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Role of BISAP score in predicting severity and mortality in acute pancreatitis at RIMS, Ranchi, Jharkhand

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Abstract

Introduction: Most episodes of acute pancreatitis (80%) are mild and self-limiting; however 10-20% patients have severe pancreatitis, with prolonged length of hospital stay and significant morbidity and mortality. There are many scores to predict severity and mortality of acute pancreatitis. Each score has its own advantage and disadvantage but none of them is a standard criterion to predict outcome of Acute Pancreatitis. The more recently proposed Bedside Index for Severity of Acute Pancreatitis (BISAP Score) is simple and can be performed within first 24 hours of admission. We aimed to study the role of BISAP score in predicting severity, mortality and outcome in cases of acute pancreatitis presenting at our institute.

Materials and methods: A prospective observational study was conducted at RIMS, Ranchi from November 2015 to October 2017 having 74 cases of acute pancreatitis.

Results: Mean age was 42.44 years with 72% males. Mean duration of hospital stay was 10 days. BISAP score correlates significantly with length of hospital stay with area under ROC Curve 0.95, with 95% confidence interval (CI) 0.89 to 1.0 It was observed that 48% cases of score 2, 33.30% in score 3 developed complications. 4% patients died in score 2, 50% in score 3, and 100% in score 4 and 5 respectively. 18% of patient with BISAP score ≥2 were having local and systemic complications.16% of patients who died were having BISAP score ≥3. The area under curve for BISAP score and mortality was 0.974, with 95% CI 0.929-1.018.

Conclusion: BISAP SCORE evaluation is found to be simple and accurate method of predicting the mortality in acute pancreatitis bases on parameters collected within 24 hours of admission. Statistically significant trend in severity and mortality was found with increasing BISAP score.

Keywords: Acute pancreatitis, BISAP score, scoring system, Mortality, severity.

Introduction

Acute pancreatitis (AP) is defined as an acute inflammatory process of the pancreas, with variable involvement of other regional tissues or remote organ system. (1) The annual incidence of AP ranges from 13 to

45 per 100,000 persons worldwide. **(2)** Mortality in acute pancreatitis has a bimodal distribution. **(3)** The cardinal symptom of acute pancreatitis is constant epigastric or periumbilical pain that radiates to the back. The pain may be relieved if the patient sits bending forward or legs are drawn up.

The signs in AP include dehydration, tachycardia, poor skin turgor, hypotension, and dry mucous membrane. Significant abdominal distension, associated with generalized rebound tenderness and abdominal rigidity is present in severe acute pancreatitis.**(3)** Respiratory signs of pleural effusion, basal collapse, wheezing and basal crepitations are found in 10-20% of patients.**(3)** International symposium (1992) on acute pancreatitis defined severe pancreatitis as the presence of local complications like necrosis, abscess or pseudocyst or any evidence of organ failure.(4) Most patients develop a mild and self limiting course; however 10-20% patients have severe pancreatitis, which is associated with prolonged length of hospital stay and significant morbidity and mortality. **(5-8)** The diagnosis of AP requires the patient to present with abdominal pain consistent with acute pancreatitis and the elevation of serum amylase or lipase (>3 times upper limit of normal). Contrast enhanced CT scan is gold standard for the diagnosis when these diagnostic criteria are not met. **(09)** There are many scores to predict severity and mortality of AP likeRanson's Score **(10)**, APACHE-II score **(11)**, Balthazar's CT Severity Index **(12)**, Glasgow and Imrie scoring system.**(13)**. Serum Creactiveprotein level of >150mg/dl predicts severity of AP. **(14)** Each score has its own advantage and disadvantage but none of them is a standard criterion to predict outcome of AP.

The Ranson and modified Glasgow score contain data not routinely collected at time of hospitalization and requires 48 hours to complete, missing a potentially valuable early therapeutic window. The more recently proposed Bedside Index for Severity of Acute Pancreatitis (BISAP) is calculated form blood urea nitrogen (>25 mg/dl), impaired mental status (GCS<15), presence of systemic inflammatory response syndrome(SIRS), age >60 years, and pleural effusion. It has the advantage of simplicity and can be performed within first 24 hours of admission.**(15)** The presence of SIRS has prognostic significance.**(16)** If any 2 out of 4 parameters of SIRS are present then SIRS was be given as score 1 of BISAP scoring system. If 3 out of 4 parameters of SIRS are present then it was taken as severe acute pancreatitis (SAP). **(17)** BISAP has been considered as an accurate method for risk stratification in patients with acute pancreatitis. **(18)** Increasing numbers of acute abdomen cases being admitted at RIMS, Ranchi are diagnosed as acute pancreatitis. The purpose of this study was to study role of BISAP score for predicting mortality and severity of acute pancreatitis, so that further management can be planned.

Materials and methods

After taking clearance from institutional ethical committee, a prospective observational study was conducted at department of surgery, RIMS, Ranchi from November 2015 to October 2017 on 74 cases of acute pancreatitis. The survey interviews were conducted in confidential settings using a pretested questionnaire in the local language. The questionnaire was prepared which included socio- demographic details such as age, sex, address, occupation, dietary habits and personal history. Adequate time was given to each study subject. Patient's comfort was maintained during the interview. The data was collected after obtaining the informed consent in their local language, in the presence of an eye witness. All parameters were recorded in 24 hours of admission of the patients and follow up was done during hospital stay and

consecutive OPD visits. Cases of chronic pancreatitis and pediatric age group were excluded from the study.

Grading System

Systemic Inflammatory Response Syndrome (SIRS):

1. Pulse (> 90/min)
2. Temperature (> 380 or < 360 C)
3. WBC (< 4000 or > 12000/mm3)
4. Tachypnoea (> 24/Min.)

BISAP Score

Table 1-

PARAMETERS	0	1
Age	< 60 years	> 60 years
BUN	< 25 mg/dl	> 25 mg/dl
SIRS	< 2/4 parameters	≥ 2/4 parameters
Mental status	GCS > 12	GCS < 12
Pleural effusion	Absent	Present

Outcome:

BISAP Score:

Hospital stay(in days):

Complications:

Death:

Statistical analysis

The collected data were entered in the Microsoft Excel 2007 and statistical analysis was performed using Statistical package for social sciences (SPSS 20) software. Area under ROC (Receiver Operating Characteristic) curve and 95% Confidence Interval values was calculated with relation to BISAP score and mortality and length of hospital stay.

Results

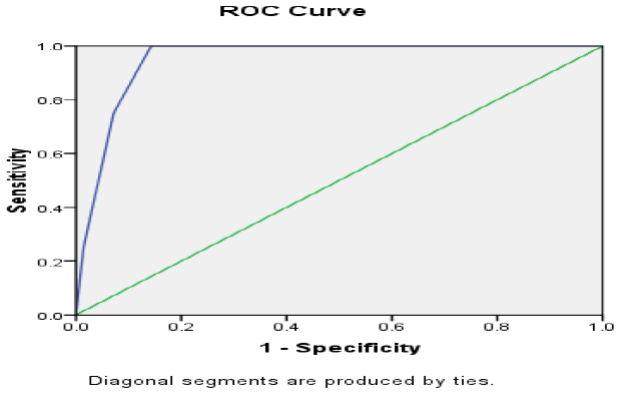
Mean age was 42.44 years with 72% male and 28% female patients. Majority of the study participants were in the age group of 41-50 years (33.7%), followed by 21 cases (28.3%) in 31-40 years age. Majority (33.8%) of cases were in score 2, followed by 25.7% in score 0, 21.6% in score 1, 8.1% in score 3 and 4 respectively and 2.7% were in score 5 respectively.

Table 2- Relationship of BISAP score with average duration of hospital stay (days) of patients.

BISAP SCORE	Average Hospital Stay (Days)
0	6
1	7.87
2	14.88
3	9.33
4	1.83
5	1.5

Table 2 - As the BISAP score increases the mean duration of Hospital stay increases significantly. There was a significant variation in stay between BISAP scores 0 and 1, 0 and 2, 0 and 3. Whereas due to substantial mortality in group of patients with score 4 and 5 there was no significant variation between scores 0 and 4, 0 and 5. The mean duration of stay was 10 days.

Graph 1- Relationship of BISAP Score and Length of hospital stay (ROC Curve).



Area Under The Curve For Bisap Score And Length Of Hospital Stay.

Area Under the Curve				
Test Result Variable(s):BISAP SCORE				
			Asymptotic 95% Confidence Interval	
Area	Std. Error[a]	Asymptotic Sig.[b]	Lower Bound	Upper Bound
0.950	0.029	0.003	0.894	1.006
The test result variable(s): BISAP SCORE has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.				
a. Under the nonparametric assumption				
b. Null hypothesis: true area = 0.5				

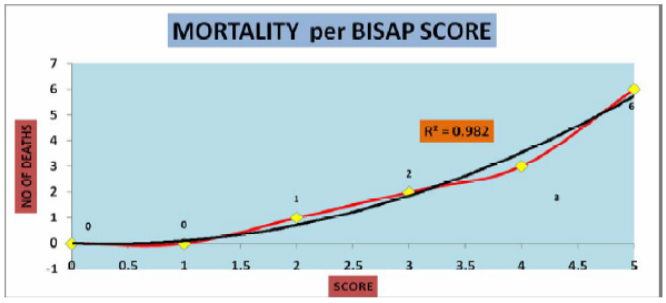
Graph 1 & Table 3- The area under the curve is 0.950 with 95% confidence interval (CI) 0.89 to 1, which is close to 1, which means with increase in BISAP score, the length of hospital stay will be more.

TABLE 4- Relationship Of Bisap Score With Complications And Mortality.

BISAP SCORE	Frequency	Complications	Percentage	Mortality	Percentage
Score 0	19	0	0	0	0
Score 1	16	0	0	0	0
Score 2	25	12	48	1	4
Score 3	06	02	33.33	3	50
Score 4	06	0	0	6	100
Score 5	02	0	0	2	100

Table 4 shows that as BISAP score increases severity of disease in terms of complications and mortality increases. 48% cases of score 2, 33.30% in score 3 developed complications during course of illness. Cases in Score 0 and 1 had no complications. All patients of score 4 and 5 died. It was observed that 4% patients died in score 2, 50% in score 3, and 100% in score 4 and 5 respectively.

Graph 2 - Relationship of BISAP Score and Mortality



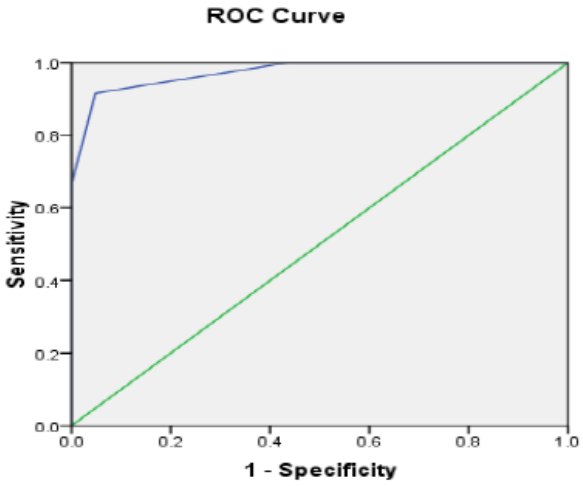
Graph 2 & Table 5 shows - As the BISAP Score was increasing the number of deaths were more. The R^2 value is 0.982 which is close to 1 which means increase in score suggests more mortality.

TABLE 5: Area Under The Curve For Relationship Of Bisap Score With Mortality.

Area Under the Curve				
Test Result Variable(s):BISAP SCORE				
Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
0.974	0.023	0.000	0.929	1.018
The test result variable(s): BISAP SCORE has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.				
a. Under the nonparametric assumption				
b. Null hypothesis: true area = 0.5				

The area under the curve is 0.974 with 95% CI (0.929-1.018) which is close to 1, which means increase in score has more mortality.

Graph 3- Relationship of BISAP Score with mortality show in ROC curve.



18.91% patients developed complications. 12.2% cases developed pseudocyst, 4.05% patients developed ascitis. Pancreatic fistula and pancreatic necrosis was seen in 1.4% patients each and 16% cases died.

Discussion

In our study, we have found that mean duration of Hospital stay was 10 days (Table 2). It was observed that as the BISAP score increases, the duration of hospital stay increases significantly (Graph 1 and Table 2, 3). Area under ROC Curve was 0.95 with 95% CI (0.89 to 1). In a retrospective study conducted by Gompertz M et al. (2012) **(19)**, on 128 patients at Chile found thatnmean hospital stay was 15 days, and stated that there was a significant correlation between BISAP score and length of hospital stay. Study conducted by Sidra Sabbir et al. (2015) **(18)** observed mean duration of stay of 13 days. In another study by Ajay K. Khanna et al. **(20)** the average hospital stay was 10 days. In our study 16.22% of study participants died during the treatment course. 1 patient died in score 0 to 2 and 11 patients died in score 3 to 5 as (Table 4). We have observed that BISAP score correlates significantly with mortality with AUROC- 0.974 (95% CI 0.929-1.018) which is close to 1 and R2 correlation value 0.982 (Graph 2 and table 4 & 5). Similar results were observed in studies done by S. Anikhindi et al. (2015)

(21). Their results has shown 24% mortality and found that BISAP score ≥ 2 best predict the 120- days mortality and area under ROC (AUROC) for BISAP and mortality was 0.853 (95% CI 0.808-0.898) . Lifen Chen et al. (2013) **(22)** in 497 Chinese patients, observed 12.8% mortality with BISAP AUROC of 0.808 (95% CI, 0.718-0.880). Wu Bu et al. (2008) **(23)** observed that BISAP score 0 to 2 have low mortality and score 3 to 5 have high mortality. The AUROC was 0.82 (95% CI 0.79-0.84). Another study conducted by Vikesh K. Singh et al. (2008) **(24)** on 397 patients in USA states that there was a statistically significant trend for increasing mortality with increasing BISAP score. The AUROC was 0.82 (95% CI 0.70-0.95). In our study, 18.91% of the cases developed complications (pseudocyst, ascitis and pancreatic necrosis). 48% cases of score 2, 33.30% in score 3 developed complications during course of illness. Cases in Score 0 and 1 had no complications. We found that the mortality rate was 4%, 50%, 100% and 100 % in score 2, 3, 4 and 5 respectively (table 4 and graph 2). Study conducted by Gompertz et al. **(28)** on 128 patients observed that 18 patients (14%) had local complications. In another study conducted by Sidra Shabbir et al. **(18)** observed that 3.75% of the case were having pancreatic necrosis. In a study conducted by Ximena Villacís et al. (**25)** stated that severity of AP increases with increase in BISAP score. It showed mortality rate on the basis of BISAP score was 55%, 25% & 6% in score 4, 3 & 2 respectively. It suggests that severity of AP in terms of complications and mortality correlates with BISAP score.

Conclusion

BISAP SCORE evaluation is found to be simple and accurate method of predicting the mortality in acute pancreatitis.

BISAP score is an accurate means of risk stratification in patients with AP in an Indian population. Statistically significant trend in mortality was found with increasing BISAP score. This was demonstrated by the increasing mortality seen with increasing BISAP scores and high discrimination for mortality by AUC. Patients with a BISAP score equal to or greater than 3 invariably develop severe acute pancreatitis and have high mortality. Duration of stay in the hospital increases with increase in BISAP score. In conclusion, Identification of patients at risk for mortality early in the course of AP is an important step in improving outcome. BISAP score is a simple bedside tool which can be applied within first 24 hours of admission and can predict patients at risk of mortality which require more monitoring and more aggressive treatment.

Limitations:

Study sample was small. The study would have been better if study have conducted over a large number of patients.

Conflict of interest:

There was no conflict of interest.

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