Study to Determine Specificity and Sensitivity of Panc3 Scoring System over Apache Ii in Acute Pancreatitis

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Abstract
A prospective study was done for a period of two years from November 2018 to November 2020 in patients diagnosed to be of Acute Pancreatitis. A detailed history and physical examination was carried out and diagnosis of Acute Pancreatitis was made.
All the study cases underwent laboratory investigations like C.B.C, Serum electrolytes, R.F.T, L.F.T, L.D.H, B.U.N, A.B.G. Radiology investigations included Chest X-ray and Ultrasound abdomen going and pelvis. BMI was calculated for all patients. Based on the results, the APACHE II score and PANC 3 score were calculated. The APACHE II was taken as gold standard scoring system and PANC 3 score was compared to it.
Our study shows that PANC-3 can be used to predict the severity of pancreatitis as efficiently as APACHE II. Thus PANC-3 criteria can be used not as a substitute but as a separate scoring system. The interpretation of PANC-3 does not need expertise and can be applied at the time
of admission which is an advantage when compared to classical scoring systems.
Key Words: *Acute Pancreatitis, APACHE II, Glasgow Severity Index, PANC 3 criteria.*

I.   Introduction

Acute Pancreatitis according to standard Atlanta Classification 1992 is defined as "An Acute Inflammatory Process of the Pancreas with variable involvement of other regional tissue or remote organ system, associated with raised pancreatic enzyme levels in blood and/or Urine". Atlanta Symposium 1992 also graded the attack based on severity into, Mild Acute Pancreatitis and Severe Acute Pancreatitis.

The clinical course of Acute Pancreatitis (AP) varies from a mild transitory form to a severe necrotizing disease. Most of these episodes are mild and spontaneously subsiding with in 3 to 5 days. In contrast, Severe Acute Pancreatitis (SAP) occurring in around 15 – 20 % of all cases , mortality can range between 10 to 85 % across various centers and countries.

In such a situation we need an indicator which can predict the outcome of an attack, as severe or mild, as early as possible and such an indicator should be sensitive and specific enough to trust upon. Worldwide, different indicators have been given the status of "Prognostic Importance" and many of such indicators have different sensitivity and specificity in predicting the outcome of an attack of AP. "The Search for the Best Indicator is Still On".

There are several such scoring systems (Ransons, Imrie, BISAP AUC, APACHE II, and APACHE III) which have their own statistical importance and prediction of outcome in AP, forecasting patients at risk of SAP[5]. Most of such systems needs advanced laboratory requirements, take greater then 48hrs to enable full severity stratification and cumbersome.

PANC 3 scoring developed by Brown A et. al of Harvard Medical School as claimed by authors is such a scoring system which is easy to apply, needs facilities of a basic hospital and is as good as other scoring systems in predicting the outcome of an attack of AP.

With this background we, are evaluating the predictive value of PANC3 scoring in comparison to APACHE II, which is the most widely accepted scoring system in predicting the outcome of an acute attack of Pancreatitis.

Although many aspects of the management of acute pancreatitis remains controversial, significant overall progress has been made during the last few decades, evidenced by decrease in mortality and morbidity rates. The overall improvement in outcome for patients with acute pancreatitis has been due to combination of factors that include improvements in intensive care medicines, imaging techniques, severity prediction and selection of patients for endoscopic retrograde cholangio-pancreatography and surgery.

II.   Results

TABLE 1: AGE WISE DISTRIBUTION OF THE SUBJECTS

Age group	Frequency	Percent
< 20	2	2.2
21-30	18	20.0
31-40	40	44.4
41-50	20	22.2
51-60	8	8.9
> 60	2	2.2
Total	90	100.0

Table 1 shows distribution of the subjects based on age. Out of 90(100%) subjects, 40(44.4%) were aged 31 to 40 yrs followed by 18(20%) aged between 21 to 30 yrs.
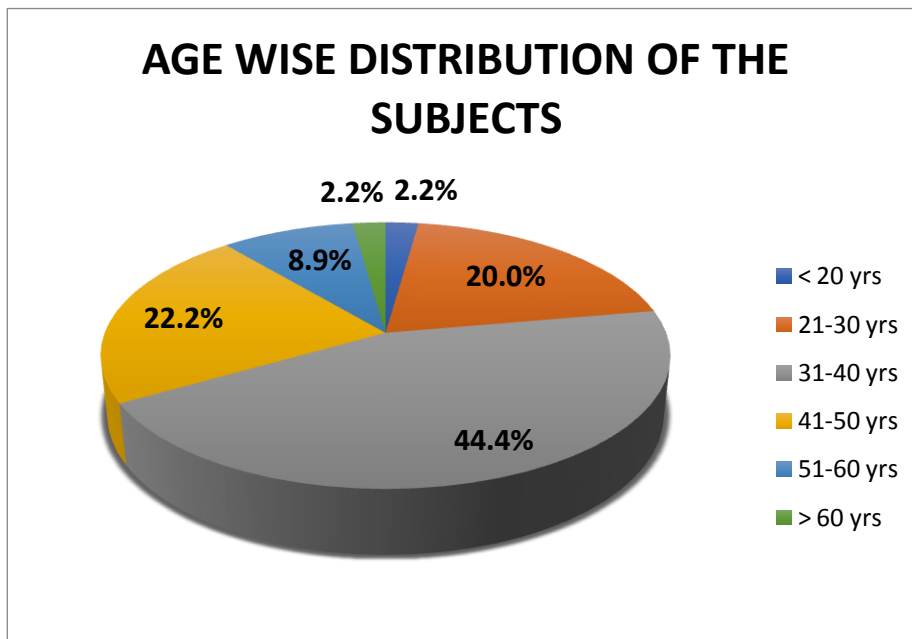
TABLE 2: DISTRIBUTION OF THE SUBJECTS BASED ON ETIOLOGY

Etiology	Frequency	Percent
Alcohol	82	91.1
Gallstone	4	4.4
Hypercalcemia	1	1.1
Hypertriglyceridemia	1	1.1
Idiopathic	2	2.2
Total	90	100.0

Table 2 shows distribution of the subjects based on etiology. Out of 90(100%) subjects, 82(91.1%) had etiology of alcohol followed by 4(4.4%) subjects had etiology of gall stone.
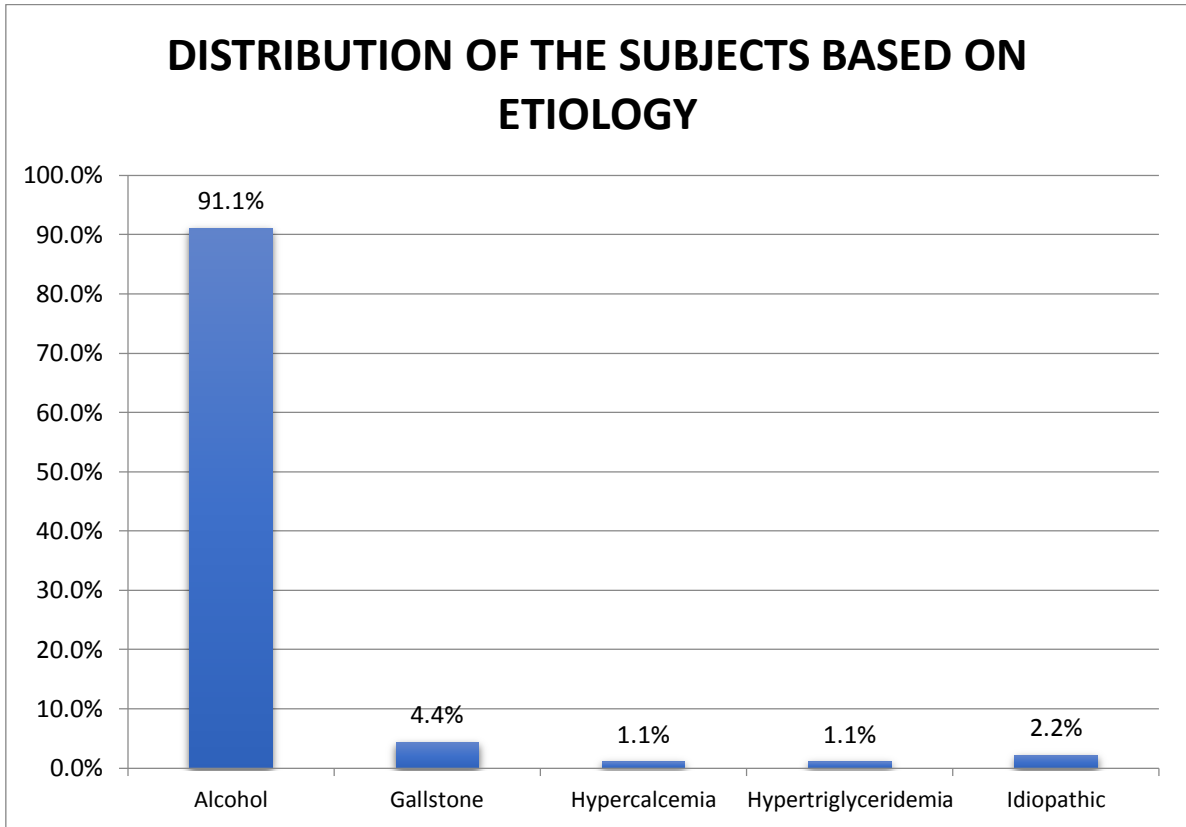
DISTRIBUTION OF THE SUBJECTS BASED ON ETIOLOGY

(Bar chart)

- Alcohol: 91.1%
- Gallstone: 4.4%
- Hypercalcemia: 1.1%
- Hypertriglyceridemia: 1.1%
- Idiopathic: 2.2%

Y-axis: 0.0% to 100.0%

TABLE 3: DISTRIBUTION OF THE SUBJECTS BASED ON GENDER

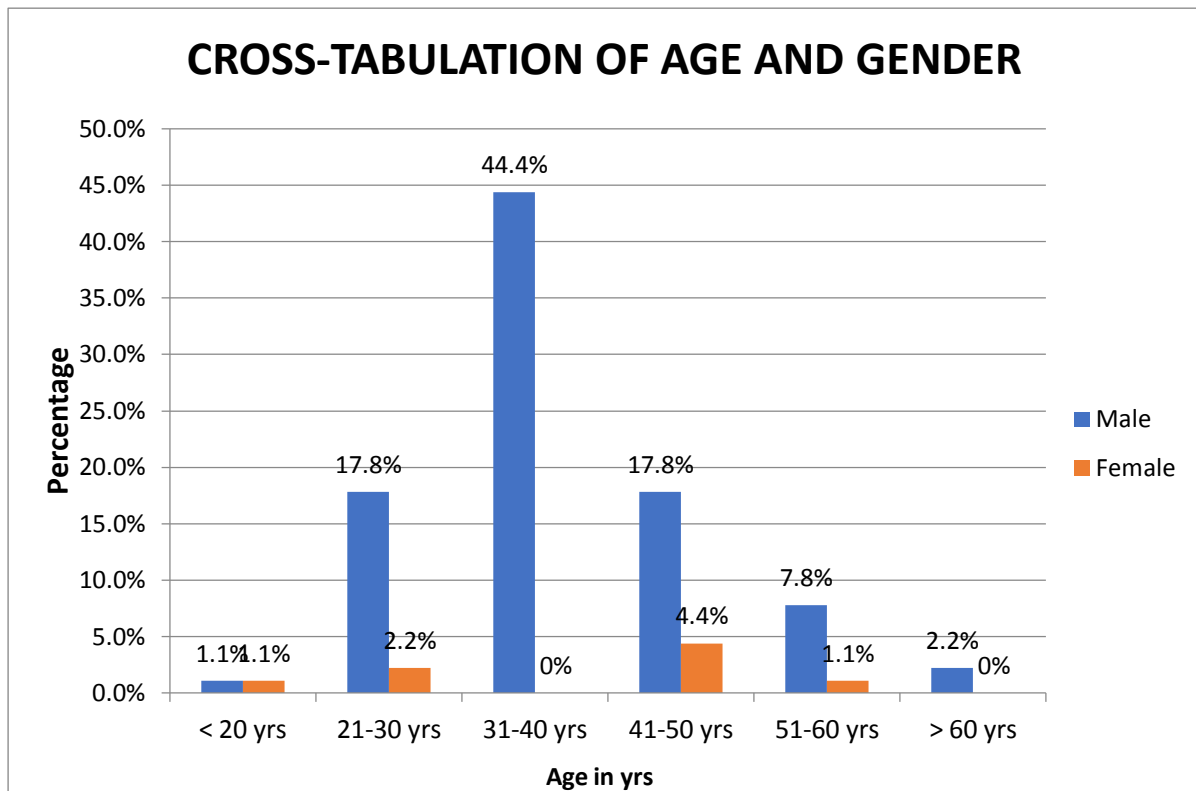| Gender	Frequency	Percent
Male	82	91.1
Female	8	8.9
Total	90	100.0

Table 3 shows distribution of the subjects based on gender. Out of 90(100%) subjects, 82(91.1%) subjects were males and 8(8.9%) were females.

DISTRIBUTION OF THE SUBJECTS BASED ON GENDER

(Pie chart)

- Males: 91.1%
- Females: 8.9%
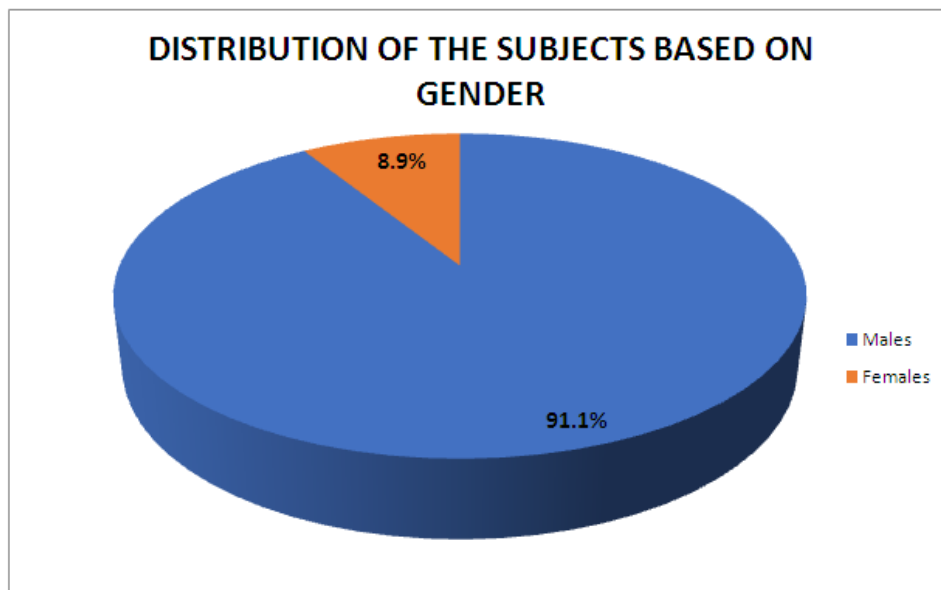
TABLE 4: CROSS-TABULATION OF AGE AND GENDER

| Age group	SEX		Total
	Male	Female	
< 20	1	1	2
	1.1%	1.1%	2.2%
21-30	16	2	18
	17.8%	2.2%	20.0%
31-40	40	0	40
	44.4%	0.0%	44.4%
41-50	16	4	20
	17.8%	4.4%	22.2%
51-60	7	1	8
	7.8%	1.1%	8.9%
> 60	2	0	2
	2.2%	0.0%	2.2%
Total	82	8	90
	91.1%	8.9%	100.0%

Table 4 shows cross-tabulation of age and gender. Out of 82(91.1%) males, 40(44.4%) belonged to 31 to 40 yrs age group. Out of 8(8.9%) females, 4(4.4%) belonged to 41 to 50 yrs age group.

TABLE 5: DISTRIBUTION OF THE SUBJECTS BASED ON APACHE SCORES

APACHE	Frequency	Percent
Severe pancreatitis	30	33.3
Mild pancreatitis	60	66.7
Total	90	100.0

Table 5 shows distribution of the subjects based on APACHE scores. Out of 90(100%) subjects, 60(66.7%) had mild pancreatitis and 30(33.3%) subjects had severe pancreatitis.

DISTRIBUTION OF THE SUBJECTS BASED ON APACHE SCORES

33.30%

66.70%

■ Severe pancreatitis
■ Mild pancreatitis
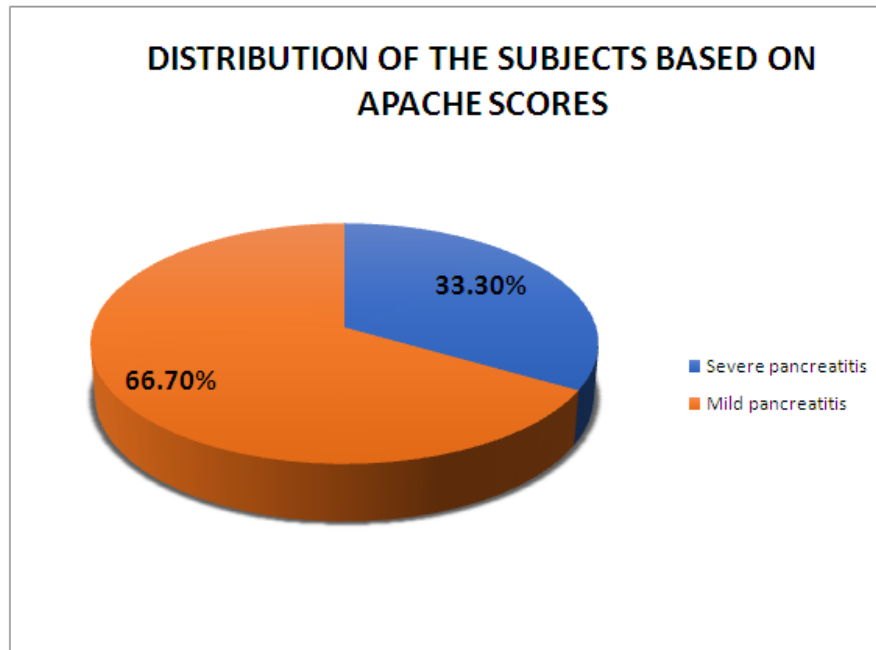
TABLE 6: CROSS-TABULATION OF APACHE SCORES AND SERUM AMYLASE

Serum amylase	APACHE		Total
	Severe pancreatitis	Mild pancreatitis	
< 500	0	30	30
	0.0%	50.0%	33.3%
500 - 1000	21	28	49
	70.0%	46.7%	54.4%
> 1000	9	2	11
	30.0%	3.3%	12.2%
Total	30	60	90
	100.0%	100.0%	100.0%
Yate's Chi square - 24.68			
p value - 0.001*			

*significant

Table 6 shows cross-tabulation of APACHE scores and serum amylase. Out of 90(100%) subjects, 49(54.4%) were having serum amylase levels in the range of 500 to 1000, out of which 28(46.7%) were having mild pancreatitis and 21(70%) were having severe pancreatitis. Chi-square test was applied to associate APACHE scores with serum amylase. Chi- square test showed statistical significant association with respect to serum amylase ($\chi2=24.68; p=0.001$).

CROSS-TABULATION OF APACHE SCORES AND SERUM AMYLASE
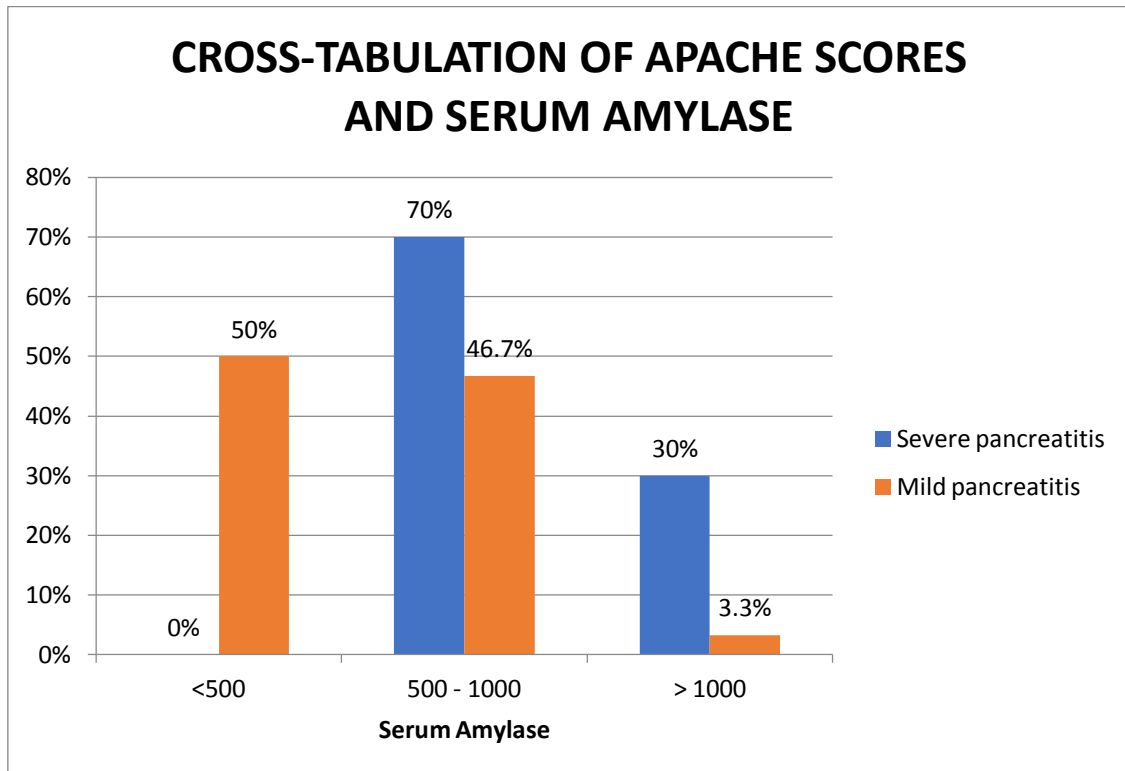
TABLE 7: CROSS-TABULATION OF APACHE SCORES AND SERUM LIPASE

Serum lipase	APACHE		Total
	Severe pancreatitis	Mild pancreatitis	
< 500	0	6	6
	0.0%	10.0%	6.7%
500 - 1000	9	52	61
	30.0%	86.7%	67.8%
> 1000	21	2	23
	70.0%	3.3%	25.6%
Total	30	60	90
	100.0%	100.0%	100.0%
Yate's Chi square - 42.57			
p value - 0.001*			

*significant

Table 7 shows cross-tabulation of APACHE scores and serum Lipase. Out of 90(100%) subjects, 61(67.8%) were having serum Lipase levels in the range of 500 to 1000, out of which 52(86.7%) were having mild pancreatitis and 9(30%) were having severe pancreatitis. Chi-square test was applied to associate APACHE scores with serum lipase. Chi- square test showed statistical significant association with respect to serum Lipase ($\chi2$=42.57; p=0.001).
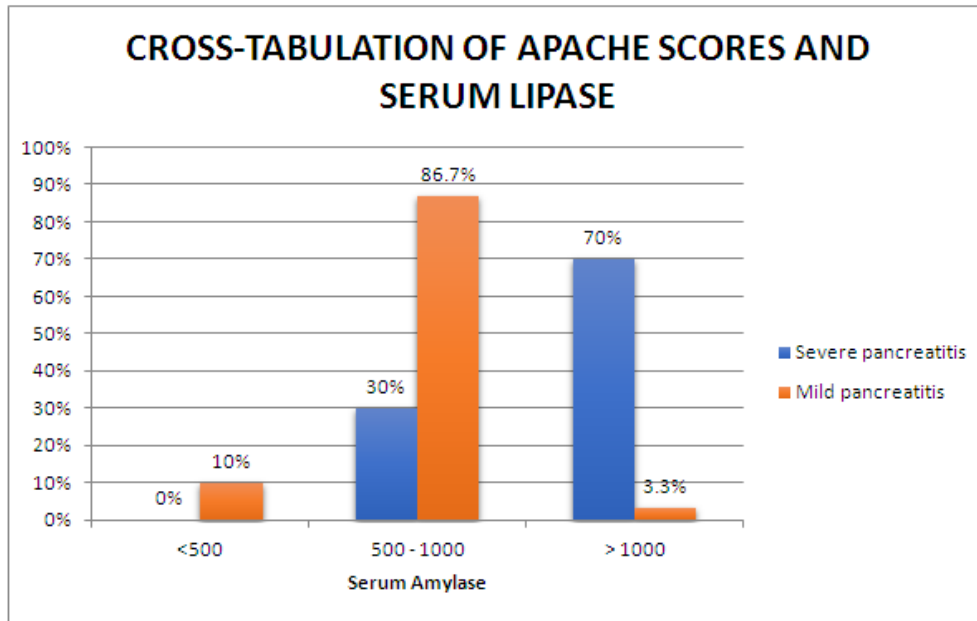
TABLE 8: CROSS-TABULATION OF APACHE SCORES AND HEMOTOCRIT

Hemotocrit	APACHE		Total
	Severe pancreatitis	Mild pancreatitis	
< 40	0	22	22
	0.0%	36.7%	24.4%
40 - 44	0	27	27
	0.0%	45.0%	30.0%
> 44	30	11	41
	100.0%	18.3%	45.6%
Total	30	60	90
	100.0%	100.0%	100.0%
Yate's Chi square - 49.108			
p value - 0.001*			

*significant

Table 8 shows cross-tabulation of APACHE scores and Hemotocrit. Out of 90(100%) subjects, 41(45.6%) subjects were having hemotocrit levels above 44, out of which 30 subjects were having severe pancreatitis and 11 were having mild pancreatitis. Chi-square test was applied to associate APACHE scores with hemotocrit. Chi- square test showed statistical significant association with respect to hemotocrit ($\chi2=49.108$; p=0.001).
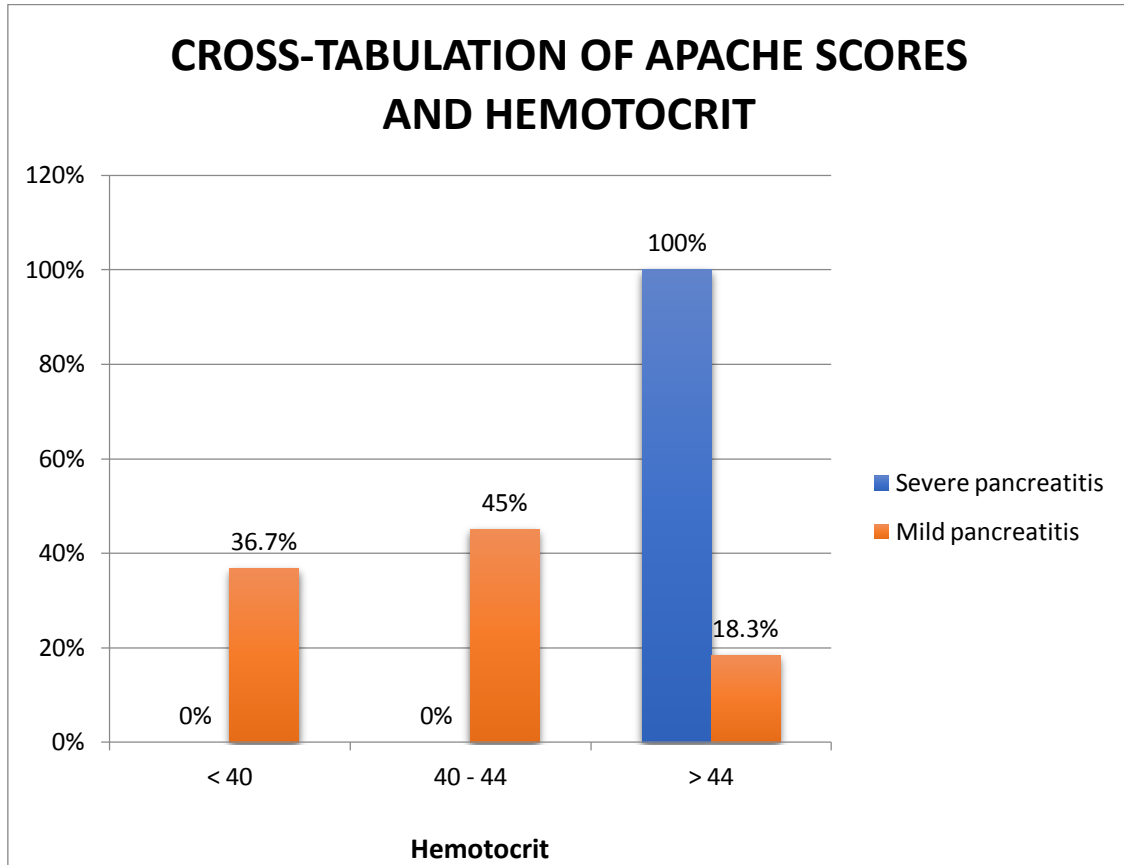
CROSS-TABULATION OF APACHE SCORES AND HEMOTOCRIT

TABLE 9: CROSS-TABULATION OF APACHE SCORES AND BMI

BMI	APACHE		Total
	Severe pancreatitis	Mild pancreatitis	
> 30	14	3	17
	46.7%	5.0%	18.9%
18.5 - 25	7	48	55
	23.3%	80.0%	61.1%
25-30	9	9	18
	30.0%	15.0%	20.0%
Total	30	60	90
	100.0%	100.0%	100.0%
Yate's Chi square - 27.407			
p value - 0.001*			

*significant

Table 9 shows cross-tabulation of APACHE scores and BMI. Out of 90(100%) subjects, 55(61.1%) subjects were having BMI 18.5 to 25, out of which 7 subjects were having severe pancreatitis and 48 were having mild pancreatitis. Chi-square test was applied to associate APACHE scores with BMI. Chi- square test showed statistical significant association with respect to BMI ($\chi2$=27.407; p=0.001).
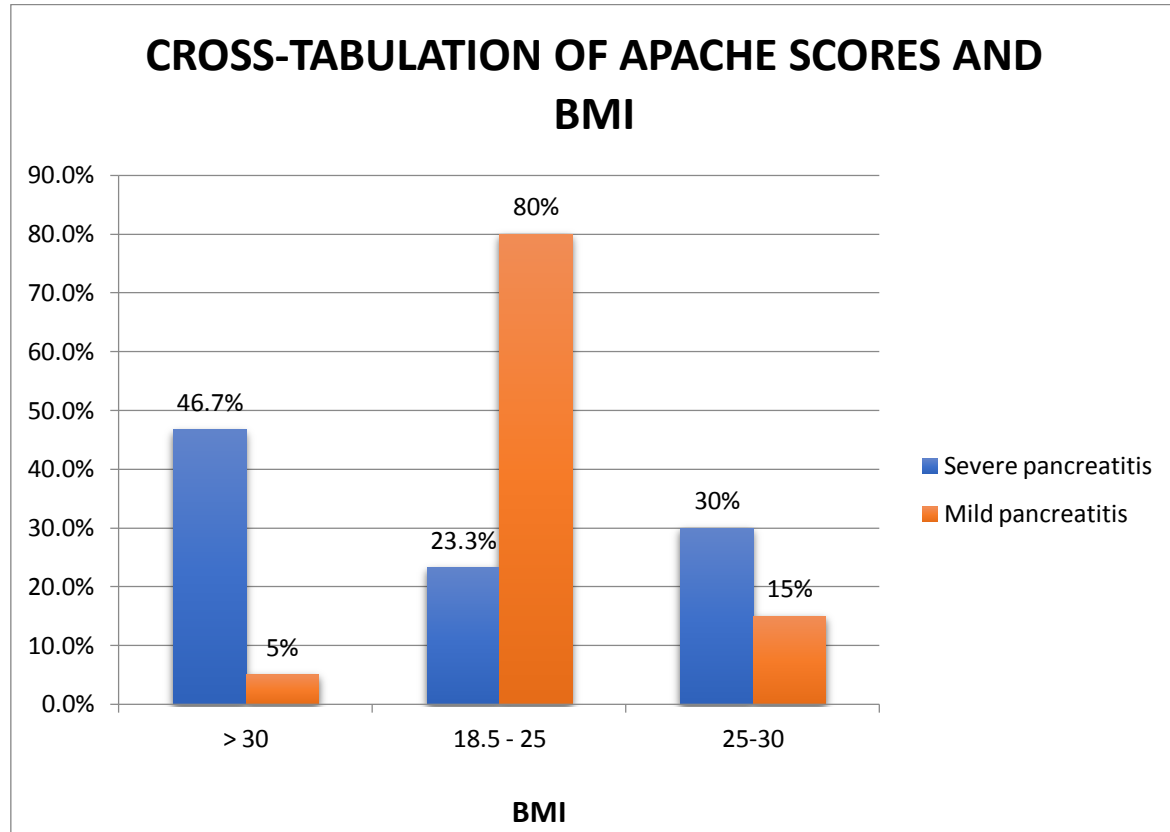
CROSS-TABULATION OF APACHE SCORES AND BMI

TABLE 10: CROSS-TABULATION OF APACHE SCORES AND PLEURAL EFFUSION

Pleural effusion	APACHE		Total
	Severe pancreatitis	Mild pancreatitis	
Absent	9	54	63
	30.0%	90.0%	70.0%
Present	21	6	27
	70.0%	10.0%	30.0%
Total	30	60	90
	100.0%	100.0%	100.0%
Chi square - 34.286			
p value - 0.001*			

*significant

Table 10 shows cross-tabulation of APACHE scores and pleural effusion. Out of 90(100%) subjects, 27(30%) subjects were having pleural effusion, out of which 21 subjects were having severe pancreatitis and 6 were having mild pancreatitis. Chi-square test was applied to associate APACHE scores with pleural effusion. Chi- square test showed statistical significant association with respect to pleural effusion ($\chi2=34.286$; p=0.001).
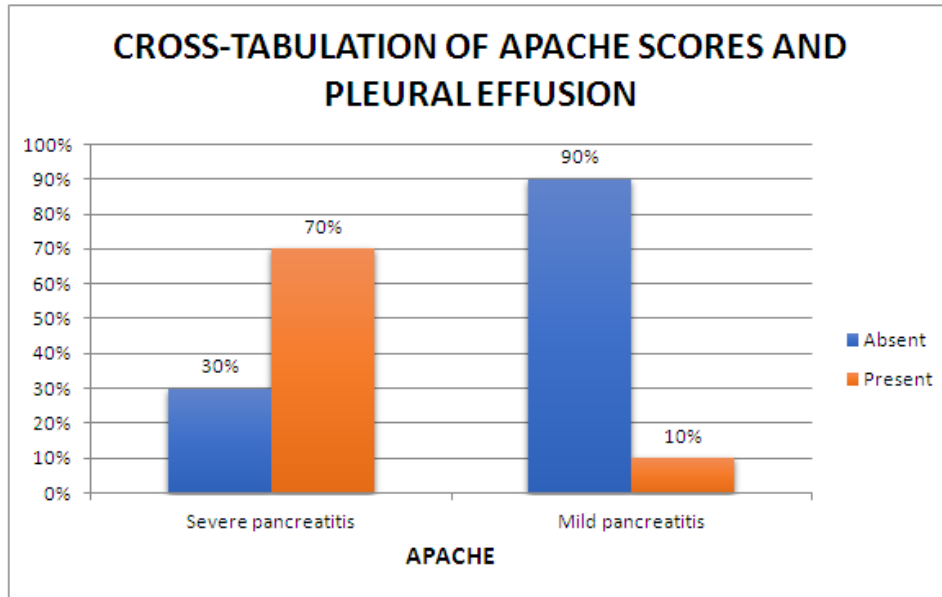
TABLE 11: CROSS-TABULATION OF APACHE SCORES AND PANC 3

PANC 3	APACHE		Total
	Severe pancreatitis	Mild pancreatitis	
Positive	14 (True Positive)	0 (False Positive)	14
	46.7%	0.0%	15.6%
Negative	16 (False Negative)	60 (True Negative)	76
	53.3%	100.0%	84.4%
Total	30	60	90
	100.0%	100.0%	100.0%

Table 11 shows cross-tabulation of APACHE scores and PANC 3. Out of 90(100%) subjects, 14(15.6%) subjects are positive for PANC 3 who have severe pancreatitis. Out of 90 subjects, 14 are true positive, 60 are True negative, 16 are false negative and no false positives.
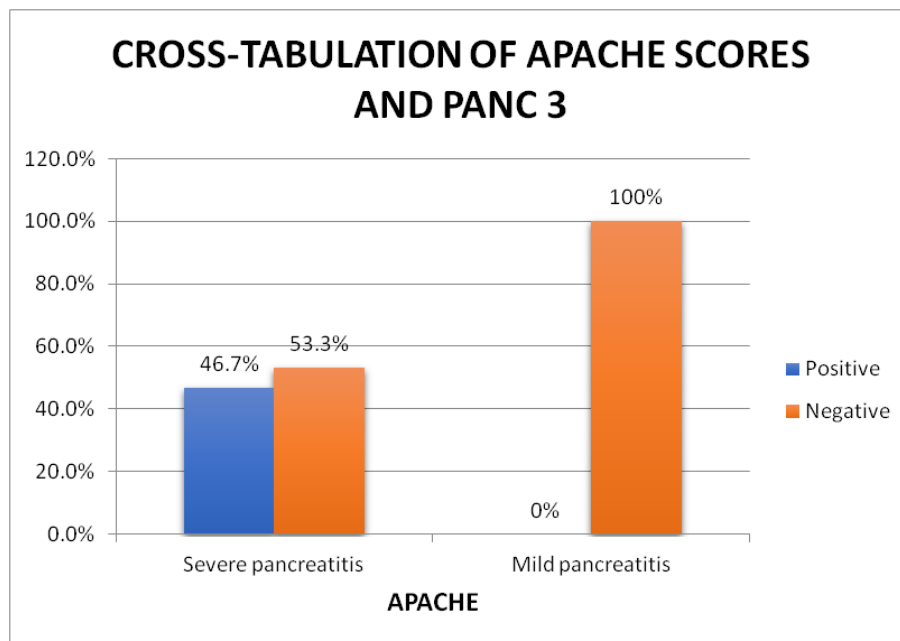
Statistics	Value	95% CI
Sensitivity	46.67%	28.34% to 65.67%
Specificity	100.00%	94.04% to 100.00%
Positive Likelihood Ratio	-	-
Negative Likelihood Ratio	0.53	0.38 to 0.75

Sensitivity was found to be 46.67% (28.34% to 65.67%); specificity- 100% (94.04% to 100.00%).

III.   Conclusion

Acute pancreatitis is a common condition associated with acute abdomen. The disease can present in mild form or severe form with multiorgan failure.

Assessment of severity of pancreatitis helps in better outcome for the patient in terms of morbidity and mortality and we can give early and advanced care to those in need of it (i.e., cases of acute severe pancreatitis).

The ultimate goal of a scoring system or markers is to predict the patients with severe attack early in the course of the disease and be able to interrupt the disease as early as possible.

PANC-3 scoring system is such an effort to prolong the life of patients by early detection and prompt treatment. The PANC-3 scoring system is easy to measure, cost-effective and showed strict accuracy to predict severe acute pancreatitis .

Our study proves that PANC-3 can be used to predict the severity of pancreatitis as efficiently as APACHE II scoring system. It uses only 3 criteria which can be done easily and is available in all basic health care setup.

The interpretation of PANC-3 score does not need expertise and can be applied at the time of admission of the patient which is an advantage when compared to other classical scoring systems that is available.

We can conclude from our study that PANC-3 criteria can be used not as a substitute, but as an individual scoring system because of its high specificity, PPV and accuracy.

IV.   Summary

➢   The prospective study was done in 90 patients admitted in hospitals attached to BMCRI
➢   The patients were diagnosed with acute pancreatitis on the basis of clinical examination, supplemented with radiological and biochemical findings
➢   The patients were divided into mild and severe acute pancreatitis according to APACHE II score
➢   The majority of cases were in 31-40 years age group and the male patient outnumbered the female patient in our study
➢   The main etiology of pancreatitis in our study was alcohol followed by gallstones.
➢   Serum amylase and Serum lipase were more drastically elevated in cases of severe pancreatitis as compared to mild pancreatitis. (p=0.001)
➢   Hematocrit and BMI were more on the higher side in cases of severe acute pancreatitis as compared to patients with mild pancreatitis (p=0.001)
➢   PANC3 criteria was used to predict severity of acute pancreatitis in our study cases.
➢   PANC3 have a sensitivity of 46.6%, specificity of 100%.

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