

# To Evaluate Correlation Between Modified Ct Severity Index, And Clinical Outcome In Patients Of Acute Pancreatitis- In Tertiary Care Hospital Of Chhatrapati Sambhajnagar

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## Abstract

This is a tertiary hospital based retrospective study. Data of all the patients diagnosed with pancreatitis in last 1 year was evaluated. MCTSI (Modified CT severity index) was taken into account and was correlated with the clinical outcome and complications of acute pancreatitis.

It was observed that mean age of the study cases was  $40.97 \pm 12.99$  years with majority of the cases were in between 36-50 years of age. Overall male predominance was seen in present study with males to female ratio 3.7:1. Alcohol intake was common etiological factor among our cases, noted in 71% patients. Most common presenting complaint was abdominal pain (98%), followed by tenderness (90%) and guarding (87%). Acute interstitial edematous pancreatitis (56%) cases outnumbered the acute necrotizing pancreatitis cases (44%). Bulky pancreas (74%) was present as most common CT finding, while pleural effusion (32%) and ascites (32%) were noted as most common extra pancreatic collections. Acute necrotic collection (34%) was noted as most common peripancreatic collection. Among cases of Acute Necrotic Pancreatitis, 59% were having <30% of necrosis, 20.5% were having 30-50% necrosis and 20.5% cases were having >50% necrosis. Using the Modified CT Severity Index, 40% patients were placed in the severe pancreatitis group and 25%, 35% patients as mild and moderate pancreatitis respectively. 10. Majority of patients had hospital stay for 16 to 20 days followed by those with 6 to 10 days.

According to MCTSI, The average duration of hospital stay among patients with mild, moderate and severe category patients was  $5.44 \pm 0.56$  days,  $9.88 \pm 1.38$  days and  $18.4 \pm 1.63$  days respectively.

We found that CT severity assessment using MCTSI showed significant correlation with all outcome parameters.

**Keywords:** Pancreatitis, Modified CT severity index, Clinical outcome, alcohol intake, CT findings, Necrosis, Complications, Duration of hospital stay.

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## I. Introduction

Acute pancreatitis (AP) has a variable clinical course and outcomes. Most of the patients present with mild disease and have good recovery rates. About 15-20% patients have severe acute pancreatitis and present with local and systemic complications. In these patients mortality can reach upto 20–30%<sup>[1,2]</sup>.

As there are fatal outcomes and high deteriorating potential, stratification of acute pancreatitis is very important.<sup>[2]</sup> It is very important to identify the patients who have severe acute pancreatitis because then it will benefit them by transferring them into specialized or intensive care unit (ICU), where there will be more aggressive management and close monitoring for development of organ failure. There are various scoring systems (clinical/laboratorial/computed tomography) in use. There are 2 commonly used CT scoring systems – CT severity index (CTSI), designed by Balthazar et al.<sup>[3]</sup>, and modified CT severity index (MCTSI), proposed by Mortelet et al. To see the presence and extent of pancreatic necrosis, inflammatory changes and local or extrapancreatic complications intravenous contrast agents are required.<sup>[4]</sup>

Many methods have been used to stratify the severity of acute pancreatitis like clinical evaluation, biochemical evaluation and imaging evaluation. Imaging evaluation includes contrast enhanced computed tomography (CECT), magnetic resonance imaging (MRI), and contrast-enhanced ultrasound (CEUS). For staging of severity and assessment of acute pancreatitis imaging methods have contributed majorly. CECT is the most commonly used imaging modality in assessing the severity of acute pancreatitis. CECT abdomen can be used to stratify the acute pancreatitis, to see the extent of necrosis, any fluid collection/abscess/pseudocysts. So abdominal CECT is very useful to assess the prognosis of acute pancreatitis.

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**Diagnosis:** To diagnose acute pancreatitis 2 features amongst following 3 are required:

1. Acute onset of severe epigastric pain which is persistent and commonly radiates to back.
2. At least three times greater Serum lipase or amylase activity than the upper limit of normal.
3. Contrast-enhanced CT (CECT) and MRI or US (less commonly) findings.

### **Imaging**

There is a very important and major role of imaging modalities in management of acute pancreatitis, because it can stratify or differentiate the severity of acute pancreatitis. Hence it plays a vital role in guiding the clinical management and it has high prognostic value. Along with this, it also plays role in identifying and managing the complications of acute pancreatitis with imaging guided drainage and aspiration. After admission, ultrasonography is the first investigation which is performed on patients. Ultrasonography has little value in diagnosing acute pancreatitis and its complications but gallstones or biliary dilatation can easily get identified on ultrasonography in those patients who have possibility of impacted bile duct calculus. It makes very good impact on outcome as these calculi get identified early and then can be managed. Most clinically useful investigation amongst all these imaging modalities is Contrast Enhanced CT<sup>[4]</sup>.

Normally the pancreas is well visualised in cross section surrounded by fat. Pancreas is identified by its relation with the superior mesenteric artery and duodenum. Pancreas has homogenous CT attenuation. Normal HU of the pancreas is in range of about 50-80 Hounsfield Units (HU). The gold standard imaging modality in the evaluation of patients with acute pancreatitis is Contrast enhanced CT. It can not only diagnose but also demonstrate the presence and extent of necrosis and local or extra pancreatic complications. If the CECT is done after 48-72 hours of onset of symptoms then there are high chances of demonstrating necrotizing pancreatitis. Focal or diffuse enlargement of the pancreas, peripancreatic fat stranding, peripancreatic fascial thickening and fluid collections, these are the features of acute pancreatitis seen on contrast enhanced CT<sup>[7]</sup>.

Types of acute pancreatitis(morphologically):<sup>5</sup>

1. Acute oedematous or interstitial pancreatitis: In Interstitial edematous pancreatitis diffuse or localized enlargement of the pancreas secondary to interstitial or inflammatory edema (without necrosis) is seen.
2. Acute necrotizing pancreatitis: In necrotizing pancreatitis there is inflammation of the pancreas with obvious pancreatic and peripancreatic tissue necrosis.

**Scoring systems in case of acute pancreatitis :** Based on an overall size, contour and density of the pancreas and peripancreatic abnormalities, Balthazar et al., introduced a system for grading of acute pancreatitis to stratify the severity of the disease. Necrotizing pancreatitis has higher incidence of complications and mortality as compared to oedematous pancreatitis. But in this grading system necrosis of the pancreas was not correlated with the clinical outcomes<sup>[3]</sup>.

In 1990 Balthazar et al. combined the presence and extent of pancreatic necrosis with his original grading system (1985) and validated CT severity of acute pancreatitis (CT Severity Index) was put forth<sup>3</sup>. It was found that this CT severity index had better prognostic accuracy than the previous grading system. But still few limitations were present in this grading system like there was no incorporation in present score of the presence/absence of organ failure, extrapancreatic complications or peripancreatic vascular complications. This variability was possibly due to subjective and multiple categorization of the extent of pancreatic inflammation and necrosis<sup>[7]</sup>.

Hence to overcome these limitations, Mortelet et al., proposed a new grading system named as Modified CT severity index(MCTSI). It is a modified and also a simplified scoring system than previous scoring systems. It is easier to calculate & reproduce the score. the correlation of MCTSI with patient's outcome measures like the organ failure, occurrence of infections, the length of hospital stay, the need for surgical or percutaneous intervention and death than the previous scoring system.<sup>[7]</sup>

### **Assessment of Severity of Acute Pancreatitis**

#### **MODIFIED CTSI:**

Where,

Mild pancreatitis: Modified CTSI score 0-2

Moderate pancreatitis: pancreatitis: Modified CTSI score 4-6

Severe pancreatitis: Modified CTSI score 8-10

Prognostic Indicator		Points
Pancreatic Inflammation	Normal pancreas	0
	Intrinsic pancreatic abnormalities with or without inflammatory changes in peripancreatic fat.	2
	Pancreatic or peripancreatic fluid collection or peripancreatic fat necrosis	4
Pancreatic Necrosis	None	0
	≤ 30%	2
	≥ 30%	4
Extra Pancreatic Complications	One or more of following: Pleural Effusion, ascites, vascular complications, parenchymal complications, or gastrointestinal tract involvement.	2

## II. Aims

To Evaluate Correlation Between Modified Ct Severity Index, And Clinical Outcome In Patients Of Acute Pancreatitis.

## III. Review Of Literature

Sahu B, Abbey P et al<sup>(4)</sup> have done study to find the correlation between severity stratification and clinical outcomes of acute pancreatitis. They studied total 60 patients. In about 71.7% cases Modified CTSI was concordant with clinical outcomes they found significant association between MCTSI and clinical outcomes except duration of ICU stay. They found high sensitivity of MCTSI in differentiating mild from severe acute pancreatitis.

Banday et al<sup>(6)</sup> have done study to find the correlation between severity stratification and clinical outcomes of acute pancreatitis. They found that CECT is an excellent imaging modality for diagnosis and stratification of severity of acute pancreatitis. They labelled MCTSI as a simpler scoring tool and more accurate than Balthazar CT severity index.

Mir MA, Bali et al<sup>(2)</sup> have done the study to assess the severity of acute pancreatitis with the help of CECT. They classified the severity of acute pancreatitis according to CT severity index (CTSI) into Group A (mild), Group B (moderate), or Group C (severe). They found that Group C (91.67%) patients have most complications and Group A (6.25%) patients have least number of complications. Highest mortality rate was found in Group C patients (16.67%).

## IV. Material And Methods

### Study site:

Dr. Hedgewar Rugnalaya, Aurangabad, Maharashtra.

### Time Frame:

1 year (2024).

### Inclusion criteria:

Patients diagnosed with pancreatitis on CT scan done at radiology department of Hedgewar hospital and whose clinic-pathological data is available on HIS.

**Source of data:** The data was collected from patients diagnosed with acute pancreatitis and whose CT abdomen and pelvis was done at radiology department, Dr. Hedgewar Rugnalaya, Aurangabad. Further data of the patients was collected from the HIS (Hospital information system).

### Methodology of data collection:

- In this retrospective study, data was collected of the patients who were diagnosed with acute pancreatitis, on abdominal CT abdomen in the year 2024.
- The data was collected from cases fulfilling inclusion criteria using pre-designed, semi-structured, pre-validated proforma, in which history, clinical findings, investigation reports, details about surgical procedures performed were incorporated.

- Clinical parameters of patients were checked in terms of duration of hospital stay, occurrence of organ failure, evidence of infection, need for intervention, and mortality . For the parameters like evidence of infection and organ failure clinician’s notes and blood investigations were recorded for information. Evidence of infection was noted by looking at clinical evidence of infection, i.e., development of fever and/or leukocytosis(WBC >12000) during hospital stay, and radiological evidence of infection. For noting occurrence of organ failure clinician’s notes mentioning organ failure(PaO2 < 60 mm Hg or need of ventilation, systolic BP of < 90 mm Hg) and patient’s blood investigations(serum creatinine of >300µmoles / L or urine output of < 500 ml / 24 h) were recorded. Interventions were noted as percutaneous catheter drainage. Clinical outcome parameters were compared with severity grading according to modified -CTSI .

**Type of Study:** Retrospective study.

**Statistical analysis :-**

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean ± SD. Normality of data was tested by Kolmogorov-Smirnov test. If the normality is rejected then non parametric tests were used.

Statistical tests applied as follows-

- Kruskal-Wallis Test was use to compare, three group on a dependent variables
- Spearman rank correlation coefficient (when the data sets were not normally distributed) was used to correlate CTSI and MCTSI with various parameters

A p value of <0.05 was be considered statistically significant.

The data was entered in MS EXCEL spreadsheet and analysis was done using GraphPad prism version 3.0.

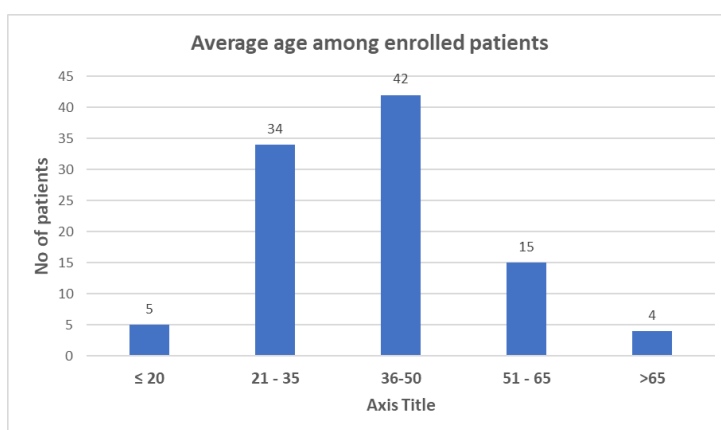
**V. Results**

Age wise distribution

Age (year)	No of patients	Percentage
≤ 20	5	5
21 - 35	34	34
36-50	42	42
51 - 65	15	15
>65	4	4
Average age (years)	40.97 ±12.99	

**Table 3: Age wise distribution of cases**

- The average age among enrolled patients was 40.97 ±12.99 years
- Majority of patients were in the age group of 36 to 50 years followed by those in the age group of 21 to 35 years



**Figure 3: Age wise distribution of cases**

Gender wise distribution

Gender	No of patients	Percentage
Male	79	79
Female	21	21
Total	100	100

**Table 4: Gender wise distribution of patients**

- Male predominance was seen among study population
- Male to female ration among enrolled patients was 3.76: 1

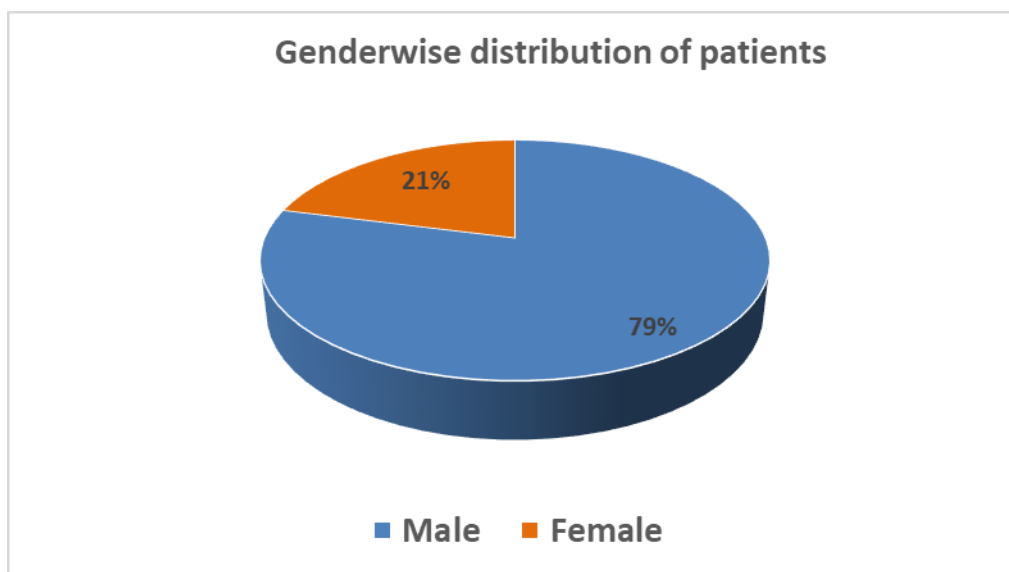


Figure 4: Gender wise distribution of patients

Predisposing history

History	No of patients	Percentage
Alcohol	71	71
Gall stone	23	23

Table 5: Risk factors among enrolled patients

- Alcohol consumption was the most common risk factor seen in our study population
- Presence of gall stone was seen in 23 % patients

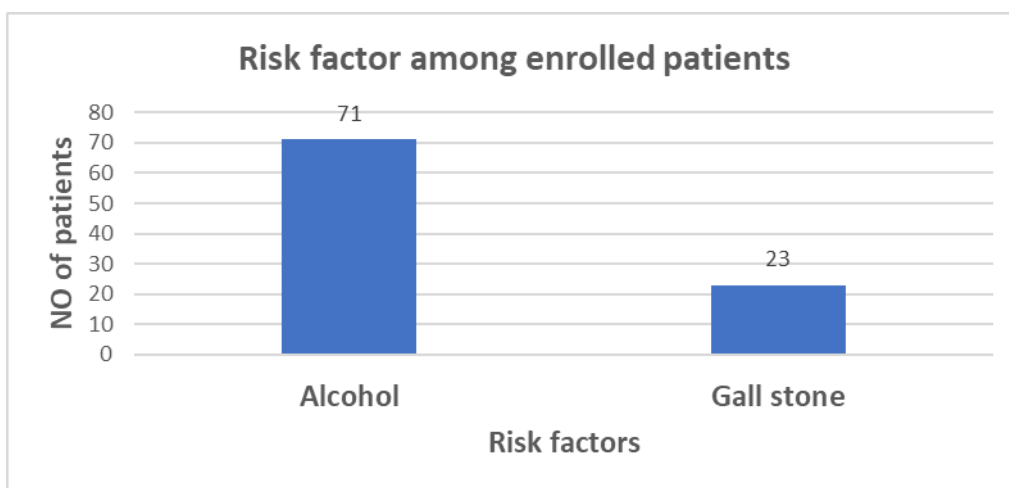


Figure 5: Risk factors among enrolled patients

Clinical presentation

Clinical presentation	No of patients	Percentage
Pain in abdomen	98	98
Guarding	87	87
Tenderness	90	90

Table 6: clinical presentation among patients

- Majority of patients presented with pain in abdomen followed by tenderness and guarding

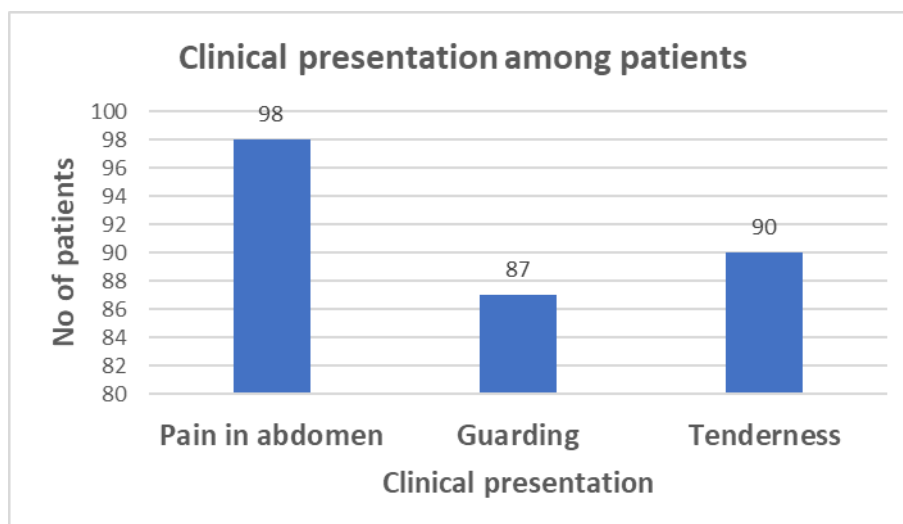


Figure 6: clinical presentation among patients

Diagnosis based on CT finding

Diagnosis	No of patients	Percentage
AIEP	56	56
ANP	44	44
Total	100	100

Table 7: Diagnosis based on CT findings

- AIEP was seen in 56% of enrolled patients
- ANP was seen in 44% of enrolled patients

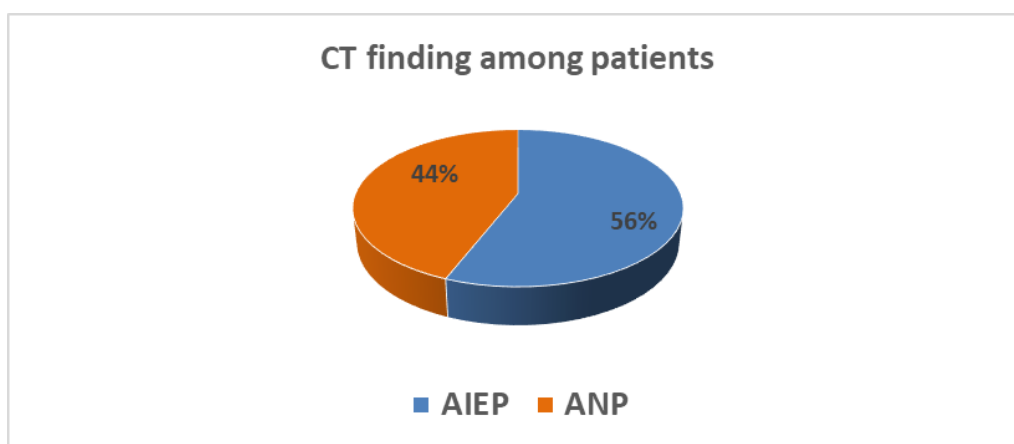


Figure 7: Diagnosis based on CT findings

CT features of Acute Pancreatitis

Features	No of patients (Total 100)	Percentage
Bulky pancreas	74	74
NECROSIS	44	44
Acute peripancreatic collection	31	31
Acute necrotic collection	34	34
Pseudocyst	5	5
Walled off necrosis	4	4
Pleural effusion	Left	22
	Bilateral	10
ASCITES	32	32
GI Inflammation	19	19
Vascular Complication	Venous thrombosis	5
	Arterial Haemorrhage	0
	Pseudoaneurysm formation	0

Table 8: CT features of acute pancreatitis

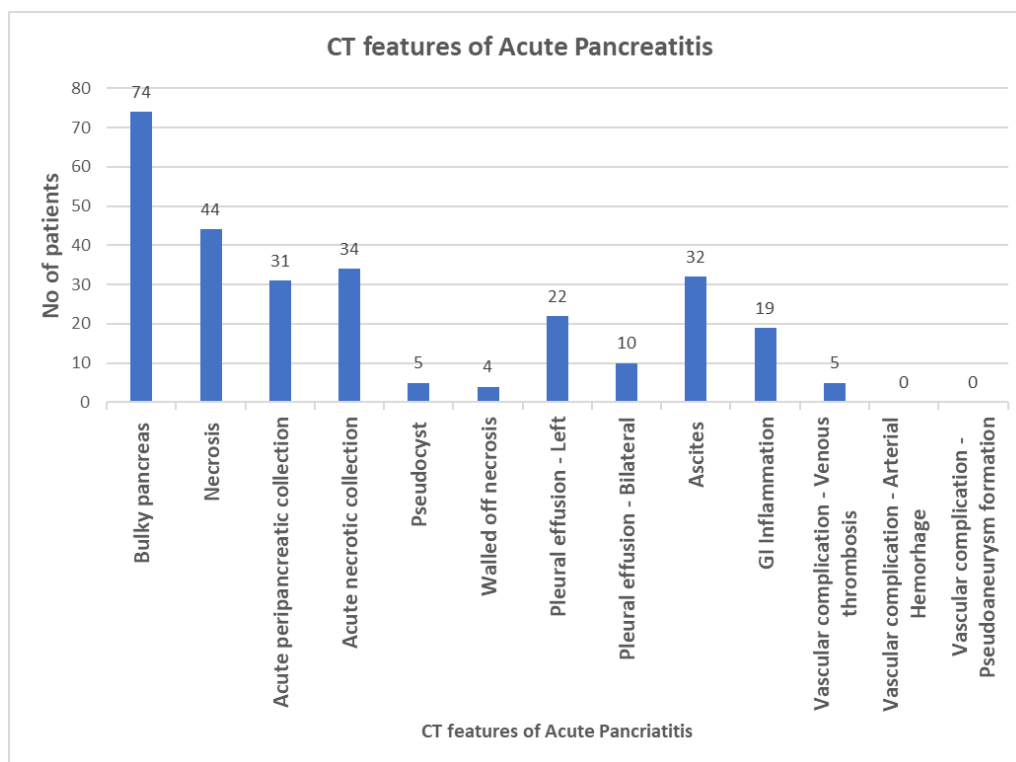


Figure 8: CT features of acute pancreatitis

AIEP features

AIEP features	No of patients (Total 56)	Percentage
Bulky pancreas	56	100
Pseudocyst	5	8.93
Acute peripancreatic fluid collection	31	55.35
Pleural effusion	Left	12
	Bilateral	4
Ascites	7	12.5
GI inflammation	4	7.14
Vascular complication	0	0

Table 9: AIEP features among patients

- Bulky pancreas was reported in all patients presented with AIEP. Other common features were presence of acute peripancreatic fluid collection and pleural effusion. Few patients also reported presence of ascites and GI inflammation

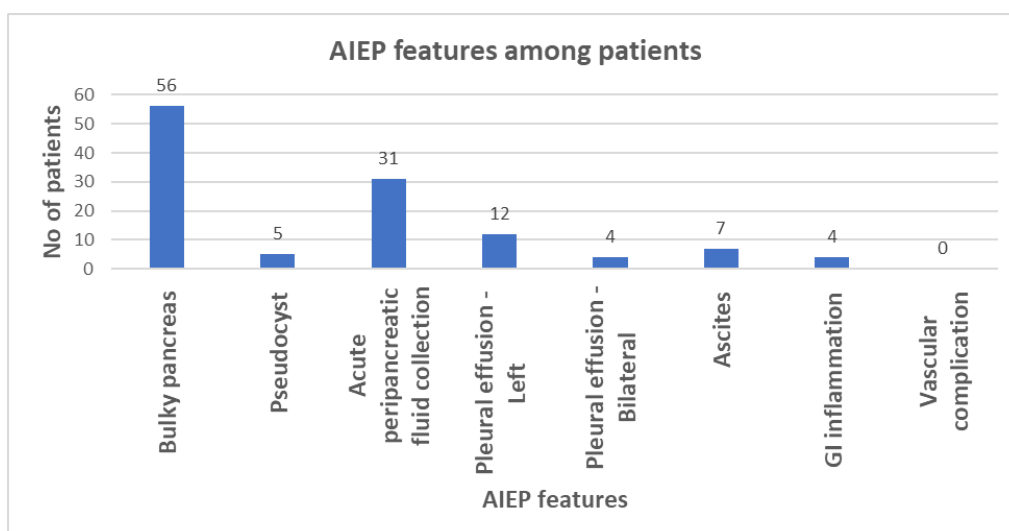


Figure 9: AIEP features among patients

ANP features

ANP features	No of patients (Total 44)	Percentage
Bulky pancreas	18	40.90
Necrosis	44	100
Walled off necrosis	4	9.1
Acute necrotic collection	34	77.27
Pleural effusion	Left	22.72
	Bilateral	13.63
Ascites	25	56.81
GI inflammation	15	34.09
Vascular complication	5	11.36

Table 10: ANP features among patients

- Necrosis was present in all patients presented with ANP. Other common features were presence of Acute necrotic collection, Ascites, bulky pancreas, Pleural effusion and GI inflammation.

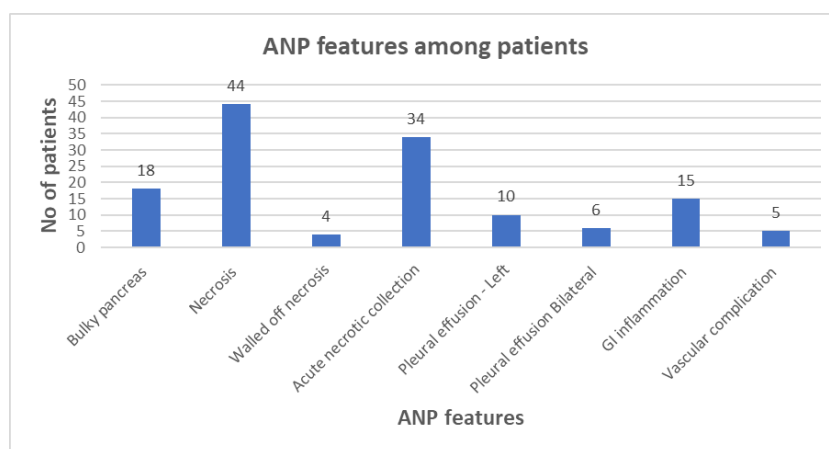


Figure 10: ANP features among patients

Pancreatic necrosis percentage in ANP

Percentage of necrosis	No of patients	Percentage
<30 %	26	59.09
30-50 %	9	20.45
>30%	9	20.45
Total	44	100

Table 11: Pancreatic necrosis percentage in ANP

- Out of 44 cases of ANP, <30%pancreatic necrosis is present in 59.09% patients 30-50% necrosis in 20.5% patients and >50% necrosis in 20.5% patients.

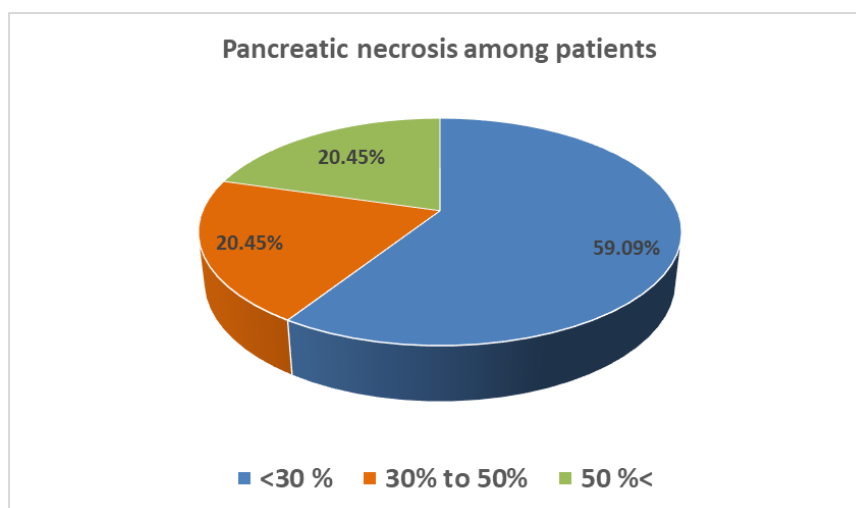


Figure 11: Pancreatic necrosis percentage in ANP

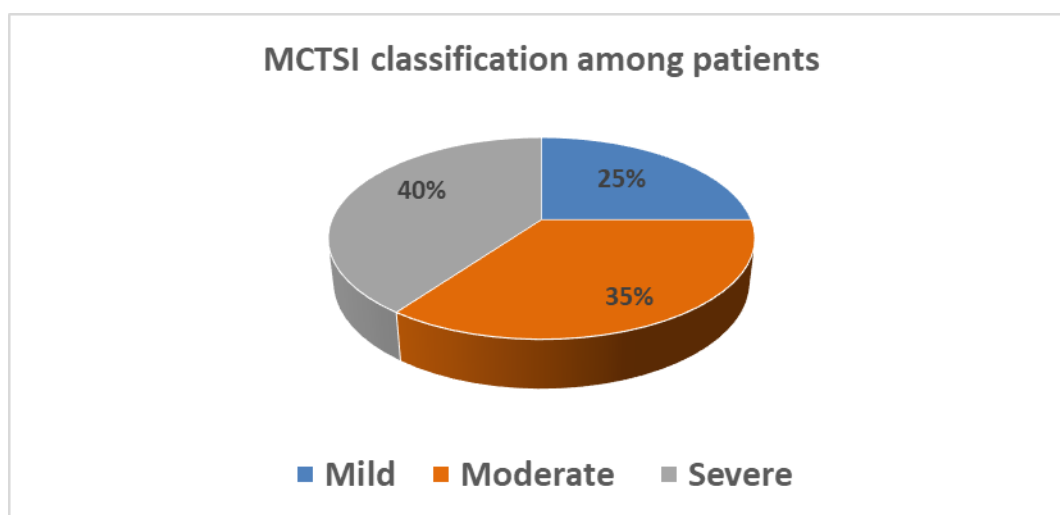


Classification of cases according to MCTSI

Class	Score	No of patients	Percentage
Mild	0-2	25	25
Moderate	4-6	35	35
Severe	8-10	40	40
	Total	100	100

**Table 12: Classification of cases according to MCTSI**

- Majority of patients (40%) presented with severe case of acute pancreatitis on MCTSI
- Whereas it was mild and moderate in 25% and 35 % respectively



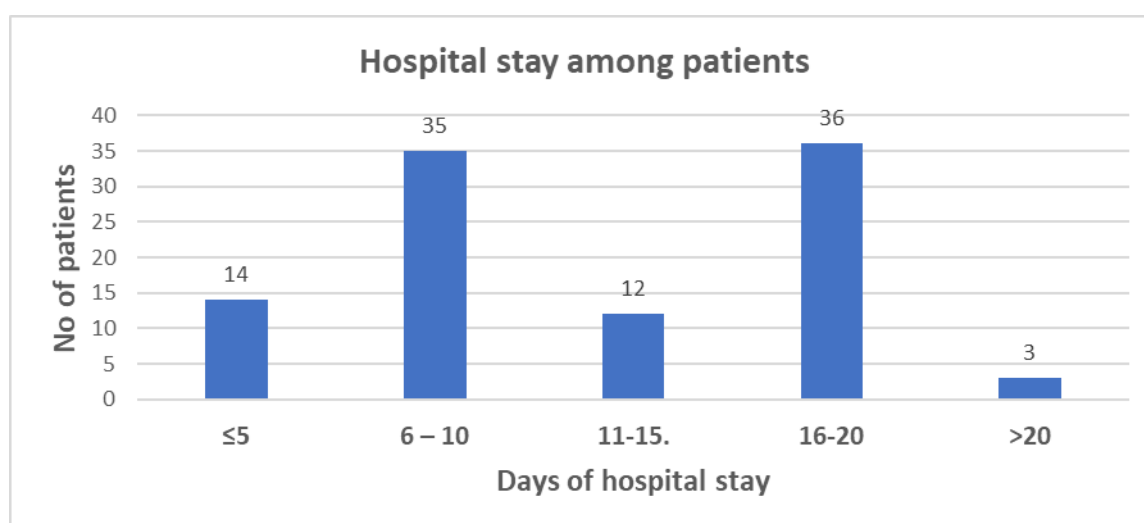
**Figure 12: Classification of cases according to MCTSI**

Outcome parameter – hospital stay

Hospital stay (days)	No of patients	Percentage
≤5	14	14
6 – 10	35	35
11-15	12	12
16-20	36	36
>20	3	3

**Table 14: Duration of hospital stay among patients**

- Majority of patients has hospital stay for 16 to 20 days followed by those with 6 to 10 days
- Few patients (14%) had hospital stay for ≤5days .
- Very less patients had hospital stay for 11-15 days and >20 days



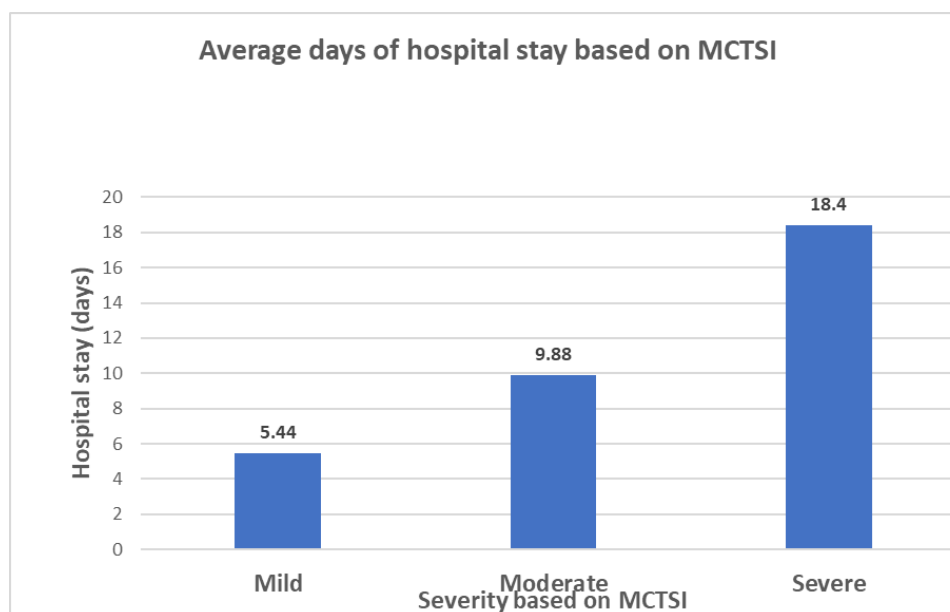
**Figure 14: Duration of hospital stay among patients**

Average hospital stay based on MCTSI

Class	Average stay	P value
Mild	5.44 ± 0.56	<0.0001 Kruskal-Wallis Test
Moderate	9.88 ± 1.38	
Severe	18.4 ± 1.63	

**Table 15: Average hospital stay based on MCTSI**

- Significant difference was seen in the average duration of hospital stay among patients with different severity on MCTSI.
- The average duration of hospital stay among patients with mild, moderate and severe category patients was 5.44 ± 0.56 days, 9.88 ± 1.38 days and 18.4 ± 1.63 days respectively



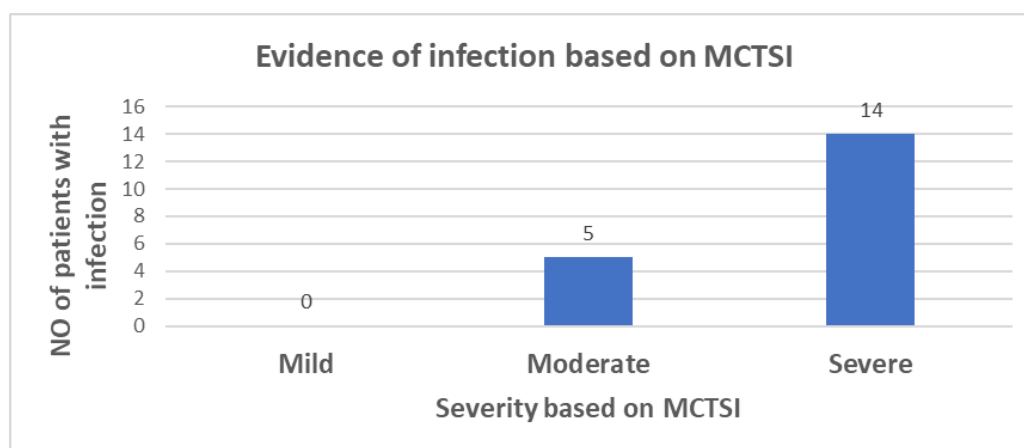
**Figure 15: Average hospital stay based on MCTSI**

Evidence of Infection based on MCTSI

Class	No of patients with infection	Percentage
Mild	0	0
Moderate	5	5
Severe	14	14

**Table 17: Evidence of Infection based on MCTSI**

- Infection was seen among 19 patients in our study.
- Infection was more among patients with severe category as compared to those with moderate category
- No infection was seen among patients with mild category



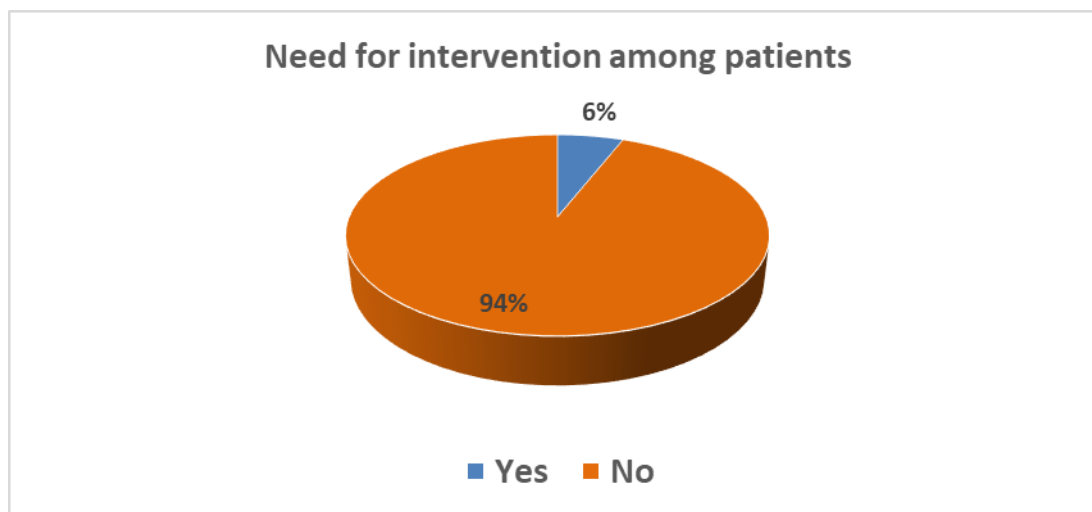
**Figure 17: Evidence of Infection based on MCTSI**

Need of intervention

Need of intervention	No of patients	Percentage
Yes	6	6
No	94	94
Total	100	100

**Table 19: Need of intervention among cases**

Intervention was required among 6 patients in our study



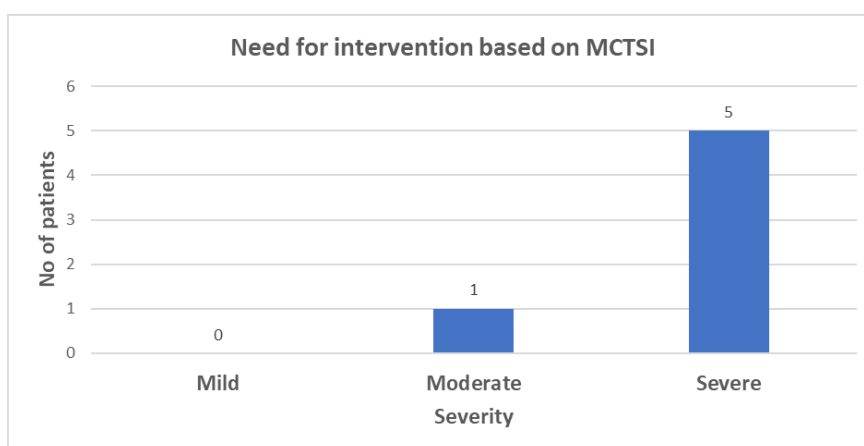
**Figure 19: Need of intervention among cases**

Need of intervention based on MCTSI

Class	Need of intervention	Percentage
Mild	0	0
Moderate	1	1
Severe	5	5

**Table 20: Need of intervention based on MCTSI**

Intervention was required among 6 patients in our study  
 Patients with severe disease required intervention mainly, where as one patient in moderate category required intervention



**Figure 20: Need of intervention based on MCTSI**

Organ failure among cases:

Organ failure	No. of patients	percentage
YES	14	14
NO	86	86
TOTAL	100	100

**Table 22: Organ failure among cases**

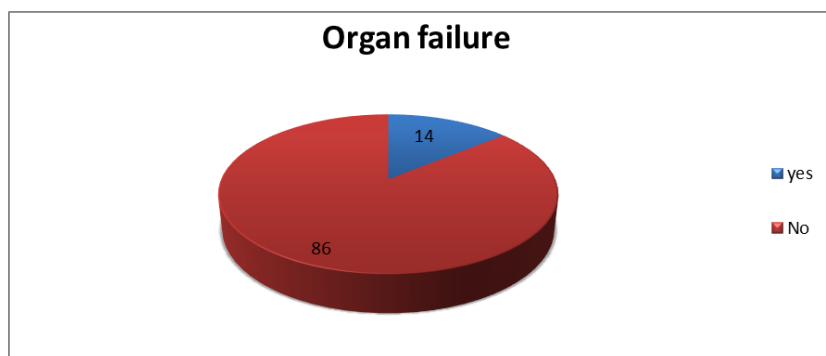


Figure 22: Organ failure among cases

Organ failure based on MCTSI

Class	Organ failure	Percentage
Mild	0	0
Moderate	2	2
Severe	12	12

Table 23: Organ failure based on MCTSI

□ Organ failure was mainly seen in patients with severe disease whereas two patients in moderate severity reported organ failure.

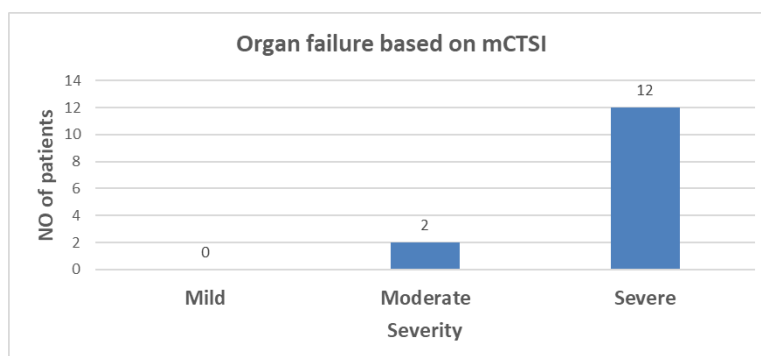


Figure 23: Organ failure based on MCTSI

Mortality

Mortality	No of patients	Percentage
Yes	6	6
No	94	94
Total	100	100

Table 25: Mortality among patients

□ Mortality was reported among 6 patients in our study population

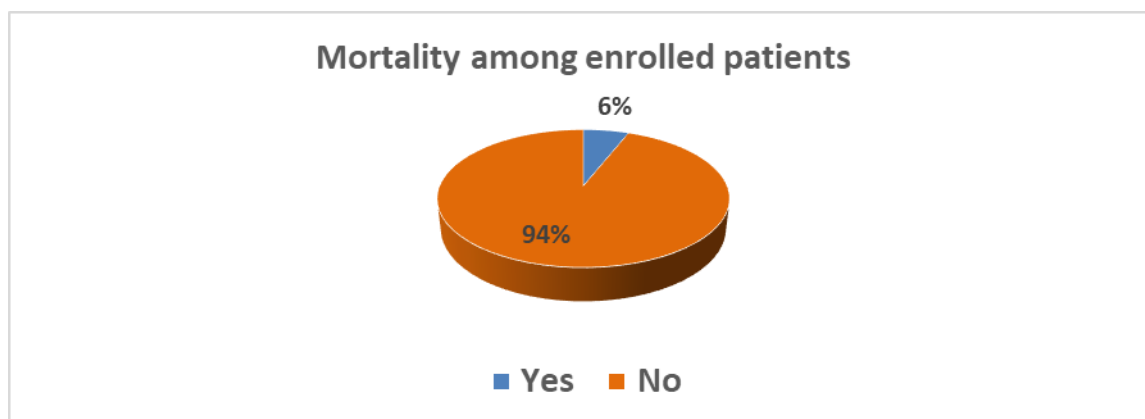


Figure 25: Mortality among patients

Mortality based on MCTSI

Class	Mortality	Percentage
Mild	0	0
Moderate	0	0
Severe	6	6

Table 26: Mortality based on MCTSI

- Mortality was reported among 6 patients in our study population
- All mortality was reported among patients with severe grade.

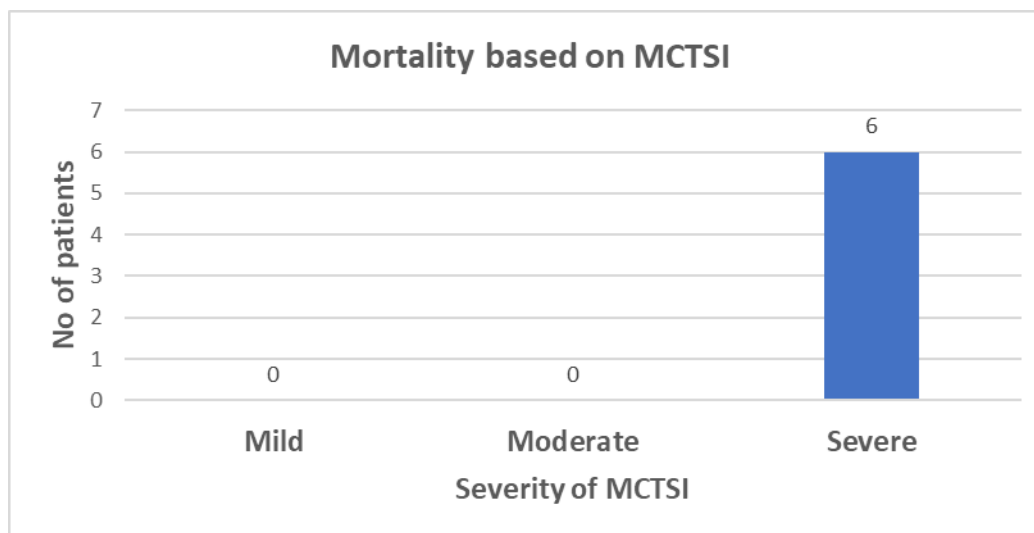


Figure 26: Mortality based on MCTSI

Final chart of outcome according to MCTSI

Parameter	Mild	Moderate	Severe
Average hospital stays	5.44 ± 0.56	9.88 ± 1.38	18.4 ± 1.63
Infection (no)	0	5	14
Organ failure	0	2	12
Need of intervention	0	1	5
No of death	0	0	6

Table 28: Final table of outcome parameters according to MCTSI

- The average duration of hospital stay was significantly higher among patients with severe grade.
- Rate of infection, organ failure, mortality and intervention were relatively higher among patients with severe grade.

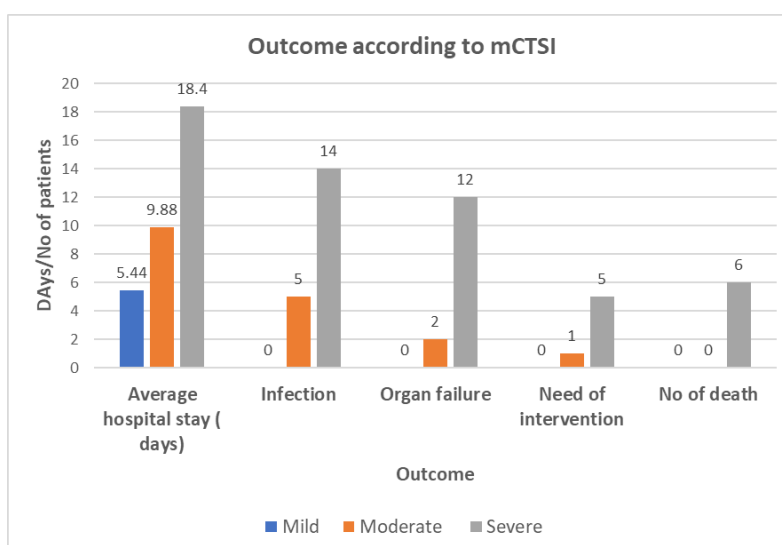


Figure 28: Final chart of outcome parameters according to MCTSI

## VI. Discussion

The present study was carried out among 100 cases of acute pancreatitis admitted in a Dr.Hedgewar rugnalaya, Aurangabad, with the aim to study the role of multidetector computerized tomography in staging of acute pancreatitis and correlation with clinical parameters . The participants fulfilling the inclusion criteria of acute pancreatitis were enrolled in the study after taking their due consents.

### Demographic characteristics

Majority of patients in our study were in the age group of 36 to 50 years followed by those in the age group of 21 to 35 years. The average age among enrolled patients was  $40.97 \pm 12.99$  years. Majority of patients were males(79%) with male :female ratio of 3.7:1.

**Chenyang Chen, et al** in their retrospective case series study, found that the mean age of all enrolled patients was  $47.5 \pm 14.3$  years.<sup>8</sup>

Similar findings were noted in study conducted by **Biswanath Sahu, et al**, they found that the mean age of all enrolled patients was  $36.5 \pm 9.8$  years. The male: female ratio in their study was 3:2.<sup>4</sup>

Our study is in concordance with above mentioned studies with maximum patients in the age group of 36-50. Like other studies, we observed that male participants outnumbered the female participants.

### Etiology of acute pancreatitis

Out of all the possible aetiologies of acute pancreatitis, we observed that majority of the cases i.e. 71 cases (71%) were alcoholic, while 23 Cases (23%) presented with gall stones.

**Sameer Raghuvanshi et al** in their study observed that most common etiological factors were alcoholism (42%) and cholelithiasis (38%) followed by idiopathic (24%), trauma (2%) and drug induced (2%).<sup>9</sup>

**Irshad Ahmad Banday et al**<sup>6</sup>, alcoholic pancreatitis was seen in 36% of cases. Together cholelithiasis and alcoholism accounted for 76% of cases. In males, alcohol was found to be most common aetiological agent accounting for 54.54% of cases. In females, cholelithiasis was found to be most common etiological agent accounting for 70.58% of cases.

**Biswanath Sahu, et al** in their study observed that most common etiological factors were alcoholism (50%) and cholelithiasis (25%) followed by idiopathic (13%).<sup>4</sup>

Our study is in concordance with above mentioned studies with alcoholism as most common etiological factor.

However our study is in discordance with the study conducted by **Chenyang Chen, et al** in which they observed out of 208 patients of biliary tract stones (46%) were noted as most common etiological factor.<sup>8</sup>

### Clinical presentation

In the present study, almost all patients with acute pancreatitis presented with abdominal pain (98%), whereas 87% cases presented with guarding and 90% with tenderness.

In the study conducted by **Irshad Ahmad Banday et al**<sup>6</sup> epigastric pain was present in all the patients. Triad of epigastric pain, nausea and vomiting was present in 75% of patients. Jaundice was noted in only in 1 case.

Similar findings were noted in study conducted by **Biswanath Sahu et al**<sup>4</sup>, in which epigastric pain was found as most common clinical symptom in 78% patients.

Our study was in concordance with these studies as abdominal pain was most common symptom present in almost all (98%) patients.<sup>9</sup>

### Computed tomography findings

We found 56% patients with acute interstitial edematous pancreatitis and 44% patients with acute necrotic pancreatitis among 100 cases. However slightly discordant results seen in study conducted by **Biswanath Sahu et al**<sup>4</sup> ANP cases were more(50%) while AIEP noted in 46.7% cases.

In the present study, Among total 44 cases of Acute Necrotic Pancreatitis , 26 cases (59%) were having <30% of necrosis, while 9 cases (20.5%) were having 30-50% necrosis and 9 cases were having >50% necrosis. In study conducted by **Biswanath Sahu et al**<sup>4</sup>, patients with <30% necrosis were predominant same as our study. Out of 30 cases of ANP, they observed 15(50%) cases presented with <30% necrosis, 14(47%) cases presented with >30% pancreatic necrosis. In study conducted by **Santhi Swaroop Vege et al**<sup>10</sup>, equal number of patients present with <30% and >30% necrosis. As among 18 patients with necrosis, 9 (50%) had < 30% necrosis, 4 (22%) had 30%-50% necrosis, and 5 (28%) had > 50% necrosis. However in another study conducted by **Mohd Altaf MIR et al**<sup>2</sup> cases with >30% necrosis were predominant, as <30% necrosis was present in 133(32%) cases, 30-50% necrosis was present in 63(18%) cases and >50% necrosis noted in 21(6%) cases.

Out of peripancreatic collections, acute necrotic collection and acute peripancreatic collection were

predominant. Out of 44 cases of ANP 34/44 cases(77%) showed acute necrotic collections and out of 56 cases of AIEP patients 31/56 (55%) showed acute peripancreatic fluid collection. In the study conducted by **Biswanath Sahu et al<sup>4</sup>**, cases with acute necrotic collection were slightly more as out of 30 cases of ANP 96.7% showed acute necrotic collections. While cases with acute peripancreatic collections were significantly less, as out of 28 cases of AIEP patients 10.7% showed acute peripancreatic fluid collection.<sup>10</sup>

### **Complications**

In our study, pleural effusion(32%) and ascites(32%) were present as most common extrapancreatic complications.22(22%) cases were of left pleural effusion and 10(10%) were having bilateral pleural effusion. GI inflammation was seen in 19(19%) patients. Vascular complications i.e. venous thrombosis was noted in 5(5%) patients. All cases of vascular complications were of venous thrombosis and all were present in cases of Acute necrotizing pancreatitis.

In the study conducted by **Thomas L. Bollen et al.<sup>11</sup>** similar findings were noted, as ascites(41%) was present as most common extra pancreatic complication followed by pleural effusion(35%).

In the study conducted by **Irshad Ahmad Banday et al<sup>6</sup>** pleural effusion was seen as the most common extra-pancreatic complication, 28 patients (56%). Left pleural effusion was more common than the right, and in none of the cases, isolated right sided pleural effusion was found. Ascites was the second most common complication seen in 18 patients (36%).

In the study conducted by **Sameer Raghuwanshi et al<sup>9</sup>**, out of total 50 patients ascites was present in 17(34%) patients. Left pleural effusion was seen in 13(26%) patients and bilateral pleural effusion was seen in 10(20%) patients. Total 4(8%) patients developed vascular complications and 12(24%) patients developed gastrointestinal inflammation.

**Mohd Altaf MIR et al<sup>2</sup>** observed that the most common extrapancreatic complication was pleural effusion which was seen in 42 (12%) of the cases.

Our study is in concordance with all above studies. Pleural effusion and ascites were present as most common extrapancreatic complications.

### **CT grading of severity of acute pancreatitis:**

In our study, when using the Modified CT Severity Index, 40/100 (40%) patients were placed in the severe pancreatitis group and 25/100 (25%),35/100 (35%) patients as mild and moderate pancreatitis respectively.

In the study conducted by **Thomas L. Bollen et al.<sup>11</sup>** according to CTSI, morphologic severity of pancreatitis graded as mild in 69%, moderate in 21%, and severe in 10% cases. While according to MCTSI, the morphologic severity of pancreatitis was graded as mild in 44%, moderate in 38%, and severe in 18% cases.

In the study conducted by **Biswanath Sahu et al<sup>4</sup>**, when acute pancreatitis was graded according to CT severity index, 27 (45%)mild cases, 19 (32%) moderate and 14 (23%) severe cases noted. While using modified CT severity index, 24 (43%)mild cases, 10 (20%) moderate and 26 (37%) severe cases noted.

**Sameer Raghuwanshi et al<sup>9</sup>**, in their study observed that using CT severity index, acute pancreatitis was graded as mild in 21 (42%) cases, moderate (score of 4-6) in 12 (24%) and severe in 17 (34%) patients. While using the modified CTSI scoring, Mild, moderate and severe pancreatitis were categorized in 9(18%),19 (38%) and 22 (44%) patients respectively.

**Irshad Ahmad Banday et al<sup>6</sup>** in their study observed that, when CT Severity Index was employed, acute pancreatitis was graded as mild in 22/50 (44%), moderate in 11/50 (22%) and severe in 17/50 (34%) patients. In contrast, when using the Modified CT Severity Index, 22/50 (44%) patients were placed in the severe pancreatitis group and 9/50 (18%),19/50 (38%) patients as mild and moderate pancreatitis.

Our study is in concordance with all above studies.

### **Assesment of mortality in acute pancreatitis:**

In our study, out of total 100 cases of acute pancreatitis 6 patients died, overall mortality rate being 6%. Similar findings were noted in study conducted by **Chih-Yuan Fu et al<sup>12</sup>** where they found overall mortality rate of acute pancreatitis as 3.8% (123/3250). However in study conducted by **CC Popa et al.<sup>13</sup>** shows higher mortality rate, 21.1%.

In our study, mortality was significantly higher in severe group of acute pancreatitis categorized by MCTSI. Out of 40 severe cases of acute pancreatitis as per MCTSI death occurred in 6 patients, mortality rate being 15%. This was in concordance with the study conducted by **Biswanath Sahu et al<sup>4</sup>**, where they found all cases of mortality were belonged to severe group of acute pancreatitis as per MCTSI.

## VII. Summary And Conclusions

### Observations and results:

1. Mean age of the study cases was  $40.97 \pm 12.99$  years with majority of the cases were in between 36-50 years of age.
2. Overall male predominance was seen in present study with males to female ratio 3.7:1.
3. Alcohol intake was common etiological factor among our cases, noted in 71% patients.
4. Most common presenting complaint was abdominal pain (98%), followed by tenderness(90%) and guarding(87%)
5. Acute interstitial edematous pancreatitis(56%) cases outnumbered the acute necrotizing pancreatitis cases(44%).
6. Bulky pancreas(74%) was present as most common CT finding, while pleural effusion(32%) and ascites(32%) were noted as most common extrapancreatic collections.
7. Acute necrotic collection(34%) was noted as most common peripancreatic collection.
8. Among cases of Acute Necrotic Pancreatitis, 59% were having <30% of necrosis, 20.5% were having 30-50% necrosis and 20.5% cases were having >50% necrosis.
9. Using the Modified CT Severity Index, 40% patients were placed in the severe pancreatitis group and 25%, 35% patients as mild and moderate pancreatitis respectively.
10. Majority of patients had hospital stay for 16 to 20 days followed by those with 6 to 10 days.
11. According to MCTSI, The average duration of hospital stay among patients with mild, moderate and severe category patients was  $5.44 \pm 0.56$  days,  $9.88 \pm 1.38$  days and  $18.4 \pm 1.63$  days respectively.
12. We found that CT severity assessment using MCTSI showed significant correlation with all outcome parameters.

### Conclusions:

- CECT(Contrast Enhanced Computed Tomography) is an excellent imaging modality for diagnosis, establishing the extent of disease process and in severity grading.
- The MCTSI shows significant correlation with clinical outcome parameters.
- Stronger correlation of MCTSI with clinical outcome parameters in our study may be attributed to the inclusion of extrapancreatic complications in the MCTSI system.
- Overall mortality rate in this study is 6% , although mortality rate is higher in severe cases of pancreatitis categorized by MCTSI.

## Bibliography/References

- [1] Jpn Guidelines For The Management Of Acute Pancreatitis: Epidemiology, Etiology, Natural History, And Outcome Predictors In Acute Pancreatitis. - Pubmed - Ncbi [Internet]. [Cited 2019 Dec 15]. Available From: <https://www.ncbi.nlm.nih.gov/pubmed/16463207>
- [2] Mir Ma, Bali Bs, Mir Ra, Wani H. Assessment Of The Severity Of Acute Pancreatitis By Contrast-Enhanced Computerized Tomography In 350 Patients. *Ulus Travma Acil Cerrahi Derg.* 2013 Mar;19(2):103–8.
- [3] Balthazar Ej, Freeny Pc, Vansonnenberg E. Imaging And Intervention In Acute Pancreatitis. *Radiology* [Internet]. 1994 Nov 1 [Cited 2021 Jul 21]; Available From: <https://pubs.rsna.org/doi/abs/10.1148/Radiology.193.2.7972730>
- [4] Sahu B, Abbey P, Anand R, Kumar A, Tomer S, Malik E. Severity Assessment Of Acute Pancreatitis Using Ct Severity Index And Modified Ct Severity Index: Correlation With Clinical Outcomes And Severity Grading As Per The Revised Atlanta Classification. *Indian J Radiol Imaging.* 2017 Jun;27(2):152–60.
- [5] Bradley El. A Clinically Based Classification System For Acute Pancreatitis. Summary Of The International Symposium On Acute Pancreatitis, Atlanta, Ga, September 11 Through 13, 1992. *Arch Surg.* 1993 May;128(5):586–90.
- [6] Banday Ia, Gattoo I, Khan Am, Javeed J, Gupta G, Latief M. Modified Computed Tomography Severity Index For Evaluation Of Acute Pancreatitis And Its Correlation With Clinical Outcome: A Tertiary Care Hospital Based Observational Study. *J Clin Diagn Res.* 2015 Aug;9(8):Tc01-05.
- [7] Imaging Acute Pancreatitis [Internet]. [Cited 2019 Dec 15]. Available From: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3473535>
- [8] Chen C, Huang Z, Li H, Song B, Yuan F. Evaluation Of Extrapancreatic Inflammation On Abdominal Computed Tomography As An Early Predictor Of Organ Failure In Acute Pancreatitis As Defined By The Revised Atlanta Classification. *Medicine.* 2017 Apr;96(15):E6517.
- [9] Raghuvanshi S, Gupta R, Vyas Mm, Sharma R. Ct Evaluation Of Acute Pancreatitis And Its Prognostic Correlation With Ct Severity Index. *J Clin Diagn Res.* 2016 Jun;10(6):Tc06-Tc11.
- [10] Vege Ss, Fletcher Jg, Talukdar R, Sarr Mg. Peripancreatic Collections In Acute Pancreatitis: Correlation Between Computerized Tomography And Operative Findings. *World J Gastroenterol.* 2010 Sep 14;16(34):4291–6.
- [11] Bollen Tl, Singh Vk, Maurer R, Repas K, Van Es Hw, Banks Pa, Et Al. Comparative Evaluation Of The Modified Ct Severity Index And Ct Severity Index In Assessing Severity Of Acute Pancreatitis. *American Journal Of Roentgenology.* 2011 Aug 1;197(2):386–92.
- [12] Fu C-Y, Yeh C-N, Hsu J-T, Jan Y-Y, Hwang T-L. Timing Of Mortality In Severe Acute Pancreatitis: Experience From 643 Patients. *World J Gastroenterol.* 2007 Apr 7;13(13):1966–9.
- [13] Popa C, Badiu D, Rusu O, Grigorean V, Neagu S, Strugaru C. Mortality Prognostic Factors In Acute Pancreatitis. *J Med Life.* 2016;9(4):413–8.