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ORIGINAL RESEARCH PAPER

A clinical study of various diagnostic criteria in evaluation of severity of acute pancreatitis

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ABSTRACT

Introduction*: Acute Pancreatitis with rapidly progressive severe inflammatory response is associated with significant morbidity. Early assessment of severity and identification of patients at risk is important for early intensive therapy and timely intervention. The study was taken up to see applicability of various diagnostic criteria in evaluation of severity of acute pancreatitis.* ***Materials and methods****: The prospective clinical study was carried out amongst the patients admitted with Acute Pancreatitis in a tertiary care Hospital in Assam for a period of one year. Data was collected by predesigned and pretested schedule along with clinical examination and laboratory investigations. Revised Atlanta classification, 2012 of determination of severity of AP was taken as the gold standard and accordingly Ransons, APACHE II , and BISAP score were calculated for severity assessment. The first outcome recorded with the accuracy in determination of severity of Acute Pancreatitis. The final outcome was recorded as per eventuality of the treatment course. Statistical analysis of categorical values were evaluated using Chi square or Fischer extract test.* ***Results****: The average RANSON score of the severe patients was 3.94. The sensitivity of RANSON'S scoring system was 75% while it had 84.21% specificity in predicting severe acute pancreatitis. The average BISAP score of the severe patients was 2.36. The sensitivity of the BISAP scoring system was 75%, while it had 86.84% specificity in predicting severe acute pancreatitis. The average APACHE II score of the severe patients were 10.34 with sensitivity of 83.34% and specificity of 86.84% The APACHE II score has demonstrated the highest accuracy for prediction of severe AP (AUC = 0.910, 95% CI: 0.826-0.993).* ***Conclusions****: APACHE II score was found to be better predictor of disease severity and survivability with good sensitivity and high specificity.*

Keywords: *APACHE II; high specificity; sensitivity.*

INTRODUCTION

Acute Pancreatitis has a highly variable clinical course. In most patients though it takes a self-limiting course 10-20% of patients develop a rapidly progressive severe inflammatory response with significant morbidity. The mortality ranges from 10% to 85%.[1]

Given the wide spectrum of disease seen, the care of the patients with pancreatitis must be highly individualized. Early assessment of severity and identification of patients at risk is important for early intensive therapy and timely intervention for better prognosis. Various scoring systems have been used to assess the severity in Acute Pancreatitis.

The study was to study various diagnostic criteria in evaluation of severity of acute pancreatitis with Ransons, BISAP, APACHE II score and usefulness of the best one in stratification of Severe Acute Pancreatitis (SAP).

MATERIALS AND METHODS

The prospective study was carried out among the patients admitted in a tertiary care hospital in Assam for a period of one year after obtaining requisite ethics committee clearance. Adult patients with more than age 15 years with clinical

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history of abdominal pain and an increased level of pancreatic enzymes suggestive of acute pancreatitis reporting within 48 hours of onset were included in the study. Patients with other co-morbid conditions like cardiac failure, liver failure, renal failure or any lung pathology, acute on a chronic pancreatitis**,** recurrent attack of acute pancreatitis and with history of complications like pseudo cyst, pancreatic abscess, etc were excluded from the study. Data was collected by predesigned and pretested schedule along with clinical examination and laboratory investigations. Accordingly Ransons,[2,3] BISAP[4,5] and APACHE II[6,7] score were calculated. The first outcome was recorded with the accuracy in determination of severity of acute pancreatitis. The final outcome was recorded as per eventuality of the treatment course.

Statistical analysis of categorical values were evaluated using Chi square or Fischer extract test. Sensitivity, specificity, positive predictive value and negative predictive value of each scoring system were calculated using the cut-off values for high sensitivity and specificity generated from the Receiver Operator Characteristics (ROC) Curve. A P-value of < 0.005 was considered to be significant. Odds Ratio for each of the scoring systems were calculated based on the Fischer extract test. Comparison of scoring systems in prediction of severe AP, were calculated on the basis of the highest sensitivity and specificity values generated from the Area Under Curve (AUC) generated from the (ROC), using the SPSS version 16.0, in order to determine the accuracy for each of the scoring systems. The following cutoff values were selected for prediction of severe AP: Ranson ≤ 3, APACHE II ≤ 8, BISAP ≤ 2.

RESULTS

The present study comprises of 50 patients suffering from pancreatitis during the study period were taken into consideration. Revised Atlanta classification, 2012 of determination of severity of AP was taken as the gold standard. The severity assessment was done by using Ransons, APACHE II and BISAP scoring systems. The patients were divided into two groups of mild to moderate severity and severe acute pancreatitis. In the present study, age of the patients ranges from 21 to 65 yrs. The mean age of incidence is 43.7 yrs. Out of 50 cases 34 patients were female and 16 patients were male. 38 patients had gall stone disease. Of these 38 patients, 33 patients were female and 5 male patients. 9 patients, all male had history of alcoholism of which one had associated gall stone disease. In 3 patients no cause of acute pancreatitis could be determined and were labeled as idiopathic AP. As per Atlanta Classification 37 Patients (75%) had mild to moderate acute pancreatitis and 13(25%) Patients had severe acute pancreatitis (SAP). Patients with RANSON score more than or equal to 3 were considered severe. In this study 35 patients were considered mild to moderate of which 23 patients were female and 12 patients were male. 15 patients were considered severe out of which 11 were female and 4 were male patients. Biliary aetiology found in most cases. 26 in mild and 11 in severe category (**Table 1).**

Table 1 Aetiology of acute pancreatitis by Ransons score

Severity	Biliary	Alcohol	Idiopathic
Mild	26	6	3
Severe	11	4	0

The average RANSON score of the severe patients was 3.94. One patient died. Mortality rate for SAP 6.67%. The sensitivity of RANSON'S scoring system was 75% while it had 84.21% specificity in predicting severe acute pancreatitis. The positive predictive value of RANSON'S score was 60% in the study while negative predictive value was 91.43%. There was significant correlation between disease severity and RANSON'S score ≤ 3 with P = .0003 **(Figure 1).**

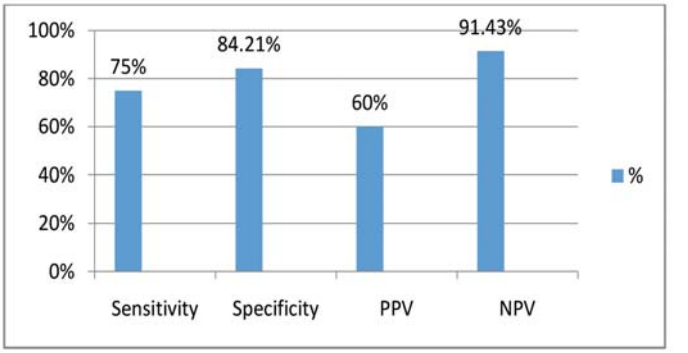

Figure 1 Sensitivity, Specificity, PPV and NPV of Ransons Score in predicting SAP

The average APACHE II score of the patients in the study group was 6.12. Patients with APACHE II score more than or equal to 8 were considered severe.35 patients had mild disease and 15 had severe disease when APACHE II score was used. Out of the 35 mild patients 22 were female and 13 were male. The average APACHE II SCORE of the mild patients was 4.31. Biliary aetiology forms the major part **(Table 2).**

Table 2 Etiology of AP by APACHE II score

Severity	Biliary	Alcohol	Idiopathic
Mild	26	8	1
Severe	11	2	2

The average APACHE II score of the severe patients were 10.34. One patient died with. Mortality rate of 6.67%.The sensitivity of APACHE II scoring system was 83.34%, while it had 86.84% specificity in predicting severe acute pancreatitis. The positive predictive value of APACHE II score was 66.67% in the study while negative predictive value was 94.29%.There was significant correlation between disease

severity and APACHE II score ≤ 8 with p value < 0.0001**.**

Patients with BISAP score more than or equal to 2 were considered severe. 36 patients were considered mild to moderate of which 22 patients were female and 14 patients were male. 14 patients were considered severe out of which 12 were female patients and 2 were male patients. Biliary aetiology constitute major part **(Table 3**)

Table 3 Etiology of acute pancreatitis by BISAP score

Severity	Biliary	Alcohol	Idiopathic
Mild	26	9	2
Severe	12	1	1

The average BISAP score of the severe patients was 2.36. One patient died showing mortality rate for SAP 7.14%. The sensitivity of the BISAP scoring system was 75%, while it had 86.84% specificity in predicting severe acute pancreatitis. The positive predictive value of BISAP score was 64.29% in the study while negative predictive value was 91.67%.

There was significant correlation between disease severity and BISAP score ≤ 2 with p value .0001 **(Figure 3).**

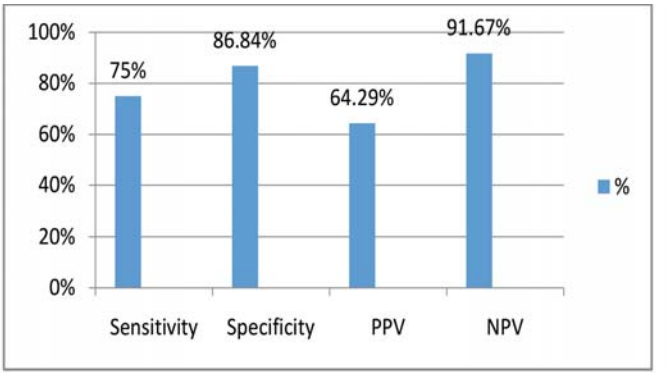

Figure 3 Sensitivity, Specificity, PPV and NPV of BISAP score in predicting SAP

On the secondary outcome of result of treatment of acute pancreatitis the following results were observed as per scoring systems: RANSON Score- 0-3- no mortality ≥ 3 –6.67% mortality; APACHE II Score <8- no mortality ≥8- 6.67% mortality;BISAP Score- 0-2 - no mortality ≥ 2 –7.14% mortality.

The APACHE II score has the highest sensitivity (83.34%), and PPV and NPV. The specificity and NPV is similar to Ransons and BISAP scoring. There was significant correlation between disease severity and Ransons score ≤ 3, with odds ratio 16.00 and 95% confidence interval 3.325 to 77.003, and p value of 0.0003.

There was significant correlation between disease severity and APACHE II score ≤ 8, with odds ratio 33.00 and 95% confidence interval 5.530 to 196.94, and p value of <0.0001.

There was significant correlation between disease severity and BISAP score ≤ 2, with odds ratio 19.800 and 95% confidence interval 3.956 to 99.093, and p value of 0.0001. Receiver-Operating characteristic (ROC) curves for severe AP were calculated for Ransons, APACHE II, BISAP scores, and the predictive accuracy of each scoring system was measured by the area under the ROC curve (AUC) with standard error and 95% confidence interval (CI). A P value of < 0.05 was considered statistically significant**. (Figure 4)**

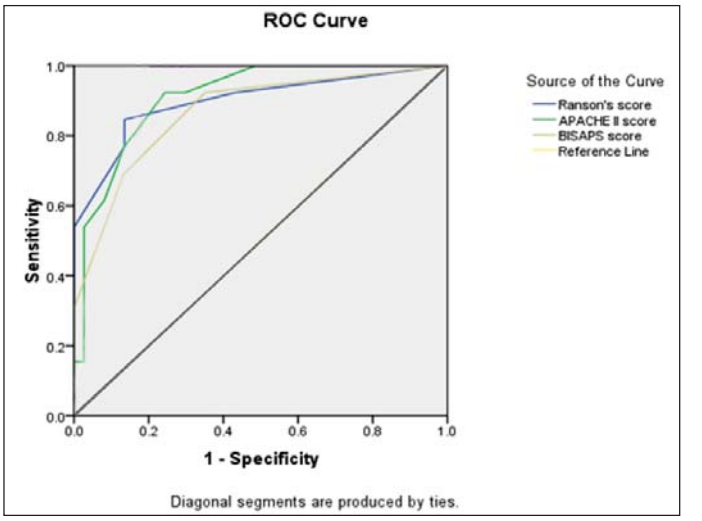

Figure 4 ROC: Specificity & Sensitivity of Scoring systems

Taking the revised Atlanta classification (2012) of severe pancreatitis, the sensitivity and specificity of scoring systems were calculated APACHE II score has demonstrated the highest accuracy for prediction of severe AP (AUC = 0.910, 95% CI: 0.826-0.993) (**Table 4**).

Table 4 Scoring comparisons in assessment of severity

SCORES	SENSITIVITY	SPECIFICITY	PPV	NPV
RANSON'S	75%	84.21%	60%	91.43%
APACHE II	83.34%	86.84%	66.67%	94.29%
BISAP	75%	85.87%	64.29%	91.67%

DISCUSSION

The present study consists of 50 patients of acute pancreatitis admitted under general surgery and medicine in a tertiary care hospital over period of one year. Three commonly used severity scoring systems has been used to grade the patients namely Ransons, APACHE II and BISAP and an attempt has been made to correlate its most effective application in determination of severity of acute pancreatitis. The age of the patients in the present study ranged from 21-65 years with mean age of 43.7 years. Incidence of disease was highest in the age group 41-50 years (24%).Acute pancreatitis associated with biliary tract calculi showed female

preponderance in the present study. The M:F ratio of acute pancreatitis in this study was 1:2.1. There was male predominance in acute alcoholic pancreatitis (100%) and female predominance was seen in acute biliary pancreatitis (86.8%). Out of 50 cases 34 patients were female and 16 patients were male. Gall stone Pancreatitis was found to be the commonest cause in the study. The overall mortality in this study was found to be 2%.

The sensitivity of RANSON'S scoring system was 75% while it had 84.21% specificity in predicting severe acute pancreatitis. The positive predictive value of RANSON'S score was 60% in the study while negative predictive value was 91.43%. There was significant correlation between disease severity and Ransons score ≤ 3, with odds ratio 16.00 and 95% confidence interval 3.325 to 77.003, and p value of 0.0003.[8,9] The APACHE II scoring system had a sensitivity of 83.3% and specificity of 86.84%. The PPV was 66.67% and NPV was 94.29%. The results of the present study are comparable with the published data.[8,9] The sensitivity of BISAP scoring system was 75%, while it had 86.84% specificity in predicting severe acute pancreatitis. The positive predictive value of BISAP score was 64.29% in the study while negative predictive value was 91.67%. The sensitivity, specificity, and NPV of the present study is comparable with the published data.[6,10] There was significant correlation between disease severity and APACHE II score ≤ 8, with odds ratio 33.00 and 95% confidence interval 5.530 to 196.94, and p value of <.0001.[11,12] However the present study shows low PPV of 64.29%. There was significant correlation between disease severity and BISAP score ≤ 2, with odds ratio 19.800 and 95% confidence interval 3.956 to 99.093, and p value of 0.0001. In terms of accuracy on applying the ROC curve for the scoring systems the area under curve (AUC) was highest for APACHE II score of 0.910, 95% CI: 0.826-0.993, which is highest among other scoring systems APACHE II score had the highest sensitivity (83.34%) and specificity (86.84%) among other scoring systems for determination of severity of AP. On comparing the accuracy on the ROC curve the APACHE II score has shown the highest area under curve (AUC) of 0.910, with 95% CI: 0.826-0.993.

CONCLUSIONS

APACHE II score was found to be better predictor of disease severity and survivability with good sensitivity and high specificity. APACHE II score more than 8 was associated with severe disease and mortality. The APACHE II score had the highest sensitivity and specificity among other scoring systems for determination of severity of Acute Pancreatitis.

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Ethical clearance: Taken.

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REFERRENCES

1. Wilson C.D, Heath I, Imrie CW. Prediction of outcome in Acute Pancreatitis - a comparative study of APACHE II, Clinical Assessment and Multiple Factor Scoring Systems. Br J Surg 1990;77:1260-4.
2. Ranson JH, Shamamian P. Diagnostic standards for acute pancreatitis. World J Surg 1997;21:136-42.
3. Ranson JH. Etiological and Prognostic factors in human acute pancreatitis: a review. Am J Gastroenterol 1982;77:633-8.
4. Wu BU, Johannes RS, Sun X, Tabak Y, Conwell DL, Banks PA. The early prediction of mortality in acute pancreatitis: a large population based study. Gut 2008;57:1678-703.
5. Papachristou GI , Muddana V, Yadav D, Connell M, Sanders MK, Slivka A, et al. Comparision of BISAP, Ransons, APACHE II and CTSI scores in predicting organ failure, complications, and mortality in acute pancreatitis. Am J Gasteroenterol 2010;105:435-41.
6. Dervenis C, Johnson CD, Bassi C, Bradley E, Imrie CW, McMahon MJ, et al. Diagnosis, objective assesment of severity and management of acute pancreatitis. Int J Pancreatol 1999 Jun;25(3):195-210.
7. Gravante G, Garcea G, Ong SL, Metcalfe MS, Berry DP, Lloyd DM, et al. Prediction of mortality in acute pancreatitis: a systemic review of published evidence. Pancreatology 2009;9:601-14.
8. Agarwal N, Pitchumoni CS. Simplified prognostic criteria in acute pancreatitis. Pancreas 1986 Jan;1(1):69-73.
9. Talamini G, Bassi C, Falconi M, Sartori N, Frulloni L, Di Francesco V, et al. Risk of death from acute pancreatitis. Role of early, simple "routine" data. Int J Pancreatol 1996;19:15-24.
10. Connor S, Ghaneh P, Raraty M, Rosso E, Hartley MN, Garvey C, et al. Increasing age and APACHE II scores are the main determinants of outcome from pancreatic necrosectomy. Br J Surgery 2003 Dec;12:1542-8.
11. Zhang J, Shahbaz M, Fang R, Liang B, Gao C, Gao H, et al. Comparision of the BISAP score in predicting the severity of acute pancreatitis in chinese patients according to the latest atlanta classification. Hepatobiliary pancreatic Sci 2014;21(9):689-94.
12. Senapati D, Debata PK, Jenasamant SS, Nayak AK, Gowda S M, Swain NN. . A prospective study of the bedside index for severity in acute pancreatitis (BISAP) score in acute pancreatitis: an Indian perspective. Pancreatology 2014 Sept-Oct;14(5):335-9.