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ORIGINAL RESEARCH

Study of BISAP Score in Evaluation of severity of Acute Pancreatitis in relation to MCTI score

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Abstract

Aim: To assess severity of acute pancreatitis by means of BISAP score at the time of patient admission.

Material and Method: This prospective study was conducted in the Department of General Surgery at Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan from May 2021 to April 2022 and included 37 patients of acute pancreatitis for period of 1 year. Following admission all patients underwent routine hematological and biochemical investigations and BISAP score was calculated calculated. Modified CTSI score was calculated at 48 hours for assessing the severity of acute pancreatitis and this score was compared with BISAP score.

Results: The mean age of the patients was 48.14±15.99 years with slight male preponderance. The main cause for acute pancreatitis was gall stones (70.3%) followed by alcohol (27%). Majority of patients had moderate disease (45.9%) while (32.4%) had mild disease and (21.6%) patients had severe disease. BISAP score of 3 and 4 was able to detect 100% patients with severe MCTSI and the association between MCTSI and BISAP was statistically significant ($p<0.001$).

Conclusions: The BISAP score is a relatively good indicator of severity of acute pancreatitis and the cut-off value of ≥3 can be a good predictor according to present study for predicting severe acute pancreatitis.

Keywords: Acute pancreatitis, BISAP score, Modified CTSI.

Introduction

Acute pancreatitis is an acute inflammatory response resulting in local pancreatic damage caused by abnormal pancreatic enzyme activation. The process is initiated by co-localization of zymogen granules and lysosomes inside the acinar cells releasing cathepsin B in cytosol resulting in acinar cell death. This initial process is further aided by local inflammatory response which is initiated at the site of injury but and can lead to systemic inflammation, if marked. In majority of the patients this inflammatory cascade is self-limited; however, in remaining patients it persists. The mortality in early phase of acute pancreatitis is resultant of this persistent immune response.

According to revised Atlanta classification, acute pancreatitis has been graded as mild, moderate and severe types[1].80% of acute pancreatitis instances are mild, self-limiting, and have no long-term effects. But when necrosis occurs in portions of the pancreas and the surrounding tissues, serious illness often develops in 10-20% of patients. These individuals develop an initial

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inflammatory reaction, which develops into a systemic inflammatory response syndrome, which results in multiorgan failure and death.[2, 3]

It might be challenging to predict how someone would react to pancreatic damage because it differs from person to person. Although the general death rate for acute pancreatitis is 2-5%, severe cases might have a mortality rate of up to 20-30%.[4,5]

Because severe acute pancreatitis (SAP) has a high death rate, it is necessary to develop early and reliable methods for determining the disease's severity in order to start more active therapies that would lessen the disease's negative effects and high mortality. In order to forecast the SAP, meticulous continuous clinical examinations, a multi-factor grading system, and imaging investigations are needed.[4, 5]

A several multifactorial scoring systems comprising clinical and biochemical criteria for assessment of severity of acute pancreatitis have been in use for several years. The Glasgow score (8 criteria), MOSS score (12 criteria), BISAP score (5 criteria), the acute physiology and chronic health evaluation (APACHE II) score (14 criteria), and the 11 criteria outlined by Ranson et al. in the 1970s are among the. Depending on the cut-off value and the timing of scoring, the sensitivity and specificity of these scoring systems for determining severe acute pancreatitis ranges between 55% and 90%.[6]

The present study was conducted to assess the clinical outcomes of patients with acute pancreatitis and classify it according to BISAP score.

Material and methods

The Present single centric, prospective, observational and hospital-based study was conducted at Department of General surgery, Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan for period of 1 years. The sample size of 37 patients was undertaken for present study.

Selection of patients

Patients having clinical presentation of acute pancreatitis with ultrasound findings suggesting of acute pancreatitis with serum amylase or lipase level raised more than 3 times of normal cut-off value were admitted in surgery department.

Inclusion criteria

1. Patients with history of acute abdominal pain 24 hours prior to hospital admission.
2. Patients with increased serum amylase or lipase levels of more than 3 times.
3. Patients with ultrasonographic abdominal changes consistent with acute pancreatitis on hospitalization.

Exclusion criteria

1. Patients admitted to hospital with other diseases like coronary artery disease, diabetes mellitus, chronic kidney disease, chronic lung disease etc. along with acute pancreatitis at the time of hospital admission.
2. Patients with chronic pancreatitis and pancreatic malignancy.

History of the patient, general physical examination and clinical examination was done (Name, age, sex, duration of symptoms, history of epigastric pain, severity, nature, number of attacks of pain, whether radiated to back or not, does pain relieve on bending forward, history of alcohol intake, history of jaundice, history of gall stone, number of times admission required in the hospital in past, history of fever, dyspepsia, previous abdominal surgeries).

Routine hematological and biochemical investigations were done and BISAP score was calculated simultaneously. Modified CT score was calculated at 48 hours for assessing the

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severity of Acute pancreatitis. It was considered to be gold standard and was compared with BISAP score.

Data analysis was done using SPSS ® Software version 26. The categorial variables were compared using Fisher's exact test and for group variables ANOVA test was used. p-value of <0.05 was considered to be significant and value of <0.001 considered to be highly significant.

Results

The mean age of the patients was 48.14±15.99 years. There was slight male predominance with 51.4% of patients being male and 48.6% being females. The main cause for acute pancreatitis was gall stones (70.3%) followed by alcohol (27%) only 2.7% cases were due to idiopathic cause. (figure 1). Majority of patients according to MCTSI scoring had a moderate disease (45.9%) while 32.4% had mild disease (figure 2); 21.6% of patients had severe disease. 21 out of total 37 patients developed local complications. It was observed that acute necrotic collection was only present in 2 patients of moderate disease vs 4 patients of severe disease (11.8% vs 50%) while PP fluid collection was only present in 8 patients of moderate disease and 1 of severe (47.1% vs 12.5%). Pseudocyst was present in 3 patients of moderate disease (17.6%). While it was present in none of the patients of severe disease. WON was present in 3 patients of severe disease (37.5%) (table 1). 75% (6/8) patients of severe acute pancreatitis developed systemic complications while only 5.9% of moderate presented with systemic complications (ARDS; 1/17). Maximum patients in SAP had ARDS (37.5%) followed by multiorgan failure, paralytic ileus and renal failure (12.5% each). This association was statistically significant (p<0.001) (table 2). In case of mild disease none of the patients needed ICU admission while in moderate disease 3(17.6%) patients needed ICU admission. In case of severe disease 6(75%) patients needed ICU admission. This association was statistically significant (p<0.05) (table 3). Significant differences were observed in duration of hospital stay with hospital stay being highest in cases with severe pancreatitis followed by moderate and mild (p<0.001) (table 4). 34 (91.9%) of the patients not needed referral while 3 (8.1%) patients needed referral (figure 3). Conservative approach was used to treat most of the patients. Only one patient with severe acute pancreatitis needed cysto-jejunostomy. This association was statistically not significant. The association between MCTSI and BISAP was statistically significant (p<0.001). BISAP score of 3 and 4 was able to detect 100% patients with severe MCTSI thus the cut of ≥3 can be a good predictor according to present study for predicting SAP(table 4).

Figure 1: etiology of acute pancreatitis Fig 2: classification of pancreatitis according to MCTSI

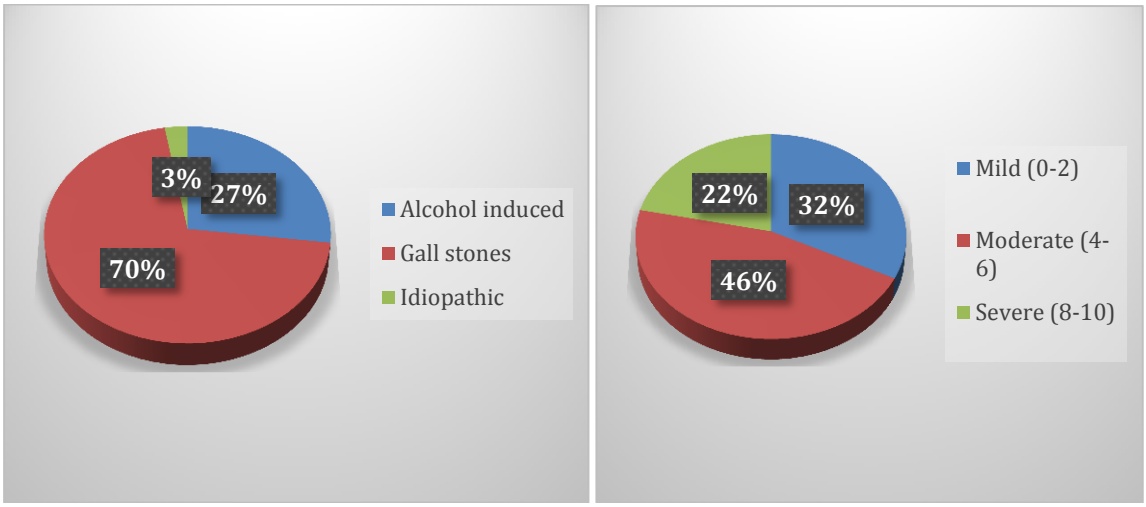

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Table-1: Distribution of patients with local complications

Local complications	Moderate		Severe		P Value
	N	%	N	%	
Acute necrotic collection	2	11.8%	4	50.0%	0.0001***
PP fluid collection	8	47.1%	1	12.5%	
Pseudocyst	3	17.6%	0	0.0%	
WON	0	0.0%	3	37.5%	
None	4	23.5%	0	0.0%	
	17	100.0%	8	100.0%	

Table-2: Distribution of patients with systemic complications

Systemic complications	Moderate		Severe		P Value
	N	%	N	%	
ARDS	1	5.9%	3	37.5%	0.001**
MOF	0	0.0%	1	12.5%	
Paralytic ileus	0	0.0%	1	12.5%	
Renal Failure	0	0.0%	1	12.5%	
None	16	94.1%	2	25.0%	

Table-3: ICU stay

ICU Stay	Mild		Moderate		Severe		P Value
	N	%	N	%	N	%	
Yes	0	0	3	17.6	6	75	0.002**
No	12	100	14	82.4	2	25	

Table 4: Hospital stay

DOHS	N	Mean	Std. Deviation	p-value
Mild	12	4.42	1.621	<.001
Moderate	17	9.53	4.048	
Severe	8	17.13	5.167	
Total	37	9.51	5.900	

Figure 3: Referred cases

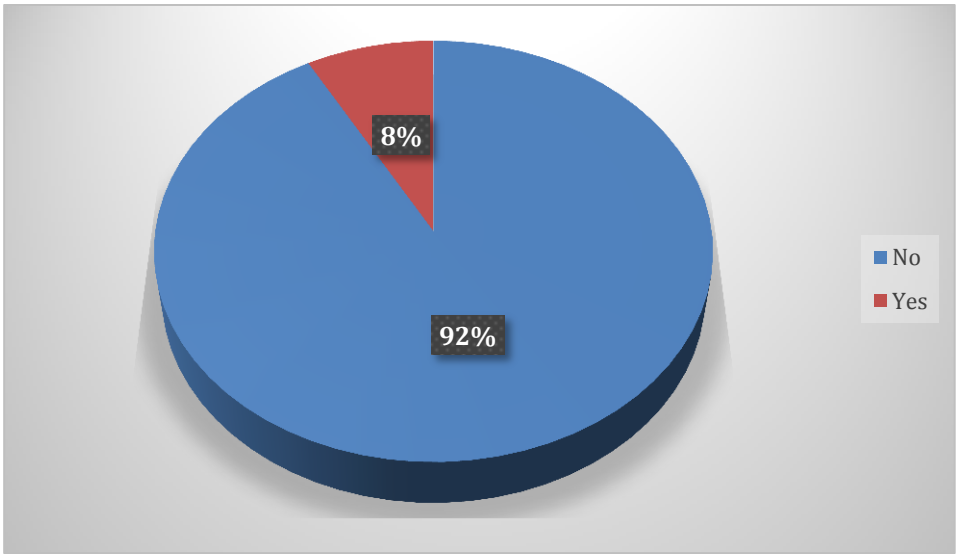

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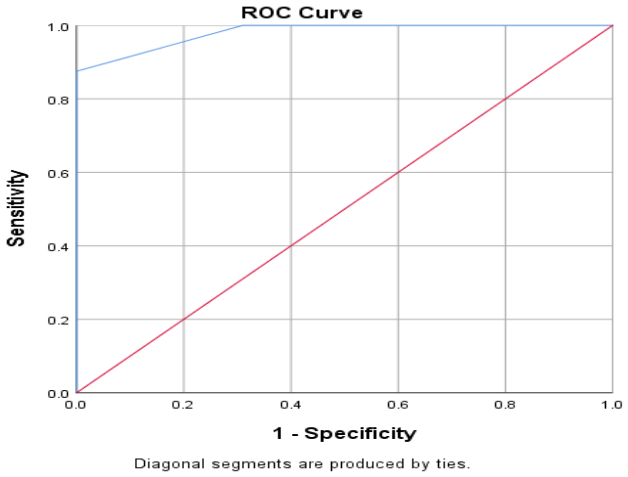
Table-4: Association of BISAP score to MCTSI

BISAP score	Modified CTSI Score						Total		p-value
	Mild		Moderate		Severe				
	n	%	n	%	N	%	N	%	
One	7	58.30%	0	0.00%	0	0.00%	7	18.90%	<0.001
Two	5	41.70%	8	47.10%	0	0.00%	13	35.10%	
Three	0	0.00%	9	52.90%	1	12.50%	10	27.00%	
Four	0	0.00%	0	0.00%	7	87.50%	7	18.90%	
Total	12	100.00%	17	100.00%	8	100.00%	37	100.00%	

ROC curve



Area Under the ROC Curve					
Test Result Variable(s)	Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
BISAP score	.978	.026	.000	.927	1.030

b. Null hypothesis: true area = 0.5

The AUC for BISAP score was .978 which was almost similar to MCTSI with statistical significant difference. The results of cut-off value of ≥3 are given below:

Results

Statistic	Value
Sensitivity	100.00%
Specificity	68.97%
Positive Predictive Value (*)	47.06%
Negative Predictive Value (*)	100.00%

Discussion

The present single centric, prospective, observational and hospital-based study was conducted at Maharishi Markandeshwar Medical College and hospital, Kumarhatti, Solan, H.P. It included 37 patients with acute pancreatitis and the severity of acute pancreatitis was determined by using BISAP, Modified CTSI score. The mean age of the patients was 48.14±15.99 years. Maximum patients were present in age group 56-70 years (35.1%) followed by 26-40 and 41-55 years with 27% in each group; least patients (8.1%) were ≤25 years or >70 years. The results of the present study were similar to Manjunath B. D. et al[7] who reported the mean age to be 54.5 years . In a study by Kaushik MR et al[8] (2017) the mean (±SD) age was 43.74±16.85 years.

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There was slight male predominance with 51.4% of patients being male and 48.6% being females. In a study by Vaidya et al[9] 89% of patients were male. Study by Veena P et al[10] in 2020, 90% were males and 10% were females. Males to females ratio was 9:1 in a study by Kaushik et al[8] in which 82% cases were male and 18% were female. 43% of the patients were males in a study by Katta et al[16]. In a study by Arif et al[11] 39.3% patients were male while 60.7% patients were female.

The main cause for acute pancreatitis was gall stones (70.3%) followed by alcohol (27%) only 2.7% cases were due to idiopathic cause. In a study by Januja etal [12] most common cause of AP was gallstones in 73 (68.9%), idiopathic in 20 (18.9%) patients and hypertriglyceridemia in 6 (5.7%) patients. According to the study by Chandrashekhar et al[13] the most common etiology in this study was revealed to be consumption of alcohol which was found in 33(66%) patients, followed by Gall stone disease, which was attributed in 10(20%) patients.

75% (6/8) patients of severe acute pancreatitis developed systemic complications while only 5.9% of moderate presented with systemic complications (ARDS; 1/17). Maximum patients in SAP had ARDS(37.5%) followed by multiorgan failure, paralytic ileus and renal failure (12.5% each). This association was statistically significant ($p<0.001$). It shows that the rate of cardiac, MODS and ARDS complication was comparable with the studies by chittipotula et al[14], Venkatapuram MR et al[15] and Veena P et al[10]. However a study by Katta et al[16] the organ failure was much more than present study. In a study by Manjunath PD On CECT, 14(28%) patients were found to have pancreatic necrosis, 19(38%) were found to have peri pancreatic fluid collection, 26(52%) had ascites and 30(60%) had pleural effusion . in present study 16.2% patients had acute necrotic collection, 24.5% have PP fluid collection, 8.1%each have pseudocysyt and WON.

In present study we observed that in mild disease none of the patient needed ICU admission while in moderate disease 3(17.6%) patients needed ICU admission. In case of severe disease 6(75%) patients needed ICU admission. This association was statistically significant ($p<0.05$)

The results were similar to the study by Januja et al[12] where patients having modified CTSI score of 8 to 10 (severe acute pancreatitis) 4(100%) patients required ICU admission, 4(100%) patients developed complications and mortality in 4(100%) patients occurred. The results were in discordance with a study by Sahu et al[17] who showed similar results, except that they did not find significant association of these scores with the length of ICU stay. This may be partly due to the relatively small number of our patients (19/60) who had a stay in the ICU (the rest of the patients were managed in the ward).

In present study for mild disease hospital stay was 4.42 day for moderate it was 9.53 day while for severe disease the DOHS was 17.13 days. Significant differences were observed among them ($p<0.001$). The results of the study were in accordance to Sahu et al[17] who showed positive correlation between hospital stay and severity of patients according to MCTSI. Padu et al[18] in their study observed that patients with severe AP had longer duration of hospital stay (mean 20 days) when compared with mild AP (mean stay of 6.56 days). Similar result was found in the study conducted by Gürleyik *et al.*[19] who noted a mean hospital stay of 10.3 days in mild cases and a mean hospital stay of 21.4 days in severe cases, respectively.

The association between MCTSI and BISAP was statistically significant ($p<0.001$). BISAP score of 3 and 4 was able to detect 100% patients with severe acute pancreatitis thus the cut-off of ≥ 3 can be a good predictor according to present study for predicting SAP.

Chen et al[20]compared BISAP with other scoring systems in predicting pancreatic necrosis, organ failure, and mortality in patients with SAP. BISAP was comparable to other scoring systems in predicting the prognoses of SAP. They demonstrated that the best cutoff value for BISAP was 2 for predicting pancreatic necrosis and organ failure, and 3 for predicting mortality. A study by

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Qiu, et al.[22] indicated that the AUC (0.604), sensitivity (0.905), and specificity (1.000) of BISAP were higher in the prediction of SAP compared to MCTSI.

The advantage of BISAP score is its relative ease with acquiring data and can be calculated within 24 hours of presentation. Patients with a BISAP score of equal to or greater than 4 have high mortality.[12]

Previous studies have well emphasized that the BISAP score is an accurate means for risk-stratification in patients with AP. Its components are clinically relevant and easy to obtain. The prognostic accuracy of BISAP is similar to that of the other scoring systems, and BISAP score would continue to be in clinical practice until any further breakthrough in the field of acute pancreatitis.[23,24]

Conclusion

BISAP score is effective in predicting severity in patients with acute pancreatitis. 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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