Bedside Index of Severity in Acute Pancreatitis (BISAP) Score on Outcome of Patients Presenting with Acute Pancreatitis in a Tertiary Care Hospital

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ABSTRACT

Background

Acute pancreatitis is a life-threatening condition characterized by inflammation of the pancreas causing intense abdominal pain and potential harm to multiple organs. The mortality rate is 1-5% and thus requires specialized and interdisciplinary care to inhibit it.

Objective

To describe the bedside index of severity in acute pancreatitis score on the outcome of acute pancreatitis patients in a tertiary care hospital.

Method

This is a hospital based observational cross-sectional study conducted in the internal medicine inpatient department of Dhulikhel Hospital from April 2018 and March 2019. This study reviewed the medical records of the department.

Result

The study included 70 participants with 44 (±14) years of average age and stating common cause as gallstone (45.7%). The study showed that those with bedside index of severity in acute pancreatitis score ≥ 3 during hospital admission had significantly higher rate of organ failure (p-value < 0.05), as well as had a prolonged hospital stay (mean: 20 [±7.9] days). The mean hospital stay was 12.9 days.

Conclusion

Patients with bedside index of severity in acute pancreatitis score greater than three at admission were found to have an increased risk of organ failure, significantly higher chances of requiring mechanical ventilation, and a longer duration of hospital stay.

KEY WORDS

Acute pancreatitis, Bedside index of severity in acute pancreatitis score, Organ failure, Outcome

INTRODUCTION

Acute pancreatitis is a common gastrointestinal disorder that requires hospitalization. It has an annual incidence of 30-40 cases per 100,000 individuals worldwide.[1] The varied causes of acute pancreatitis with cause identified in 75-85% cases.[2] The common causes are gallstones and alcohol use.[3] Other metabolic causes are hypercalcemia and hypertriglyceridemia, drug-induced, autoimmune conditions, post-ERCP procedures, trauma, infections, congenital or genetic conditions, and idiopathic.[4,5] Each person's case of acute pancreatitis may be unique and the result of a combination of various factors.

The overall mortality rate for acute pancreatitis is estimated to be approximately 1%.[6,7] However, among hospitalized patients who develop organ failure or pancreatic necrosis, the mortality rate can be much higher, ranging from 30-40%.[8-11] Moreover, higher mortality rate is found among patients with biliary pancreatitis than those with alcoholic pancreatitis.[12] The management of severe pancreatitis requires interdisciplinary, specialized, and intensive care due to its association with multi-organ failure and the need for complex interventions.[13]

To ensure early assessment and prediction of the severity, bedside index for severity in acute pancreatitis (BISAP) scoring system is a simple and non-invasive that helps to estimate the severity and the mortality of the acute pancreatitis patients.[14,15] The score is a modified version of Ranson's criteria and is precise to predict the patient's outcome with in 24 hours of admission.[14] This study aimed to assess the outcome of the acute pancreatitis patients of Dhulikhel Hospital, based on the BISAP score.

METHODS

The study was designed as a prospective, cross-sectional observational study and was conducted among participants with acute pancreatitis in the internal medicine department at Dhulikhel hospital. Before collecting data for the study, ethical approval was obtained from the institutional review committee of Kathmandu University School of Medical Sciences and written consent was taken from willing participants who met the inclusion criteria. The study was conducted from April 2018 to March 2019 and data was collected using a proforma during the 2-week period after presentation. Participants were evaluated using clinical findings, laboratory results, and radiological evidence, and BISAP scoring was used to determine their risk of mortality. The BISAP score is calculated based on five clinical variables that are easily available at the bedside: presence of systemic inflammatory response syndrome (SIRS), altered mental status, age, elevated blood urea nitrogen, and presence of pleural effusion.[16] Each variable is given a score of 0 to 1, and the total score ranges from 0 to 5. The evidence of early organ failure in all patients was defined by the Marshall scoring system, which assessed the respiratory, cardiovascular, and renal systems and scored them from 0 to 4. A score of greater than 2 in one or more of the three organ systems was regarded as organ failure. The Marshall score was calculated at the time of admission and subsequently at 48 hours, 7 days, and the completion of 2 weeks of admission. Patients who were discharged prior to the 2 week period were called for follow-up on 7 days and 2 weeks, and patients who were unable to come for follow-up were contacted via telephone.

Data was entered into SPSS version 21.0 for analysis and was measured in terms of mean, frequency, percentage. Inferential statistics, such as the chi-square test, were used to determine the significance among the variables. Statistical significance was considered as $p < 0.05$. In conclusion, the study aimed to evaluate the outcome of acute pancreatitis patients and determine their risk of mortality using the BISAP scoring system, and the data collected was analyzed using statistical methods to determine the significance of the results.

RESULTS

A total of 70 participants were enrolled and analyzed in the study. The mean age of participants was 44±14, with a minimum age of 20 and a maximum age of 86 years. The majority of participants were male, making up 62.9% of the study population, while 37.1% were female.

Table 1. Demographic characteristics of the participants (n=70)

Variables	Frequency	Percentage
Age in years (mean) = 44 ± 14 years		
20-29	10	14.3
30-39	19	27.1
40-49	18	25.7
50-59	8	11.4
60 and above	15	21.4
Sex		
Male	44	62.9
Female	26	37.1
Etiology of acute pancreatitis		
Gallstones	32	45.7
Alcohol	23	32.9
Post ERCP	3	4.3
Drug induced	1	1.4
Hypertriglyceridemia	1	1.4
Idiopathic	10	13.3

The etiology of acute pancreatitis in the study participants was found to be gallstones in 45.7% of cases, followed by alcohol consumption in 32.9%, idiopathic causes in 13.3%, post ERCP in 4.3%, and 1.4% each for drug-induced and hypertriglyceridemia. These results highlight the various causes of acute pancreatitis in the study population, with gallstones being the most common contributing factor.

Table 2. Co- relation of etiology and BISAP score of the participants (n= 70)

Etiology	BISAP score ≥ 3	BISAP score ≤ 3
Gallstones	17 (53.1%)	15 (46.9%)
Alcohol	3 (13.0%)	20 (87.0%)
Post ERCP	1 (33.3%)	2 (66.6%)
Drug induced	0	1 (100%)
Hypertriglyceridemia	0	1 (100%)
Idiopathic	3 (30.0%)	7 (70.0%)

Among the study participants, those with a BISAP score of ≥ 3 had evidence of organ failure at the time of admission according to the modified Marshall criteria. Specifically, 21 out of 24 patients (87.5%) with a BISAP score ≥ 3 had evidence of organ failure, compared to only 4 out of 46 patients (8.7%) with a BISAP score < 3, which was found to be statistically significant (p=0.001). After 48 hours of admission, 95.8% of patients with a BISAP score ≥ 3 had developed organ failure, while 95.7% of patients with a BISAP score < 3 had no evidence of organ failure. These results suggest that the BISAP score is an effective tool in predicting the likelihood of organ failure in acute pancreatitis patients.

Table 3. BISAP scoring and presence of organ failure (n= 70)

BISAP score	Organ Failure (Present)	Organ Failure (Absent)	Total	P value
On admission				
≥ 3	21 (87.5%)	3 (12.5%)	24	0.001
< 3	4 (8.7%)	42 (91.3%)	46	
After 48 hours of admission				
≥ 3	23 (95.8%)	1 (4.2%)	24	0.001
< 3	4 (8.7%)	42 (91.3%)	46	
7 days after admission				
≥ 3	18 (75%)	6 (25%)	24	0.001
< 3	2 (4.3%)	44 (95.7%)	46	
2 weeks after admission				
≥ 3	6 (25%)	18 (75%)	24	
< 3	1 (2.2%)	45 (97.8%)	46	

The average length of hospital stay among all participants was 12.90 days with a standard deviation of 8.05. The shortest hospital stay was 4 days, while the longest was 40 days. In the case of patients with a BISAP score of 3 or higher, the average hospital stay was 20.62 days with a standard deviation of 7.90. For those with a BISAP score lower than 3, the average hospital stay was 8.86 days with a standard deviation of 4.35.

Table 4. BISAP scoring and duration of hospital stay

	Duration of hospital stay		
BISAP score	Maximum	Minimum	Mean/SD
≥ 3	40	8	20.60±7.90
≤ 3	28	4	8.86±4.35

DISCUSSION

Acute pancreatitis is a prevalent inflammation of the exocrine pancreas that causes severe abdominal pain and can result in failure of multiple organs, including necrosis of the pancreas, leading to ongoing organ dysfunction.[1] Although it is a common gastrointestinal disorder it can present with varying levels of severity, ranging from mild, self-limiting symptoms to severe, multi-organ failure and death.[3,6,7] Several risk factors have been identified that contribute to the development of acute pancreatitis including gallstones, alcohol consumption, high triglyceride levels, metabolic disorders, viral infections, and medication use.[1,3] Understanding these risk factors is crucial in predicting the outcome and management of patients with acute pancreatitis.

In the study under consideration, it was found that a higher proportion of males had acute pancreatitis compared to females. This finding is consistent with other studies in the field, such as one conducted by Lankisch et al. in Germany and another by Anikhindi et al. in North India. In the German study, among 274 participants, males were more likely to have acute pancreatitis than females.[17] In the North Indian study, 78% of the patients with acute pancreatitis were male, and the median age of the study population was 42 years.[18] These findings suggest that males may be at a higher risk for developing acute pancreatitis.

Moreover, in this study, it was found that the two most common causes of acute pancreatitis were gallstones and alcohol consumption. This finding is consistent with other studies in the field. For example, a study by Anderson et al. reported that 60% of acute pancreatitis cases were caused by gallstones.[19] Another study conducted in Nepal found that gallstones combined with alcohol consumption were the most common causes of acute pancreatitis, accounting for 66% of all cases.[20] In contrast, a study conducted in North India found that biliary causes accounted for 35% of cases and alcohol consumption accounted for 32%.[18] These studies confirm that gallstones and alcohol consumption are the two most common causes of acute pancreatitis across different parts of the world.

This study evaluated the usefulness of BISAP score in predicting the outcome of patients with acute pancreatitis. Participants were assessed at admission and at various intervals throughout their hospital stay and were given a BISAP score based on the modified Marshall criteria for organ failure. The results showed that patients with a BISAP score of 3 or higher were more likely to experience organ failure than those with a score less than 3, which was statistically significant. Another study conducted in India had similar findings, with 78% of the 50 patients having no organ failure, and 22% experiencing it. Among those with organ failure, 9 out of 11 had a BISAP score of 3 or higher.[21] These studies suggest that the BISAP score is an effective tool for predicting the outcome of patients with acute pancreatitis.

In the present study, all patients made a full recovery without any fatalities. A systematic review and meta-analysis conducted by Gao et al. analyzed data from ten studies with a total of twelve cohorts and found that the overall sensitivity of BISAP score ≥ 3 in predicting mortality was 56% (95% CI: 53-60%), with a specificity of 91% (95% CI: 90-91%). The positive likelihood ratio was 5.65 (95% CI: 4.23-7.55) and the negative likelihood ratio was 0.48 (95% CI: 0.41-0.56).[22]

The study found that out of 70 patients, 6 required mechanical ventilation and all of these patients had a BISAP score of ≥ 3. This indicates that the BISAP score is a reliable predictor of the severity of acute pancreatitis and the likelihood of needing mechanical ventilation. This finding is consistent with a study conducted by Raghu et al, which showed that among the patients included in their study, 40 (66.6%) had hypoxemia at presentation, and 26 (43.3%) required ventilator support, with 14 of them having a BISAP score of > 3.[23]

Furthermore, in this study the duration of hospital stay was also found to be prolonged in patients with a BISAP score of > 3, with a mean duration of 20.62 days, compared to 12.9 days for all patients. A study by Soren et al. revealed that the length of hospital stay for patients with mild acute pancreatitis was 5.63 days, for moderately severe acute pancreatitis was 6.58 days, and for severe acute pancreatitis was 9.28 days, which was statistically significant.[24]

While this study provides important insights into the use of the BISAP score in evaluating the severity of outcomes in patients with acute pancreatitis, it is important to note its limitations. The study was conducted at only one hospital, had a limited time frame and sample size, and used a non-probabilistic method of sampling, which may impact the ability to generalize the results to a larger population. These limitations should be taken into consideration when interpreting the study's findings.

CONCLUSION

Results of this study provide important insight into the use of the BISAP score as a tool for evaluating the severity of outcomes in patients with acute pancreatitis while in the hospital. Our findings showed that patients with a high BISAP score (above 3) had an increased risk of organ failure, a higher likelihood of requiring mechanical ventilation, and a longer hospital stay compared to those with a lower score. These results suggest that the BISAP score can be considered a reliable tool for assessing the severity of outcomes in patients with acute pancreatitis.

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