortality was seen with increasing BISAP score.

The observed incidence of severe disease stratified by the BISAP score has ($p < 0.001$) which is statistically significant. Similarly, incidence of severe disease stratified by Ranson's score has ($p < 0.001$). The number of patients with a BISAP score of ≥ 3 was 15 and Ranson's score of > 3 was 25.

With regard to mortality, all 4 patients who died had a Ranson's score ≥ 3, ($p= 0.002$). On the other hand, one patient who died had a BISAP score of 2, 3 patients had a BISAP score of 3, and no such patients had a score of 4 or 5, ($p=0.003$) which is statistically significant as shown in Table II and III.

Four patients died during the course of hospitalization, out of which one patient expired within 72 hours of admission due to advanced age, uncontrolled sepsis and co-morbidities, giving a total mortality rate of 5%. The details are summarized in Table IV.

**Table I:** Number of patients and their proportion of variables and mortality stratified by the BISAP point score.

| BISAP score | Number of patients | MAP (mild acute panreatitis) | SAP (severe acute pancreatitis) | PNec (pancreatic necrosis | Mortality |
|---|---|---|---|---|---|
| 0 | 20 | 20 | 0 | 0 | 0 (0%) |
| 1 | 29 | 27 | 2 | 0 | 0 (0%) |
| 2 | 16 | 8 | 8 | 0 | 1 (6.25%) |
| 3 | 15 | 0 | 15 | 3 | 3 (20%) |
| 4 | 0 | - | - | - | - |
| 5 | 0 | - | - | - | - |

**Table II:** Mortality in patients having BISAP score ≥ 3.

| Variable | BISAP score ≥ 3 | | Total |
|---|---|---|---|
| | Yes | No | |
| Mortality | 12 | 64 | 76 |
| Survival | 3 | 1 | 4 |
| Total | 15 | 65 | 80 |

**Table III:** Mortality in patients having Ranson score ≥ 3.

| Variable | Ranson score ≥ 3 | | Total |
|---|---|---|---|
| | Yes | No | |
| Mortality | 21 | 55 | 76 |
| Survival | 4 | 0 | 4 |
| Total | 25 | 55 | 80 |

**Table IV:** Mortalities observed (n=4).

| Age | Gender | BISAP score and Ranson score | Complications |
|---|---|---|---|
| 40 | Female | Ranson's score = 4<br>BISAP score = 2 | Sepsis |
| 60 | Female | Ranson's score = 4<br>BISAP score = 3 | Pancreatic necrosis<br>sepsis |
| 55 | Male | Ranson's score = 5<br>BISAP score = 3 | Pancreatic necrosis<br>sepsis |
| 70 | Female | Ranson's score = 5<br>BISAP score = 3 | MODS |

## 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[1,4] and also in improving outcome. 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.[6,11,12] The nature and purpose of this research work was to assess the predictive accuracy of BISAP in finding out the frequency of severity and in turn mortality in patients with acute pancreatitis.

Female predominance has been reported by most studies which is in conformity with this study.[13,14] 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 were in the 4th and 5th decades of life which seconds the study conducted by Kaya *et al*. in Turkey.[16]

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.[4] 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,[1] thus it is important to identify patients having severe disease.[17,18] The incidence of severe pancreatitis in this study was 31% which was higher than reported elsewhere (11.9%).[4] Similar incidence (27.5%) was also reported in study conducted in Thailand and Heredia,[5,19] but it was still lower than in this study. 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.

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. In this study, the incidence of pancreatic necrosis is 4% which is similar to a study conducted in the USA.[20] In contrast to this, there are studies from Germany and Turkey where the incidence of pancreatic necrosis was around 20%.[16,21] Pancreatic necrosis was associated with increased severity and mortality.[16] This was true in these patients as well, as three patients had pancreatic necrosis out of which 2 patients expired.

In this study, we compared the accuracy of Ranson's scoring system and the new BISAP system in patients with acute pancreatitis. The newly proposed BISAP index is an accurate means of stratifying patients with AP within 24-hour from admission. In this study, the BISAP score performed similar to the Ranson's scoring system, thus there is agreement of BISAP score with Ranson's score in finding out frequency of severity and in turn mortality in patients with acute pancreatitis. This is in comparison to study conducted in Pittsburgh, China and Korea.[7,22,23]

In this study, amongst the dying patients, 2 had associated pancreatic necrosis and 2 patients had sepsis and only one patient went into multiorgan failure and there were a total of four mortalities (with overall 5% mortality), all of them had Ranson's score of more than 3 and 3 patients had BISAP score of 3. Only one patient had a BISAP score of 2. This is in contrast to studies

conducted in Goa and China which shows higher incidence of severe acute pancreatitis (32.9%) and higher mortality rate of 12.05%.[24] Similarly, mortality above 20% was observed in study conducted in New Zealand,[20,25] also studied conducted in Turkey and Germany showed increase severity and mortality due to higher incidence of pancreatic complications i.e. pancreatic necrosis around 20%.[16,21] This low mortality rate observed in this study is due to easy availability of different radiological, endoscopic and surgical procedures, better intensive care facility and low complication rate.

## CONCLUSION

BISAP score is equally effective in finding out the frequency of severity and predicting mortality 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.

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