A HOSPITAL BASED PROSPECTIVE EVALUATION OF THE BEDSIDE INDEX FOR SEVERITY IN ACUTE PANCREATITIS (BISAP) SCORE IN PREDICTING SEVERITY AND PROGNOSIS OF ACUTE PANCREATITIS

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Abstract

Aim: A prospective study of the bedside index for severity in acute pancreatitis (BISAP) score in predicting severity and prognosis of acute pancreatitis.
Methods: The present prospective study was conducted in the Gastroenterology division of Department of General Medicine at Ananta Institute of Medical Sciences & Research Center, Udaipur, Rajasthan, India for the period of 1 year from December 2021 to November 2022. The total number of patients included in the study was 50. 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).
Results: Out of 50 patients, 45 (90%) were males and 5 (10%) were females. Thus, a male preponderance was observed in this disease. Out of 50 patients, 40 had BISAP score <2. Among them, 37 patients (92.5%) had a hospital stay for ≤7 days and only 3 patients (7.5%) had a hospital stay for >7 days. 10 patients had BISAP score >2. Among them, 9 patients (90%) had a hospital stay for >7 days and only 1 patient (10%) had a hospital stay for ≤7 days. Hence, BISAP Score >2 was associated with prolonged hospital stay. In this study, BISAP score had a sensitivity of 70%, specificity of 92.5%, positive predictive value of 70%, negative predictive value of 92.5%, false positive rate of 7.5% and false negative rate of 30% in predicting severe acute pancreatitis and poor prognosis.
Conclusion: It is possible to draw the conclusion that the BISAP score accurately predicts the severity of acute pancreatitis as well as the patient's prognosis.

Keywords: BISAP, acute pancreatitis, SIR

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1. INTRODUCTION

Acute pancreatitis is the most common gastrointestinal cause of hospitalization.[1] This rate of hospitalization continues to grow.[2] A comprehensive overview of the global incidence of acute pancreatitis over the last 56 years and demonstrates a steadily rising incidence over time.[3] The commonest causes for Acute Pancreatitis are gallstones, alcohol, and the remainder are due to a variety of causes including autoimmune and genetic risk factors.[4]

The severe form comprising about 20–30% of the patients is a life-threatening disease with hospital mortality rates of about 15%. The Atlanta classification identifies two phases (early and late). Severity is classified as mild, moderate, or severe. The mild form (interstitial edematous pancreatitis) has no organ failure, local or system complications, and usually resolves in the first week. If there is transient (less than 48 h) organ failure, local complications or exacerbation of co-morbid disease, it is classified as moderate. Patients with persistent (more than 48 h) organ failure have the severe form of the disease known as severe acute pancreatitis (SAP).[5] Persistent organ failure (POF) is the strongest determinant of mortality in acute pancreatitis (AP).[6]

Predicting the development of severe pancreatitis early on in the course of the disease is a significant problem for healthcare professionals. However, doing so would enhance patient treatment and resource use. However, the majority of patients who develop severe pancreatitis while in the hospital report to the emergency department without first organ failure, and there is no one laboratory test that has been shown to consistently predict later development to severe pancreatitis. Therefore, a precise clinical prediction rule has the potential to make significant advancements in the treatment of acute pancreatitis.

The Bedside Index for Severity in Acute Pancreatitis (BISAP) was developed in 2008.[7] It is an easy way to calculate from data points available in the first 24 hours of presentation to emergency department. Other clinical prediction scores reported in the literature are cumbersome to calculate, need clinical and laboratory data from 48 hours of hospitalization and do not outperform BISAP in predicting severe pancreatitis.[8] This is all the more relevant since the first 24–48-hour period is the most crucial time window in management of pancreatitis, and by the end of 48 hours most patients have revealed the severity of their illness with clinical improvement or development of organ failure.

2. MATERIAL AND METHODS

The present Prospective study was conducted in the Gastroenterology division of Department of General Medicine at Ananta Institute of Medical Sciences & Research Center, Udaipur, Rajasthan, India for the period of 1 year form December 2021 to November 2022, after taking the approval of the protocol review committee and institutional ethics committee.

Inclusion criteria

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 least three times greater than the upper limit of normal value,
- Characteristic manifestations of acute pancreatitis on CECT or transabdominal ultrasonography.[9]

Exclusion criteria

Patients with incomplete clinical data, doubtful diagnosis and patients with chronic pancreatitis were excluded.

Methodology

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.

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).[10]

SIRS is defined as two or more of the Temperature of <36 or >38ºC, Respiratory rate >20 breaths/min or Pa CO2 <32mmHg, Pulse >90beats/min, WBC <4,000 or >12,000 cells/mm3 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.[9] The accuracy of BISAP score in predicting the severity and prognosis of acute pancreatitis was evaluated.

3. RESULTS

Out of 50 patients 45 (90%) were males and 5 (10%) were females. Thus, a male preponderance was observed in this disease (Table 1).

Table 1: Sex distribution.

Sex	Frequency	Percentage
Male	45	90%
Female	5	10%

Table 2: Age distribution.

Age group in years	Number of patients	%
Below 30	8	16
30-40	20	40
40-50	20	40
50-60	0	0
Above 60	2	4

Out of 50 patients, 20 belonged to the age group 30-40 years, 20 belonged to the age group 40- 50 years, 8 belonged to the age below 30 years, 2 belonged to the age group above 60 years and none belonged to the age group 50-60 years. The peak incidence was in the 4th and 5th decade (Table 2).

Table 3: Etiology.

Etiology	No. of patients	Percentage
Alcohol	43	86%
Gall stone	7	14%
Total	50	100

The history of alcohol consumption and likelihood of it being the etiological factor was in 43 patients (86%), while gallstone disease was implicated in 7 patients (14%) (Table 3).

Table 4: Relationship between BISAP score and hospital stay.

BISAP Score	Hospital stay in days		Total
	< 7 days	>7 days	
<2	37 (92.5%)	3 (7.5%)	40
>2	1 (10%)	9 (90%)	10

Out of 50 patients, 40 had BISAP score <2. Among them, 37 patients (92.5%) had a hospital stay for ≤7 days and only 3 patients (7.5%) had a hospital stay for >7 days (Table 4). 10 patients had BISAP score >2. Among them, 9 patients (90%) had a hospital stay for >7 days and only 1 patient (10%) 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	7	3	10
<2	3	37	40
Total	10	40	50

Out of 50 patients, 10 developed complications and 40 patients did not develop any complications. Of the 10 patients with BISAP score > 2, 7 patients developed complications while 3 of them did not develop any complications. Among the 40 patients with BISAP score <2, only 3 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 50 patients, 10 developed severe pancreatitis and 40 patients developed mild pancreatitis. Of the 10 patients with BISAP score >2, 7 patients developed severe pancreatitis while only 3 of them developed mild pancreatitis.

Among the 40 patients with BISAP score <2, only 3 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	7	3	10
<2	3	37	40
Total	10	40	50

Following statistical values evaluated the accuracy of BISAP score in predicting the severity of acute pancreatitis. In this study, BISAP score had a sensitivity of 70%, specificity of 92.5%, positive predictive value of 70%, negative predictive value of 92.5%, false positive rate of 7.5% and false negative rate of 30% in predicting severe acute pancreatitis and poor prognosis.

4. 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 50 patients studied 45 (90%) were males and 5 (10%) 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.[9,11] 40 (80%) patients were between 30- 50 years of age. Similar results were obtained in the study conducted by Kaya E et al.[12]

Of the 50 patients studied 10 patients developed severe acute pancreatitis, 40 of them had mild pancreatitis that showed 20% 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.[13] Similar incidence (27.5%) was also reported in study conducted in Thailand and Heredia.[14,15] In this study, BISAP score had a sensitivity of 70%, specificity of 92.5%, positive predictive value of 70%, negative predictive value of 92.5%, false positive rate of 7.5% and false negative rate of 30% in predicting severe acute pancreatitis and poor prognosis. This result was comparable to the results obtained by Papachristou GI et al.[16] Nine of the eleven patients who had BISAP score > 2 developed severe pancreatitis. 37 of the 40 patients who had BISAP score <2 developed mild pancreatitis. 7 of the 10 patients with BISAP score >2 had longer hospital stay (>7 days). 7 of the 10 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. [9,11,13] Kim BG et al, concluded that BISAP is accurate in predicting the severity of acute pancreatitis in a Korean population.[17] 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.[18]

5. CONCLUSION

It is possible to draw the conclusion that the BISAP score accurately predicts the severity of acute pancreatitis as well as the patient's prognosis. Individuals who have been diagnosed with acute pancreatitis and have a BISAP value of more than two have a higher risk of developing severe pancreatitis and a worse prognosis, while patients whose BISAP score is less than two only develop mild pancreatitis and have a more favorable prognosis.

6. REFERENCES

Peery AF, Crockett SD, Murphy CC et al.Burden and cost of gastrointestinal, liver, and pancreatic diseases in the USA.Update 2018. Gastroenterology. 2019;156(1):254.

Peery AF, Crockett SD, Barritt AS, et al. Burden of gastrointestinal, liver, and pancreatic diseases in the USA. Gastroenterology. 2015;149(1731–1741):e3.3 .

Iannuzzi JP, King JA, Leong HL et al. Global Incidence of Acute Pancreatitis Is Increasing Over Time: A Systematic Review and Meta-Analysis. J. Gastro. 2021.09.043

Heckler M, Hackert T, Hu K, Halloran CM, Büchler MW, Neoptolemos JP. Severe acute pancreatitis: surgical indications and treatment. Langenbecks Arch Surg. 2021 May;406(3):521-535.

Leppäniemi A, Tolonen M, Tarasconi A. et al. 2019 WSES guidelines for the management of severe acute pancreatitis. World J Emerg Surg 14, 27 (2019). 13017-019-0247-0

Machicado JD, Gougol A, Tan X, et al. Mortality in acute pancreatitis with persistent organ failureis determined by the number, type, and sequence of organ systems affected. United European Gastroenterol J.2021;9:139–149

Wu BU, Johannes RS, Sun X, et al. The early predic- tion of mortality in acute pancreatitis: a large popula- tion-based study. Gut. 2008;57:1698–1703.

Zhang J, Shahbaz M, Fang R, et al. Comparison of the BISAP scores for predicting the severity of acute pancreatitis in Chinese patients according to the latest Atlanta classification. J Hepatobiliary Pancreat Sci. 2014;21:689–694.

Park JY, Jeon TJ, Ha TH, et al. Bedside index for severity in acute pancreatitis: comparison with other scoring systems in predicting severity and organ failure. Hepatobiliary Pancreat Dis Int. 2013;12:645–650

Singh VK, Wu BU, Bollen TL, Repas K, Maurer R, Johannes RS, et al. A prospective evaluation of the bedside index for severity in acute pancreatitis score in assessing mortality and intermediate markers of severity in acute pancreatitis. Am J Gastroenterol. 2009;104(4):966.

Pednekar J, Patil S, Pednekar S. Bedside Index of Severity in Acute Pancreatitis (BISAP) score for predicting prognosis in acute pancreatitis. IAIM. 2015;2(2):62-70.

Kaya E, Dervişoğlu A, Polat C. Evaluation of diagnostic findings and scoring systems in outcome prediction in

acute pancreatitis. World J Gastroenterol: WJG. 2007;13(22):3090.

Haridas TV, Iqbal AIK. A prospective study of the bedside index for severity in acute pancreatitis (BISAP) score in predicting severity and prognosis of acute pancreatitis. Int Surg J 2019;6:570-573.

Barreto SG, Rodrigues J. Acute pancreatitis in Goa- -a hospital-based study. J Ind Med Assoc. 2008;106(9):575-6.

Surco Y, Huerta Mercado J, Pinto J, Piscoya A, Los Ríos R, Prochazka R, et al. Predicción precoz de severidad en pancreatitis aguda. Rev Gastroenterol Perú. 2012;32(3):241-50.

Papachristou GI, Muddana V, Yadav D, O'Connell M, Sanders MK, Slivka A, et al. Comparison of BISAP, Ranson's, APACHE-II, and CTSI scores in predicting organ failure, complications, and mortality in acute pancreatitis. Am J Gastroenterol. 2010;105(2):435