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ORIGINAL ARTICLE

Accuracy of Bisap Score to Predict Severe Acute Pancreatitis Keeping Ranson Score as Gold Standard

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ABSTRACT

Objective: To ascertain the diagnostic accuracy of BISAP score to predict severe acute pancreatitis keeping Ranson score as gold standard

Study design: Descriptive Cross Sectional study

Place and duration of study: Surgical Department, Combined Military Hospital Rawalpindi from January 2017 to July 2017.

Methodology: 65 patients having history indicative of acute pancreatitis, serum lipase and serum amylase were measured. Patients with confirmed diagnosis of acute pancreatitis who consented for taking part in the research and achieving the inclusion and exclusion criteria were enrolled for study. Patients were evaluated by adequate history and thorough examination. All patients are investigated for Ranson score and BISAP score and divided into mild and severe pancreatitis on the basis of BISAPS and Ranson scoring.

Results: In our study, mean+sd age was 44.92+8.92 years. Frequency of severe acute pancreatitis was 32.3%. Diagnostic accuracy of BISAP score to predict severe acute pancreatitis keeping Ranson score as gold standard had 80.9% of sensitivity, 81% of specificity, 68% of PPV and 90% of NPV.

Conclusion: BISAP score have an excellent accuracy for prediction of severe acute pancreatitis as Ranson score. BISAP score can be used as tool for recognition of severe acute pancreatitis within 24 hours in simple and precise manner.

Keywords: Severe acute pancreatitis, Prediction, BISAP score, Ranson score, Accuracy

INTRODUCTION

Acute pancreatitis is an inflammation of pancreas and peri-pancreatic tissue with possible involvement of multiple organs.[1] According to global estimates, the incidence of AP was shown to be 33·74 cases (95% CI 23·33-48·81) per 100 000 person-years and a mortality of 1·60 (95% CI 0·85-1·58) per 100 000 person-years due to AP.[2] In most of the cases acute pancreatitis is mild and self-limiting with 1% mortality rate but up to 20-30% patients evolve severe acute pancreatitis with 20-60% mortality rate.[3,5] Parniczky et al., 2016 reported 28% mortality in severe acute pancreatitis. Early appreciation of severe acute pancreatitis(SAP) would support the clinician for more aggressive management within 24 hours that could potentially prevent adverse complications.[3,4] Currently, many scoring systems are in use e.g. Ranson score, Glasgow score, Japanese Severity Score (JSS), CT Severity Index (CTSI), BALI (Blood Urea Nitrogen, Age, Lactate Dehydrogenase, Interleukine-6) and Acute Physiology and Chronic Health Evaluation II (APACHEII) for risk stratification of severe disease but they are not convenient for use because of involvement of many parameters.[5] Mortele et al., formulated the modified CTSI (mCTSI) including a simplified evaluation of peripancreatic inflammation and extent of pancreatic parenchymal necrosis and incorporated the extrapancreatic complications (vascular, gastrointestinal, and extrapancreatic parenchymal complications as well as the presence of pleural effusion and/or ascites) in the assessment.[6] In Revised atlanta classification, Severity of the disease is categorized into 3 levels: mild, moderately severe, and severe on basis of local or systemic complications and organ failuree (as classified by the modified Marshal scoring system).[7] Ranson score is the commonly used in all over the world. The sensitivity, specificity and accuracy of Ranson score with ≥ 3 for SAP is 91.67%, 96.15% and 94% respectively.[8] Ranson and Glasgow score take more than 48 hours for the assessment which may lead to increased mortality and morbidity during that period due to missing of early aggressive therapeutic intervention.[5,9] A perfect scoring system should be quick, simple, precise and accurate.[4]

In 2008, Wu et al formulated bed side index for severity in acute pancreatitis (BISAP) to find out patients with SAPs in early stages.[3,10,11] BISAP score is easy to calculate within 24 hours as its parameters are clinically applicable and easy to find.[3,10] BISAP score 2 predicts SAP and score 3 predicted mortality.[3] Sensitivity and specificity for prognostication of SAP with BISAP Score ≥ 2 is 79.17 and 84.46 respectively.[8]

The justification of this study was that in our local settings Ranson and Glasgow score are used which is difficult to follow and time consuming. By establishing the accuracy of BISAP scores, we shall be able to determine the SAP within 24 hours in a simple manner which decreases both morbidity and mortality. It will also enable the treating physician and surgeon to manage the patient more effectively.

MATERIAL AND METHODS

Descriptive cross sectional study was executed in Combined Military Hospital Rawalpindi. Study duration was six months duration from Jan 2017 to July 2017. The Sample size calculated by WHO Calculator using sensitivity 79.15, Precision 10%, Confidence level 95% was 65. Sampling Technique was Non-probability consecutive sampling. All acute pancreatitis patients of either gender with age range 13-80 years and biliary acute pancreatitis were included in study. Patient's exclusion criteria were those who present with symptoms of more than 3 days**,** pregnancy, Chronic Pancreatitis, patients in Immunocompromised states, Recurrent Pancreatitis, pancreatitis of unknown etiology, patients having chronic illnesses like Diabetes Mellitus, Chronic Renal Disease, Liver Cirrhosis and any history of any malignancy.

Patients of acute abdomen in Accident and emergency department CMH, Rawalpindi with the history suggestive of acute pancreatitis, serum amylase/ serum lipase was measured under supervision of experienced pathologists. After confirming the diagnosis of acute pancreatitis and fulfilling the exclusion and inclusion criteria, those patients who consented for participation in the study, were enrolled for research. Patients were appraised by adequate history and detailed examination. All patients were investigated for Complete Blood Count, Haematocrit, Renal function Tests, Blood Urea Nitrogen, Serum albumin, Lactate Dehydrogenase, Aspartate Aminotransferase, Blood Sugar, Arterial Blood Gases, Serum Calcium and Chest X-Ray at time admission by respective specialists. Haematocrit, Blood Urea Nitrogen, Serum Calcium and Arterial Blood Gases were repeated for Ranson Scoring within 48 hours. Intake Output Chart was maintained for fluid deficit from time of admission. All patients were

scored according to both Ranson score and BISAP Score and divided into mild and severe pancreatitis. Acute pancreatitis patients with severe disease (Ranson Score > 3, BISAP Score > 2) were treated in high dependency unit or intensive care unit and rest were admitted in surgical ward. All patients were managed according to standard protocols. Data was collected on a specially designed Performa by researcher himself. Ethical issues were maintained by informing about confidentiality, such as data coding, disposal, sharing and archiving.

Statistical Analysis: All data collected through Performa was processed and analyzed in SPSS version 21.0. Descriptive statistics were used to calculate quantitative and qualitative variables. Mean and standard deviation was used for quantitative data like age, Ranson and BISAP score. Qualitative variables like gender accuracy (True positive, True negative) was measured as frequency and percentages.

Effect modifier like age and gender was organized by stratification and Chi-square test was exercised. P value ≤ 0.05 was significant.

RESULTS

Age distribution ranged 18-80 years (mean+sd was 45.89+10.40years). The patients were stratified in two groups in regards to age, 38 (58.46%) were < 50 years while 27(41.54%) were above 50 years (Table No. 1). Twenty nine (44.61%) patients were male and 36(55.38%) were females. (Table No. 1).

Table no. 1: Demographic Data

	Characteristic	No of Patients	Percentage
Age (Years)	< 50 Years	38	58.46 %
	>50 Years	27	41.54 %
Sex	Male	29	44.61 %
	Female	36	55.38 %

Frequency of SAP according to Ranson score (gold standard) was 32.3%(n=21) while 67.71%(n=44) had Mild AP. Mean Ranson and BIASP score was 2.169+1.097 for Ranson score while 1.70+1.128 for BIASP score.

Diagnostic accuracy of BISAP score for prediction SAP keeping Ranson score as gold standard had sensitivity of 80.95%, specificity of 81%, positive predictive value of 68% and negative predictive value of 90%. (Table No. 2)

Table no. 2: diagnostic accuracy of bisap score in predicting the sap as compared to ranson score (n=65)

BIASP Score	Ranson Score as Gold Standard		P value
	SAP Present	SAP absent	
SAP Present	True positive(a) 17 (26.15%)	False positive (b) 8 (12.3%)	0.00
SAP Absent	False negative(c) 4 (6.16%)	True negative (d) 36 (55.38)	

Sensitivity: 80.95%
Specificity: 81%
PPV: 68%
NPV: 90%
Accuracy Rate: 81.53%

The data was stratified on the basis of age and gender to control the effect modifiers. For patients with age >50 years, sensitivity (84%) is slightly higher and specificity, NPV and accuracy rate (90%, 93% and 86% respectively) are higher in patients with age <50 years. (Table No. 3)

For male patients, sensitivity, specificity, PPV, NPV and accuracy rate (87.5%, 85.7%, 70%, 94.7% and 86.2% respectively) are higher. (Table No.4)

Table no. 3: stratification for age

	AGE < 50 YEARS		P value	AGE > 50 YEARS		P value
BIASP Score	Ranson Score as Gold Standard			Ranson Score as Gold Standard		
	SAP Present	SAP absent	0.00	SAP Present	SAP absent	0.00
SAP Present	True positive(a) 6	False positive (b) 3		True positive(a) 11	False positive (b) 5	
SAP Absent	False negative(c) 2	True negative (d) 27		False negative(c) 2	True negative (d) 9	
	Sensitivity = 75% Specificity = 90% Positive predictive value = 67% Negative predictive value = 93% Accuracy rate = 86%			Sensitivity = 84% Specificity = 64% Positive predictive value= 68% Negative predictive value = 81.8% Accuracy rate = 74%		

Table no. 4: stratification for gender

	MALE		P value	FEMALE		P value
BIASP Score	Ranson Score as Gold Standard			Ranson Score as Gold Standard		
	SAP Present	SAP absent	0.00	SAP Present	SAP Absent	0.030
SAP Present	True positive(a) 7	False positive (b) 3		True positive(a) 10	False positive (b) 5	
SAP Absent	False negative(c) 1	True negative (d) 18		False negative(c) 3	True negative (d) 18	
	Sensitivity =87.5% Specificity =85.7% Positive predictive value =70% Negative predictive value =94.7% Accuracy rate = 86.2%			Sensitivity = 76.9% Specificity =78.2% Positive predictive value = 66.6% Negative predictive value =85.7% Accuracy rate =77.78%		

DISCUSSION

Acute pancreatitis is frequent disease having varied range of severity with the incidence of about 30-113 cases per 100,000 individuals.[12] Its mortality rate is around 10-15% .[12] Early recognition of patients at danger for SAP is vital for management because rapid remedial interventions improve recovery of patient.[13-15] Brivet et al[16] showed fourfold increase in death rate in case of delay for > 24hours in shifting to intensive care unit. Clinical assessment alone can overlook severe disease in many patients.[17] Ranson and Glasgow score take more than 48 hours for the assessment which may lead to increased mortality and morbidity during that period due to missing of early aggressive therapeutic intervention.[5,9] Some clinicians have revealed that after 48 hours of admission, clinical evaluation is equally effective as other scoring systems which make them invaluable.[18] A perfect scoring system should be quick, simple, precise and accurate.[4] BISAP score has been formulated to categorize patients with acute pancreatitis at bedside and early stage.

Our study depicts the frequency of acute severe pancreatitis is 32.3% which is higher than reported 20-30%[3,5]. The possible reason for higher frequency of SAP in this study is that it is a

tertiary care hospital having better intensive care facility and it receives more referrals of patients from periphery with SAP. Diagnostic accuracy of BISAP score to predict SAP keeping Ranson score as gold standard had sensitivity of 80.95%, specificity of 81%, positive predictive value of 68% and negative predictive value of 90%. Presently, literature revealed inadequate data for authentication of BISAP score among various patient nationalities.

We compared our results with study conducted in Korea showing sensitivity, specificity, PPV, NPV, Accuracy are 79.17%, 84.46%, 86.36%, 82.14% and 84% respectively for prediction of SAP with BISAP Score ≥ 2.[8] Our findings are close regarding sensitivity of BIASP while specificity and accuracy rate are slightly lower than recorded in above study.

A research article by Papachristou et al[9] showed that BISAP score had sensitivity of 37.5%, specificity of 92.4%, PPV of 57.7% and NPV of 84.3% for the prediction of SAP with score 3. A study conducted in China by Lifen Chen and others revealed sensitivity, specificity, PPV and NPV are 61.4%, 83.1%, 48.1, 89.4% respectively with BISAP>2[19]. On comparing with previous studies, our study reveals higher sensitivity and lower specificity for BISAP scores. Several factors like traits of study participants, such as lifestyle, ethnic group and genetic makeup may be the causes of these differences. Moreover, etiology of disease may also explain the noted differences as we included only patients with biliary pancreatitis in present study. One study conducted in New Dehli, India showing BISAP predicts severity, organ failure and death, in acute pancreatitis very well AND as good as APACHE-II but better than Ranson criteria, CTSI, CRP, hematocrit, and BMI.[11]

Sidra Shabbir and others[20] determined the accuracy of BISAP score in finding out the frequency of SAP and mortality in patients with acute pancreatitis by comparing it with Ranson's score. The detected incidence of severe disease graded by the BISAP score has ($p < 0.001$) and by Ranson's score has ($p < 0.001$). In regards to mortality, patients having BISAP score ≥ 3 has p=0.003, while patients having Ranson's score≥ 3 has p=0.002, both are statistically significant which depict BISAP score is a precise tool for severity stratification as Ranson's score. BISAP score is a valuable tool in predicting severity of severe acute pancreatitis within 24 hours with comparable accuracy of Ranson's score.[21]

CONCLUSION

BISAP score have an excellent accuracy in prediction of SAP as Ranson score. BISAP score can be used as tool for recognition of severe acute pancreatitis within 24 hours in simple and precise manner which may enable treating physician and surgeon to consider more aggressive management with no time delay.

Conflict Of Interest: This study has no conflict of interest to declare by author.

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