

A Comparative Study between Apache II and Ranson Scoring Systems in Predicting the Severity of Acute Pancreatitis

G. Chandrashekar Naik*, Kailas C.T.**, Ramesh K.***

*Assistant Professor, **Senior Resident, Department of General Surgery, Basaveswara Medical College and Hospital Chitradurga.
***Associate Professor, VIMS, Bellary.

Abstract

A comparative study between Apache II and Ranson scoring systems in predicting the severity of acute pancreatitis is a prospective study of 50 cases of acute pancreatitis with an objective to compare the efficacy of Apache II scoring system with Ranson scoring system in predicting the severity of acute pancreatitis. A total of 50 cases of acute pancreatitis admitted in K.S. Hedge Medical Academy were considered in the study. All had a diagnosis on admission of acute pancreatitis based on clinical suspicion and raised serum amylase levels. They were assessed with multiple variables of Apache II and Ranson scoring system. The sensitivity, specificity, positive and negative predictive value of Apache II was compared with standard literature.

Key words: Apache II Scoring System; Ranson Scoring System; Acute Pancreatitis; Sensitivity; Specificity.

Introduction

A clinical review of acute pancreatitis is important and timely. First, acute pancreatitis is a common disease that causes significant morbidity and mortality. Secondly, clinicians may under diagnose pancreatitis at the extremes of the clinical spectrum of very mild and very severe disease [1,2]. Missed mild disease can result in failed opportunities to prevent recurrent attacks, whereas failure to recognize a fulminant attack can result in otherwise preventable mortality. Acute pancreatitis has widely variable

clinical and systemic manifestations spanning the spectrum from a mild, self-limiting episode of epigastric pain to severe, life-threatening, multiorgan failure including sepsis, renal failure, acute respiratory distress syndrome, and death [3]. Previous prognostic scoring systems predict severity reasonably well but are limited by time constraints, are unwieldy to use, or both [4]. The aim of this prospective study was to compare the efficiency of general severity of illness scoring system and the most widely used specific scoring system in order to simplify the initial monitoring of AP at the time of admission and give a timely intervention [5].

Aims and Objective of the Study

To study the efficacy of Apache II scoring system with Ranson scoring system in predicting the severity of acute pancreatitis.

Materials and Methods

Source of Study

Inclusion Criteria

All patients diagnosed with acute pancreatitis admitted in K.S. Hedge Medical Academy from the year November 2010 to 2012.

A total of 50 patients were included in the study.

All had a diagnosis on admission of acute pancreatitis

All 50 patients fulfilled more than one of the inclusion criteria:

- Clinical suspicion of pancreatitis
- Increased amylase
- Features of Pancreatitis on USG ABDOMEN

Corresponding Author: Ramesh K., Associate Professor, Vijayanagara Institute of Medical Sciences (VIMS), Ballari, Karnataka 583104.

E-mail: ramspsm@yahoo.co.in

Exclusion Criteria

- Hyperamylasaemia due to other causes
- Chronic pancreatitis

Method of Collection of Data

All patients diagnosed with acute pancreatitis based on the clinical suspicion and increased serum amylase levels admitted in K.S. Hedge Medical Academy are 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 Apache II scoring system in relation to of Ranson scoring system keeping this as a standered, were evaluated and compared with standard published literature.

Ranson criteria is the most commonly used scoring system and is based on 11 clinical and laboratory parameters measured within the first 48 hours of admission to the hospital (Table 87-1) [6]. Patients with one or two criteria have a predicted mortality of less than 1% compared to patients with three criteria (10%) or four criteria (15%); with more than seven criteria, the predicted mortality approaches 50%.

AST, aspartate aminotransaminase; BUN, blood urea nitrogen; LDH, lactate dehydrogenase; WBC, white blood cell.

Table 1: Ranson's Criteria: [7]

Ranson's Criteria	Nonbiliary Acute Pancreatitis	Biliary Acute Pancreatitis
Admission		
Age (yr)	>55	>70
WBC count ($\times 1000/\text{mm}^3$)	>16	>18
Glucose (mg/dl)	>200	>220
AST (IU/L)	>250	>250
LDH (IU/L)	>350	>400
Within 48 Hours of Admission		
Hematocrit decrease (points)	>10	>10
BUN increase (mg/dl)	>5	>2
Base deficit (mEq/L)	>4	>5
Fluid replacement (L)	>6	>4
PaO ₂ (mm Hg)	<60	<60
Calcium (mg/dl)	<8	<8

Table 2: Acute Physiology and Chronic Health Evaluation (APACHE)-II scoring system (Box 87-3) [8] Incorporates 12 physiologic and laboratory parameters as well as age and comorbid conditions to estimate severity of any disease process

Acute Physiology and Chronic Health Evaluation (APACHE)-II Scoring System ^[1] of Disease Severity
A. Physiologic Variable
Temperature
Mean arterial pressure (mm Hg)
Heart rate
Respirations
Arterial pH
PaO ₂ (mm Hg)
Serum sodium
Serum potassium
Serum creatinine (mg/dl)
Hematocrit (%)
White blood cell count
Glasgow Coma Score
B. Age Points
C. Chronic Health Points
* APACHE-II score = A + B + C.

Multiorgan Dysfunction Score (MODS) is similar to APACHE-II; this organ-injury based scoring system has been used to predict disease severity.

Statistical Methods Applied

Chi-Square Tests and SPSS version 17.

Observation and Results

A total of 50 patients were included in the study. All had a diagnosis on admission of acute pancreatitis. All 50 patients fulfilled more than one of the inclusion criteria:

- Clinical suspicion of pancreatitis

- Increased amylase
- Features of Pancreatitis on USG ABDOMEN

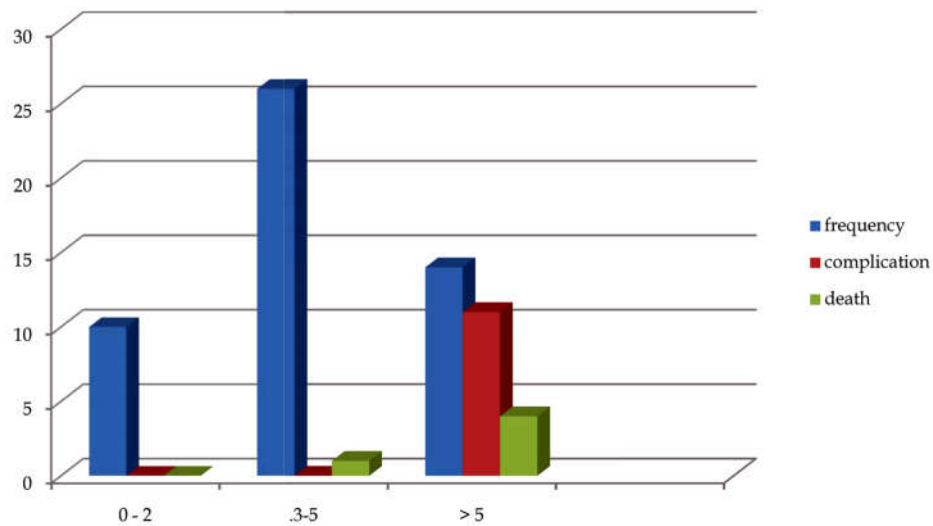
Of the 50 patients, age range was 17-72 years (mean-45 years), 42(84%) were men and 8(16%) women. The causes of acute pancreatitis included alcohol 25(50%), idiopathic 20(40%), biliary stone 4(8%), steroid induced AP 1(2%). The common concomitant diseases were, diabetes mellitus, hypertension.

Table 3: RANSON scoring system results

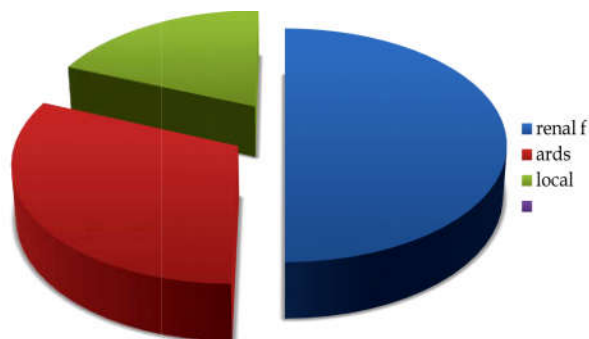
Scores	Frequency	Percentage	ARDS	ARF	DEATH
0-2	10	20	-	-	-
3-5	26	52	1	1	1
>5	14	28	4	7	4
Total	50	100%	5	8	5

(Score >5 suggests severe pancreatitis)

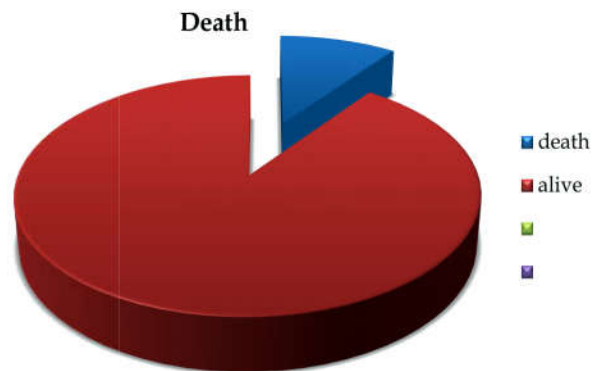
Frequency, Complication and Death Graph



Systemic and Local Complications: According to Ranson



Frequency of Death in both Ranson and Apache II



In our study only 14 patients had score more than 5, suggesting that 28% of them were considered to

be having severe pancreatitis as per Ranson criteria.

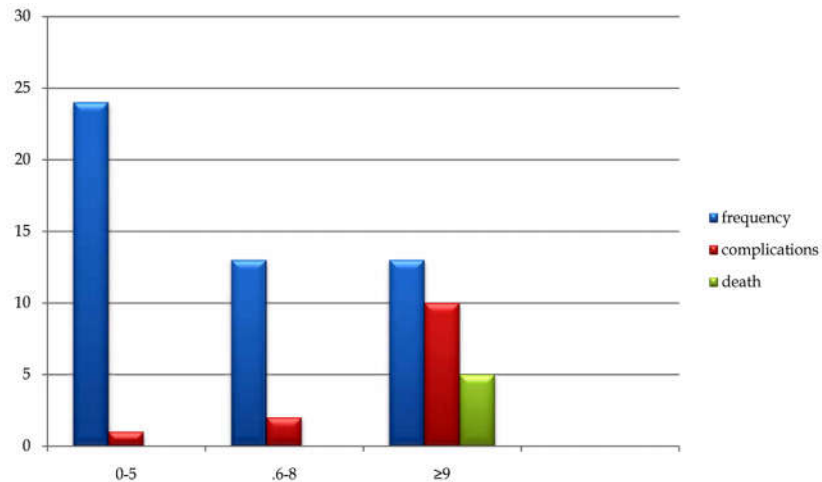
Apache II Scores

Table 4: Apache II scoring system results

Scores	Frequency	Percentage (%)	ARDS	ARF	Death
0-5	24	48	-	1	-
6-8	13	26	1	1	-
>9	13	26	4	6	5
Total	50	100	5	8	5

(Score > 9 suggest severe pancreatitis)

Frequency, Complication and Death Graph



In this study 13 patients were diagnosed to have score more than 9 of the 50 cases, suggesting that 26 % had severe pancreatitis as per Apache II scoring criteria .

Systemic and Local Complications: According to Apache II



Comparitive graph between Apache II and Ranson

Table 5: percentage table (both scoring system together)

		Apache II and Ranson			Total
		0 - 2	RANSON 3 - 5	>5	
APACHEII	0- 5 Count	7	19	1	27
	% MILD	77.8%	70.4%	7.1%	54.0%
	6 - 8 Count	2	6	1	9
	% Moderate	22.2%	22.2%	7.1%	18.0%
Total	≥9 Count	0	2	12	14
	% Sever	.0%	7.4%	85.7%	28.0%
	Count %	9	27	14	50
		100.0%	100.0%	100.0%	100.0%

P < .0001

Predictive Performance: Apache II

		Apache II and Ranson		Total
		Sever	Mild	
APACHE II	SEVERE	Count 21	Count 2	Count 23
		% 51.2%	% 22.2%	% 46.0%
	MILD	Count 20	Count 7	Count 27
		% 48.8%	% 77.8%	% 54.0%
Total		Count 41	Count 9	Count 50
		% 100.0%	% 100.0%	% 100.0%

$\chi^2=2.498$ p=.114

Sensitivity =51.2%;

Specificity =77.8%

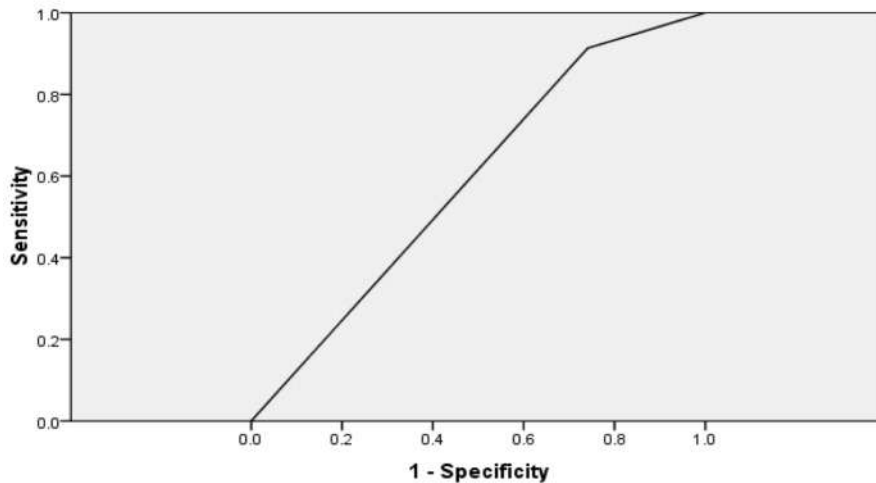
Positive predictive value=91.3%

Negative predictive value=82%,

Accuracy rate=56%

Area under the Curve: 0.586

ROC Curve



Diagonal segments are produced by ties.

Discussion

Severe acute pancreatitis usually declares itself shortly after the onset of symptoms and delayed progression from mild to severe disease is uncommon⁵. 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 [1,10]. Ideal predicting criteria should therefore be simple, minimally-invasive, accurate and quantitative, and the assessment tests should be readily available at the time of diagnosis. Amongst the multi-factorial scoring systems, Ranson system is classical though the Apache II system also appears to provide the best accuracy. The incidence of acute severe

pancreatitis in this study was 32 % of which Apache II system showed 26 % incidence and Ranson system 28%. Unlike the Ranson criteria, the Apache II score has its highest value in predicting mild disease. The most common systemic complication was acute renal failure and deaths occurred in severe category of both Ranson and Apache II scoring system but there was one death noted falling into moderate category of Ranson scoring system and probable cause would be due to Cardiovascular shock with hypovolemia. There was no correlation between the acute severe pancreatitis and serum albumin. This study has demonstrated that Apache-II scoring system is equally efficient as Ranson in predicting the severity of acute pancreatitis. The AUC of Apache II score was 0.586 Sensitivity of Apache II was 51.2% , Specificity of Apache II was 77.8%, ppv of ApacheII 91.3% , npv of Apache II 82%, with a Accuracy rate =56% .

Table 6: Comparison with other studies [12,13,14]

Study	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Savior G B et al 2007	56 %	98 %	95%	82%
Yeung YP et al 2006	83.3%	80%	37%	97.3%
Willson et al 2001	68 %	67 %	40 %	87 %
PRESENT STUDY APACHE II :	51.2 %	77.8 %	91.3 %	82%

Conclusion

The Apache II scoring system is equally efficient as Ranson scoring system in predicting the severity of acute pancreatitis.

Summary

This study which included 50 patients, 13 patients (26%) had severe pancreatitis according to Apache-II scoring system and Ranson scoring system showed 14 patients (28%) to be having severe pancreatitis. The complications, systemic and local complications were seen in patients considered to be having severe pancreatitis in both, by Apache II and Ranson score. The systemic complications were, acute renal failure 8(16%), respiratory failure 5(10%), and death occurred in 5(10%). Local complications occurred in 4 patients (8%). The age range was 17-72 years (mean-45 years), 42(84%) were men and 8(16%) women.

The causes of acute pancreatitis included alcohol 25(50%), idiopathic 20(40%), biliary stone 4(8%), steroid induced AP 1(2%). The common concomitant diseases were diabetes mellitus and hypertension. The AUC of Apache II score was 0.586. Sensitivity of Apache II was 51.2% , Specificity of Apache II was 77.8%, ppv of Apache II 91.3%, npv of Apache II 82%,with a Accuracy rate =56%. The Apache II system is the only system which takes into account all the major risk factors that influences outcome of disease, including the acute physiological derangements as well as patients ability to recover which may be diminished by advancing age and chronic disease. The early diagnosis and precise scoring of disease severity are important goals in the initial evaluation and management of pancreatitis. Pancreatitis must not only be differentiated from a myriad of other potential diagnosis, but must also be stratified to identify those with severe disease and to guide appropriate therapy.

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