

COMPARATIVE STUDY OF BEDSIDE INDEX OF SEVERITY IN ACUTE PANCREATITIS (BISAP) AND ACUTE PHYSIOLOGY AND CHRONIC HEALTH EVALUATION (APACHE II) SCORE IN ACUTE PANCREATITIS IN TELANGANA POPULATION

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**Abstract**

Background: Acute pancreatitis (AP) is a sudden inflammation of the pancreas characterized by activation of pancreatic enzymes to cause self-digestion of pancreas. Although self-limiting in majority of cases, may lead to necrosis, organ failure and mortality. Severity can be assessed by various scores to stratify patients and treat accordingly. **Materials and Methods:** 45 adult patients with AP have studied. In addition to laboratory and radiological findings, APACHE II and BISAP scores were evaluated to predict the severity of AP. **Result:** Clinical and laboratory findings in severe acute pancreatitis were observed, both scores were evaluated, and significant results noted. APACHE-II score > 8 group had 15 patients and 6 found to have SAP. APACHE-II <8 group had 30 patients and 8 had SAP. BISAP score \geq 2 had 19 patients and 8 had SAP. BISAP \leq 2 score had 26 patients and 2 had SAP. Moreover, significant sensitivity, specificity, PPV, NPV observed in BISAP and APACHE-II. **Conclusion:** APACHE-II emerged as most reliable scoring system followed by BISAP to predict the SAP and mortality of the patients.

INTRODUCTION

Acute pancreatitis (AP) is an inflammatory condition of the pancreas with a clinical course that varies from mild to severe and is characterised by activation of pancreatic enzymes to cause self-digestion of pancreas.^[1] Generally, AP is mild self-limiting and requires no special treatment, but 20-30% of patients would develop a severe disease that can progress to systemic inflammation and cause pancreatic necrosis, multi-organ failure and potentially death.^[2] Therefore, it is important to choose early quick and accurate risk stratification for AP patients which would permit evidence based early initiation of intensive care therapy for patients with severe AP to prevent adverse outcomes and possible complications.^[3]

There are a variety of scoring systems for the early detection of severe acute pancreatitis such as APACHE-II, Bedside index of severity in acute pancreatitis (BISAP) which can predict the clinical severity of pancreatitis within 24 hours of admission.^[4] An attempt was made to compare and evaluate both scores to conclude the severity of acute pancreatitis.

MATERIALS AND METHODS

45 adult patients having acute pancreatitis admitted at surgery and medicine departments, SVS Medical College Hospital, Mahabubnagar– 509002, Telangana were studied.

Inclusive Criteria

Patients with symptoms of acute pancreatitis, laboratory and/or radiological evidence of acute pancreatitis were selected for study.

Exclusion Criteria

Patients less than 15 years of age, cases of chronic pancreatitis, hereditary pancreatitis, traumatic pancreatitis and immune-compromised patients were excluded from study.

Method

Patients with acute pancreatitis were admitted, resuscitated with Nasogastric decompression, IV fluids, analgesics and electrolyte imbalance correction. Laboratory and radiological investigations were carried out according to the proforma. APACHE-II score ranging from 0 to 71, and BISAP score ranging from 0 to 5 were calculated from the worst parameters in the first 24 hours. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated for each score.

The duration of study was January-2018 to March-2021.

Statistical Analysis

Clinical and Laboratory Parameters in acute pancreatitis patients were collected and scores of both APACHE-II and BISAP were compared with z test. Various clinical parameters of pancreatitis were classified with percentage. The Statistical analysis was carried out in SPSS software. The ratio of male and females was 2:1.

RESULTS

[Table 1] The aetiology of acute pancreatitis – 25 (55.5%) Alcoholic, 2 (4.44%) Drug induced, 8 (17.7%) had Gall stones, 1 (2.22%) had Hypercalcaemia, 1 (2.22%) had Hypertriglyceridemia and 1 (2.22%) Obstructed pancreatic duct, 2 (4.44%) had Pancreas divisum, 5 (11.1%) had Idiopathic.

[Table 2] Comparative study of hospital stay and laboratory parameters:

- Duration of hospital stay 10.15 (\pm 2.30) in mild and moderate acute pancreatitis (MAP) and 15.38 (\pm 3.40) in severe acute pancreatitis (SAP) t test value was 4.60 and $p < 0.00$ (significant).
- Serum amylase level was 899.15 (\pm 190.2) in MAP, 925.8 (\pm 198.8) in SAP and t test 0.64 and $p > 0.51$ (insignificant)
- Serum lipase level was 1530.32 (\pm 120.3) in MAP, 1798.48 (\pm 138.2) in SAP, t test 9.81 and $p < 0.00$ (significant).
- Hematocrit level was 35.98 (\pm 6.20) in MAP, 41.08 (\pm 8.22) in SAP t test 3.32 and $p < 0.001$ (significant).

- Blood Urea Nitrogen level was 17.11 (\pm 3.32) in MAP, 35.29 (\pm 4.08) in SAP, t test 23.1 and $p < 0.00$ (significant).
- Serum creatinine level was 1.19 (\pm 0.80) in MAP, 2.49 (\pm 1.02) in SAP, t test 6.7 and $p < 0.00$ (significant).
- WBC count was 11465 (\pm 520.1) in MAP, 15380 (\pm 530.8) in SAP, t test 35.3 and $p < 0.00$ (significant).
- Fasting blood sugar level was 105.90 (\pm 60.3) in MAP, 138.36 (\pm 52.33) in SAP t test 2.5 and $p < 0.001$ (significant).
- Serum Total Calcium level was 8.3 (\pm 1.04) in MAP, 8.57 (\pm 1.40) in SAP t test 1.03 and $p > 0.30$ (insignificant).
- APACHE-II score was 4.33 (\pm 3.30) in MAP, 11.30 (\pm 7.07) in SAP t test 5.98 $p < 0.00$ (significant).
- BISAP score was 1.04 (\pm 1.06) in MAP, 2.6 (\pm 1.22) in SAP t test 6.47 and $p < 0.000$ (significant).

[Table 3] Severity of acute pancreatitis as per the score – In APACHE-II > 8 score out of 15, 6 (13.3%) had severe pancreatitis. In APACHE-II < 8 out of 30, 4 (8.8%) had severe acute pancreatitis. In BISAP > 2 – out of 19 patients 8 (17.7%) had SAP. In BISAP < 2 score out of 26 patients 2 (4.4%) had SAP.

[Table 4] Study of sensitivity, specificity, positive predictive value and negative predictive value in both scores –

- APACHE-II score had sensitivity - 62, specificity - 74.60, PPV - 41.36 and NPV - 86.19.
- BISAP score had sensitivity- 82, specificity – 68.64, PPV - 43.22 and NPV - 92.02.

Table 1: Numbers for aetiology of pancreatitis

SI No	Aetiology of Pancreatitis	No. of Patients (45)	Percentage %
1	Alcohol	25	55.5
2	Drug Induced	2	4.44
3	Gall Stones	8	17.7
4	Hypercalcemia	1	2.22
5	Hypertriglyceridemia	1	2.22
6	Obstructed pancreatic duct	1	2.22
7	Pancreas divisum	2	4.44
8	Idiopathic	5	11.1

Table 2: Comparative study of laboratory parameters in Mild to moderate and severe acute pancreatitis No. of patients: 45

Parameters	Mild and Moderate pancreatitis Mean value \pm SD	Severe acute pancreatitis	t test value	p value
Duration of hospital stay	10.15 (\pm SD 2.30)	15.38 (\pm SD 3.40)	4.60	$P < 0.00$
Level of serum amylase	899.15 (\pm SD 190.20)	925.58 (\pm SD 198.8)	0.64	$P < 0.51$
Serum lipase	1530.32 (\pm SD 120.3)	1798.48 (\pm SD 138.2)	9.81	$P < 0.000$
Hematocrit	35.98 (\pm SD 6.20)	41.08 (\pm SD 8.22)	3.32	$p < 0.001$
Blood Urea Nitrogen	17.11 (\pm SD 3.32)	35.29 (\pm SD 4.08)	23.1	$P < 0.000$
S. Creatinine	1.19 (\pm SD 0.80)	2.49 (\pm SD 1.02)	6.7	$P < 0.000$
WBC count	11465 (\pm SD 520.1)	15380 (\pm SD 530.8)	35.3	$P < 0.000$
Fasting Blood sugar	105.90 (\pm SD 60.31)	138.36 (\pm SD 52.33)	2.5	$P < 0.001$
S. Total calcium	8.3 (\pm SD 1.04)	8.57 (\pm SD 1.40)	1.03	$p > 0.30$ (insignificant)
APACHE-II score	4.33 (\pm SD 3.30)	11.30 (\pm SD 7.07)	5.98	$P < 0.00$
BISAP score	1.04 (\pm SD 1.06)	2.6 (\pm SD 1.22)	6.47	$p < 0.00$

Table 3: Severity of acute pancreatitis as per the scores

Score	Patients	Severe pancreatitis
APACHE-II ≥ 8	15 (33.3%)	6 (13.3%)
≤ 8	30 (66.6%)	4 (8.8%)
BISAP ≥ 2	19 (42.2%)	8 (17.7%)
≤ 2	26 (57.7%)	2 (4.4%)

Table 4: Sensitivity, Specificity of APACHE-II and BISAP scores

Scores	Sensitivity 95% CI	Specificity 95% CI	Positive predictive value (95% CI)	Negative predictive value (95% CI)
APACHE-II	62.00	74.60	41.36	86.19
	35.03-81.84	61.50-84.3.7	30.01-55.40	79.19-92.55
BISAP	82	68.64	43.22	92.02
	57.30-95.17	57.11-80.22	34.40-54.32	83.21-97.16

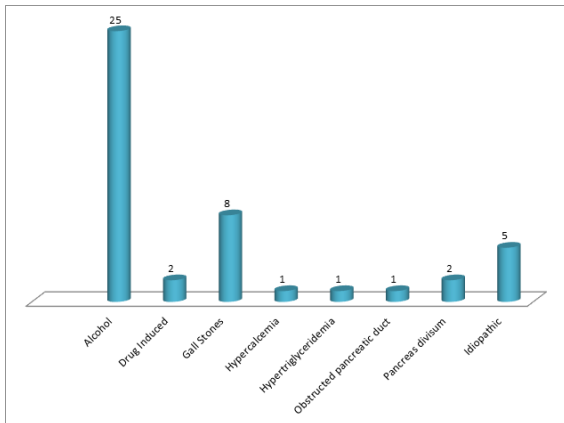


Figure 1: Numbers for aetiology of pancreatitis

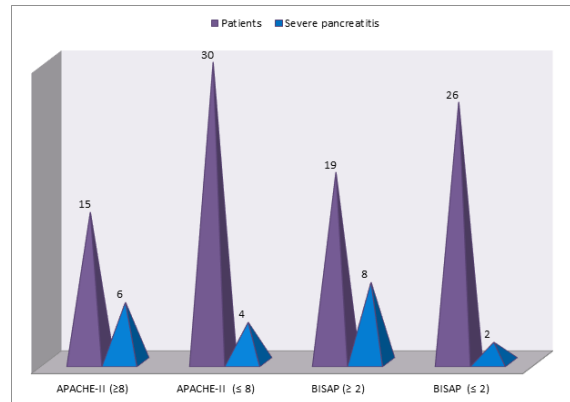


Figure 3: Severity of acute pancreatitis as per the scores

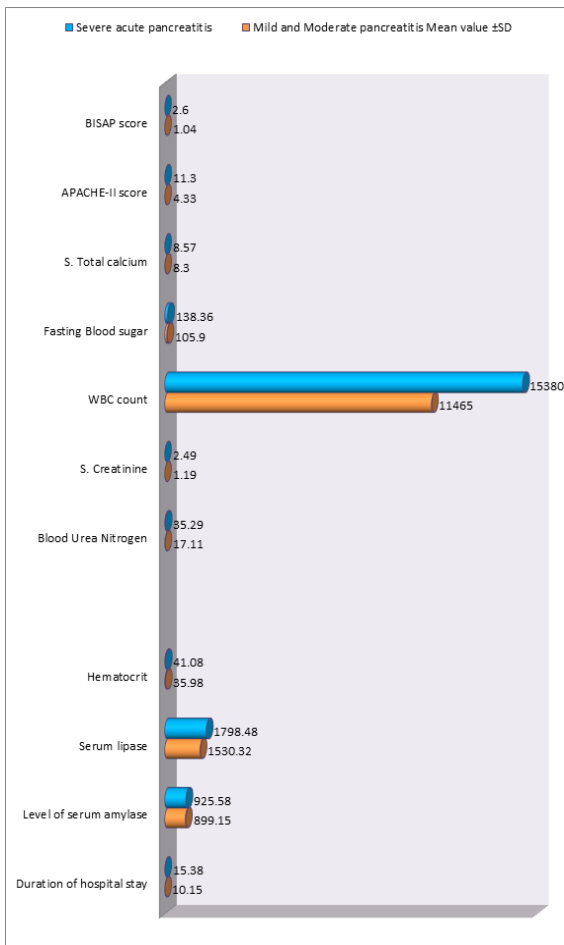


Figure 2: Comparative study of laboratory parameters in Mild to moderate and severe acute pancreatitis

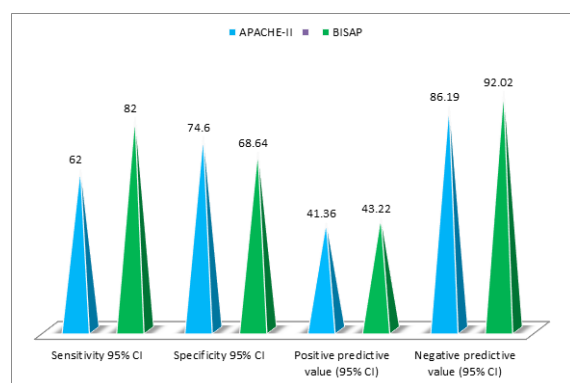


Figure 4: Sensitivity, Specificity of APACHE-II and BISAP scores

DISCUSSION

Present comparative study of BISAP and APACHE-II scores in acute pancreatitis was studied in Telangana Population.

The etiological factors– 25 (55.5%) were Alcoholic, 2 (4.44) Drug induced, 8 (17.7%) had Gall stones, 1 (2.22%) had Hypercalcaemia, 1 (2.22%) had Hypertriglyceridemia, 1 (2.22%) Obstructed pancreatic duct, 2 (4.44%) Pancreas divisum, 5 (11.1%) Idiopathic and total number of patients was 45 (Table-1). Laboratory parameters in both SAP and MAP were compared and found to be highly significant. APACHE-II score was 4.33 (\pm 3.30) in MAP, 11.30 (\pm 7.07) in SAP t test 5.98 and $p > 0.000$ (significant). BISAP score 1.04 (\pm 1.06) in MAP, 2.6 (\pm 1.22) in SAP, t test 6.47 and

$p < 0.00$ (significant) (Table-2). In assessment of SAP APACHE-II score > 8 had 15 patients and 6 had SAP and < 8 score had 30 patients and 4 had SAP. In BISAP > 2 score had 19 patients and 8 found to have SAP, < 2 score had 26 patients and 2 had SAP (Table-3). APACHE-II scores had 62 sensitivity, 74.6 specificity, 41.36 PPV and 86.19 NPV. In BISAP score 82 sensitivity 68.6 specificity, 43.2 PPV, 92.02 NPV [Table 4] These findings are more or less in agreement with previous studies.^[5-7]

The patho-physiology of acute pancreatitis is generally considered in three phases. In first phase there is activation of trypsin, once trypsin is activated it activates variety of injurious pancreatic digestive enzymes. In second phase there is intra pancreatic inflammation through variety of mechanisms and pathways. In third phase there is extra pancreatic inflammation including acute respiratory distress syndrome (ARDS).

APACHE-II score was calculated from 12 admission physiologic variables comprising the Acute Physiology Score (APS), the patient's age, and chronic health status. The APS is determined from the most deranged (worst) physiologic value, e.g. the lowest BP or highest respiratory rate during initial 24 hours of admission. The 24 hours period ensures that all pertinent physiologic values are available and clinical judgement ensures that each value is legitimate. Because severity of disease significantly reduces the probability of survival during acute illness, APACHE-II is a reliable and useful means of classifying ICU patients. Increased Acute physiological scores (APS) are associated with increased risk of subsequent hospital death.^[8] APACHE-II has also proved useful in evaluating outcome from intensive care and in comparing the success of different treatment protocols.^[9]

Severe Acute pancreatitis (SAP) implies the presence of organ failure, local complications or pancreatic necrosis. The sensitivity and specificity of these scores predict the SAP range between 55% to 90% depending on the cut off number and timing of scanning.^[10]

The factors that determine the severity are not clearly understood but appear to involve a balance between pro-inflammatory and anti-inflammatory factors.

CONCLUSION

Present comparative study of BISAP and APACHE-II scores, APACHE-II score yielded better in predicting the severity, organ failure and outcome. BISAP score also hold significant value in predicting them. Hence it is concluded that the simple scoring systems may have reached their

maximal utility and novel models are needed to further improve predictive accuracy because exact pathological mechanism of acute pancreatitis is still unclear.

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