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Original Research Article

A prospective study of the bedside index for severity in acute pancreatitis (BISAP) score in predicting severity and prognosis of acute pancreatitis

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ABSTRACT

Background: The aim of this study was to evaluate the ability of Bedside Index for Severity in Acute Pancreatitis (BISAP) score in predicting the severity and prognosis in patients admitted with acute pancreatitis.
Methods: A prospective study was performed on 52 patients who presented with acute pancreatitis during the study period between January 2016 to November 2016. BISAP score was calculated for the patients. The disease was classified as mild or severe on the basis of presence of organ system failure and local/systemic complications. The accuracy of BISAP score in predicting the severity and prognosis of acute pancreatitis was evaluated.
Results: Of the 52 patients studied, 11 patients had BISAP ≥2 and 41 patients had BISAP score <2. 9 of the 11 patients who had BISAP score ≥2 developed severe pancreatitis, local or systemic complications and had poor prognosis. 37 of the 41 patients who had BISAP score < 2 developed mild pancreatitis.
Conclusions: BISAP score is accurate in predicting severity and prognosis of acute pancreatitis. Patients with BISAP score ≥2 developed severe pancreatitis and carried poor prognosis than patients with BISAP score <2.

Keywords: Acute pancreatitis, BISAP score, Severity, Prognosis

INTRODUCTION

Acute pancreatitis is an inflammation of the pancreas with possible peripancreatic tissue involvement and multiorgan involvement. It results from a complex process that has variable etiology and natural histories, and early identification of patients at high risk can be difficult. Most episodes of acute pancreatitis (80%) are mild and self-limiting without sequelae. In 10-20% of cases, however, severe disease develops and parts of the pancreas and surrounding tissue become necrotic. In such cases, the acute inflammatory response may progress to systemic inflammatory response syndrome and/or multiorgan failure resulting in death.[1] Identification of patients at risk for mortality early in the course of acute pancreatitis is an important step in improving outcome. The management of acute pancreatitis is still a challenge facing the clinician. Various strategies have been used to predict the severity and outcome of acute pancreatitis, including the Ranson's criteria, Acute Physiology and Chronic Health Evaluation (APACHE) II, Computed Tomography Severity Index (CTSI), Glasgow scoring systems. Each has advantages and disadvantages, and none is currently recognized as a criterion standard.[2]

In 2008, Wu et al, retrospectively developed a new scoring system, the Bedside Index for Severity in Acute Pancreatitis (BISAP), to estimate the risk of in-hospital mortality in patients with AP.[3] BISAP requires only physical examination, vital signs, laboratory data and imaging for detection of pleural effusion that are commonly documented within 24 hours of presentation.[1]

BISAP score carries several important advantages over other prognostic scoring systems in acute pancreatitis. First is that the score is simple to calculate requiring only those vital signs, laboratories and imaging that are commonly obtained at the time of presentation or within 24 hours of presentation. Second is that the score was initially derived and tested using 36,248 cases of acute pancreatitis across 389 hospitals, reflecting the full spectrum of health-care delivery.

This is in contrast to many other studies that have focused on smaller numbers of patients, primarily in tertiary referral centers, with predicted severe acute pancreatitis. Third is that the score predicts in-hospital mortality.[4] In addition, organ failure has been shown to be a major determinant of duration of hospitalization for patients with acute pancreatitis. Patients with BISAP score ≥2 developed severe pancreatitis and organ failure much more frequently than those with BISAP score <2.[1,4]

METHODS

A prospective study was done on patients admitted with a diagnosis of acute pancreatitis in the Department of General Surgery, Govt. Medical College Thrissur, during the period from January 2016 to November 2016. The total number of patients included in the study was 52. Patients with incomplete clinical data, doubtful diagnosis and patients with chronic pancreatitis were excluded.

The diagnostic tools were used for study was history and clinical examination, laboratory tests such as serum amylase, serum lipase, serum creatinine, blood urea, total WBC count and imaging modalities like chest X-ray, trans-abdominal ultra-sonography, CECT abdomen.

Diagnosis of acute pancreatitis was based on the presence of two of the following three features:

- Abdominal pain consistent with acute pancreatitis (acute onset of a persistent, severe, epigastric pain often radiating to the back,
- Serum amylase and/or lipase at least three times greater than the upper limit of normal value,
- Characteristic manifestations of acute pancreatitis on CECT or transabdominal ultrasonography.[1]

For all the patients diagnosed with acute pancreatitis, BISAP score was calculated within 24 hours of presentation.

Individual components of the BISAP scoring system were BUN >25mg/dl, impaired mental status (Glasgow Coma Scale Score <15) and SIRS (systemic inflammatory response syndrome).[4] SIRS is defined as two or more of the following:

- Temperature of <36 or >38ºC,
- Respiratory rate >20 breaths/min or Pa CO2 <32mmHg,
- Pulse >90beats/min,
- WBC <4,000 or >12,000 cells/mm^3 or >10% immature bands,
- Age > 60 years,
- Pleural effusion detected on imaging (CT scan, chest radiograph, or abdominal ultrasound obtained within 24 h of presentation).

One point was assigned for each variable within 24 hours of presentation and added for a composite score of 0-5.

The disease was classified as mild or severe on the basis of development of organ system failure and local complications such as peripancreatic fluid collections, pancreatic pseudocyst, pancreatic necrosis and pancreatic abscess. Transabdominal ultrasonogram and CECT abdomen were used to diagnose the development of local complications.

Diagnosis of organ system failure is based on the presence of following features persisting for more than 48 hours:

- Cardiovascular insufficiency: Systolic blood pressure <90mmhg,
- Pulmonary insufficiency: Arterial PO2 <60mmhg in room air or need for mechanical support,
- Renal failure: Serum creatinine level >2mg/dl.[1]

The accuracy of BISAP score in predicting the severity and prognosis of acute pancreatitis was evaluated.

RESULTS

Out of 52 patients 48 (92.3%) were males and 4 (7.69%) were females. Thus, a male preponderance was observed in this disease (Table 1).

Table 1: Sex distribution.

Sex	Frequency	Percentage
Male	48	92.3%
Female	4	7.69%

Table 2: Age distribution.

Age group in years	Number of patients
21-30	14
31-40	18
41-50	18
51-60	0
61-70	2

Out of 52 patients, 18 belonged to the age group 31-40 years, 18 belonged to the age group 41-50 years, 14 belonged to the age 21-30 years, 2 belonged to the age group 61-70 years and none belonged to the age group 51-60 years. The peak incidence was in the 3rd and 4th decade (Table 2).

Table 3: Etiology.

Etiology	No. of patients	Percentage
Alcohol	44	84.61%
Gall stone	8	15.39%
Total	52	100

The history of alcohol consumption and likelihood of it being the etiological factor was in 44 patients (84.61%), while gallstone disease was implicated in 8 patients (15.39%) (Table 3).

Table 4: Relationship between BISAP score and hospital stay.

BISAP Score	Hospital stay in days		Total
	≤ 7 days	>7 days	
<2	39 (95%)	2 (5%)	41
≥2	1 (9.09%)	10 (90.90%)	11

Out of 52 patients, 41 had BISAP score <2. Among them, 39 patients (95%) had a hospital stay for ≤7 days and only 2 patients (5%) had a hospital stay for >7 days (Table 4).

Eleven patients had BISAP score ≥2. Among them, 10 patients (90.09%) had a hospital stay for >7 days and only 1 patient (9.09%) had a hospital stay for ≤7 days. Hence, BISAP Score ≥2 was associated with prolonged hospital stay.

Table 5: Relationship between BISAP score and development of complications (systemic+local).

BISAP Score	Development of complications (systemic + local)		Total
	Yes	no	
≥2	9	2	11
<2	4	37	41
	13	39	52

Out of 52 patients, 13 developed complications and 39 patients did not develop any complications. Of the 11 patients with BISAP score ≥2, 9 patients developed complications while 2 of them did not develop any complications. Among the 41 patients with BISAP score <2, only 4 patients developed complications while 37 of them did not develop any complications. BISAP score ≥2 was found to be more associated with the development of complications (Table 5).

Out of 52 patients, 13 developed severe pancreatitis and 39 patients developed mild pancreatitis. Of the 11 patients with BISAP score ≥2, 9 patients developed severe pancreatitis while only 2 of them developed mild pancreatitis.

Among the 41 patients with BISAP score <2, only 4 patients developed severe pancreatitis while 37 of them developed mild pancreatitis. BISAP score ≥2 was found to be more associated with the severe form of the disease (Table 6).

Table 6: Relation between BISAP score and the severity of acute pancreatitis.

BISAP Score	Severity		Total
	Severe	Mild	
≥2	9 (a)	2 (b)	11
<2	4 (c)	37 (d)	41
	13	39	52

Following statistical values evaluated the accuracy of BISAP score in predicting the severity of acute pancreatitis. (Values of a, b, c, d taken from above Table 6 as depicted above).

- Sensitivity =a/a+c =9/13 =69.25%,
- Specificity =d/b+d =37/39 =94.87%,
- Positive predictive value =a/a+b =9/11 =81.82%,
- Negative predictive value =d/c+d =37/41=90.24%,
- False positive rate =b/b+d =2/39=5.13%,
- False negative rate =c/a+c =4/13 =30.77%.

DISCUSSION

In this study, author evaluated the usefulness of the BISAP score in predicting severity and prognosis of acute pancreatitis. This study demonstrated that the BISAP score was accurate in predicting severity and prognosis of acute pancreatitis.

Of the 52 patients studied 48 (92.3%) were males and 4 (7.69%) were females. Thus, a male preponderance was observed in this disease. Alcoholism was the most common etiology in this study and this explains the reason for male preponderance. Male predominance in this disease and alcoholism as the common etiology has been reported by most studies which was in conformity with this study.[1,2] 36 (69.2%) patients were between 30-50 years of age. Similar results were obtained in the study conducted by Kaya E et al.[5]

Of the 52 patients studied 13 patients developed severe acute pancreatitis, 39 of them had mild pancreatitis that showed 25% of the patients studied developed severe form of the disease. In most cases, acute pancreatitis is self-limiting, however, 20-30% of patients develop a severe disease that can progress to severe form.[3] Similar incidence (27.5%) was also reported in study conducted in Thailand and Heredia.[6,7] In this study, BISAP score had a sensitivity of 69.25%, specificity of 94.87%, positive predictive value of 81.82, negative predictive value of 90.24%, false positive rate of 5.13% and false negative rate of 30.77% in predicting severe acute pancreatitis and poor prognosis. This result was comparable to the results obtained by Papachristou GI et al.[8] Nine of the eleven patients who had BISAP score ≥2

developed severe pancreatitis. 37 of the 41 patients who had BISAP score <2 developed mild pancreatitis. 10 of the 11 patients with BISAP score ≥2 had longer hospital stay (>7 days). 9 of the 11 patients with BISAP score ≥2 had poor prognosis and developed either local or systemic complications.

Thus, BISAP score ≥2 was found to be associated with the severe form of the disease and poor prognosis. This was in conformity with various previous studies in India, Korea and China.[1,2,3] Kim BG et al, concluded that BISAP is accurate in predicting the severity of acute pancreatitis in a Korean population.[9] Zhang J et al, also reported that the BISAP score may be a valuable means of risk stratification and prognostic prediction in Chinese patients with acute pancreatitis.[10]

CONCLUSION

It can be concluded that BISAP score is accurate in predicting severity and prognosis of acute pancreatitis. Patients diagnosed with acute pancreatitis having BISAP score ≥2 are prone to develop severe pancreatitis and carried poor prognosis while patients with BISAP score <2 develop only mild pancreatitis and have better prognosis.

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