A Comparative Study Between BISAP Score and Japanese Score for Predicting the Severity in Acute Pancreatitis

Dr. Tushar Dave[1], Dr Shashi Rekha[2]
[1]Junior Resident, [2]Professor
Department of General Surgery, Sri Devaraj Urs Medical College, Kolar, Karnataka, India- 563101

*Corresponding Author:
Dr. Tushar Dave
Junior Resident, Department of General Surgery, Sri Devaraj Urs Medical College, Kolar, Karnataka, India-563101

Abstract

Background:

One of the most common medical condition which requires emergency surgery is Acute pancreatitis which occurs due to two major causes involving biliary disease and alcohol related condition in nearly 50-70% of the subjects.[1,2,3]The disease manifests in a wide range of severity, like the mild peri pancreatic edema to the potentially life-threatening infected necrotizing and haemorrhagic pancreatitis. BISAP's clinical score are widely used in assessing acute pancreatitis severity. Radiological evaluation using the Balthazar radiological CT severity index is being increasingly used to identify infected necrosis as well as to determine the pancreatitis severity. The most recent criterion for severity of acute pancreatitis, the new Japanese score (JPN) for the assessment of acute pancreatitis was prepared is also good predictor. There are limited studies comparing BISAP score and JSS score in acute pancreatitis. Hence the present was conducted in our institute with the objective to compare BISAP score and JAPANESE score to assess the severity of acute pancreatitis.

Methods:

An Observational study was done on patients diagnosed to have acute pancreatitis at R. L. Jalappa Hospital and Research Centre, Kolar from December 2018 to September 2020. 64 subjects based on Universal sampling technique were included in the study. All the subjects were subjected to BISAP and JSS scoring and were graded. Their outcome in terms of time for recovery and complication like hemodynamic instability, bacteraemia, ARDS, reactive pleural effusion, gastrointestinal tract Hemorrhage, renal failure, and disseminated intravascular coagulation, SIRS, MODS and mortality etc. were documented.

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. Graphical representation of data: MS Excel and MS word were used to obtain various types of graphs such as bar diagram and Pie diagram. p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests. Statistical software: MS Excel, SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyze data.

Results:

In the present study the mean age of subjects was 38.58 ± 14.18 years. Majority of subjects belonged to age group 31 to 40 years (37.5%). 95.3% were males and 4.7% were females. Mean BISAP grade was 2.05 ± 0.722. Mean JSS grade was 4.02 ± 1.241. Mean duration of SICU stay was 2.70 ± 0.937 days. 90.6% were given Somatostatin Analogue. 26.6% had Clinical Deterioration. 4.7% had AKI, ARDS and other organ failure respectively and 1.5% had Necrotizing Pancreatitis. Mortality rate was 10.9%. BISAP score of >2 had highest sensitivity of 57.14%, specificity of 78.95%, PPV of 25% and NPV of 93.7% in predicting mortality among acute pancreatitis subjects. JSS score of >4 had highest sensitivity of 57.14%, specificity of 66.67%, PPV of 17.4% and NPV of 92.7% in predicting mortality among acute pancreatitis subjects.

Conclusion:

From the study it was concluded that BISAP score was better than JSS score in predicting Severity of Acute pancreatitis (Mortality and Clinical deterioration).

INTRODUCTION

One of the most common medical condition which requires emergency surgery is acute pancreatitis which occurs due to two major causes involving biliary disease and alcohol related condition in nearly 50-70% of the subjects. The diagnosis of Acute Pancreatitis remains to be done by the clinical examination which can be further supported by increased value of serum amylase by 1.5 to 2 times

the normal value. Further evaluation of Serum Lipase levels is considered to be confirmatory which increases the diagnostic yield. Supportive radiological procedures are sonography, computed tomography. There are very few studies comparing BISAP score with the newer JPN score. Hence in the current study we intend to compare BISAP score and JAPANESE score to assess the severity of AP, with following objectives of to determine the severity of acute pancreatitis using BISAP score, to determine the severity of acute pancreatitis using JAPANESE score and to compare the validity of BISAP score and JAPANESE score in predicting Severity of acute pancreatitis.

Materials and Methods:

Source of Data: Patients diagnosed to have acute pancreatitis at R. L. Jalappa Hospital and Research Centre, Kolar from December 2018 to September 2020. Patients diagnosed with acute pancreatitis admitted to the department of surgery were included and patients with Necrotizing pancreatitis and Haemorrhagic pancreatitis were excluded.

Duration of study: November 2018 and September 2020

Study Design: Observational study

Sampling technique: Universal sampling technique was followed in the present study Sample size: A total of 64 study subjects who met the inclusion criteria during the study period of November 2018 and September 2020 and were included in the study.

Method of Data Collection:

Acute pancreatitis patient who fulfilled 2 or more of the following criteria, abdominal pain (staring from epigastrium radiating to the back), Serum amylase and/or lipase (Increased levels up to 3 times the normal value), Ultrasonography of the abdomen within first 7 days of hospitalization demonstrating changes consistent with acute pancreatitis. All the subjects were subjected to BISAP and JSS scoring and were graded. Scores were assigned and the patients were treated according to their severity. Their outcome in terms of time for recovery and complication like hemodynamic instability, bacteremia, ARDS, reactive pleural effusion, gastrointestinal tract hemorrhage, renal failure, and disseminated intravascular coagulation, SIRS,

MODS and mortality etc. were documented. Blood investigations: Complete haemogram, renal function test, Random blood sugar, Serum amylase, Serum calcium, Lactate dehydrogenase, C-reactive protein, Arterial blood gas analysis. Radiological investigations: Chest X-ray (PA view), X-ray erect abdomen, Ultrasound abdomen and pelvis.

Individual components of BISAP scoring system:

1. BUN > 25 mg/dl
2. Impaired mental status (Glasgow Coma Scale Score < 15)
3. SIRS-SIRS is defined as two or more of the following:
4. Temperature of < 36 or > 38 ° C
5. Respiratory rate > 20 breaths/min or $PaCO_2$ < 32 mm Hg
6. Pulse > 90 beats/min
7. WBC < 4,000 or >12,000 cells/mm3 or >10% immature bands.
8. Age > 60 years
9. Pleural effusion detected on imaging

Interpretation of Result: (One point for each positive criterion)

1. A score of 0-2 is low mortality of less than 2%.
2. A score of 3-5 is associated with a higher mortality of more than 15%.

Individual components of the JSS scoring system:

1. Base Excess ≤ 3 mEq/L or shock (systolic blood pressure<80 mmHg)
2. PaO_2 ≤ 60 mmHg (room air) or respiratory failure (respirator management is needed)
3. BUN ≥ 40 mg/dL (or Cr ≥ 2.0 mg/dL) or oliguria (daily urine output < 400 mL even after IV fluid resuscitation)
4. LDH ≥ 2 times of upper limit of normal
5. Platelet count ≤ 100,000/mm3
6. Serum Ca ≤ 7.5 mg/dL
7. CRP ≥ 15 mg/dL

8. Number of positive measures in SIRS criteria ≥3

9. Age ≥ 70 years

Interpretation of JSS scoring system: (one point for each positive criteria)

Patients having positive result of any 3 above mentioned criteria are classified to have SAP. Score of 2 or less is classified as mild acute pancreatitis.

Statistical analysis

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. Validity of Bisap and JSS score in predicting outcome was assessed by using ROC Curve analysis. Graphical representation of data: MS Excel and MS word were used to obtain various types of graphs such as bar diagram, Pie diagram and ROC Curve. p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests. Statistical software: MS Excel, SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyze data. 4,5,6

Results:

In the study mean age of subjects was 38.58 ± 14.18 years. Majority of subjects were in the age group 31 to 40 years (37.5%). 95.3% were males and 4.7% were females. Mean BISAP grade was 2.05 ± 0.722. According to BISAP Score, 76.6% had mild, 1.6% had moderate and 21.9% had severe Acute Pancreatitis. Mean JSS grade was 4.02 ± 1.241. According to JSS Score, 14.1% had mild, 25% had moderate and 60.9% had severe Acute Pancreatitis. Mean duration of SICU stay was 2.70 ± 0.937 days. Majority of subjects stayed in SICU for 3 days (42.2%). 90.6% were given Somatostatin Analogue in the present study. 26.6% had Clinical Deterioration, 4.7% had AKI, ARDS and other organ failure respectively and 10.9% had mortality.

Table 1. Validity of BISAP Score in predicting outcome

Area under the ROC curve (AUC)	0.722
Standard Error	0.0876
95% Confidence interval	0.596 to 0.827
z statistic	2.532
Significance level P (Area=0.5)	0.0113

BISAP score of >2 had highest sensitivity of 57.14%, specificity of 78.95%, PPV of 25% and NPV of 93.7% in predicting mortality among acute pancreatitis subjects (Fig 1). Similarly, BISAP score of >2 had highest sensitivity of 41.18%, specificity of 80.85%, PPV of 43.7% and NPV of 79.2% in predicting clinical deterioration among acute pancreatitis subjects.

Criterion values and coordinates of the ROC curve

Criterion	Sensitivity	95% CI	Specificity	95% CI	+PV	-PV
≥0	100	59.0 - 100.0	0	0.0 - 6.3	10.9	
>1	100	59.0 - 100.0	19.3	10.0 - 31.9	13.2	100
>2	**57.14**	**18.4 - 90.1**	**78.95**	**66.1 - 88.6**	**25**	**93.7**
>3	0	0.0 - 41.0	100	93.7 - 100.0		89.1

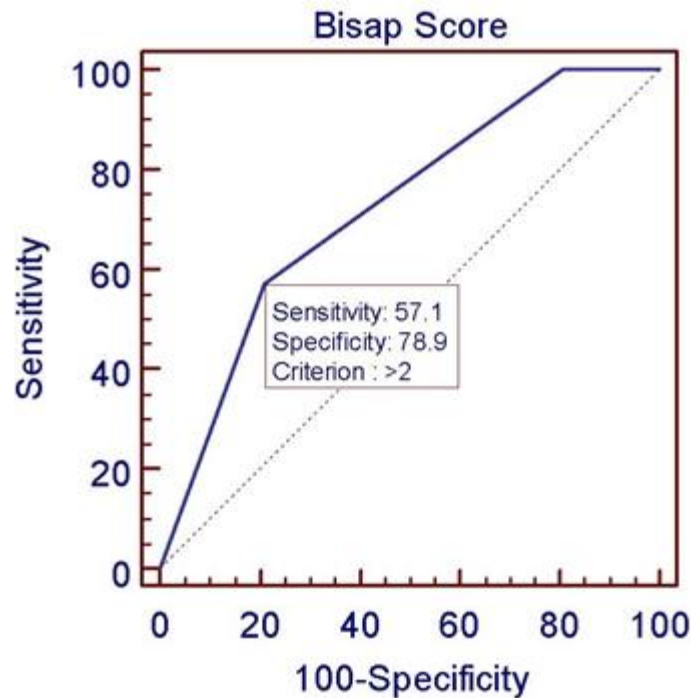**Figure 1: ROC curve showing Validity of BISAP Score in predicting outcome**

Table 2: Validity of JSS Score in predicting outcome

Area under the ROC curve (AUC)	0.643
Standard Error	0.102
95% Confidence interval	0.513 to 0.759
z statistic	1.407
Significance level P (Area=0.5)	0.1594

Criterion values and coordinates of the ROC curve

Criterion	Sensitivity	95% CI	Specificity	95% CI	+PV	-PV
≥1	100	59.0 - 100.0	0	0.0 - 6.3	10.9	
>4	**57.14**	**18.4 - 90.1**	**66.67**	**52.9 - 78.6**	**17.4**	**92.7**
>6	0	0.0 - 41.0	100	93.7 - 100.0		89.1

JSS score of >4 had highest sensitivity of 57.14%, specificity of 66.67%, PPV of 17.4% and NPV of 92.7% in predicting mortality among acute pancreatitis subjects (Fig 2). JSS score of

>2 had highest sensitivity of 47.06%, specificity of 68.09%, PPV of 34.8% and NPV of 78% in predicting clinical deterioration among acute pancreatitis subjects.
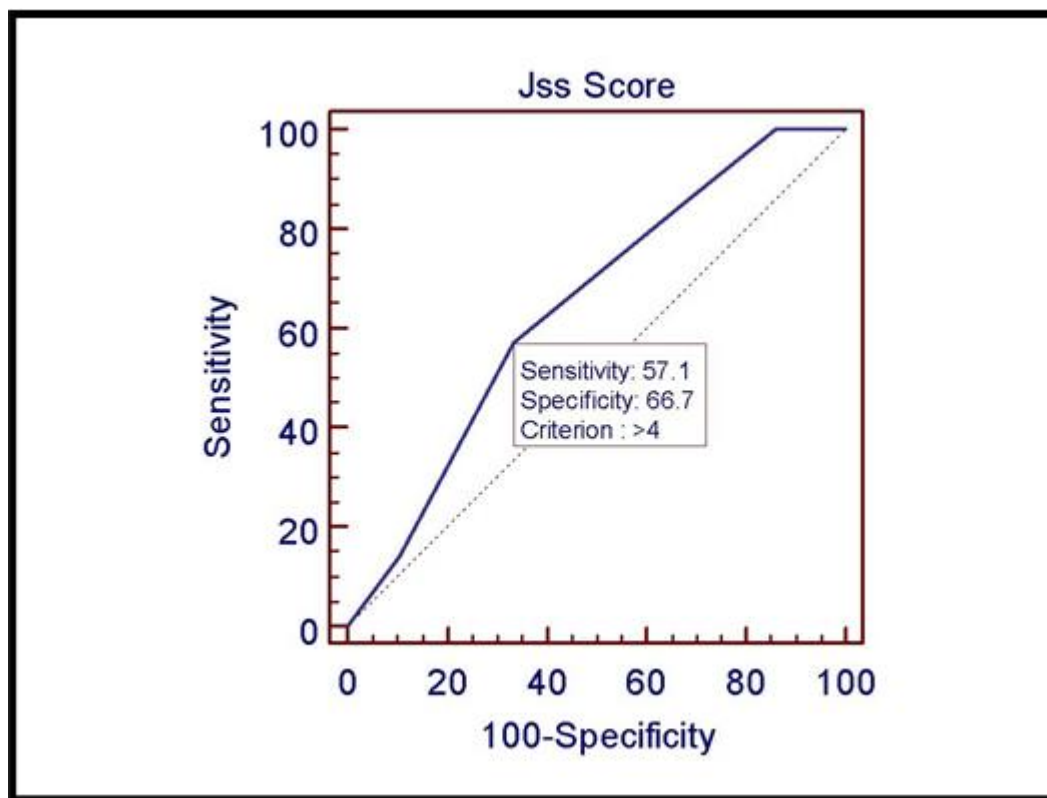
Figure 2: ROC Curve showing Validity of JSS Score in predicting outcome

Discussion:

Acute pancreatitis is a common disease entity. The early identification of potentially severe acute pancreatitis enables the selection of patients who may require more intensive and invasive method of management than are appropriate in mild pancreatitis.

While diagnosing a case of acute pancreatitis, a through history, a complete physical examination and biochemical tests are necessary. Radiological conformation may require. The present study was conducted to compare BISAP score and JAPANESE score in assessing the severity of Acute Pancreatitis.

The mean age of presentation in our study was 38.58 ± 14.18 years and is comparable to the study by Kashid A et al7. Other studies had late presentation in the 5th and 6th decade. The age distribution can be attributed to alcohol intake in middle age which is one of the was important etiological factor for Acute pancreatitis.

Mean duration of hospital stay in our study was 2.70 days; however, studies showed higher duration of hospital stay or SICU stay such as study by Choudhuri G et al8 and Kashid A et al7

Table: Comparison with other studies:

Mean Age	Kashid A et al[7]	Choudhuri G et al[8]	Pupelis G et al[9] (n=274)	Present study (n=64)
Mean age in Years	35	44.8	47	38.58

Male %	70.91	66.6	73.7	95.3
Female%	29.09	33.4	26.3	4.7
Mean Hospital stay (days)	10	6.6	-	2.7

MORTALITY

Mortality in our study was 10.9%, it was higher compared to the study by Buchler MW et al10, Choudhuri G et al8 and Kashid A et al7.

Table: Mortality

Mortality	Kashid A et al[7]	et al[8] Choudhuri G	Buchler MW et al10 (n=86)	Our study (n=64)
Mortality	5.45	6.5	3.4	10.9

Bisap Score:

In the present study BISAP score of >2 had highest sensitivity of 57.14%, specificity of 78.95%, PPV of 25% and NPV of 93.7% in predicting mortality among acute pancreatitis subjects.

BISAP score of >2 had highest sensitivity of 41.18%, specificity of 80.85%, PPV of 43.7% and NPV of 79.2% in predicting clinical deterioration among acute pancreatitis subjects.

In the study by Lifen Chen et al11, Bishop score of 3 had highest sensitivity of 83.3%, specificity of 67.4%, PPV of 25.6% and NPV of 96.8% in predicting mortality among acute pancreatitis subjects and in predicting clinical deterioration, Bisap score at 2 had highest sensitivity of 93.1%, specificity of 51.4%, PPV of 43.5% and NPV of 94.9%. This study showed higher sensitivity and lower specificity that the present study, however NPV and PPV was similar to the present study.

A study by Papachristou et al12 reported that with the cutoff value set at 3, BISAP score had a sensitivity of 37.5%, a specificity of 92.4%, a PPV of 57.7%, and an NPV of 84.3% in predicting SAP. The findings were similar to the present study were in low sensitivity and higher specificity was observed.

Several factors may contribute to these differences. First, there are differences in the

characteristics of study participants, such as race, lifestyle, and genetic basis. In addition, etiologic distribution may also explain the noted differences.

JSS Score:

In the present study JSS score of >4 had highest sensitivity of 57.14%, specificity of 66.67%, PPV of 17.4% and NPV of 92.7% in predicting mortality among acute pancreatitis subjects. Area under the curve was 0.643. JSS score of >2 had highest sensitivity of 47.06%, specificity of 68.09%, PPV of 34.8% and NPV of 78% in predicting clinical deterioration among acute pancreatitis subjects.

In the study by Senol K et al.,13 the optimum cut off level of the new JSS was 5 or higher. Sensitivity, specificity, positive predictive value, and negative predictive value in the new JSS were 72.8%, 60.5%, 69%, and 69.9%, respectively in predicting the outcome. The findings were close to the present study.

In the study by Hamada T et al.,14 JSS score at Cut off 2 had Area under the curve of 0.798 for prediction of in-hospital mortality. The finding was differencing from the present study were in cut off was 4 and AUC was 0.643.

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Conclusion:

From the study it can be concluded that BISAP score was better than JSS score in predicting Severity of Acute pancreatitis (Mortality and Clinical deterioration). BISAP scoring system is very simple, cheap, easy to remember and calculate. BISAP scoring system accurately predicts the outcome in patients with acute pancreatitis. Moreover, the values in BISAP score are instantaneous and there is no time delay.

References:

1. Townsend CM, Sabiston textbook of Surgery. The biological basis of modern surgical practice 2012; ed 19(2):1522-23.

2. Fagenholz PJ, Castillo CF, Harris NS, et al. Increasing United States hospital admissions for acute pancreatitis, 1988-2003. Ann Epidermiol 2007; 17:491-7.

3. Banks PA, Freeman ML, practice guidelines in acute pancreatitis. Am J Gastroenterol 2006; 101:2379-400.

4. Dakhale GN, Hiware SK, Shinde AT, Mahatme MS. Basic biostatistics for post-graduate students. Indian J Pharmacol. 2012; 44 (4):435-442.

5. Sunder Rao P S S , Richard J: An Introduction to Biostatistics, A manual for students in health sciences , New Delhi: Prentice hall of India. 4th edition. 2006; 86-160.

6. Elenbaas, RM, Elenbaas, JK, Cuddy, PG. Evaluating the medical literature, part II: Statistical analysis. Ann Emerg Med. 1983; 12:610–620.

7. Kashid A, et al, Acute pancreatitis experience at manipal hospital, Bangalore, Appendix 1-A, in management of acute pancreatitis, by bhansali SK and shah SC, joslok hospital 2006:173- 175

8. Choudhuri G, et al. Acute pancreatitis Experience at Sanjay Gandhi PGI of Medical Sciences, Lucknow, Appendix 1-B, in Management of Acute Pancreatitis, by Bhansali SK 9and Shah SC, Jaslok Hospital 2006. Pg. 176-178.

9. Pupelis G, et al. conservative approach in the management of severe acute pancreatitis: eight- year experience in a single institution. HPB 2008; 10: 347- 355.

10. Buchler MW, Gloor B, Muller CA, et al. Acute necrotizing pancreatitis: treatment strategy according to the status of infection. Ann Surg 2000; 232: 619– 626.

11. Chen L, Lu G, Zhou Q, Zhan Q. Evaluation of the BISAP score in predicting severity and prognoses of acute pancreatitis in Chinese patients. Int Surg. 2013;98(1):6-12.

12. 18. Papachristou GI, Muddana V, Yadav D, O'Connell M, Sanders MK, Slivka A, et al. 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(2):435–441. [PubMed] [Google Scholar]

13. Senol, K, Gundogdu, SB, Ozkan, B. External validation of the new Japanese severity score in Turkish patients with acute pancreatitis. Pancreas 2014; 43: 487–488.

14. Hamada T, Yasunaga H, Nakai Y, Isayama H, Horiguchi H, Fushimi K, Koike K. Japanese severity score for acute pancreatitis well predicts in-hospital mortality: a nationwide survey of 17,901 cases. J Gastroenterol. 2013 Dec;48(12):1384-91.