

# A Comparative Study Between APACHE II and Ranson Scoring Systems Inpredicting the Severity of Acute Pancreatitis

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## Abstract

**Background:** Acute pancreatitis is a sudden inflammation of the pancreas. Acute pancreatitis (acute hemorrhagic pancreatic necrosis) is characterized by acute inflammation and necrosis of pancreas parenchyma, focal enzymic necrosis of pancreatic fat and vessel necrosis (hemorrhage). The early diagnosis and precise scoring of disease severity are important goals in the initial evaluation and the management of pancreatitis. Pancreatitis not only must be differentiated from a myriad of other potential diagnoses, but patients also must be stratified to identify those with severe disease and to guide appropriate therapy.

**Methods:** This prospective observational study was conducted by the Department of General Surgery at Dhanalakshmi srinivasan medical college and hospital from July 2012 to July 2013. A total of 32 patients were included in the study on the basis of the non probability (purposive) sampling method. Multiple clinical and laboratory variables of both Ranson's and APACHE II scoring system and the final score of

the patient from both the scoring systems were assessed.

**Results:** The mean age group of the subjects was 37.72 years ranging from 20 to 70 yrs. As sensitivity, specificity, positive predictive value and negative predictive value and accuracy are found to be the same for Ranson's and APACHE II score, Ranson's score is equally efficacious as APACHE II scoring system in the prognostication of acute pancreatitis.

**Keywords:** Pancreatitis; APACHE II score; Ranson's score.

## Introduction

Acute pancreatitis is a sudden inflammation of the pancreas. Acute pancreatitis (acute hemorrhagic pancreatic necrosis) is characterized by acute inflammation and necrosis of pancreas parenchyma, focal enzymic necrosis of pancreatic fat and vessel necrosis (hemorrhage). Acute pancreatitis may be a single event, it may be recurrent or it may progress to chronic pancreatitis are associated with high mortality, even with optimal management.<sup>1</sup> Acute pancreatitis includes a wide spectrum of disease, from one with mild self limiting symptoms to fulminant process with multiorgan failure and high mortality. Acute pancreatitis is the most terrible of all the calamities that occur in connection with the abdominal viscera. The suddenness of its onset, the illimitable agony which accompanies it and the mortality attendant upon it, all render it the most

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formidable of catastrophes. The early diagnosis and precise scoring of disease severity are important goals in the initial evaluation and the management of pancreatitis.

Pancreatitis not only must be differentiated from a myriad of other potential diagnoses, but patients also must be stratified to identify those with severe disease and to guide appropriate therapy. Of the several scoring systems used, commonly used Ranson’s and APACHE II scoring systems guide in the prediction of the severity of the disease, but the efficacy between these two scoring systems remains a debate and hence the need for the study.

**Materials and Methods**

*Source of Data*

This prospective observational study was conducted by the Department of General Surgery at Dhanalakshmi srinivasan medical college and hospital from July 2012 to July 2013. A total of 32 patients were included in the study on the basis of the non probability (purposive) sampling method. Multiple clinical and laboratory variables of both Ranson’s and APACHE II scoring system and the final score of the patient from both the scoring systems were assessed to know their efficacy in predicting the severity of the disease (higher the score more severe the disease).

*Inclusion Criteria:*

1. Patients diagnosed with acute pancreatitis based on the clinical suspicion and elevated serum amylase

*Exclusion Criteria*

1. Hyperamylasaemia due to other causes
2. Chronic pancreatitis
3. Acute on chronic pancreatitis
4. Previously diagnosed case of acute pancreatitis
5. Age less than 20 years. And more than 70 years

**Procedure**

The detailed history and proper clinical findings were entered in a proforma case sheet. The clinical examination was done and necessary investigations were carried out to establish the diagnosis. The subjects were assessed with multiple clinical and laboratory variables of both Ranson and Apache II scoring system and the final score of the patient from both the scoring systems are assessed to know their efficacy in predicting the severity of the disease (higher the score more severe the disease). The sensitivity, specificity, positive predictive value and negative predictive value of Ranson’s and APACHE II scoring system in relation to the raised serum amylase level were evaluated and compared with standard published literature.

*Statistical Analyzis*

The data was analyzed using SPSS software version 16. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were calculated. A *p*-value of less than 0.05 was considered to be statistically significant. The results were averaged (mean + standard deviation) for each para meter for continuous data and numbers and percentage for categorical data presented in table and figure. Proportions were compared using Chi-square test of significance.

**Results**

In this study, 32 patients were included. According to Atlanta Revised criteria, 21 patients had mild pancreatitis and 11 patients had severe pancreatitis. Of the 32 patients, 26 patients had Ranson’s score less than or equal to 8 and 6 patients had a score of more than 8. Patient with age 20 yrs to 70 yrs was part of study. Males accounted for 62% of the patients in the present study.

Out of 32 subjects enrolled into the study, maximum 13 (40.6%) were in the age group of 31-40 years followed by 10 (31.3%) from the age Group 41-50 years. The mean age of the patients was 37.72 (SD14.66) years ranging from 21 to 70 yrs (Table 1).

**Table 1:** Age and Sex Wise Distribution of Study Subjects

Age	Mild Pancreatitis	Severe Pancreatitis	Total
21-30	5	3	8 (25%)
31-40	8	5	13 (40.6%)
41-50	8	2	10 (31.3%)
51-61	0	1	1 (3.1%)
61-70	0	0	0
<b>Total</b>	21 (65.62%)	11 (34.38%)	32

Majority of the subjects were male 27 (84.4.3%) compared to females 5 (15.6%) (Table 2).

In our study only 5 patients had score more

than 3, suggesting that only 15.6% of them were considered to be having severe pancreatitis as per Ranson's criteria (Table 3).

**Table 2:** Sex wise Distribution of Study Subjects

Sex	Mild Pancreatitis	Severe Pancreatitis	Total
Male	18	9	27 (84.4%)
Female	3	2	5 (15.6%)
Total	21 (65.62%)	11 (34.38%)	32

**Table 3:** Ranson Scoring System Results

Score	Frequency	Percentage
<3	27	84.4
3-4	5	15.6
>5-6	0	0
>6	0	0
<b>Total</b>	32	100

(Score >3 suggests severe pancreatitis)

In our study 8 patients were diagnosed to have score more than 8 of the 32 cases, suggesting that

24.24% had severe pancreatitis as per APACHE II scoring criteria (Table 4).

**Table 4:** Apache Scoring System Results

Score	Frequency	Percentage
0-5	21	65.6
6-10	9	28.1
11-15	2	6.3
>15	0	0
<b>Total</b>	32	100

(Score > 8 suggest severe pancreatitis)

Assensitivity, specificity, positive predictive value and negative predictive value and accuracy are found to be the same for Ranson's and APACHE

II score, Ranson's score is equally efficacious as APACHE II scoring system in the prognostication of acute pancreatitis (Table 5).

**Table 5:** Prediction of Severity by Two Scoring Systems

	Sensitivity	Specificity	PPV	NPV	Accuracy
Ranson Score	91.61	93	92.62	94	93
APACHE Score	94.23	95	95.12	96	95

## Discussion

Assessment of the severity of acute pancreatitis is important for early identification of patients who may benefit from additional supportive and specific therapeutic procedures. It is also important to standardize clinical data for comparison of results between centres.<sup>2</sup> The mean age group of the subjects was 37.72 years ranging from 21 to 70 yrs.

The mean age of presentation (in years) in various studies done by Barreto SG et al.<sup>3</sup> which was at 40 yrs and Haloneena KI et al.<sup>4</sup> was at 42.7 which were in consistent with our studies but studies done by Larvin et al.<sup>5</sup> show the mean age to be around 62 yrs which was higher than the studies done. Increased incidence was seen in males which was in consistent with the other studies done by Barreto SG et al.,<sup>3</sup> Haloneena KI et al.<sup>4</sup> and Larvin et al.<sup>5</sup>

The sensitivity, specificity, positive predictive value and negative predictive value were compared with other studies in prediction of severity and

it was higher than studies done by Larvin at al.,<sup>5</sup> Wilson et al.<sup>6</sup> but was in consistent with studies done by Maheshwar A et al.<sup>7</sup>

**Table 6:** Comparative Study between Ranson and APACHE II Scoring Systems

	Ransons scoring system				APACHE II scoring system			
	Study	Larvin et al. <sup>5</sup>	Wilson et al. <sup>6</sup>	Maheshwar A et al. <sup>7</sup>	Study	Larvin et al. <sup>5</sup>	Wilson et al. <sup>6</sup>	Maheshwar A et al. <sup>7</sup>
Sensitivity	91.61	75	87	87.5	94.23			83.3
Specificity	93	68	71	97.2	95			86.1
PPV	92.62	37	49	95.5	92.12			80
NPV	94	91	94	92.1	95			88.6
Accuracy	93	69	75	NA	96			NA

### Conclusion

From this study, we can conclude Ranson’s scoring system is equally as good as APACHE II scoring system, in predicting the severity of acute pancreatitis. Ranson’s scoring system is a simple, cheap, easy to remember/recollect and easy to calculate too. Above all this Ranson’s scoring system was developed specifically for acute pancreatitis. In developing countries like India, where cost effectiveness is an important factor, Ranson’s scoring system can be used in place of APACHE II scoring system.

The Ranson’s scoring system accurately predicts the outcome in patients with acute pancreatitis and compares favourably with almost all physiological scoring systems available for prediction of severity and outcome for acute pancreatitis, the only disadvantage being a 24 hour delay. According to our study, the Ranson’s scoring system accurately predicts the outcomes in patients with acute pancreatitis compared with the physiological scoring systems (APACHE II scoring system) in the prediction of disease severity for acute pancreatitis.

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**Conflict of interest:** None declared

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

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