ORIGINAL RESEARCH PAPER

Volume-7 | Issue-3 | March-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

IS RANSON SCORE STILL A VALID PROGNOSTIC TOOL IN ACUTE PANCREATITIS?

General Surgery

Dr. Ramanuj Mukherjee*	MS DNB MRCS Associate professor,General surgery.RGKar Medical college,Kolkata *Corresponding Author
Dr. Prasenjit Das	MS MRCS Consultant General Surgeon,Registrar Surgery,Apollo Hospitals
Dr. Dilip Kumar Das	MS Associate professor,General surgery.RGKar Medical college,Kolkata
Dr. Gouri Mukhopadhyay	Resident Surgery,SSKM hospitals
Dr. Goutam Bhowmik	MS FRCS Consultant general Surgeon.

KEYWORDS

INTRODUCTION

Acute Pancreatitis (AP) is an inflammatory process with a highly variable clinical course and includes a wide spectrum of disease, from one with mild self-limiting symptoms to fulminant process with multi-organ failure and high mortality. Most patients with AP have a mild disease that resolves spontaneously without sequelae, however, 10%-20% of patients experience a severe attack with high mortality up to 30% [1; 2] This high risk group of patients may benefit from aggressive fluid management, close monitoring for development of organ failure and other specific therapeutic interventions like endoscopic sphincterotomy and radiologic interventions [3]. Thus, the early assessment of the severity and stratification of patients at risk is important for early intensive therapy and timely intervention to improve prognosis and survival.

To predict the severity of the disease, several scoring systems have been designed. The earliest scoring system, introduced by Ranson and colleagues in 1974, [4] is based on 11 parameters obtained at the time of admission and/or after 48 hours later. The mortality rate of the acute pancreatitis directly correlates with the number of parameters that are positive. Another multi-factorial scoring system, Acute Physiology And Chronic Health Evaluation (APACHE) – II scores have been used since 1989 [5] and it addresses the severity of acute pancreatitis based on the patients age, previous health status and 12 routine physiologic parameters. Apart from these two widely used multi-factorial scoring systems, there are several other severity predicting tools in cases of acute pancreatitis. Using imaging characteristics Balthazar and associates [6] have established the CT severity index in 1990 that correlates the CT findings with the patients' outcome. The Atlanta Classification has been considered the global standard tool for the assessment of AP severity since its establishment in 1992[7]

However, as time goes on, some of the definitions in the original Atlanta Classification has been proved to be confusing, especially its definition of "severity". In 2012, the Atlanta classification was revised with an emphasis on persistent organ failure [8]. Amongst several scoring and severity assessment systems, Ranson scoring is still reasonable even after several decades of its introduction.

AIMS AND OBJECTIVES

I. AIMS OF THE STUDY-

To assess and compare the validity of prognostic efficacy of Ranson scoring system in comparison to APACHE II scoring systems in predicting the severity of acute pancreatitis in the set-up of a tertiary care teaching hospital.

II. SPECIFIC OBJECTIVES -

All patients diagnosed with acute pancreatitis based on clinical suspicion and raised serum amylase levels will be assessed with multiple variables of APACHE II and RANSON scoring system, the scores of which would indicate the severity of the disease and they will be compared with the final outcome of patients to assess the efficacy of both the scoring systems.

The specific objectives of the study are

- To assess and compare the sensitivity of both Ranson criteria and Apache II scoring
- To assess and compare the specificity of both Ranson criteria and Apache II scoring
- To assess and compare the positive predictive value of both Ranson criteria and Apache II scoring
- To assess and compare the negative predictive value of both Ranson criteria and Apache II scoring

MATERIALS AND METHOD

(a) STUDY AREA: Surgery department of R.G.Kar Medical College and Hospital.

(b) STUDY POPULATION: Patient admitted in general surgery wards in R.G. Kar Medical College and Hospital.

Inclusion Criteria:
All patients admitted in the wards of R. G. Kar Medical College and Hospital with diagnosis of acute pancreatitis based on the clinical suspicion and increased serum amylase level and/or radiological/sonological findings of acute pancreatitis.

Exclusion Criteria:
1. Hyperamylasaemia due to other causes
2. Chronic pancreatitis

(c) **STUDY PERIOD**: January 2016 to June 2017
(d) **SAMPLE SIZE**: 35 PATIENTS
(e) **STUDY DESIGN**: Observational descriptive cross-sectional study based on clinical examinations and investigations.

OBSERVATION AND RESULTS

The present study, comprising 35 cases of acute pancreatitis, has been carried out personally under professional guidance during the period of January 2016 to June 2017, in the department of surgery, R G Kar Medical College and Hospital.

The cases has been studied and of severity predictibility of APACHE II and Ranson scores were statistically compared.

Comparison of scoring systems (Ranson score and APACHE II scores):
Total of 35 cases of acute pancreatitis were observed in this study. Of these 35 patients 9 cases were classified as having severe acute pancreatitis (considering Atlanta Classification 2012 as gold standard) and 26 cases were mild acute pancreatitis.

When Ranson criteria was applied for severity prediction, 8 cases were predicted for having severe outcomes; but 6 cases of theme showed actual severe disease according to Atlanta classification 2012. And ranson score predicted rest 27 cases for mild outcome; of which 24 had actual mild outcome.

On the other hand, when APACHE II scores were applied for severity prediction, 10 cases were predicted for having severe outcomes; but 9 cases of them showed actual severe disease according to Atlanta classification 2012. And APACHE II scores predicted rest 25 cases for mild outcome; of which all 25 cases had actual mild outcome.

Following table shows the distribution of mild and severe disease predictions by Ranson score and APACHE II scores.

TABLE 1: DISTRIBUTION OF MILD AND SEVERE DISEASE ACCORDING TO RANSON AND APACHE SCORES

Scoring systems	Mild disease (predicted)	Severe disease (predicted)	Total cases observed
Ranson criteria	27	8	35
APACHE II scores	25	10	35

Following bar diagram shows the distribution of predicted mild and severe disease according to Ranson and APACHE II scores.

Ranson score result analysis:

TABLE 2: RASON SCORING SYSTEM RESULTS:

Score	Frequency	Percentage (%)
<3	27	77.14
3-4	8	22.86
5-6	Nil	0
>6	Nil	0
Total	35	100

Score > 3 predicts severe acute pancreatitis.

TABLE 3: PATIENT FREQUENCY OF RANSON SCORING SYSTEM:

	Frequency	Percentage (%)
Mild	27	77.14
Severe	8	22.86
Total	35	100

Hence, 8 cases (22.86% of total cases) from the population of 35 cases were considered as having severe acute pancreatitis as per Ranson criteria.

APACHE II score result analysis

TABLE 4: APACHE II SCORING SYSTEM RESULTS:

Score	Frequency	Percentage(%)
0-5	24	68.57
6-10	4	11.43
11-15	4	11.43
>15	3	8.57
Total	35	100

Score > 8 predicts severe acute pancreatitis

TABLE 5: PATIENT FREQUENCY OF APACHE II SCORING SYSTEM:

	Frequency	Percentage (%)
Mild	25	71.43
Severe	10	28.57
Total	35	100

Hence, 10 cases (28.57 % of total cases) from the population of 35 cases were considered as having severe acute pancreatitis as per APACHE II criteria.

Data was analysed using Wilcoxon Sign Rank test and Fischer Exact test. The values at the cut off points were expressed as sensitivity, specificity, positive predictive value, negative predictive value and area under ROC curve. P value < 0.05 was considered to be significant.

TABLE 6: ANALYSED DATA FROM RANSON AND APACHE II SCORES:

	Ranson scores	APACHE II scores
Population size	35	35
Median	0	2
Q-1	0	0
Q-2	2	10
Inter-Quartile Range	2	10
Mean	0.88	4.743
Standard Deviation	1.30	5.288
Z- value	4.1969	
Standard error of diff.	0.920	
p- value	< 0.0001	
95% CI	2.036 – 5.70	

TABLE 7: RANSON VS APACHE II SEVERITY PERCENTAGE CROSS-TABULATION:

			Ranson		Total
			Mild	Severe	
APACHE II	Mild	Count	24	1	25
		% within total	68.6%	2.8%	71.4%
	Severe	Count	3	7	10
		% within total	8.6%	20%	28.6%
Total		Count	27	8	35
		% within total	77.2%	22.8%	100.0%

Predictive performance of Ranson score:

Among 35 observed cases of acute pancreatitis 27 cases (77.1% of total) were predicted for mild disease, of which 24 cases (68.8% of total) were actually mild disease and 3 cases (8.6% of total) were actually severe disease. Ranson score predicted 8 cases (22.9% of total) to be severe acute pancreatitis of which 6 cases (17.1%) were actual severe acute pancreatitis and 2 cases (5.7%) were actually mild disease.

TABLE 8: RANSON SCORE PREDICTED SEVERITY VS ACTUAL SEVERITY CROSS-TABULATION

			Ranson		Total
			Mild	Severe	
Actual severity	Mild	Count	24	2	26
		% within total	68.6%	5.7%	74.3%
	Severe	Count	3	6	9
		% within total	8.6%	17.1%	25.7%
Total		Count	27	8	35
		% within total	77.1%	22.9%	100.0%

Sensitivity: 66.67%
Specificity: 92.30%
Positive Predictive Value: 75%
Negative Predictive Value: 88.89%
Area Under ROC curve: 0.713

Predictive performance of APACHE II score:

Among 35 observed cases of acute pancreatitis 25 cases (71.4% of total) were predicted for mild disease, of which all 25 cases (71.4% of total) were actually mild disease and no cases had actual severe disease. APACHE II score predicted 10 cases (28.6% of total) to be severe acute pancreatitis of which 9 cases (25.8%) were actual severe acute pancreatitis and 1 case (2.8%) was actually mild disease.

TABLE 9: APACHE II SCORE PREDICTED SEVERITY VS ACTUAL SEVERITY CROSS-TABULATION

			APACHE II		Total
			Mild	Severe	
Actual severity	Mild	Count	25	1	26
		% within total	71.4%	2.8%	74.2%
	Severe	Count	0	9	9
		% within total	0%	25.8%	25.8%
Total		Count	25	10	35
		% within total	71.4%	28.6%	100.0%

Sensitivity: 100%

Specificity:	96.15%
Positive Predictive Value:	90%
Negative Predictive Value:	100%
Area Under ROC Curve:	0.791

TABLE 10: COMPARISON BETWEEN PREDICTIVE PERFORMANCE OF RANSON AND APACHE II SCORES

	Ranson score	APACHE II score
Sensitivity	66.67 %	100%
Specificity	92.30%	96.15%
Positive Predictive Value	75%	90%
Negative Predictive Value	88.89%	100%
Area under ROC	0.713	0.791

DISCUSSION

The present study comprises 35 cases of acute pancreatitis, admitted at R G Kar Medical College and Hospital during the period of January 2016 to June 2017. The patient characteristics, i.e. age of incidence, sex distribution, etiological epidemiology and comparison between predictive performance of Ranson score and APACHE II score are discussed here.

PREDICTIVE PERFORMANCE OF RANSON AND APACHE II SCORES:

The ability of various prognostic scores to predict the severity of acute pancreatitis has been a debate over time. Of all the prognostic scores for acute pancreatitis, Ranson score and APACHE II scores are the most discussed and compared, in studies, since their introduction for severity prediction for acute pancreatitis.

Papachristou et al (2010), studied 185 cases of acute pancreatitis and compared the sensitivity and specificity of Ranson criteria and APACHE II scores and found that the sensitivity and specificity of Ranson and APACHE II criteria were 84.2, 89.8% and 70.3%, 71.9% respectively [11]. Equivalent sensitivity and specificity of both of the scoring systems have also been noted in the studies by Simoes et al[12], Khanna et al [9], Cho et al [10] and Chatzicostas C et al [19]. On the other hand, in a study this year, Reddy et al, [13] in a meta-analysis on the study of 1307 patients, found the sensitivity and specificity of Ranson and APACHE II scores to be in a somewhat lower range at 75%, 77%, 65% and 76% respectively. This study involved quite a larger population size than the previous studies. Almost similar results were obtained from the study by Yeung et al [18]. In the present study the sensitivity and specificity of Ranson and APACHE II scores were 66.67%, 92.3%, 100% and 96.15%; which compares closely to the values obtained in the study by Yeung et al [18].

The Positive Predictive Value (PPV) and the Negative Predictive Value (NPV) of these two severity scoring systems are also found to be variable amongst the different studies. In their study, Chatzicostas C et al [19] obtained the PPV and NPV of the Ranson and APACHE II scores at 48%, 93%, 43% and 86%, respectively. Studies done by Khanna et al [9], Cho et al [10], Papachristou et al [11] and Simoes et al [12], Reddy et al [13] also obtained the PPV and NPV of nearly similar values. However, Yeung et al [18] reported the PPV, NPV of theRanson and APACHE II score to be 28.6%, 94.5% , 37% and 97.3%, respectively, i. e. in relatively lower range . In the present study PPV and NPV of the Ranson score and APACHE II score were 75%, 88.89% and 90% and 100% respectively. This variation of the PPV and NPV amongst the different studies may be attributable to the population size enrolled for the study and, most importantly, the prevalence of the disease among the population studied.

Interestingly, despite wide-ranging values, all studies, including the present study, have found a low PPV and a high NPV for both the scoring systems. Thus both of them can mainly be used to rule out severe pancreatitis, or to predict the risk of mortality.

Chatzicostas C et al [19] in their series concluded that the Ranson score was as equally as predictive as APACHE II system. But most of the other studies have found that, the APACHE II system is better than Ranson criteria for severity prediction for acute pancreatitis, which is perceived in the present study too.

Table: comparison of predictive performance of Ranson and APACHE II in various studies

			RANSON					APACHEII				
Study	Year	No. of cases	Sensitivity	Specificity	PPV	NPV	AUC	Sensitivity	Specificity	PPV	NPV	AUC
Papachristou et al[11]	2010	185	84.2	89.8	69.6	95.3	0.94	70.3	71.9	40	909.1	0.78
Simoes et al[12]	2011	193	91.2	74.4	57.4	95.7	0.879	79.4	83.1	64.3	91.4	0.892
Khanna et al[9]	2013	72	83.9	78	86.5	80.6	0.85	80.6	82.9	78.2	89.1	0.88
Cho et al[10]	2015	161	85.7	44.3	18.8	95.3	0.69	81	65.7	26.2	95.8	0.78
Reddy et al[13]	2015	1307	75	77	49	92	-	65	76	43	93	-
Suvarna et al[16]	2011	51	-	-	-	-	-	75	60	46	78	-
Yeung et al[18]	2006	-	66.67	77.5	28.6	94.5		83.3	80.9	37	97.3	
Chatzicostas C et al[19]	2004	-	82	74	48	93	0.817	58	78	43	86	0.618
Savio et al[20]	2007	282	-	-	-	-	-	56	98	95	82	-
Zhang et al [14]	2015	155	-	-	-		0.903	-	-	-	-	0.836
Halonen et al[15]	2003	253	-	-	-	0.655	-	-	-	-	-	0.817
Qiu et al[17]	2015	909	-	-	-	0.938	-	-	-	-	-	0.834
Present study	2015	35	66.67	92.3	75	88.89	0.713	100	96.15	90	100	0.791

CONCLUSION

The sensitivity, specificity, PPV and NPV of Ranson score are 66.67%,92.30%,75% and 88.89% respectively.

The sensitivity, specificity, PPV and NPV of APACHE II are 100%, 96.15%,90% and 100% respectively.

It is established from the present study, keeping in mind the limitations placed by small sample size, that APACHE II scores has better predictability for severity of acute pancreatitis than Ranson score.

Furthermore, it is also seen from the present study, that both the scores have low PPV and high NPV. Thus both of them can mainly be used to rule out severe pancreatitis or to predict the risk of mortality rather than diagnosis of severity. Thus, there is no point of considering the Ranson scoring system as outdated and/or can be replaced with APACHE II or other physiologic scoring systems.

REFERENCES

1. BanksPA, Freeman ML. Practice guidelines in acute pancreatitis.Am J Gastroenterol2006; 101: 2379-2400 [PMID: 17032204 DOI:10.1111/j.1572-0241.2006.00856.x
2. Fagenholz PJ, Castillo CF, Harris NS, Pelletier AJ, Camargo CA.Increasing United States hospital admissions for acute pancreatitis,1988-2003. Ann Epidemiol2007; 17: 491-497 [PMID: 17448682DOI: 10.1016/j.annepidem.2007.02.002
3. Forsmark CE, Baillie J. AGA Institute technical review on acute pancreatitis. Gastroenterology 2007; 132: 2022-2044 [PMID: 17484894 DOI:10.053/j.gastro.2007.03.065
4. Ranson JH, Rifkind KM, Roses DF, et al: Prognostic signs and the role of operative management of acute pancreatitis. SurgGynecolobstat 139:69-81, 1974
5. Larvin M, McMahon MJ. APACHE-II score for assessment and monitoring of acute pancreatitis. Lancet 1989; 2: 201-205 [PMID: 2568529 DOI: 10.1016/S0140-6736(89)90381-4
6. Balthazar EJ, Robinson DL, Megibow AJ, et al: Acute Pancreatiits : value of Ct in establishing prognosis. Radiology 174:331-336, 1990
7. Bradley EL. A clinically based classification system for acute pancreatitis.Summary of the International Symposium on Acute Pancreatitis, Atlanta, Ga, September 11 through 13, 1992.Arch Surg1993; 128: 586-590 [PMID: 8489394 DOI: 10.1001/archsurg.1993.01420170122019
8. Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG, Tsiotos GG, Vege SS. Classification of acute pancreatitis--2012: revision of the Atlanta classification and definitions by international consensus. Gut 2013; 62: 102-111 [PMID: 23100216 DOI: 10.1136/gutjnl-2012-302779
9. Khanna AK, Meher S, Prakash S, Tiwary SK, Singh U, SrivastavaA,Dixit VK: Comparison of Ranson, Glasgow, MOSS, SIRS, BISAP, APACHE-II, CTSI Scores, IL-6, CRP, and Procalcitonin in Predicting Severity, Organ Failure, Pancreatic Necrosis, and Mortality in Acute Pancreatitis: Hindawi Publishing Corporation: HPB Surgery

Volume 2013, Article ID 367581
10. Cho JH; Kim TN; Kim SB: Comparison of clinical course and outcome of acute pancreatitis according to the two main etiologies: alcohol and gallstone:s BMC Gastroenterology (2015) 15:87 DOI 10.1186/s12876-015-0323-1
11. Papachristou GI, Muddana V, Yadav D: and David C Whitcomb :Comparison of BISAP, Ranson's, APACHE-II, and CTSI Scores in Predicting Organ Failure, Complications, and Mortality in Acute Pancreatitis: Am J Gastroenterol 2010; 105:435–441; doi:10.1038/ajg.2009.622
12. Simoes M, Alves P, Esperto H:Predicting Acute Pancreatitis Severity: Comparison Of Prognostic Scores: Gastroenterology Research (2011);4(5):216-222
13. Reddy KM, Wu UB: Predictive Scoring Systems In Acute Pancreatitis: prediction and management of severe acute pancreatitis: Chris E. Frosmark, Timothy B. Gardner: springer: 2015: new york: p 87 – 96
14. Zhang, J., Shahbaz, M., Fang, R., Liang, B., Gao, C., Gao, H., Ijaz, M., Peng, C., Wang, B., Niu, Z. and Niu, J. (2014), Comparison of the BISAP scores for predicting the severity of acute pancreatitis in Chinese patients according to the latest Atlanta classification. Journal of Hepato-Biliary-Panc, 21: 689–694. doi: 10.1002/jhbp.118
15. Halonen KI, Leppaneimi AK, Lundin JE, Puolallainen PA: predicting fatal outcome in the early phase of severe acute pancreatitis by using novel prognostic model: pancraetology: (2003)' 3(4): 309-15
16. Suvarna R, Pallipadi A, Bhandary N: the clinical prognostic indicators of acute pancreatitis: Journal of Clinical and Diagnostic Research. 2011 June, Vol-5(3): 459-463
17. Qiu, Lei MD; Sun, Rui Qing MD; Jia, RongRong MD; Ma, Xiu Ying MD; Cheng, Li MD; Tang, Mao Chun MD, PhD; Zhao, Yan MD, PhD: Comparison of Existing Clinical Scoring Systems in Predicting Severity and Prognoses of Hyperlipidemic Acute Pancreatitis in Chinese Patients: A Retrospective Study:Medicine: June 2015 - Volume 94 - Issue 23 - p e957:doi:10.1097/MD.0000000000000957
18. Yeung YP, Lam BY, Yip AW: APACHE II system in prediction of severity of acute pancreatitis :hepatobil. panc.int: 2006: 5;294 – 299
19. Chotzicostas C, Roussomoustakaki M, Vlachonikalis IG: Comparison OfRanson And APACHE II And APACHE III Scoring System In Acute Pancreaatitis: 25(4):2004: 331-335
20. Barreto SG, Rodrigues J: Comparison of APACHE II and Imrie Scoring Systems in predicting the severity of Acute Pancreatitis: World Journal of Emergency Surgery 2007, 2:33 doi:10. 1186/1749-7922-2-33