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### Original Research

## Evaluating the Ability of BISAP Plus Serum C-Reactive Protein (CRP) Score to Predict the Severity of Acute Pancreatitis

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### ABSTRACT

**Background** - Because of the variability and seeming unpredictability of acute pancreatitis, clinical scoring systems have been developed to predict the severity of acute pancreatitis like Ranson's scale, BISAP, SAP, Glasgow scale. **Aim**- To evaluate the ability of BISAP plus Serum CRP in predicting the severity of acute pancreatitis. **Material and method**-This Prospective observational study included a total of 50 patients admitted to surgery department of Rajindra Hospital, Patiala, diagnosed to have Acute Pancreatitis (AP), BISAP score and serum CRP were calculated. **Results** -BISAP plus CRP score in acute pancreatitis, proved to be better predicting pancreatic necrosis with area under curve 0.671, p value is less than 0.05 data is significant. With sensitivity 95.8% and NPV 90.9%. **Conclusion**- We conclude that addition of CRP with BISAP score has benefit in detecting severity of acute pancreatitis.

**Key words:** Pancreatitis, C-Reactive Protein, BISAP score.

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### INTRODUCTION

Severe acute pancreatitis develops in about 25% of patients with acute pancreatitis. Severity is linked to the presence of systemic organ dysfunction and pancreatic necrosis. Morbidity of severe acute pancreatitis is biphasic. In first week it is strongly related to systemic inflammatory response while sepsis due to infected pancreatic necrosis leading to multi-organ failure syndrome occurs in the later course after the first week<sup>[1]</sup>. Because of the variability and seeming unpredictability of acute pancreatitis, clinical scoring systems have been developed to predict the severity of acute pancreatitis and are as important, for patient stratification and enrollment in clinical trials. These include the clinical scoring scales such as Ranson's criteria, Glasgow scales, simplified acute physiology (SAP) score, acute

physiology and chronic health evaluation II (APACHE II) score<sup>[2]</sup>.

In 2008 Wu et al. proposed a new prognostic scoring system for the early determination of the severity of acute pancreatitis, which they named the 'bedside index of severity in acute pancreatitis' (BISAP)<sup>[3]</sup>. There are several biochemical markers which can differentiate mild and severe pancreatitis. Most parameters peak only during early stage and decline rapidly during course of pancreatitis but few parameters like C-reactive protein, procalcitonin, serum amyloid A are persistently raised in severe pancreatitis<sup>[4]</sup>. CRP is an important prognostic marker of pancreatic necrosis with the highest sensitivity and negative prognostic value<sup>[5]</sup>, so the aim of present study is to evaluate the ability of BISAP plus serum C-reactive protein (CRP) score to predict severity of

acute pancreatitis in patients admitted to this institution.

#### MATERIAL AND METHOD-

Present study was Prospective observational study included a total of 50 patients admitted to surgery department of Rajindra Hospital, Patiala, diagnosed to have Acute Pancreatitis(AP) from December 2015 to December 2017. This study patients having acute pain in the abdomen within 24 hrs before admission in hospital. Serum amylase or lipase level raised >3 times normal value. Ultrasonography of the abdomen within first 24hrs of hospitalization demonstrating changes consistent with acute pancreatitis. CECT whole abdomen done for proven cases of acute

pancreatitis. All patients were kept at least 12 hours of fasting before surgery and written consent was obtained from each patient after explaining the complication.

#### BISAP plus CRP score

BISAP score was calculated for every patient admitted to hospital and CRP more than 150mg/L was taken as CRP positive, and added with BISAP score and given 1 point. New score was calculated for every patient with inclusion of CRP and it was analysed by receiver operator curve (ROC) curve, cut off point decided by coordinates of ROC curve. Score less than 3 was taken mild and more than equal to 3 taken as severe pancreatitis.

B UN > 25 mg/dl	1
Impaired mental status (Glasgow Coma Scale Score < 15)	1
SIRS is defined as two or more of the following: (1) Temperature of < 36 or > 38 ° C (2) Respiratory rate > 20 breaths/min (3) Pulse > 90 beats/min (4) WBC < 4,000 or >12,000 cells/mm <sup>3</sup>	1
Age > 60 year	1
Pleural effusion detected on imaging	1
CRP > 150mg/L	1

#### Statistical analysis

Data was collected and analysed using SPSS v16 software, frequency and percentage were calculated BISAP plus CRP score was compared with MCTSI in assessing different prognostic indicators of acute pancreatitis. Sensitivity, specificity PPV, NPV and area under curve was calculated and compared.

#### RESULTS:

Table 1 - Distribution of BISAP SCORE and BISAP SCORE (with CRP)

BISAP (with CRP) SCORE	Frequency	BISAP SCORE	Frequency
<3	11(22%)	<2	6(12%)
≥3	39(78%)	≥2	44(88%)
Total	50(100%)	Total	50(100%)

In present study standard BISAP score with and without serum CRP was calculated and severity graded by score of less than 3 (less severe) and more than equal to 3 (severe) for BISAP with CRP and less than 2 and more than equal to 2 for BISAP without CRP. 22% patient had score less than 3 and 78% had score more than equal to 3 in BISAP with CRP limb of test. Whereas 12% had score less than 2 and 88% had score more than equal to 2.

Table 2 - Distribution of CRP

Serum CRP	Frequency	Percentage (%)
Negative	13	26%
Positive	37	74%
Total	50	100.0

All patients were evaluated by serum CRP level within 24 hrs. Value 150 mg/L was taken as cut off with value above it as positive and below it as negative. Serum C-reactive protein level was positive in 37 (74%) cases and negative in 13 (26%) cases.

**Table 3 - Comparison of prognosis in acute pancreatitis with BISAP plus CRP score**

BISAP plus CRP score	Local complications		Systemic complications		Pancreatic necrosis		ICU stay		Mortality	
	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent
Mild <3	1	1	1	10	1	10	1	10	1	10
Severe ≥3	20	19	11	28	23	26	7	32	5	24
p-value	0.012 <0.05 HS		0.184 >0.05 NS		0.004 <0.05 HS		0.430 >0.05 NS		0.604 >0.05 NS	
Specificity	34.5%		26.3%		38.5%		23.8%		22.7%	
Sensitivity	95.2%		91.7%		95.8%		87.5%		83.3%	
PPV	51.3%		17.9%		59%		17.9%		12.8%	
NPV	90.9%		90.9%		90.9%		90.9%		90.9%	
sAUC (area under curve)	0.649		0.590		0.671		0.537		0.530	

While comparing BISAP plus CRP score with prognosis in acute pancreatitis, this proved to be better predicting pancreatic necrosis with area under curve 0.671, p value is less than 0.05 data is significant. With sensitivity 95.8% and NPV 90.9%

For local complications sensitivity is 95.2% and NPV 90.9% but has low specificity 34.5% and PPV is 51.3%. p value is less than 0.05 and data is significant.

For systemic complications sensitivity is 95.2% and specificity is 34.5% with NPV 90.9% and PPV is 51.3%. AUC for this test is 0.649.

For ICU stay sensitivity is 87.5% specificity is 23.8% NPV is 90.9%, PPV is 17.9%, AUC for test is 0.537, p value is more than 0.05 data is not significant.

For mortality specificity is 22.7%, sensitivity is 83.3%, PPV is 12.8% and NPV is 90.9%, AUC is 0.530 p value is more than 0.05 data not significant

## DISCUSSION

In our study, when BISAP score was employed to assess the severity of acute pancreatitis. AP was graded as mild (<2) in 6 out of 50 (12%) and severe (≥2) in 44 out of 50 (88%) patients. In contrast to a study by **Papachristou GI et al**<sup>[6]</sup>, 138 out of 185 (74.6%) patients had mild and 47 out of 185 (25.4%) patients had severe pancreatitis. The presence of higher number of patients of moderate and severe pancreatitis in our study is attributed to the fact that our hospital being a tertiary care centre, very sick patients having severe pancreatitis were referred to us. In our study, serum CRP level was more than 150mg/L in 37 pt. (74%) and level less than 150 mg/L in 13 pt. (26%) in study conducted by **Khanna et al**<sup>[7]</sup>. CRP level was more than 150mg/L in 35 (58.3%) and less than 150mg/L in 25 (41.7%) high value of CRP in our study may be due to more no of severe cases.

In our study BISAP score was added with Serum CRP (>150 mg/L) and ROC curve was drawn for mortality in acute pancreatitis, area under curve was 0.530 in similar study conducted by **Cardoso<sup>[8]</sup> et al** BISAP score was added with CRP and area as under

curve was evaluated it was 0.81 (95% CI 0.65-0.97).

In our study, 24 patient out of 50 developed necrosis, BISAP plus CRP score was less than 3 in 1 (4%) patient and more than and equal to 3 in 23 (96%) patient. The data was found to be statistically significant.

In a study done by **Khanna A K et al**<sup>[7]</sup>, 17 pt. developed necrosis out of which 7 (41.1%) had BISAP score less than 2 and 10 (58.9%) had score more than equal to 2. This showed that necrosis is present in patients with higher BISAP score.

In our study 8 pt were admitted to ICU and it was taken as one of prognostic marker in acute pancreatitis. Out of 8 patient 1 (2%) pt had score less than 3 and 7 (14%) had score more than equal to 3. So with increasing score more chances of ICU admission seen. In a study done by **Khanna A K et al**<sup>[7]</sup>, out of 9 patient admitted to ICU 7 were in severe BISAP score and 2 in mild BISAP score.

So with increasing BISAP score more chances of ICU admission was seen in there study. No similar study for BISAP plus CRP score available for comparison it need further study and evaluation.

## CONCLUSION:

Bedside index of severity in acute pancreatitis (BISAP) score have been studied in great details in various studies and was found useful score in determining severity of acute pancreatitis, similarly in biochemical markers several markers studied and Serum CRP level was found to be closely associated with acute episode of pancreatitis. So from our study we can conclude that addition of CRP with BISAP score has benefit in detecting severity of acute pancreatitis.

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