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Reliability of PANC3 Scoring System to Grade the Severity of Acute Pancreatitis

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Abstract: ***Background: This prospective study was conducted to analyse the reliability of PANC3 scoring system to grade the severity of acute pancreatitis. Methods: A prospective study carried out in SDUAHER, Karnataka. Data was collected from patients admitted in the surgical wards with a diagnosis of acute pancreatitis. PANC3 scoring was done on these patients and grading of pancreatitis was done. Results: A total of 31 patients were included in the present study. In the study mean age of subjects was 38.55 ± 7.70 years. Majority of subjects were in the age group 31 to 40 years (38.7%). 90.3% were males and 9.7% were females. In the study PAN3 score >0 had sensitivity of 77.78%, specificity of 100%, +PPV of 100% and -NPV of 91.7%. Conclusion: PANC3 scoring system is a reliable marker of severity on acute pancreatitis and aids in better management of the patient.***

Keywords: PANC3 scoring system, Acute pancreatitis, Severity grading, Reliability, Patient management

1. Introduction

Acute pancreatitis (AP), which affects the pancreas, surrounding tissues, and other organs, is characterised as an acute pancreatic inflammation brought on by the activation of digesting enzymes found inside the gland. It is one of the most typical causes of acute abdomen seen in emergency situations. The fatality rates range from 1% for the mild form to 20-30% for the severe form, making it the 14th most common cause of death with gastrointestinal origin.

The diagnosis of AP requires at least the presence of two of the three following criteria:

- Abdominal pain consistent with the disease
- Biochemical evidence of pancreatitis (serum amylase and/or lipase greater than three times the upper limit of normal) and
- Characteristic findings from abdominal imaging.[1]

In order to anticipate the severity of AP, a number of scoring systems, including Ransons, APACHE II, and Bedside index for severity in AP (BISAP), have been established. These grading scales are either time-consuming (greater than 48 hours), complicated ,hard to memorise, or expensive .

Based on above problems, a retrospective study done by Brown et al., in 2007, found that combining parameters such as hematocrit, body mass index (BMI), and pleural effusion led to post-test likelihood of disease to be 99% and hence the term “PANC3 score” was coined.[2]

PANC3 scoring system does not use any complex scoring parameters and is a cheap and simple scoring system for classifying patients according to severity at the time of admission, early in the course of the disease leading to better results.

2. Aims and Objectives

To access the reliability of PANC-3 criteria for early prediction of severity of Acute Pancreatitis.

3. Methods and Materials

a) **Study design :** Cross-sectional study
b) **Number of subjects :** 31 Subjects
c) **Inclusion criteria:** The patients who met the criteria defining acute pancreatitis above and had onset of pain <48 hrs before admission were included in this study
d) **Exclusion criteria:**
   - Patients presented with organ failure at presentation or within 24 h of admission (They were already in severe pancreatitis)
   - Patient below 13 years of age
   - History of pancreatic carcinoma
   - Acute on chronic pancreatitis
   - Recurrent attack of AP
   - Patients with comorbid conditions such as cardiac failure, liver failure, and renal failure
   - Illness that could compound the interpretation of investigations such as presence of pleural effusion on chest radiographs preceding development of AP such as known anemia, congestive heart failure, and pregnancy

- Statistical methods: Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data was represented as mean and standard deviation. Normality of the continuous data, was tested by Kolmogorov–Smirnov test and the Shapiro–Wilk test. Validity of Screening test was plotted by ROC Curve sensitivity, specificity at best showing Cut-off. Graphical representation of data: MS Excel and MS word were used to obtain various types of graphs such as bar diagram, Pie diagram and ROC Curve. p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

4. Results

Table 1: Profile of subjects

		Count	%
Age	<30 years	6	19.40%
	31 to 40 years	12	38.70%
	41 to 50 years	10	32.30%
	>50 years	3	9.70%
	Mean ± SD	38.55 ± 7.70	
Sex	Female	3	9.70%
	Male	28	90.30%
H/o alcohol	No	5	16.10%
	Yes	26	83.90%

In the study mean age of subjects was 38.55 ± 7.70 years. Majority of subjects were in the age group 31 to 40 years (38.7%). 90.3% were males and 9.7% were females.

83.9% had history of alcohol consumption.

Table 2: PAN3 Score Parameters

PAN3Score Parameters		Count	%
BMI	<30	24	77.40%
	>30	7	22.60%
	Mean ± SD	28.00 ± 2.46	
Pleural effusion	Absent	24	77.40%
	Present	7	22.60%
Haematocrit	<44%	25	80.60%
	>44%	6	19.40%
	Mean ± SD	39.04 ± 5.36	

Mean BMI was 28.00 ± 2.46, 77.4% had BMI <30 and 22.6% had BMI >30. 22.6% had pleural effusion. Mean Haematocrit was 39.04 ± 5.36, 80.6% had Hematocrit <44% and 19.4% had Hematocrit >44%.

Table 3: PAN3 Score distribution

		Count	%
PAN3 Score	0	24	77.40%
	2	1	3.20%
	3	6	19.40%

In the study 77.4% had PAN3 score as 0, 3.2% had PAN3 score as 1 and 19.4% had PAN3 score as 3.

Table 4: Severity of Acute Pancreatitis

		Count	%
Severity of AP	Mild to Moderate	24	77.40%
	Severe	7	22.60%
Need for ICU admission	No	23	74.20%
	Yes	8	25.80%

In the study 77.4% had mild to moderate Acute pancreatitis and 22.6% had severe acute pancreatitis.

In the study 25.8% had need for ICU admission.

Table 5: Area under the ROC curve (AUC) showing severity predicting ability of PAN3 score in Acute pancreatitis

Area under the ROC curve (AUC)	0.889
Standard Error	0.0735
95% Confidence interval	0.724 to 0.973
z statistic	5.292
Significance level P (Area=0.5)	<0.0001*

Youden index

Youden index J	0.7778
Associated criterion	>0

Criterion values and coordinates of the ROC curve

Criterion	Sensitivity	95% CI	Specificity	95% CI	+PV	-PV
≥0	100	66.4 - 100.0	0	0.0 - 15.4	29	
>0	77.78	40.0 - 97.2	100	84.6 - 100.0	100	91.7
>3	0	0.0 - 33.6	100	84.6 - 100.0		71

In the study PAN3 score >0 had sensitivity of 77.78%, specificity of 100%, +PPV of 100% and -NPV of 91.7%.

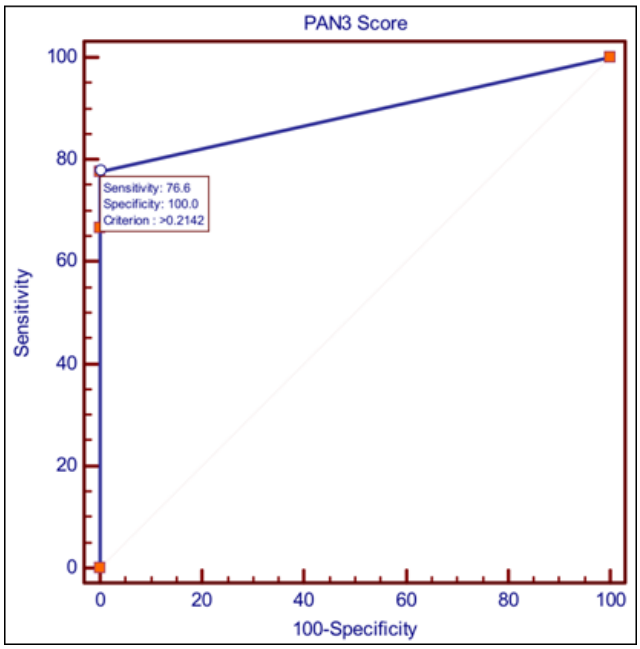

Figure 1: ROC curve (AUC) showing severity predicting ability of PAN3 score in Acute pancreatitis

5. Discussion

In the treatment of acute pancreatitis, determining the severity is a crucial first step. 15–30% of patients have severe disease when they first arrive, and it's critical to identify these patients quickly to reduce morbidity and mortality from the attack. About 50% mortality associated with severe acute pancreatitis can be reduced to 8% by early recognition.[3]

According to Atlanta 1992 criteria, severe pancreatitis forms are those that fall under the following criteria: Ranson's score ≥3, Apache II ≥8, organic dysfunction (shock, SBP 2 mg/dl after hydration), local complication (necrosis, pseudocyst, or abscess), and systemic complication (DIC, platelets <100,000/mm^3, fibrinogen , 100mg/dl, degradation fibrinogen >80 mcg/ml, and calcium<7.5mg/dl) . [4]

In 2020, Venkatesh et al., did a comparison of acute physiology and chronic health evaluation ll (APACHE II), BISAP, modified Glasgow score, and Ranson score on admission and 48 h after admission, procalcitonin in predicting severity, an organ failure. The results are shown in Table 6. [5]

Table 6

Scoring system	Sensitivity, %	Specificity, %	PPV, %	NPV, %	Diagnostic accuracy, %
APACHE II	48.5	36.2	27.8	58.1	40.3
BISAP	8.5	55	8.8	54.2	39.4
MGS	68.5	20.2	30.3	56	36.5
Ranson at admission	14.2	68.1	18.5	61	50
Ranson at 48 h	22.8	36.2	15.3	48	31.7
Procalcitonin	100	100	100	100	100

APACHE: Acute physiology and chronic health evaluation, BISAP: Bedside index for the severity in acute pancreatitis, MGS: Modified Glasgow score

The majority of cases of severe acute pancreatitis are associated with obesity. Mean BMIs for the mild and moderate groups are 25.076 kg/m2 and 26.093 kg/m2, respectively. The literature supports these findings, which indicate that a patient's BMI affects the severity of an attack.[6]

85% of patients with severe acute pancreatitis have pleural effusions visible on X-rays. These results corroborated those of Heller et al., who discovered abnormal chest radiographs in 84.2% of their patients. [7]

It has been demonstrated that hematocrit levels greater than 44% and a failure to decrease in these levels after 24 hours predict the development of pancreatic necrosis. Consequently, as noted by Brown et al., the hemoconcentration can be utilised to forecast the severity of the condition. [8]

Fukuda et al. conducted a study on 65 patients and discovered that the PANC3 score had a 100% specificity, 100% PPV, and 81.66% NPV.16 The small sample size of their study and the low number of patients with severe acute pancreatitis are likely to blame for the discrepancy in results. [9]

The limitation of our study is lack of literature on PANC-3 scoring and small sample size.

6. Conclusion

PANC3 scoring system is a reliable marker of severity on acute pancreatitis and aids in better management of the patient.

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