

Original Research Article

Clinical pattern of acute pancreatitis in eastern India and comparison of Ranson, BISAP and APACHE II as a predictor of severity, local complications and mortality

Nishith M. Paul Ekka*, Gaurav Mishra, Vinod Kumar, Arun Kumar Tiwary,
Tanushree Kar, Ashutosh Tiwary

Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

Received: 06 September 2018

Accepted: 15 September 2018

*Correspondence:

Dr. Nishith M. Paul Ekka,

E-mail: drnmpekka@gmail.com

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ABSTRACT

Background: Acute pancreatitis is the single most frequent gastrointestinal cause of hospital admissions. Scoring systems have been used since the 1970s for assessment of its severity. This study was aimed to assess the clinical pattern of acute pancreatitis and to compare various predicting systems like Ranson, BISAP and APACHE II in predicting severity, local complications and mortality in acute pancreatitis.

Methods: In this prospective study, 91 consecutive cases of acute pancreatitis admitted, between April 2015 to March 2017, were studied. The diagnostic criteria include the presence of at least two of the three features; abdominal pain, serum amylase and lipase levels and findings on imaging studies. Patients were divided into two groups each, BISAP Ranson ≥ 3 and < 3 , APACHE II ≥ 8 and < 8 , and analyzed statistically.

Results: Out of total of 91 patients, 81 were male and 14 were female with mean age was 36.14 years. Commonest aetiological factor was alcoholism in 57.89% followed by gallstones in 23.16%. Serum amylase was raised in 83.26% patients while 95.79% had raised serum lipase levels. 75.79% patients were of MAP while 24.21% patients were of MSAP and SAP. 7.37% patients developed local complications and mortality rate was 6.32%. All the scoring systems were found similar in predicting severity, local complication and mortality, had low sensitivity and high specificity (P value < 0.05).

Conclusions: There is no ideal predicting system for acute pancreatitis. These scoring systems can be used to triage patients for better healthcare delivery.

Keywords: APACHE II, Acute pancreatitis, BISAP, Predicting systems, Ranson

INTRODUCTION

With a reported annual incidence ranging from 4.9 to 35 per 100,000 population, acute pancreatitis is the single most frequent gastrointestinal cause of hospital admissions around the world.¹ According to the revised Atlanta classification, acute pancreatitis is clinically defined by at least two of three features, (a) abdominal

pain suggestive of pancreatitis; (b) serum amylase and lipase levels three or more times normal; and (c) characteristic findings on imaging studies.² Acute pancreatitis is classified on the basis of its severity as,

- Mild acute pancreatitis, which is characterized by absence of organ failure and local or systemic complications

- Moderately severe acute pancreatitis, which is characterized by no organ failure or transient organ failure less than 48 hours with or without local complications and,
- Severe acute pancreatitis characterized by persistent organ failure more than 48 hours that may involve one or multiple organs.³

Multi-factorial scoring systems, including Ranson et al and Acute Physiology and Chronic Health Evaluation (APACHE)-II scores have been used since the 1970s for assessment of the severity of AP.^{4,5} Bedside Index for Severity in Acute Pancreatitis (BISAP), has recently been proposed as an accurate and simple method for early identification of patients at risk of in-hospital mortality.⁶ These predictive methods have been established as an important tool for assessment of the severity of acute pancreatitis. However, these multi-factorial scoring systems, which are complex and difficult to use in clinical basis, have been shown to perform with high negative predictive value but only moderate overall sensitivity.⁷

The present study was aimed to assess the clinical pattern of acute pancreatitis and to do a comparative study of various predicting systems like Ranson, APACHE II and BISAP in predicting severity, local complications and mortality in acute pancreatitis.

METHODS

This is a prospective study, which was conducted from April 2015 until March 2017 at Department of Surgery, Rajendra Institute of Medical Sciences Ranchi. The consecutive patients who were diagnosed and treated for acute pancreatitis during this period formed the pool for the present study. Patients who were diagnosed as acute pancreatitis were only included in the present study.

The diagnostic criteria of acute pancreatitis referred to the Atlanta Classification of Acute Pancreatitis which includes the presence of at least two of the three features:

- Abdominal pain suggestive of pancreatitis;
- Serum amylase and lipase levels three or more times normal; and
- Characteristic findings on imaging studies.

Patients with chronic pancreatitis with acute exacerbations and patients of pancreatic malignancies were excluded from this study. Patients were classified as mild acute pancreatitis (MAP), moderately severe acute pancreatitis (MSAP) and severe acute pancreatitis (SAP), based on the presence of organ failure and local complications. Patient's demographic data, history and clinical features and complications were recorded along with serum amylase and lipase levels. BISAP and APACHE II score were calculated in 24 hours after admission. Ranson score was calculated in 48 hours. Patients were divided into two groups each, BISAP and

Ranson ≥ 3 and <3 , APACHE II ≥ 8 and <8 . The data was statistically analyzed using MedCalc software 17.5. BISAP, Ranson and APACHE II were compared in predicting severity, local complications, and mortality of Acute Pancreatitis, using chi-square testing.

RESULTS

Out of the total of 95 patients studied, 81 were men, i.e., 85.26% while 14 were women, i.e., 14.74%, with a male female ratio of 5.78:1. The age at diagnosis ranged between 18 -70 years with mean age of 36.14 years and median age of 35 with a standard deviation of 11.94 and sample variance of 142.56. Most of the patients, i.e. 38 (40%), were in 4th decade of their life, followed by 3rd decade (n=22, 23.16%) and 5th decade (n=21, 22.11%). Only 3 patients (3.1%) were between 61-70 years of age (Table 1).

Table 1: Age and sex distribution of patients of acute pancreatitis.

Age group in years	Male	Female	Total
10-20	5	1	6
21-30	18	4	22
31-40	31	7	38
41-50	19	2	21
51-60	5	0	5
61-70	3	0	3

Most common clinical feature, which was present in all of the patients, was pain abdomen suggestive of acute pancreatitis i.e. pain in upper abdomen radiating to back or shoulders (n = 95, 100%). Vomiting, being the second most common symptom was present in 41 subjects (43.16%). Other less common clinical features include fever (n = 41, 43.16%), jaundice (n = 20, 21.05%), shock (n = 16, 16.84%) and pleural effusion (n = 2, 2.11%). 6 patients presented as MODS, and none of them survived.

Table 2: Clinical feature of acute pancreatitis and their occurrence.

Clinical features	No. of patients	Percentage
Pain abdomen	95	100
Vomiting	79	83.16
Fever	41	43.16
Jaundice	20	21.05
Shock	16	16.84
MODS	6	6.32
Pleural effusion	2	2.11

Most of the cases in this study (n = 55, 57.89%) were of alcohol induced acute pancreatitis, while 22 (23.16%) patients were gall stone induced. Trauma was identified as the cause in 12 (12.63%) patients and ERCP in 1 (1.05%). In 5 (5.26%) patients etiology couldn't be identified and were termed as idiopathic. Most of the patients of alcohol induced acute pancreatitis were male

while most of patients of gall stone induced pancreatitis were female (Table 3).

Table 3: Etiological distribution of patients of acute pancreatitis.

Etiology/Association	No. of patients	Percentage
Gall Stones	22	23.16
Alcohol	55	57.89
Idiopathic	5	5.26
Traumatic	12	12.63
Post ERCP	1	1.05

Out of 95 patients participating in this study, 91 had raised serum lipase levels, a sensitivity of 95.79%. It ranged from minimum 40 to maximum 1310, with a median of 480.5 and standard deviation of 323.3. Serum amylase was raised in 79 patients, a sensitivity of 83.16%. The range varied from 14 to 3319, with a median of 350 and standard deviation of 639.78 (Table 4). Out of a total of 95 patients participating in this study 72 (75.79%) patients were of mild acute pancreatitis (MAP) while 23 (24.21%) patients were of moderately

severe (MSAP) and severe acute pancreatitis (SAP). A total of 7 (7.37%) patients developed local complications during the course of illness and 6 patients died during treatment with a mortality rate of 6.32%.

It was observed that the incidence of MSAP and SAP, local complications, and mortality were significantly higher in the group with higher scores of BISAP, Ranson and APACHE II than in the group with lower scores (Table 5, 6 and 7).

Table 4: Distribution of rise of serum amylase and/or lipase levels in acute pancreatitis.

Raised Lipase and amylase level	Raised Lipase with normal amylase level	Raised Amylase with normal Lipase level	Total raised Lipase level	Total raised Amylase level
75 (78.95%)	16 (16.84%)	4 (4.21%)	91 (95.79%)	79 (83.16%)

Table 5: Comparative analysis of BISAP, Ranson and APACHE II scores in predicting severity.

Groups	MSAP & SAP	MAP	Total	X ²	p value
BISAP					
≥3	12	7	19	19.427	<0.0001
<3	11	65	76		
			95		
Ranson					
≥3	13	10	23	17.085	<0.0001
<3	10	62	72		
			95		
APACHE II					
≥8	12	8	20	17.498	<0.0001
<8	11	64	75		
			95		

Table 6: comparative analysis of BISAP, Ranson and APACHE II scores in predicting local complications.

Groups	Local Complication	No Local Complication	Total	X ²	p value
BISAP					
≥3	4	14	18	7.1	0.0077
<3	3	74	77		
			95		
Ranson					
≥3	4	15	19	6.44	0.0111
<3	3	73	76		
			95		
APACHE II					
≥8	5	16	21	10.56	0.0012
<8	2	72	74		
			95		

Table 7: Comparative analysis of BISAP, Ranson and APACHE II scores in predicting mortality.

Group	Mortality	Survival	Total	X ²	p value
BISAP					
≥3	5	14	19	15.887	0.0001
<3	1	75	76		
			95		
Ranson					
≥3	5	15	20	14.789	0.0001
<3	1	74	75		
			95		
APACHE II					
≥8	5	15	20	14.789	0.0001
<8	1	74	75		
			95		

Table 8: Statistical analysis of BISAP, Ranson and APACHE scores.

Scoring system	Sensitivity	Specificity	PPV	NPV	PLR	NLR
MSAP and SAP						
BISAP	52.17%	90.28%	63.16%	85.53%	5.37	0.53
Ranson	56.52%	86.11%	56.52%	86.11%	4.07	0.5
APACHE II	52.17%	88.89%	60%	85%	4.7	0.54
Local complications						
BISAP	57.14%	84.09%	22.22%	82.35%	3.59	0.51
Ranson	57.14%	82.95%	21.05%	96.05%	3.35	0.52
APACHE II	71.43%	81.82%	23.81%	97.30%	3.93	0.35
Mortality						
BISAP	83.33%	84.33%	26.32%	98.68%	5.3	0.2
Ranson	83.33%	83.15%	25.00%	98.67%	4.94	0.2
APACHE II	83.33%	83.15%	25.00%	98.67%	4.94	0.2

All the three scoring systems were found to be similar in predicting severity, local complication and mortality. All the three systems had a sensitivity of 52.71 to 90.28% and specificity of 86.11 to 90.28% in predicting severity (P value <0.0001) while in predicting local complications sensitivity ranged from 57.14 to 71.43% and specificity from 81.82% to 84.33% (P value < 0.05).

These systems were most sensitive in predicting mortality with a sensitivity of 83.33% for all the systems and specificity ranged from 83.15% to 84.33% (P value = 0.0001). These findings have been elaborated in Table 5, 6, 7 and 8.

Table 5 shows comparative analysis of BISAP, Ranson and APACHE II scores in predicting severity. It shows that the patients with mild acute pancreatitis had significantly lower scores while with severe disease had significantly higher scores. (MAP= mild acute pancreatitis. MSAP=moderately severe acute pancreatitis, SAP=severe acute pancreatitis)

Table 6 shows comparative analysis of BISAP, Ranson and APACHE II scores in predicting Local

complications. It shows that the patients without any local complication had significantly lower scores while those with local complication had significantly higher scores.

Table 7 shows comparative analysis of BISAP, Ranson and APACHE II scores in predicting mortality. It shows that the patients who did not survive had significantly higher scores compared to those who survived.

Table 8 shows statistical analysis of BISAP, Ranson and APACHE scores. It is observed that all the three systems were very specific in predicting severity, local complications and mortality but lacked sensitivity in predicting severity and local complications. (PPV=positive predictive value, NPV=negative predictive value, PLR=positive likelihood ratio, NLR=negative likelihood ratio)

DISCUSSION

In the present study it was observed that acute pancreatitis was more common in men (85.26%) than in women (14.74%). Baig SJ et al in their prospective study

of acute pancreatitis in 2008 done in eastern India, also observed a male predominance with 73% of their patients being male.⁸ Vengadakrishnan K et al in their study in Chennai, India in 2015 observed that acute pancreatitis was found five times more common in males than in females.⁹ Nesvaderani M et al in 2015 published their retrospective cohort study of 932 patients and observed that 50.4% patient patients were females.¹⁰ Present study is in concurrence with other Indian studies. This may be because most of our patients had alcohol induced acute pancreatitis and alcoholism is far more common in male population in India.

In the present study we observed that a total of 38 (40%) patients were in 4th decade of their life, followed by 3rd decade then 5th decade, with mean age of 36.14 years and median age of 35. G. Efron in his study to determine the natural history of pancreatitis, published in British Journal of Surgery in the year 1966, observed that incidence of pancreatitis increased with age, was most in 3rd, 4th & 5th decades of life, and again dipped during later part of life.^{11,14} Vengadakrishnan et al in their study observed that most patients were in the age group of 21 to 40 years.⁹ Nesvaderani M et al observed a median age of 50 which was higher than what was observed in our study.¹⁰

Baig SJ et al in their study observed a mean age of 30 years which was similar to that of our study.⁸ Chang MC et al in their study done in Taiwan and published in 2003 observed that patients with alcohol-related acute pancreatitis were the youngest (mean age: 41.5 years), while those with gallstone pancreatitis were the eldest (mean age: 64.1 years).¹² This observation made by Chang et al may be the cause of younger mean age in the current study.

All the patients in our study presented with pain abdomen suggestive of acute pancreatitis. Organ failure was present in 6 patients while shock in 16 patients. Pain abdomen is one of the diagnostic criteria as described in revised Atlanta classification for acute pancreatitis.² It was a important diagnostic criteria in our study and thus patients who had pain abdomen suggestive of pancreatitis were only included in this study. Organ failure and shock are the characteristic features, apart from other complications, which differentiates MAP with MSAP/SAP. In the present study none of the patients with organ failure survived.³

Contrary to the classical text book teaching of biliary disease being the most common cause of acute pancreatitis, it was observed in our study that alcohol (57.89%) was the most common cause of acute pancreatitis followed by gall stones (23.16%) and trauma (12.63%). Chang MC et al in their study observed that alcohol was the etiology in 33.6%, followed by gallstones in 34.1%. They also observed that the predominant cause of acute pancreatitis in women was gallstones, while alcohol was the leading cause of acute pancreatitis in

men.¹² Guo-Jun Wang et al in their review of etiology and pathogenesis of acute pancreatitis published in 2009 opined that in developed countries, obstruction of the common bile duct by stones (38%) and alcohol abuse (36%) are the most frequent causes of acute pancreatitis.¹³ Baig SJ et al observed alcoholism in 41.1%, gallstones in 23.5%, trauma in 17.6%, idiopathic in 11.7% and post-ERCP in 5.8%.⁸ Simoes et al in their study observed that the most common etiology was alcohol consumption (39.3%), followed by gallstones (24.1%).¹⁴ High incidence of alcoholism as an etiological factor in our study may be due to high prevalence of alcoholism among males in this part of the globe. Other authors have also made similar observation.^{8,14} It may be possible that recently alcoholism is replacing gall stone as the most common cause of acute pancreatitis. Only one patient in our study was of post ERCP pancreatitis, this was because of lack of ERCP facility in our centre.

We observed sensitivity of 95.79% for serum lipase and 83.16% for serum amylase. Gomez et al in their study in 2012 observed sensitivity of serum lipase to be 95-100% depending on cause.¹⁵ Some studies observed sensitivity for serum amylase to be 63.6 % and that for serum lipase to be 99.5 %, whereas, specificity for serum amylase to be 99.4 % and that for lipase to be 99.2 %.¹⁶ present study is in agreement with most authors that Sr. lipase is superior to serum amylase in the diagnosis of acute pancreatitis.

Cho JH in their comparison of scoring systems in predicting the severity of acute pancreatitis in 2015 concluded that the APACHE-II scoring system seems to have the highest accuracy in assessment of the severity and outcome of acute pancreatitis, although the predictive accuracy of APACHE-II was not significantly different compared to that of the other scoring systems.¹⁷ Khanna et al in their study observed a sensitivity and specificity of 83 and 78 for Ranson score in predicting severity and organ failure, sensitivity and specificity of BISAP was 74 and 68 and that for APACHE II it was 80 and 82. They concluded that there is no single ideal method in assessing the severity of the disease. Individual preference and available institutional facilities influence the method chosen for prognostic assessment of acute pancreatitis.¹⁸ In the present study all the three scoring systems were found to be similar in predicting severity, local complication and mortality. All the three systems had a sensitivity between 52.71 to 90.28% and specificity between 86.11 to 90.28% in predicting severity (P value < 0.0001) while in predicting local complications sensitivity ranged from 57.14 to 71.43% and specificity from 81.82% to 84.33% (P value < 0.05). In predicting mortality the sensitivity was 83.33% for all the systems and specificity ranged from 83.15% to 84.33% (P value = 0.0001). All the three systems had high negative predictive value and low positive predictive value (Table 8) as observed by other authors.¹⁰ Therefore, all three scoring systems can be used to predict the severity, local

complications, and mortality of acute pancreatitis but none was found to be superior to others.

CONCLUSION

Incidence of alcohol induced acute pancreatitis is on the increase. Mean age is also on the lower side nowadays. Serum lipase was found to be superior to serum amylase in the diagnosis of acute pancreatitis. All the scoring systems in this study were very similar in predicting severity, local complication and mortality. Although all three scoring systems can be used to predict severity, local complications, and mortality of acute pancreatitis, they were much better in predicting mortality. There is no ideal predicting system for acute pancreatitis, but these scoring systems can be used to triage patients for better healthcare delivery.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Ekka NMP, Mishra G, Kumar V, Tiwary AK, Kar T, Tiwary A. Clinical pattern of acute pancreatitis in Eastern India and comparison of Ranson, BISAP and APACHE II as a predictor of severity, local complications and mortality. Int Surg J 2018;5:3707-12.