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Scoring Systems Using Bedside Index of Severity in Acute Pancreatitis (BISAP) and PANC3 Vs Revised Atlanta Classification in Predicting the Severity of Acute Pancreatitis

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ABSTRACT

Background: Acute pancreatitis is a disease of great importance in clinical practice, defined as acute inflammatory process of the pancreas that may involve local tissues and affect other organs and requires intensive care. **Methods:** This prospective comparative observational studyincluded patients with acute pancreatitis. Bedside index of severity in acute pancreatitis (BISAP) and PANC3 were used to stratify through severity of disease. Score from each model was compared to clinical severity defined by Revised Atlanta classification 2021for predicting complication and mortality. Sensitivity, specificity and accuracy were compared for each model. A p value of < 0.05 was significant. **Results:** It was seen that, 48 (82.8%) patients had mild to moderately severe acute pancreatitis, while 10 (17.2%) patients had severe acute pancreatitis**.** BISAP score had a higher sensitivity(88.24%) compared to PANC3 score (76.47%) whereas both had equal specificity for prediction of complications (95.12%). BISAP scoring model had a higher accuracy of 93% for predicting local complications as compared to PANC3 score (86%). **Conclusions:** BISAP score had more sensitivity, diagnostic accuracy, positive and negative predictive value, and equal specificity in predicting the severity of acute pancreatitis as compared to the PANC3 score.Hence, BISAP score was found to predict more number of patients with, the likelihood of progressing to severe disease.

INTRODUCTION

Acute pancreatitis is as an acute inflammatory process of the pancreas due to activation of digestive enzymes. Acute pancreatitis is defined as by a patients meeting two of the following three criteria [1] Symptoms (e.g. acute onset epigastric and/or left upper quadrant pain, often radiating to the back), [2] A serum amylase or lipase level greater than 3 times the upper limit of the laboratory reference range, and [3] Radiologic imaging consistent with pancreatitis, usually using CT or MRI.

The incidence and global distribution of acute pancreatitis is heterogenous due to its self limiting nature in mild cases as well as variation in health care systems across different countries. The prevalence rate for pancreatitis in India is 7.9 per 1,00,000. The prevalence rate for men and women is 8.6 and 8.0 per 1,00,000 in India[1]. In India gall stone and alcohol are the most common cause of acute pancreatitis[2].

The severity of organ failure caused by acute pancreatitis is the most important determinant of mortality in the disease. Over 80% of patients have mild self limiting disease while approximately 20% of patients have a severe form with mortality rate as high as 30%[3]. Therefore it is of foremost importance to assess the severity and identify the patients who are at risk for the development of persistent organ failure early in the course of disease so that timely intensive therapy and appropriate interventions are ensured to decrease the mortality rate.

Several scoring systems such as Revised Atlanta classification, Ranson's Criteria, The Acute Physiology and Chronic Health Evaluation II score (APACHE II), The Glasgow score and Harmless Acute Pancreatitis (HAP) Score have been validated and used for assessing the severity of acute pancreatitis. The Atlanta Classi - fication has been considered the global standard tool for the assessment of acute pancreatitis severity.[4] However due to their

complexity, simple scoring systems such as Bedside index of severity in acute pancreatitis (BISAP) and PANC3 score were developed and evaluated. BISAP and PANC3 are simple and can be calculated bedside at the time of admission, requiring less time and fewer laboratory parameters. In this background we are comparing the scoring systems of BISAP and PANC3 vs Revised atlanta classification in predicting the severity of acute pancr - eatitis.Although various scoring models exist to clinically evaluate the severity of acute pancreatitis and organ failure hitherto, no single system has been considered ideal and there is no consensus on which scoring system to be used. In this context, the need for an objective way to predict acute pancreatitis severity remains an enigma.

METHODS

This prospective comparative observational study was conducted from March 2021to March 2022. A total of 58 cases as per diagnostic criteria of acute pancreatitis admitted in the medicine ward of Pt. B.D. Sharma PGIMS Rohtak were enrolled in the study after informed consent.Patients aged 18 years and above, diagnosedof AP (either first attack or recurrent attacks), presenting with acute onset of persistent severe epigastric pain, with or without radiation, and increased serum amylase and lipase levels were included. However, Patients with pre-existing chronic pancreatitis, Chronic Cardiac, liver, lung and kidney disease were excluded from the study.

Assessment of severity and associated complications:

BISAP, PANC3 and Revised atlanta classification (RAC) were used to stratify the severity of disease. All subjects thereafter were followed up for 4 weeks to watch for any complications associated with pancreatitis and mortality.

The components of BISAP scoring system are:

I. Blood Urea Nitrogen (BUN) >25
II. Impaired mental status
III. Severe Inflammatory Response Syndrome (SIRS)≥ 2
IV. Age >60
V. Pleural effusion

A score >2 indicates severe pancreatitis.SIRS includes two or more of the following conditions: Tempe -rature>38.3°C or <36.0°C, Heart rate of >90 beats/minute, Respiratory rate of >20 breaths/minute or PaCO2 of <32 mmHg, WBC count of >12,000 cells/mm3, <4000 cells/mm3, or >10 % immature (band) forms.

The components of PANC3 score are:

i. Serum hematocrit >44%
ii. Body Mass Index (BMI)>32 kg/m2
iii. Pleural effusion on the chest x ray

Revised Atlanta classification (RAC) of acute pancreatitis[5] was classified into Mild acute pancreatitis(No organ failure and no local or systemic complications), Moderately severe acute pancreatitis (Organ failure that resolves within 48 h (transient organ failure) and/orLocal or systemic complications without persistent organ failure and Severe acute pancreatitis [Persistent organ failure (>48 hours)].The modified Marshall scoring system is used in the Revised Atlanta classification, and it scores the respir-atory(PaO2/FiO2), cardiovascular(SBP) and renal system(S. creatinine value) to detect organ failure with a score >_ 2 indicating organ failure.

Table 1: Type of pancreatitis in study subjects (n=58)

Type of pancreatitis	No.	%
Mild	41	70.7
Moderate	7	12.1
Severe	10	17.2

In our study, it was also seen that, 48 (82.8%) patients had mild to moderately severe acute pancreatitis, while 10 (17.2%) patients had severe acute pancreatitis which was comparable to other study[8] as shown in table 1.

Most common complication in our study was Acute Kidney Injury (AKI) as shown in figure 1.BISAP score had a higher sensitivity (88.24%) compared to PANC3 score (76.47%) whereas both had equal specificity for prediction prediction of complications (95.12%). BISAP scoring model had a higher accuracy of 93% for predicting local complications as compared to PANC3 score (86%) (Figure 2). Results of BISAP score were comparable with study done by Lalithkumar et al.[9] which showed that BISAP score had better specificity (95.35%), and diagnostic accuracy (92%) and Park et al[10] which showed that BISAP sensitivity for organ failure was 91.3% and, specificity was 85%.

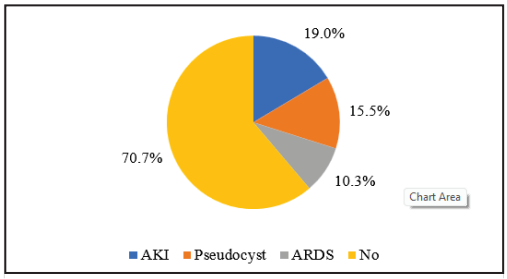

Figure 1: Complications in pancreatitis subjects (n=58)

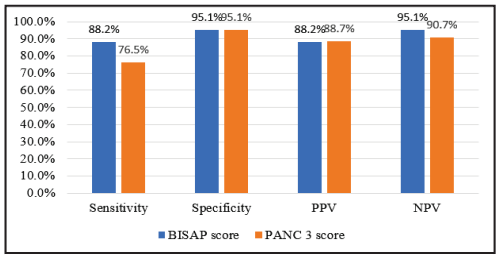

Figure 2: Diagnostic value of BISAP and PANC3 score for prediction of complications in pancreatitis subjects

Systemic inflammatory response syndrome (SIRS) score of 2 or more on day 1 was present in 50 percent of all acute pancreatitis subjects which were similar to results of other study done by Alaarabiou A[11] (50%) and Vikesh K Singh[12](62%).

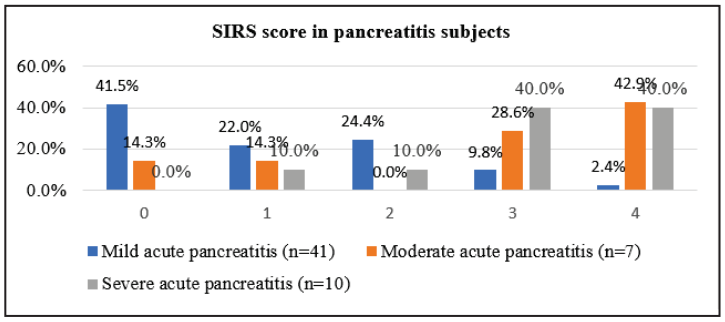

Figure 3: SIRS score in pancreatitis subjects

There was In-hospital mortality rate of 5.2% (n = 3) in our study which is comparable to mortality for acute pancreatitis by Singh et al who reported 14 (3.5%) deaths among 397 cases.[12] Cause of death was found to be Multi-organ Dysfunction Syndrome (MODS).

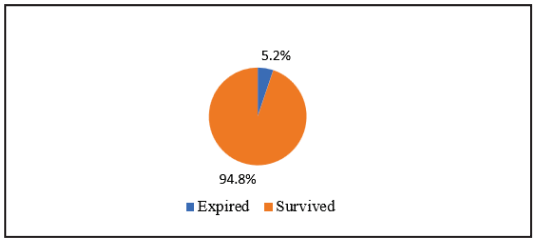

Figure 4:Outcome in pancreatitis

The analysis for prediction of mortality showed higher sensitivity of 100% with BISAP score as compared to 66.7% with PANC3 score. Both scores had equal specificity of 89.09%. Positive and negative predictive values in the study were found to be 25% and 98% respectively for PANC3 score and 33.33% and 100% respectively for BISAP score. Diagnostic accuracy of this study was found to be 84 %, for a PANC3 score of 3 and 97% for BISAP score of 3 or more than 3. We observed that BISAP score was most accurate in predicting mortality (97%). Findings from another study, doneby Koziel et al. also reported that BISAP was more accurate in predicting mortality when compared to PANC 3 and Ranson's.[13] On the contrary results reported by Park et al[14] and Yadav et al[15] showed better accuracy of the PANC3 score.AUC for BISAP for predicting mortality in AP in our study (0.97) is far better than the study conducted by Park et al[14] (0.86) which might be due to less sample size of our study.

ROC Curve using BISAP and PANC3 score for prediction of

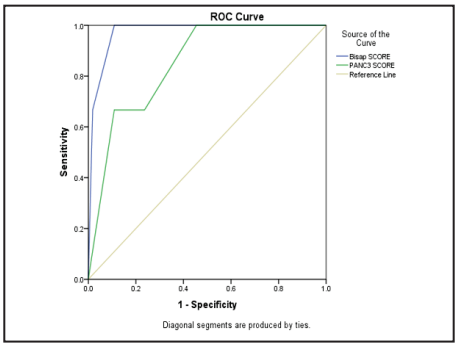

Figure 5: ROC Curve using BISAP and PANC3 score

When calculating the likelihood ratios for the BISAP score at a threshold of 3, the positive likelihood ratio was above 5 for both prediction of complications and mortality in pancreatitis subjects, suggesting that a BISAP score of ≥3 did well in predicting mortality and complications of AP.

Patients were followed for 4 weeks after discharge from the hospital, there was no mortality during this period. 8 patients had AKI at time of discharge. 7 out of them had improvement in renal function tests

CONCLUSION

BISAP score was found to have more sensitivity, diagnostic accuracy, positive and negative predictive value, and equal specificity in predicting the severity of acute pancreatitis as compared to the PANC3 score. Hence, the BISAP score was found to predict more number of patients with, the likelihood of progressing to severe disease. Larven et al stated in their study that, a prognostic scoring should preferably have high positive predictive values or high negative predictive values to assess the severity of acute pancreatitis. Hence, BISAP is considered a simple and good bedside scoring system in predicting the severity of acute pancreatitis.

The limitations of our study were the small size of study population which limits a more extensive evaluation of the ability of the BISAP and PANC3 scores to predict local complications and mortality. The etiology in this study was found to be different from the worldwide accepted one, hence might not be correct to compare with other studies. Variations in the timing of the presentation of patients to the hospital after the onset of symptoms might have interfered with the assessment of the scoring systems. BISAP score is higher in patients having SIRS, in older patients and in patients with altered mental status. BISAP has the disadvantage that it cannot easily distinguish transient from persistent organ failure.

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