

**STUDY OF BISAP SCORE AS A PREDICTOR OF MORTALITY IN ACUTE  
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**ABSTRACT**

**Background and objective:** Pancreatitis is an inflammation of glandular parenchyma resulting in injury or destruction of acinar cells. The pathologic process can cause a self-regulating disease with no sequelae or may initiate catastrophic auto digestion activity with systemic cytotoxic effects and serious complications in the acute form. The clinical sign of pancreas-related abdominal pain associated with variations of serum amylase and lipase led to the term pancreatitis. The recent observations obtained by imaging studies, including ultrasound, CT, and MRI, should discourse the required treatment patient by patient. The initial stage is extremely difficult to diagnose, but also important to provide the right medical or surgical choice. Only the active surveillance of patients with controlled follow-up permit us to classify pancreatitis and to outline the disease better, assigning the decisive labels supported by the biochemical and radiologic sources well categorized by the different classification systems present. The clinical sequence of acute pancreatitis fluctuates from a mild transitory form to a severe necrotizing disease. Majority of the episodes of acute pancreatitis (80%) are mild and self-limiting, settling spontaneously in 3 to 5 days. Recent statistics indicate a rise in number along with rate of out emergency department visits, hospital admissions and direct healthcare costs for Acute Pancreatitis. With an estimated mortality rate of 2-5%, a reliable method of risk stratification for Acute Pancreatitis is of substantial clinical importance. The Ranson and modified Glasgow score contain data not routinely collected at time of hospitalization. In addition, both require 48 hours to complete, neglecting a potentially valuable early therapeutic window. The most commonly used to predict scoring system for clinical studies in Acute Pancreatitis is the Acute Physiology and Chronic Health Examination (APACHE) II score. However, the APACHE II was primarily developed as an intensive care instrument and entails the collection of a large number of parameters, some of which may not be related to prognosis in Acute Pancreatitis. The reason of this study was to develop a simple and precise clinical scoring system for classifying patients according to the risk of in hospital mortality. To develop a clinical tool useful in initial course of disease, we will examine data collected within the first 24 h of hospitalization. **Methods:** This study is a prospective hospital based time bound study concerning patients of Acute Pancreatitis admitted in Krishna Institute of Medical Sciences from December 2016-June 2018. Information was collected from detailed history, clinical examination and investigation (both hematological and radiological) on the patients. A total of 92 patients of Acute Pancreatitis were studied. **Result:** In this study among 92 cases, there were 6 (6.52 %) deaths. There was a statistically significant tendency for increasing mortality ( $P < 0.0001$ ) with increasing BISAP score. The area under the receiver operating curve for mortality by BISAP score in the prospective cohort was 0.938 (95 % confidence interval: 0.862, 1.00). Fischer's exact test value of 19.263 is also significant. This outcome is in coherence with other studies previously done and thus establishing the significance of BISAP as a simple and accurate predictor of mortality. **Summary and Conclusion:** BISAP SCORE evaluation is found to be very simple and accurate method of predicting mortality in the Acute pancreatitis in Observational Analytical Prospective Cohort Study included 92 patients presented with acute pancreatitis and were given the score from 0 to 5 on the basis of five simple variables. These were BUN, Impaired mental status, SIRS, Age and Pleural Effusion. All these parameters were easy to evaluate and were routinely done in our hospital for patients admitted with Acute Pancreatitis. Statistically significant trend in mortality was found with increasing BISAP. No mortality was seen in group with score 0 whereas there was 66% mortality in cluster of patients with score 4. Overall stay period in the hospital increases with increase in BISAP score. Male to female ratio in our group of patients showed male preponderance with a ratio of 2.57:1. With majority of the patients were in age group between 21-39. Among the various etiologies of Acute Pancreatitis, our study showed alcohol induced pancreatitis as the most common cause, with 34% of patients presenting with this association. This is mainly due to the male preponderance of our study. Gall stone pancreatitis was also a significant cause, as 27% of patients have this association. 8% of patients presented with Post ERCP induced pancreatitis thus stressing the complication associated with the procedure.

**KEYWORDS:** Acute Pancreatitis; BISAP SCORE; Fischer's exact test value.

## INTRODUCTION

Pancreatitis is a condition in which there is inflammation of gland resulting in damage or injury to the acinar cells. Acute pancreatic pathogenesis can result in a self-modifiable disease without any sequelae or can progress to autophagic action with generalized cell toxicity and conditions which are life-threatening. Calcification and fibrosis are the main presentation of chronic pancreatitis.

The clinical sign of pancreas-related abdominal pain associated with variations of serum amylase and lipase led to the term pancreatitis. The current clinical observations obtained by imaging studies, including ultrasound, CT, and MRI of the bile ducts and Wirsung's duct, should discourse the required treatment patient by patient. The early stage is extremely difficult to diagnose, but also important to provide the right medical or surgical choice. Vigorous scrutiny of cases with meticulous follow-up help us to classify pancreatitis and to outline the disease better, assigning the decisive labels supported by the biochemical and radiographic sources well characterized by the different classification systems present. The clinician should recognize pancreatitis at an initial stage, but avoid allocating a definitive classification immediately, instead investigating thoroughly all the factors available to determine whether an initial acute attack could lead to chronic changes with fibrosis, permanent damage and exocrine-endocrine insufficiency.

Clinically the events of acute pancreatitis vary from a mild form to a full developed severe necrotizing disease. Most of the time episodes of acute pancreatitis (80%) are mild and self-limiting, settling spontaneously in 3 to 5 days.<sup>(1-4)</sup> Patients of mild pancreatitis respond well to medical treatment and generally don't need intensive care unit (ICU) treatment or pancreatic surgery. Morbidity and mortality rates is below 1%.<sup>[1-4]</sup> On the other hand, severe pancreatitis is associated with local complications in form of necrosis, abscess formation, or pseudocysts, or both. Severe pancreatitis may be seen in approximately 15% to 20% of all cases.

In, another study, the total death was 4% (ten of 263 patients) and 9% (ten of 106 patients) in patients having necrotizing disease respectively.<sup>[5]</sup>

Acute pancreatitis is a condition with substantial burden in the community. Current survey suggests steep rise in the number of cases in the emergency department, hospital admissions and cost of healthcare because of Acute Pancreatitis. Due to an assessed death rate of around 2-5%, there is a need for the development of consistent system for risk quantification in Acute Pancreatitis.<sup>[6,7]</sup>

Acute pancreatitis, which is the study topic, is the frequently occurring pancreatic condition and the one which often exhibits therapeutic and diagnostic dilemma. Present system for quantification of risk have restriction

in. Data collection on admission is required in Ranson and modified Glasgow score which is not routinely done also both include 48 hours to complete, neglecting a potentially valuable early therapeutic window.<sup>[8,9]</sup> Routinely preferred score for evaluation of Acute Pancreatitis is the Acute Physiology and Chronic Health Examination (APACHE) II score.<sup>(10,11)</sup> Though, it was initially devised for critical care but requires gathering of huge number of parameters, few of them not even linked to the prognosis of disease.

The aim of our research was to device a simple and precise scoring system based upon clinical assessment categorize cases according to the risk of in hospital mortality. To device a clinical tool suitable in primary stage of Acute Pancreatitis, which evaluates data collected at the time of admission.

## AIM AND OBJECTIVE

To explore the accuracy of BISAP SCORE in predicting the risk of mortality in patients with Acute Pancreatitis.

## MATERIALS AND METHODS

### 1. Study Area

Krishna Institute of Medical Sciences & Deemed University, Karad.

### 2. Study Population

Patients admitted in Krishna Institute of Medical Sciences & Deemed University, Karad with Pancreatitis confirmed by clinical, biochemical, and radiological parameters.

### 3. Study Period

18 Months (Dec 2016-June 2018).

### 4. Sample Size

Patients admitted in Krishna Institute of Medical Sciences & Deemed University, Karad with acute pancreatitis under department of surgery during study period.

### 5. Study Design

Observational Analytical Prospective Cohort Study.

### 6. Mode of Selection of Patients- Inclusion Criteria

- Patients of all age groups
- All patients of acute pancreatitis confirmed by radiological methods.

### Exclusion Criteria

- Patients who didn't give consent
- Patients with chronic pancreatitis or surgical causes of acute pancreatitis

### 7. Study Tools

- i. Biochemical Investigations
- ii. Questionnaire
- iii. Clinical examination

- iv. Radiological Investigations
- v. Pulse Oximeter
- vi. Sphygmomanometer

#### Parameters To Be Studied

- I) To confirm the diagnosis of Pancreatitis
  1. Serum AMYLASE
  2. Serum LIPASE
  3. ULTRASONOGRAPHY/ CT SCAN
- II) To assess scoring of the patient
  4. Blood Urea Nitrogen
  5. WBC COUNT
  6. X-RAY CHEST P/A view to look for PLEURAL EFFUSION III) To assess organ failure
  7. S. Creatinine 8. PO2

#### Assessment

One point is assigned for the presence of each of the following during first 24 hours (BISAP)

1. BUN (Blood Urea Nitrogen) > 25 mg/dl
2. IMPAIRED MENTAL STATUS<sup>[26]</sup>
3. SIRS (Systemic Inflammatory Response Syndrome).<sup>[27,28]</sup> defined by presence of  $\geq 2$  of the following criteria
  - Pulse >90 beats/min
  - Respirations >20/min or PaCO<sub>2</sub> <32 mmHg
  - Temperature >38°C or, <36°C
  - WBC count >12 000 or <4000 cells/mm<sup>3</sup> or >10% immature neutrophils (bands)
4. AGE > 60 years
5. Presence of a Pleural Effusion

Using BISAP SCORE we will be able to stratify patients within the 24 hours of hospitalization into distinct risk groups for in-hospital mortality.

BISAP SCORE	Number of Cases	Observed Mortality
0		
1		
2		
3		
4		
5		

#### RESULT AND ANALYSIS

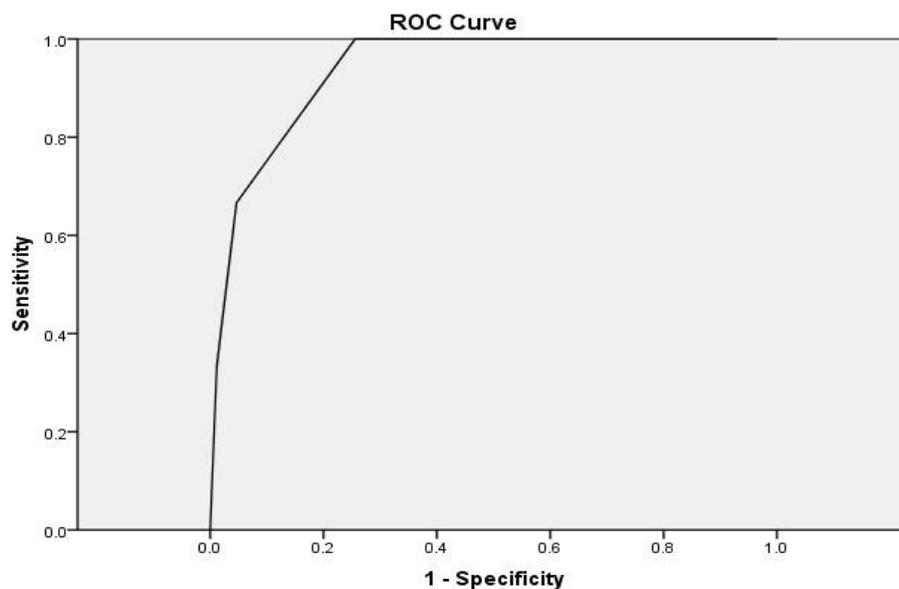
Patients diagnosed as a case of Acute Pancreatitis admitted in Surgical Ward of KIMS, Karad in between Dec 2016 to June 2018 are part of our study. Radiological (USG/CT Scan), and Biochemical (S. Amylase and S. Lipase) results are the parameters upon which diagnosis depends. 92 cases were included in study as they were fulfilling the criteria of disease.

Evaluation of data done using SPSS 10.

Six (6.5%) deaths occurred from total of ninety-two cases. As the BISAP score increase there is statically increase in death rate. AUR curve for death according to BISAP score was 0.937 (95 % confidence interval: 0.863, 1.00).

Fischer's test value of 19.264 is also significant.

The findings are in similarity with the different studies done previously thus favoring BISAP score as an easy, simple and precise predictor of mortality.



**Area Under the Curve**Test Result Variable (s): **BISAP SCORE**

Area	Std. Error <sup>a</sup>	Asymptotic Sig. <sup>b</sup>	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.937	.035	.000	.863	1.000

The test result variable (s): BISAP SCORE has at least one similarity in between the positive actual state group and the negative actual state group. Statistics can be biased.

- Under the non-parametric assumption
- Null hypothesis: true area = 0.5

The test result variable(s): BISAP Score has minimum one similarity between the positive actual state group and the negative actual state group.

- The least cutoff value is the min observed test value minus 1, and the greatest cutoff value is the max observed test value plus 1. All the other cut-off values are the mean of 2 consecutive ordered observed test values.

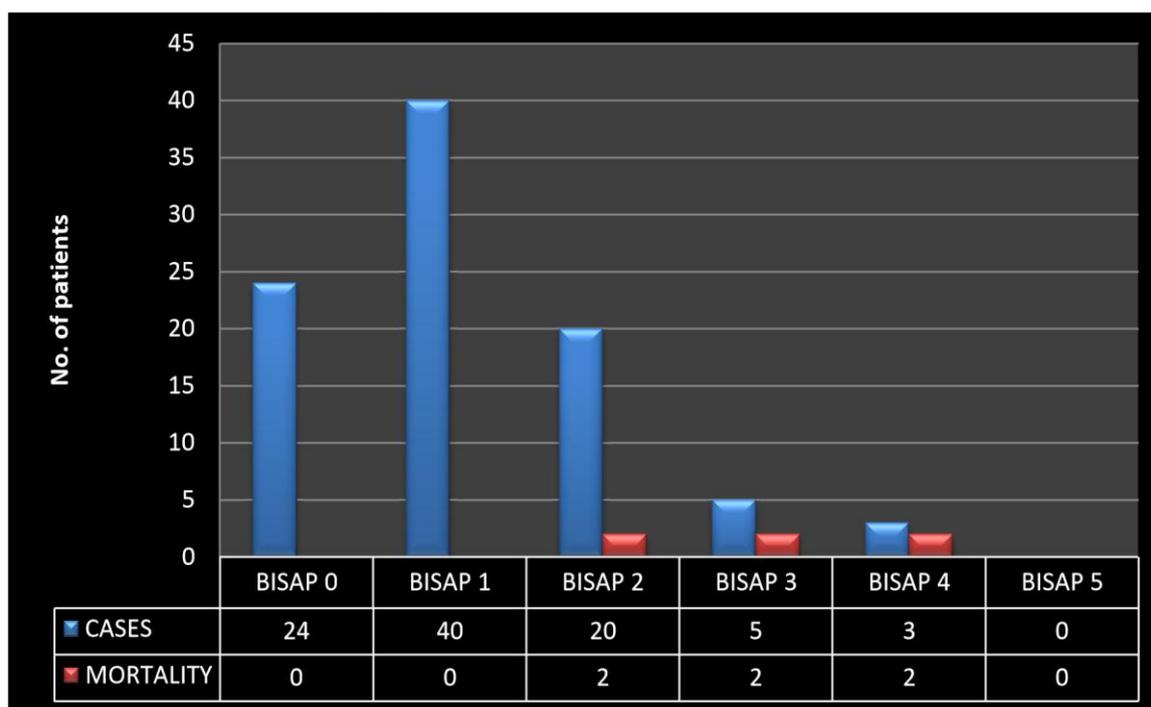
**Co-ordinates of the Curve**Test Result Variable(s): **BISAP SCORE**

Positive if $\geq^a$	Sensitivity	1 – Specificity
-1.00	1.000	1.000
.50	1.000	.721
1.50	1.000	.256
2.50	.667	.047
3.50	.333	.012
5.00	.000	.000

**Chi-Square Tests.**

	Value	df	Asymp. Sig. (2sided)	Exact Sig. (2sided)
<b>Pearson ChiSquare</b>	31.855 <sup>a</sup>	4	.000	.000
<b>Likelihood Ratio</b>	20.808	4	.000	.000
<b>Fisher's Exact Test</b>	19.263			.000
<b>N of Valid Cases</b>	92			

- 7 cells (70.0%) have anticipated count less than 5. The minimum anticipated count is .20.



Bar Diagram showing no. of cases and mortality in each group.

Percentage of patients having death in each group increases progressively as the score increases.

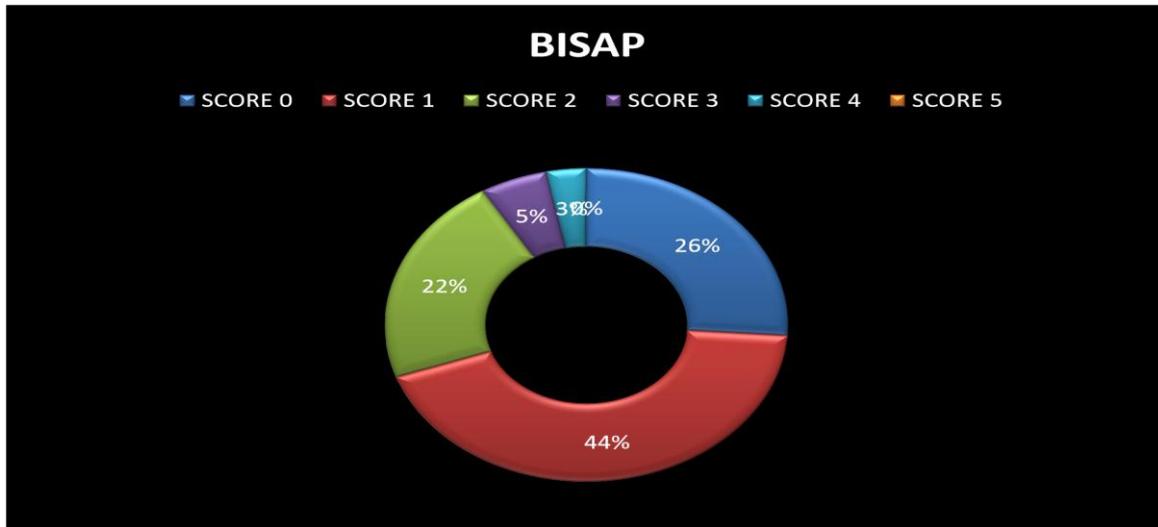
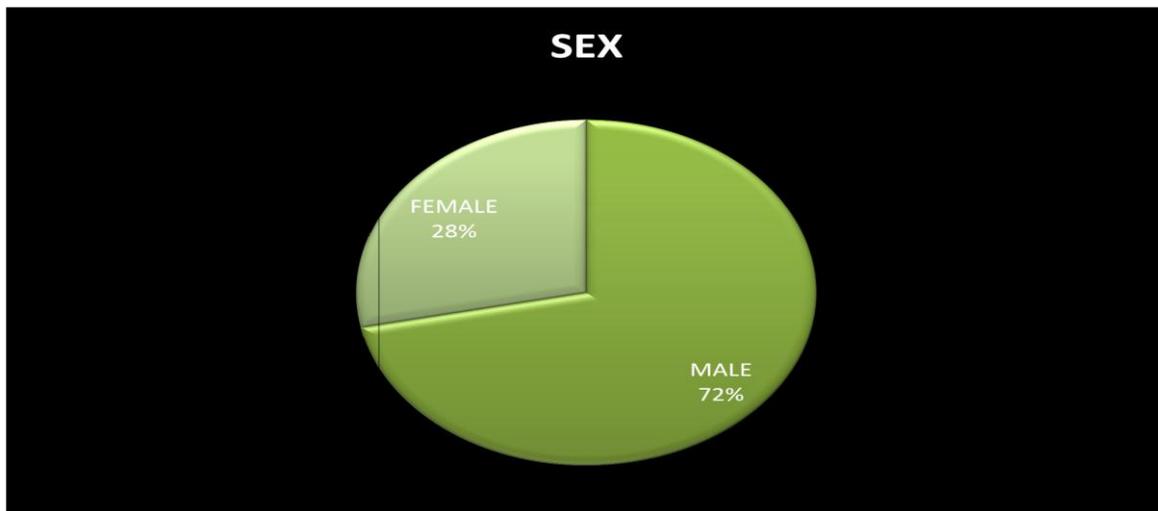
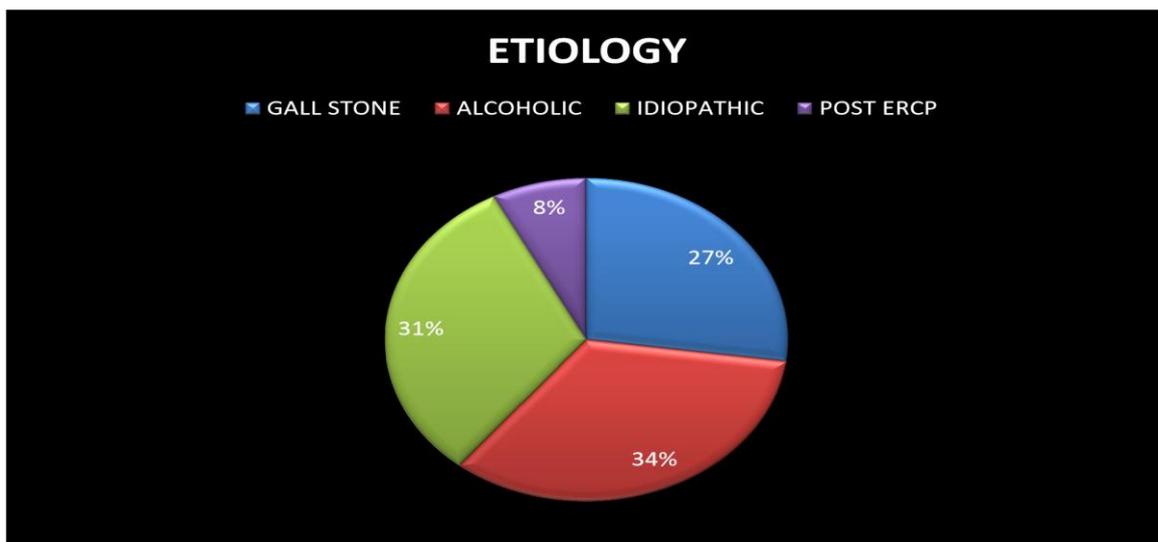


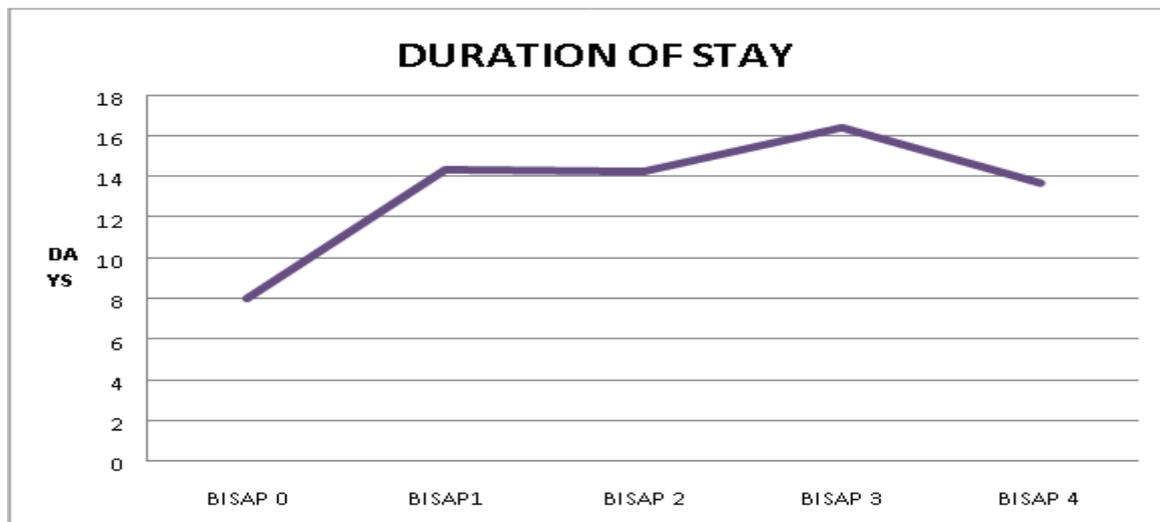
Diagram showing percentage of cases in each group.



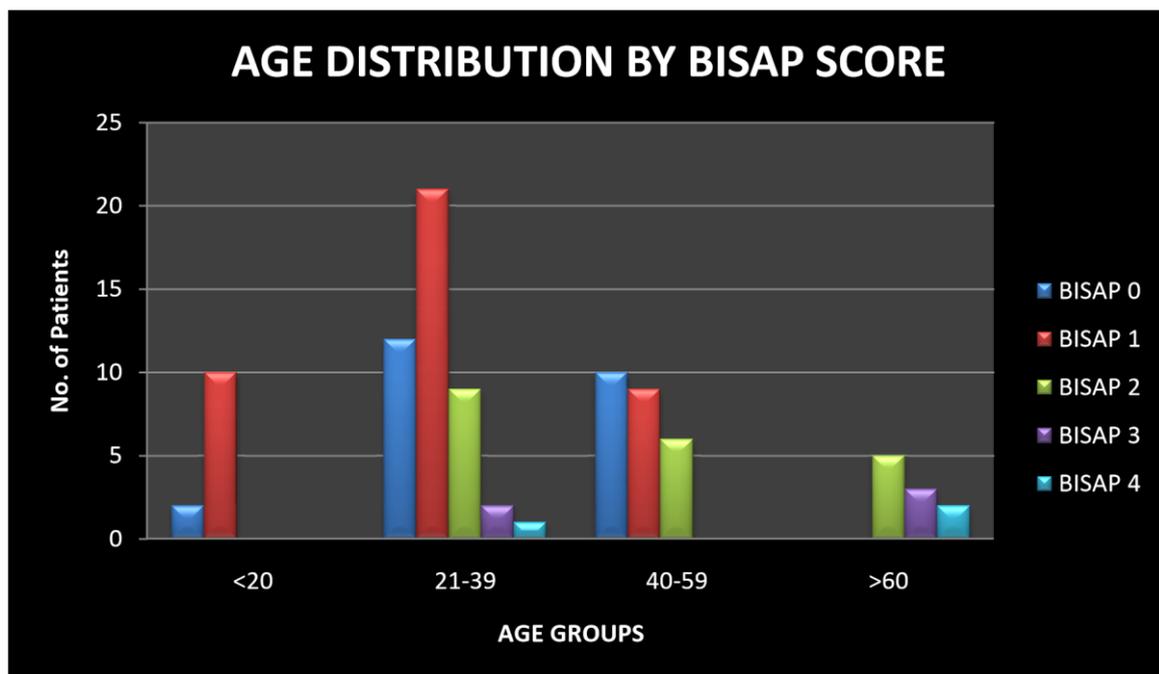
Sex distribution of Patients with Acute Pancreatitis.



Pie diagram showing etiologies of Acute Pancreatitis. Most common cause in this study point towards alcohol as a cause of pancreatitis, as the percentage of male patients was significantly higher. Gall stone induced pancreatitis also came out to be an important cause for the disease.



Line Diagram showing average stay of patients in each group. Mean length of stay varied significantly according to BISAP score. By application Post-hoc Tukey test (not shown in table), it was seen that the mean length of stay varied significantly between BISAP score 0 and 1 ( $p = 0.000$ ), 0 and 2 ( $p = 0.001$ ) and between 0 and 3 ( $p = 0.006$ ). However, it did not differentiate significantly between scores 0 and 4 ( $p = 0.325$ ), which may be due to huge numbers of mortality among those with BISAP score 4 which thereby had reduced the length of stay. No significant change in the average length of stay was found on comparing scores 1,2, 3, 4 with each other.



Bar diagram showing the division of patients in different age groups. Distribution of patients with different scores in each group shown above. Younger age group has cases with score of only 0 and 1, thus having better prognosis. Age group more than 60 has patients with score of only 3 and 4, thus having poor prognosis.

## DISCUSSION

Acute pancreatitis is a condition which lead to significant impression on our healthcare. Now a day there is sudden increase in cases, hospital admissions and increased healthcare expenditure for Acute Pancreatitis. Considering 2-6% of mortality, there is a need for a simple, reliable and easy system for risk quantification in Acute Pancreatitis.<sup>[6,7]</sup>

Scoring systems which are currently used for calculating risk have their own restrictions. Scoring systems like Ranson and modified Glasgow score requires large data collection at the time of admission among which few of them mostly missed during assessment also data collected 48 hours later which can result in missing vital initial therapeutic window.<sup>[8,9]</sup> In Acute Pancreatitis is the APACHE II scoring system which is frequently used in day to day practice.<sup>[10,11]</sup> To initially access and identify

cases with poor prognosis is the area of interest and research in AP.<sup>[29-41]</sup> Research which have been carried out previously mainly focused to create a scoring system for prognosis or to identify risk factors to assess severity of disease. Few of these studies consider death as an end point.

The chief objective behind this study was to create simple and precise scoring system based upon clinical parameters to classify patients based upon the risk of death in hospital. Prepare a scoring system which will be useful in initial course of AP, and the data collection will be done during the initial 24 hours of hospital admission. By accessing Blood Urea Nitrogen, impaired mental status (GCS), Systemic Inflammatory Response Syndrome, age and pleural effusion (BISAP), patients were classified in the initial 24 hours of hospitalization into different classes based upon risk factors for mortality in the hospital.

The skill to classify patients based upon the risk factors in the initial stage of disease course has proven to have many vital implications and outcome. Primarily, initial identification of patients with high risk will make treating doctors vigilant to provide an active treatment to the patients and if required consideration for higher center referral. Secondly, a scoring system gives an idea about criteria for enrolment of subjects into future clinical research. Also, this scoring system of risk factors if applied on large population will be helpful in providing additional outcome in research. For example, factors associated with mortality in cases with less BISAP scores may be helpful in planning management strategies in AP.

Simplicity and accuracy is the main advantage of BISAP score. Each factor carries one score to a total five point score. Amongst five factors each one can be simply accessed during the initial course of admission. Assessment of mental status is the only factor which is subjective. Systemic Inflammatory Response Syndrome.<sup>[27,28]</sup> is a composite factor involving 4 criteria, assessment of SIRS is routinely done and has shown to have a prognostic value in AP.

## SUMMARY AND CONCLUSION

BISAP SCORE evaluation is found to be very simple and accurate method of predicting mortality in the Acute pancreatitis in Observational Analytical Prospective Cohort Study done in our institution KIMS, Karad. The study included 92 patients presented with acute pancreatitis and were given the score from 0 to 5 on the basis of five simple variables. These were BUN, Impaired mental status, SIRS, Age and Pleural Effusion. All these parameters were easy to evaluate and were routinely done in our hospital for patients admitted with Acute Pancreatitis.

There was mortality of 6.52% in this study. Total 6 patients expired out of 92 patients.

Statistically significant trend in mortality was found with increasing BISAP score (p value < 0.0001). No mortality was seen in group with score 0 whereas there was 66% mortality in cluster of patients with score 4. There was not a single patient with score of 5 in our study. This was established by the increasing mortality seen with rising BISAP scores and increased discrimination for mortality by AUC.

The area under the receiver operating curve for mortality by BISAP score in the prospective cohort was 0.938. This was in coherence with previous similar studies done, B U Wet *et al.*<sup>[13]</sup> AUC was 0.83, Vikesh K. Singh *et al.*<sup>[22]</sup> AUC was 0.82.

Fischer's exact test value also further confirms the significance of scoring mortality which came out to be 19.263 in our study.

Male to female ratio in our group of patients showed male preponderance with a ratio of 2.57:1.

Among the various etiologies of Acute Pancreatitis, our study showed alcohol induced pancreatitis as the most common cause, with 34% of patients presenting with this association. This is mainly due to the male preponderance of our study. Gall stone pancreatitis was also a significant cause, as 27% of patients have this association. 8% of patients presented with Post ERCP induced pancreatitis thus stressing the complication associated with the procedure. In rest of the patients no specific cause could be identified and were labeled as idiopathic.

Overall stay period in the hospital increases with increase in BISAP score. Post hoc Turkey test shows 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 there was no significant variation between scores 0 and 4.

When the total number of patients were divided in different age groups, most of the patients were in age group between 21-39 (48.9%), for others it was 13% having age less than 20 years, 27% were in age group between 40-59. 10.8% were more than 60 years of age.

Distribution on the basis of scoring shows 24 patients with score 0, 40 patients with score 1, 20 patients with score 2, 5 patients with score 3 and 3 patients with score 4. There was no patient with score of 5.

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