

Original research article

Study on etiology, clinical profile, severity and outcome of acute pancreatitis in relation to Bedside Index for Severity of Acute Pancreatitis (BISAP) and Modified Computer Tomographic Severity Index [MCTSI] scores

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Abstract

Background: Acute pancreatitis is an inflammatory process of the pancreas involving regional issues and/or remote organ systems and widely variable clinical and systemic manifestations. Identification of patients at risk of development of organ failure and severe pancreatitis would result in better patient management. Hence, we tried to predict mortality and outcome of Acute Pancreatitis in relation to BISAP score and MCTSI score.

Methodology: This is a prospective, observational study conducted on patients admitted in GGH, Kurnool for a period of 2 years between 2016 to 2017. After considering inclusion and exclusion criteria, all required parameters were collected from eligible patients, including routine blood investigations and CECT/NCCT done after 72 hours of admission and analysed. Statistical analysis was performed using SPSS 23rd version.

Results: Of the 190 cases admitted, 100 consecutive cases of acute pancreatitis were included in the study. Most common age group was 31 to 45 years. Majority were Males (84%), Alcohol was the commonest aetiology (69%), Pain Abdomen (88%) was common presentations. The median length of hospital stay was eight days. High BUN, high hematocrit were seen in 23%, 40% respectively, BISAP Score ≥ 3 in 27% and MCTSI score ≥ 8 in 46% of cases. Pancreatic collections are seen in 26% of cases. Higher BISAP scores were associated with higher MCTSI scores and poor outcome.

Conclusions: At admission BISAP score is simple and bedside tool for assessment & to triage the patients and CT scan done after the 3rd day may overestimate the necrosis. Biliary pancreatitis had an excellent prognosis despite high MCTSI scores.

Keywords: Acute pancreatitis, BISAP score, modified CT severity index (MCTSI), prognosis

Introduction

Acute pancreatitis is pancreatic inflammation with the involvement of regional tissues or remote organ systems and with extensive clinical and systemic manifestations which span from a self-limiting milder episode of epigastric pain to life-threatening severe multiorgan failure ^[1].

The mortality of Acute Pancreatitis differs significantly between mild and severe disease (mild < 5% vs. severe 20-25%), it is critical to assess severity as early as possible. Various scoring systems for assessment of severity like APACHE II scoring, RANSON scoring, GLASGOW scoring, CTSI, modified CTSI and BISAP. Among these BISAP and Modified CTSI scoring systems have been considered to be predictive and most widely used ^[2, 3].

BISAP has the advantage over Modified CTSI of being calculated within 24hrs of admission. Early prediction of the outcome of acute pancreatitis within 24 hrs by bed Side Index of Severity of Acute Pancreatitis [BISAP] Score being useful in the initiation of early treatment, assessing severity, to prevent

morbidity and mortality. While Modified CTSI calculated after 72 hrs using Plain and Contrast-enhanced CT abdomen^[3, 4].

BISAP score is a bedside assessment score that can be assessed at any level of health care facility. If we correlate the MCTSI scores with BISAP scores; Upon assessing BISAP scores early prediction of mortality can be made which prevents fatal outcomes^[5, 6]. These factors prompted to study the clinical profile and outcome of patients with Acute Pancreatitis in relation to BISAP and MCTSI scores who get admitted in Govt. General Hospital, Kurnool. With this background, the objectives of this study were to study the etiology, clinical profile, severity, and outcome of acute pancreatitis in relation to BISAP Score and modified CTSI and to assess the accuracy of BISAP scoring system vs. modified CTSI scoring system in predicting severity in an attack of acute pancreatitis.

Materials & Methods

This study was an Observational and Prospective study conducted in the Department of General Medicine, Government General Hospital & Kurnool Medical College, Kurnool, for two years (December 2016 to December 2018). All Consecutive patients presenting to the medical emergency department were included in the study. A total of 100 prospective acute pancreatitis were included during the study period.

Inclusion criteria: Patients who presented with the onset of pain abdomen for less than 48 hours, aged more than 15 years, patients who were admitted for pain in the abdomen, and satisfy any two of these three conditions:

1. Acute epigastric pain that often radiates to back and relieves with stooping posture.
2. Raise in serum Amylase and Lipase levels greater than 3-fold.
3. USG & CT evidence of Acute Pancreatitis.

Exclusion criteria: Patients with other known co-morbid conditions like cardiac failure, liver failure, renal failure, or any lung pathology. Attack of Acute on Chronic Pancreatitis. Recurrent attack of Acute Pancreatitis of the previous history of Complications like pseudocyst, pancreatic abscess, etc.

Method of collection of data: All Patients underwent thorough clinical examination in the form of General Examination, Vital signs like Pulse rate, Respiratory Rate, Blood Pressure, Temperature, and Conscious levels using GCS scale and systemic examination. Moreover, for confirmation of the presence of Acute Pancreatitis, they have undergone the following Biochemical and Radiological investigations.

Hemogram-Hb, TLC, DLC, Platelet Counts, Hematocrit, Blood Sugar, Serum Electrolytes, RFT, LFT, ECG, USG abdomen. Investigations to evaluate BISAP score: (within 24 hours of admission): BUN (Blood Urea Nitrogen) and X-ray Chest/Ultrasonography for Pleural Effusion. Investigations to determine modified CTSI: CT abdomen [both CECT & or NCCT] were done after 72 hrs.

All these investigations were done in GGH, KURNOOL at the time of Admission, and relevant other investigations were repeated after 48-72 hours. Each patient underwent the above investigations, and with those results, BISAP score was calculated at the time of presentation or within 24 hours of presentation, and the radiological-based modified CT Severity Index [MCTSI] was also calculated to assess the severity, morbidity, and mortality in the same patient.

This study was approved by Institute Ethics Clearance Committee of Kurnool Medical College Kurnool. (Review letter dated 11.11.2016, IEC-KMC, GGH)

Statistical analysis: Analysis was done using SPSS 23.0 (IBM, Chicago, Illinois). Continuous variables were presented as mean (SD). Categorical variables were presented as frequency and percentages.

Results

In this study, 100 cases of Acute Pancreatitis who fulfilled the inclusion and exclusion criteria were studied. The most common age group encountered in our study was 31-45 years which constitutes 38% followed by 14-30 years with 37%. Males were commonly affected (n=84) & Male to female ratio is 5.2: 1. Most common etiology is Alcohol (69%) followed by Gall stones (12%) & Idiopathic (11%). Pain abdomen was the commonest complaint (88%)/ Fever was seen in 59% of individuals at the time of presentation. 74% of patients had evidence of SIRS. At presentation, 51% of patients had neither clinical nor radiological (Chest X-ray or USG abdomen & Chest) evidence of Pleural Effusion. 25 had bilateral and 24 had left pleural effusion. (Table 1)

Table 1: Distribution of demographic factors, etiology, Chief complaints and pleural effusion

Variable	Number	
Age group	14 - 30	37
	31 - 45	38

	45 - 60	20
	61 - 75	5
Sex	Male	84
	Female	16
Aetiology of Acute Pancreatitis	Idiopathic	11
	Alcohol	69
	Gall stones	12
	hypertriglyceridemia	2
	Malaria pf+ve	2
	Pancreatic Divisum	2
	RVD + on ART	2
Chief Complaints	Abdominal Distension	2
	Anasarca	1
	Constipation	1
	Fever	3
	Jaundice	3
	Pain Abdomen	88
	Vomiting	2
Pleural effusion (PLEF) and distribution	absent	51
	B/L PLEF	25
	Lt PLEF+	24

Table 2: Distribution of BISAP score, MCTSI score, USG findings and organ failure

Variable		Number	
BISAP score distribution	0	7	
	1	33	
	2	33	
	3	21	
	4	5	
	5	1	
MCTSI score	Mild	2	15
	Moderate	4	19
		6	20
	Severe	8	25
	10	21	46
Ultrasonogram Abdomen	Abnormality consistent with pancreatitis	4	
	Direct evidence of Pancreatitis	57	
	Normal study	34	
	Others	5	
Organ failure	Absent	48	
	Renal failure	23	
	Cardiovascular failure	14	
	Coagulation failure	11	
	Hepatic failure	21	
	Respiratory failure	1	

The median duration of hospital stay was eight days. Leucocytosis was seen in 56% of patients at admission. The Median Platelet count was 1.2lakh/cumm. Median hematocrit (%) at presentation was 40%. High BUN (i.e., ≥ 25 mg/dl) at the time of presentation was seen in 23% of patients. Median S. Amylase and S. Lipase levels were 301 U/L and 250 U/L respectively. Most common ECG finding encountered was Sinus tachycardia (48%). In 2% of patients, non-specific ST elevations noted. Rest (50%) had normal ECG's.

At presentation, 73% of the patients had BISAP score of <3 and 27% of patients had BISAP scores of ≥ 3 . Patients with BISAP score of 5 was seen only in one patient at the time of presentation. (Table 2).

In the ultrasound studies conducted on the patients with acute pancreatitis; direct evidence of pancreatitis was seen in 57 patients (57%), no abnormality was detected in 34 (34%) of the patients. Among the other two patients had only cholelithiasis; 2 patients had Hepatomegaly with Ascites & 1 patient had Massive Splenomegaly with Portal cavernoma. 12% of patients had Gallstones. In 12% (n=12) of patients contrast CT was not done, but Plain CT was done on the third day. Necrosis was seen in 94% of cases. (Table 2)

Acute Necrotic Collection (ANC) was seen in 22% (n=22) and APFC (Acute Pancreatic Fluid Collection) seen in 4% (n=4). Pleural Effusion was noted in 49% of a study group of which 24 members had Left Pleural Effusion and 25 members had Bilateral Pleural Effusions. Ascites was seen in 34% of cases. No solid organ involvement is seen in this study. Vascular thrombosis was seen in 5% (n=5). All 5 cases had venous thrombosis. None of the study population had Pseudoaneurysm and Arterial hemorrhage. Modified CTSI scores showed 15% of mild cases, 39% of moderate cases & 46% of severe cases. (Table 2)

Table 3: BISAP scores and Age distribution

Count of BISAP score (B+I+S+A+P)	Age Groups				Grand Total
	14-30	31-45	45-60	61-75	
0	4	3	0	0	7
1	15	13	5	0	33
2	11	14	8	0	33
3	6	8	5	2	21
4	1	0	2	2	5
5	0	0	0	1	1
Grand Total	37	38	20	5	100

Age distributions as per BISAP scores were as follows. The majority of patients with BISAP scores < 3 were seen with age groups of 14-30 and 31-45 years whereas age groups of 45-60 and 61-75 years had BISAP scores of >3. (Table 3)

Table 4: Comparison of BISAP and MCTSI scores

BISAP Score	MCTSI total score			Grand Total
	Mild	Moderate	Severe	
0	3	4	0	7
1	12	12	9	33
2	0	17	16	33
3	0	5	16	21
4	0	1	4	5
5	0	0	1	1
Grand Total	15	39	46	100

BISAP and MCTSI were compared which is shown in Table-4. The majority of Mild pancreatitis (15%; n = 15) as per MCTSI score had BISAP score of ≤1. Moderate Pancreatitis saw in 39% of the study population of which 43% (n=17) had a BISAP score of 2. Severe Pancreatitis was seen in 46% of study subjects of which 37 (80.4%) persons had BISAP score of ≥2.

Table 5: BISAP score and outcome

Bisap	Died Number	Good Number
0	0	7
1	0	33
2	0	33
3	5	16
4	2	3
5	1	0
Grand Total	8	92

In this study, 8% (n=8) died due to severe disease. Table 5 showed the Association between BISAP score and the outcome of acute pancreatitis. This showed as the severity of the Attack increases mortality raises.

Table 6: MCTSI and outcome

MCTSI total score	Outcome		
	DIED	Good	Grand Total
Mild			
2	0	15	15
Moderate			
4	0	19	19
6	1	19	20
Severe			
8	2	23	25
10	5	16	21
Grand Total	8	92	100

Regarding outcome about MCTSI is shown in Table 6 patients, patients with mild pancreatitis recovered and had a good prognosis. Of 39 patients with Moderate pancreatitis, one person had a poor prognosis and succumbed to illness. 7% of the study population with severe pancreatitis experienced poor prognosis.

Table 7: Organ Failure and Outcome

Organ failure	DIED	Good	Grand Total
1	1	32	34
2	3	9	12
3	4	3	7
Absent	0	48	48
Grand Total	8	92	100

As evident in Table: 7 Multi-organ failure with ≥ 2 organs had a poor outcome. 48% (n=48) had no evidence of organ failure during illness all patients were recovered well, and no mortality observed in that group. Patients having single organ failure had 1% (n=1) mortality. Early Death is defined as death occurring within ≤ 14 days and Late death is defined as death occurring after 14 days. Among eight deaths in study, seven deaths occurred within 14 days one occurred after 34 days of hospitalization.

Discussion

Acute Pancreatitis (AP); the disease with a broad spectrum of illness. Severe Pancreatitis has high mortality and morbidity associated with several systemic and local complications. Multiple interventions have been tried to prevent progression to severe disease. Similarly, many prognostic factors are assessed to predict the poor outcome and severity of the disease. Early hospitalization may be beneficial to identify those who require aggressive interventions to prevent the severe attack of AP. In this study Aetiology, Clinical profile, Outcome of AP in relation to BISAP score and MCTSI scores were analyzed. There was a considerable variation in the age of presentation. Most common age group of presentation in this study was 31-45 years (38%) followed by 14-30 years (37%). Mean Age of patients was 38.15 ± 12.44 years. This observation correlates closely with previous studies like Sahu *et al.* [7], PK Garg *et al.* [8] Raghu MG *et al.* [9] where age of presentation was ranged 36.6 to 42.9 years. Srinivas Rao *et al.* [10] pointed out that 4th decade is the common age of onset. Out of 100 patients, 84% were males; 16% were females. Male to Female ratio in our study was 5.25:1. Our study closely correlates with Srinivasarao *et al.* [10] study with a male-to-female ratio of 4.5:1. Whereas other studies demonstrate Male to female ratio of 2 to 3:1 as shown by Nitesh Negi *et al.* [11] (2.6:1) and PK Garg *et al.* [8] (2.18:1). Most common etiology observed in this study was Alcohol (69%), followed by Gallstone related in 12%, and Idiopathic in 11%. Other aetiologies like Hypertriglyceridemia, Malaria, Pancreatic Divisum, Retroviral illness related seen in 2% each.

In studies like Sahu *et al.* [12] Chronic alcohol abuse was the most common cause of AP (n = 30, 50.0%), followed by gallstone disease (n = 15, 31%) and Idiopathic (n = 13, 22%). Srinivasarao *et al.* [10], showed alcoholic consumption by 51%, idiopathic in 49%, followed by gallstones in 16.4%. Raghu MG *et al.* [9] observed in their study, gallstones was the aetiology in 29 patients (48.3%), alcohol in 22 (36.7%) and idiopathic in 9 (15.0%) patients. In a study by Kaya *et al.* [4] Biliary pancreatitis commonest form, followed by idiopathic pancreatitis (53% and 26%, respectively).

In this study pain abdomen was the most common (n=88) presenting complaint. This is followed by fever in 3%, jaundice in 3%. Vomiting & Abdominal distension in 2% each. Various studies like Sahu *et al.* [12] coincide with our result of epigastric pain in 47 (78.3%) patients, followed by vomiting in 46 (76.7%). Srinivasarao *et al.* [10] reported 100% of their patients had abdominal pain as presenting complaint. SIRS (Fever/Hypothermia; Leucocytosis/Leukopenia; Tachycardia; Tachypnoea) 2 of 4 is seen in 74% of cases at admission. Pleural effusion seen in 49% (n=49) of admission cases. Of which 24 cases had Left Pleural effusion alone while 25 cases had Bilateral Effusions. Leucocytosis was seen in 56% of cases. In the rest 41% of cases, leukopenia seen in 12% (n=12) only.

Mean duration of Hospital stay was 9.63 ± 5.9 days. 68% (n = 68) of patients length stay was <10days and 28% had a stay of >10 days. The longest duration of stay was 45 days. The similar average length of Hospital stays noted in a study of Negi *et al.* [11] as 8.03 ± 4.98 days.

At presentations, most (73%) of our patients had BISAP scores of 1-3. However Srinivasarao *et al.* [10] Study showed that 67% had BISAP scores of 1-3, this is probably generated a skew towards the left. As age advances, severity of attack of Acute Pancreatitis increases which was observed with many contemporary studies like Srinivasarao *et al.* [10] and Negi *et al.* [11] Ultrasound Abdomen showed direct evidence of Pancreatitis in 57% (n=57) and normal study in 34% (n = 34). Irshad Ahmad Banday *et al.* [13] the study showed the incidence of gallstones in 40% of cases.

Pancreatic and Extra Pancreatic complications were noted in our study. Most common complication in this study was Pleural effusion at 49% (n=49); Ascites at 34% (n=34), followed by Acute Necrotic Collection (ANC) in 22% (n=22); Vascular thrombosis in 5% (n=5); Acute Pancreatic Fluid Collection (APFC) in 4% (n=4). Whereas Sameer Raghuwanshi *et al.*, [14] studies showed that APFC is seen in 72% (n=36) and ANC is seen in 48% (n=24). Pleural effusion was documented in 46% of cases and Vascular thrombosis in 8% (n=4) of cases.

Organ Failure associated with Acute Pancreatitis may be a result of two mechanisms. In the earlier course of disease, Organ failure may be due to SIRS evoked by Acute Pancreatitis in the later phase it is

due to sepsis and related organ dysfunction. The absence of Organ failure was associated with moderate pancreatitis as evidenced by MCTSI (n=21) 21%. Any sort of organ failure like renal or hepatic or coagulation or cardiovascular or respiratory failure was considered and counted as a failure and analyzed concerning MCTSI scores.

Mild attacks of Pancreatitis were seen in 15% (n= 15); moderate attacks were seen 39% (n=39) and severe attacks were seen in 46% (n=46). Irshad Ahmad Banday *et al.* [13]

Reported that 18% (n=9) had mild attack of acute of Pancreatitis; 38% (n=19) had moderate Pancreatitis and 44% (n=22) had severe attacks. Negi *et al.* [11] demonstrated that Modified CT severity index (n=67) Mild at 29.85% (n=20); Moderate at 40.29% (n=27) and Severe at 32.83% (n=22). A clinically mild attack may be estimated radiologically as severe or moderate because of various reasons. Age-wise distribution of MCTSI scores showed that that as Age increases, the severity of an attack of pancreatitis increases.

Of the Patients who had BISAP score 0, none had experienced a severe attack of pancreatitis and all had a good outcome. BISAP score increases the severity of attack which is evidenced as MCTSI scores.

8% (n=8) of the study population succumbed to illness because of various factors. 1% (n=1) of patients of Moderate Pancreatitis had a poor prognosis and died after 34 days of illness due to various factors like sepsis and sepsis-related organ failure. 7% (n=7) of patients succumbed to illness \leq 14 days of illness secondary to Pancreatitis related Organ failure and Multi-Organ Dysfunction Syndrome. Negi *et al.* study [11] also showed that mortality in Moderate Pancreatitis was 4.08% (n=2) and mortality in severe Pancreatitis was 17.5% (n=5).

The identification of organ failure is now central to the definition of severe acute pancreatitis. Transient organ failure is a marker of moderately severe disease. If organ failure persists for more than 48 hours, the patient has severe pancreatitis and is at high risk (at least 35%) of a fatal outcome. In this study, mortality is nil in patients with no organ failure, and mortality percentage increased as the number of organs failed increased like 1% (n=1) in patients with any sort of single organ failure and 3% (n=3) in persons with dual organ failure and 4% (n=4) in patients with three organ failure. As the severity of Modified Marshall score increases; Organ failure also increases and prognosis worsens.

Higher BISAP scores at admission carry a poor prognosis and higher mortality rates which warrant the careful monitoring of such patients. BISAP scores \leq 2 at admission had a good prognosis, as none of the patients experienced death or disability. Patients having scores of \geq 3 had poor outcomes. 23% (n=5) of the patients with BISAP score 3 (n=21) had poor prognosis. 40% (n=2) of the patients with BISAP score 4 (n=5) had a poor prognosis. One patient with BISAP score of 5 succumbed to illness. Several studies like Wei Gao *et al.* study [15] and Lifan Chen *et al.* [16] concurred with this observation. 60% of patients (n=3) with BISAP score four had a good prognosis reason being all these three patients had Biliary pancreatitis.

As the severity of an attack of AP increases mortality also increased which was seen in this study. However, about the outcome, MCTSI did not show any statistical association possible factors may be a small sample and overestimation of necrosis which made the patients have higher MCTSI scores.

Conclusions

From this study, it can be concluded that Alcohol is the most frequent etiology, and Pain abdomen is the commonest presenting complaint. Biliary Pancreatitis had an excellent prognosis despite high MCTSI scores. Persistent organ failure is associated with poor prognosis. The presence of Respiratory failure marks the worst prognosis and renal failure was also associated with poor prognosis Higher Age was associated with higher BISAP scores and MCTSI score with poor prognosis. At Admission, BISAP score is a simple bedside tool for the assessment of severity and triage of the patient. CT imaging done after three days and assessment done with MCTSI scores may overestimate the necrosis.

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