



General Medicine

COMPREHENSIVE ANALYSIS OF ETIOLOGY, PROGNOSIS AND CLINICAL OUTCOME OF ACUTE PANCREATITIS IN A TERTIARY CARE CENTER

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ABSTRACT

BACKGROUND: Pancreatitis is an “inflammation of glandular parenchyma lead to injury or destruction of acinar components associated with little or no fibrosis of the pancreas”. The mechanism of injury in pancreatitis is based on premature activation of pancreatic enzymes within the pancreas, leading to an autolytic process. Once cellular damage sets in, the inflammatory process can lead to pancreatic edema, hemorrhage, and ultimately necrosis. **OBJECTIVES:** 1. To evaluate the ability of BISAP score and Modified CT Severity Index to predict mortality in a prospective cohort of acute pancreatitis patients from our institution. 2. To assess the ability of the BISAP score and Modified CT Severity Index to predict which patients are at risk of developing organ dysfunction and to stratify patients prior to onset of organ failure and improve further management. **METHODS:** 100 subjects of age between 18 and 70 years with a clinical picture consistent with the diagnosis of acute pancreatitis, along with radiological evidence of inflamed pancreas will be considered to have acute pancreatitis. **RESULTS:** Out of 100 cases alcohol was found to be the most common etiology of acute pancreatitis contributing 55% of cases followed by gall stones contributing 29% of cases. Hyperlipidemia and Post ERCP were also found to be rare causes contributing 2% each. Out of 100 patients, 69 had no organ failure and 31 developed organ failure. out of 100 patients, 18 had mild, 42 had moderate and 40 had severe CTSI score. 76 patients had BISAP <3 and 24 had BISAP >3. 97 patients survived, 3 patients died which showed significance (p value=0.01) with the BISAP. **CONCLUSION:** This study shows that BISAP score is the best in predicting the prognosis than the CTSI. In this study BISAP correlates well with the outcome as the patients with low score did not develop complications and all patients with high score developed complications. Whereas the CTSI scores were overlapping. Hence the patients with low BISAP scores, This reduces the cost and saves time for the both, patients as well as the service providers. Even it can reduce the over load of cases at the higher centers. As BISAP is a bedside study and calculated at the time of admission, clinically it can be valued higher than the CTSI which is usually done after 48 hours.

KEYWORDS :**INTRODUCTION**

Pancreatitis is an “inflammation of glandular parenchyma lead to injury or destruction of acinar components associated with little or no fibrosis of the pancreas”.

The mechanism of injury in pancreatitis is based on premature activation of pancreatic enzymes within the pancreas, leading to an autolytic process. Once cellular damage sets in, the inflammatory process can lead to pancreatic edema, hemorrhage, and ultimately necrosis. The release of inflammatory mediators into the circulation can lead to systemic complications such as: Hemodynamic instability, bacteremia (due to gut microbiota translocation), acute respiratory distress syndrome and pleural effusion, gastrointestinal bleeding, renal failure, and disseminated intravascular coagulation (DIC).

METHODS OF STUDY AND DATA COLLECTION

SOURCE OF DATA : Patients coming to the MAHATMA GANDHI MEMORIAL HOSPITAL, Warangal.

SAMPLE SIZE : 100 SUBJECTS

STUDY DESIGN: Observational study.

SAMPLE DESIGN: Simple random sampling.

DURATION OF STUDY: 18 months from January 2021 to October 2022

INCLUSION CRITERIA

- 1) Patients with a clinical picture consistent with the diagnosis of acute pancreatitis, along with radiological evidence of inflamed pancreas will be considered to have acute pancreatitis.
- 2) Age > 18 years and Age < 70 years

EXCLUSION CRITERIA

- 1) Proven cases of chronic pancreatitis.
- 2) Hereditary pancreatitis
- 3) Chronic kidney disease
- 4) Traumatic pancreatitis

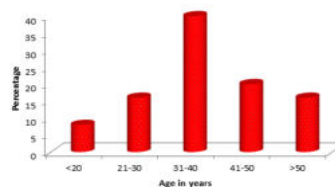
INVESTIGATIONS

- 1) Complete Blood Picture
- 2) Serum amylase and Serum lipase
- 3) Liver Function Test
- 4) Renal Function Test
- 5) Serum calcium

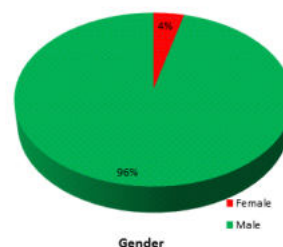
- 6) Lipid profile
- 7) Serum electrolytes
- 8) Chest X ray PA View
- 9) Ultrasound Abdomen
- 10) CECT Abdomen

RESULTS**AGE DISTRIBUTION**

Of the total of 100 patients studied in the study, most of the patients (40%) were in the age group of 31–40 years. 16% of patients were above 50 years and 24% of patients were below 30 years of age.

Chart 1. Age Distribution**SEX DISTRIBUTION**

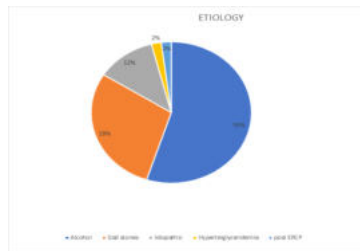
96% of patients in the study are males. Other Indian studies also revealed similar gender distribution pattern, the majority being males. This Male preponderance is due to high incidence of alcohol consumption in a male population of India.

Chart 2. Sex Distribution

ETIOLOGY

In our study, alcohol was found to be the most common etiology of acute pancreatitis contributing 55% of cases followed by gall stones contributing 29% of cases. Hyperlipidemia and Post ERCP were also found to be rare causes contributing 2% each.

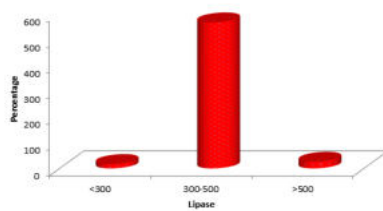
Chart 3. Etiology



SERUM LIPASE DISTRIBUTION

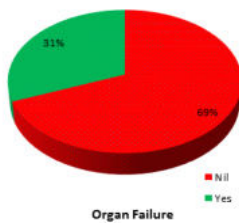
Out of 100 patients 17% of patients have <300, 57% have levels between 300-500 and 26% have values >500.

Chart 4. Lipase levels

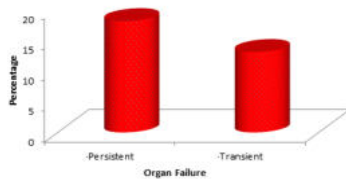


Incidence of organ failure

Chart 5. Incidence of organ failure



Out of 100 patients 69(69%) patients had no organ failure. Remaining 31(31%) developed organ failure.



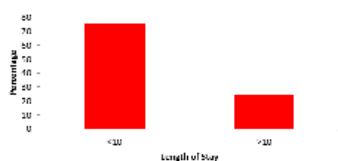
Type of Organ Failure-

Chart 6. Type of organ failure

organ failure patients, cardiac failure 12% was most common and 7% ARDS- Respiratory failure ,8% renal failure and Multi organ dysfunction syndrome- MODS in 4%.

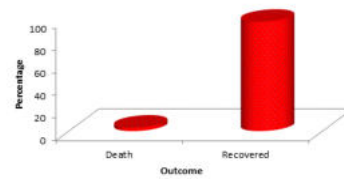
Length of Hospital stay

Chart 7. Length of stay



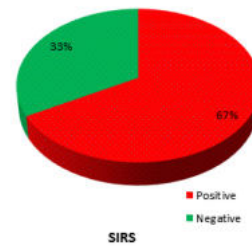
Outcome of the patients

Chart 8. Outcome



SIRS DISTRIBUTION

Chart 9. Occurrence of SIRS



BISAP score of patients studied

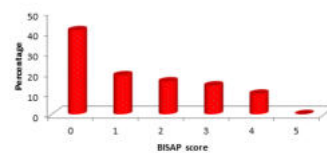
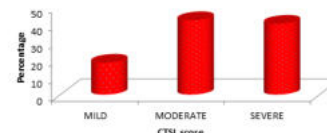


Chart 10. BISAP score distribution

Out of 100 patients 76 patients has BISAP score less than 3 and 24 patients has score of ≥ 3 .

CTSI SCORE

Chart 11. CTSI score distribution



Correlation of clinical variables in relation to CTSI score of patients studied

Variables	CTSI Score			Total	P Value
	MILD	MODERATE	SEVERE		
AGE IN YEARS					
<20	0(0%)	5(11.9%)	3(7.5%)	8(8%)	0.037*
21-30	0(0%)	7(16.7%)	9(22.5%)	16(16%)	
31-40	14(77.8%)	16(38.1%)	10(25%)	40(40%)	
41-50	2(11.1%)	8(19%)	10(25%)	20(20%)	
>50	2(11.1%)	6(14.3%)	8(20%)	16(16%)	
GENDER					
Female	0(0%)	1(2.4%)	3(7.5%)	4(4%)	0.403
Male	18(100%)	41(97.6%)	37(92.5%)	96(96%)	
SIRS					
Positive	16(88.9%)	28(66.7%)	23(57.5%)	67(67%)	0.055*
Negative	2(11.1%)	14(33.3%)	17(42.5%)	33(33%)	
PAIN ABDOME					
Absent	0(0%)	0(0%)	0(0%)	0(0%)	1.000

RADIATING PAIN					
Present	18(100%)	42(100%)	40(100%)	100(100%)	
Absent	8(44.4%)	11(26.2%)	10(25%)	29(29%)	0.278
Present	10(55.6%)	31(73.8%)	30(75%)	71(71%)	
VOMITING					
Absent	6(33.3%)	10(23.8%)	6(15%)	22(22%)	0.276
Present	12(66.7%)	32(76.2%)	34(85%)	78(78%)	
GUARDING					
Absent	4(22.2%)	8(19%)	8(20%)	20(20%)	0.947
Present	14(77.8%)	34(81%)	32(80%)	80(80%)	
Total	18(100%)	42(100%)	40(100%)	100(100%)	

Chi-Square Test/Fisher Exact Test

Correlation of Lipase in relation to CTSI score of patients studied

Lipase	CTSI Score			Total
	MILD	MODERATE	SEVERE	
<300	5(27.8%)	6(14.3%)	6(15%)	17(17%)
300-500	11(61.1%)	24(57.1%)	22(55%)	57(57%)
>500	2(11.1%)	12(28.6%)	12(30%)	26(26%)
Total	18(100%)	42(100%)	40(100%)	100(100%)

P=0.481, Not Significant, Fisher Exact Test

Correlation of BISAP score in relation to CTSI score of patients studied

BISAP score	CTSI Score			Total
	MILD	MODERATE	SEVERE	
0	12(66.7%)	15(35.7%)	14(35%)	41(41%)
1	1(5.6%)	11(26.2%)	7(17.5%)	19(19%)
2	3(16.7%)	6(14.3%)	7(17.5%)	16(16%)
3	2(11.1%)	7(16.7%)	5(12.5%)	14(14%)
4	0(0%)	3(7.1%)	7(17.5%)	10(10%)
5	0(0%)	0(0%)	0(0%)	0(0%)
Total	18(100%)	42(100%)	40(100%)	100(100%)

P=0.232, Not Significant, Fisher Exact Test

Correlation of Length of stay in relation to CTSI score of patients studied

Length of Stay	CTSI Score			Total
	MILD	MODERATE	SEVERE	
<10	16(88.9%)	32(76.2%)	28(70%)	76(76%)
>10	2(11.1%)	10(23.8%)	12(30%)	24(24%)
Total	18(100%)	42(100%)	40(100%)	100(100%)

P=0.322, Not Significant, Fisher Exact Test

Risk Factors-Frequency distribution in relation to CTSI score of patients studied

Risk Factors	CTSI Score			Total	P Value
	MILD	MODERATE	SEVERE		
ALCOHOL	9(50%)	24(57.1%)	22(55%)	55(55%)	0.878
GALL STONES	5(27.8%)	11(26.2%)	13(32.5%)	29(29%)	0.814
IDIOPATHIC	3(16.7%)	5(11.9%)	4(10%)	12(12%)	0.786
HYPERTRIGLYCERIDEMIA	1(5.6%)	1(2.4%)	0(0%)	2(2%)	0.329
POST ERCP	0(0%)	1(2.4%)	1(2.5%)	2(2%)	1.000
Total	18(100%)	42(100%)	40(100%)	100(100%)	

Chi-Square Test/Fisher Exact Test

Outcome- Frequency distribution in relation to CTSI score of patients studied

Outcome	CTSI Score			Total
	MILD	MODERATE	SEVERE	

Death	0(0%)	1(2.4%)	2(5%)	3(3%)
Recovered	18(100%)	41(97.6%)	38(95%)	97(97%)
Total	18(100%)	42(100%)	40(100%)	100(100%)

P=0.787, Not Significant, Fisher Exact Test

Comparison of clinical/biochemical variables in relation to CTSI score of patients studied

Variables	CTSI Score			Total	P
	MILD	MODERATE	SEVERE		
LIPASE	356.44±101.84	423.12±143.87	462.78±179.99	426.98±156.67	0.055+
BUN	24.22±6.22	23.98±4.95	25.23±5.02	24.52±5.2	0.539
GCS	14.39±1.42	14.33±1.3	14.08±1.56	14.24±1.42	0.637
LENGTH OF STAY	5.5±4.6	7.98±6.56	10.23±9.66	8.43±7.82	0.091+
SERUM CALCIUM(MG/DL)	8.67±0.69	8.71±0.67	8.65±0.8	8.68±0.72	0.920

Association of BISAP with CTSI, LIPASE, LENGTH OF STAY AND OUTCOME OF PATIENTS STUDIED

Variables	BISAP SCORE					Total	P Value
	0	1	2	3	4		
CTSI SCORE							
MILD	12(29.3%)	1(5.3%)	3(18.8%)	2(14.3%)	0(0%)	18(18%)	0.232
MODERATE	15(36.6%)	11(57.9%)	6(37.5%)	7(50%)	3(30%)	42(42%)	
SEVERE	14(34.1%)	7(36.8%)	7(43.8%)	5(35.7%)	7(70%)	40(40%)	
LIPASE							
<300	17(41.5%)	0(0%)	0(0%)	0(0%)	0(0%)	17(17%)	<0.001**
300-500	24(58.5%)	19(100%)	14(87.5%)	0(0%)	0(0%)	57(57%)	
>500	0(0%)	0(0%)	2(12.5%)	14(100%)	10(100%)	26(26%)	
LENGTH OF STAY							
<10	41(100%)	19(100%)	8(50%)	7(50%)	1(10%)	76(76%)	<0.001**
>10	0(0%)	0(0%)	8(50%)	7(50%)	9(90%)	24(24%)	
OUTCOME							
Death	0(0%)	0(0%)	0(0%)	1(7.1%)	2(20%)	3(3%)	0.010*
Recovered	41(100%)	19(100%)	16(100%)	13(92.9%)	8(80%)	97(97%)	
ORGAN FAILURE							
Nil	41(100%)	19(100%)	8(50%)	1(7.1%)	0(0%)	69(69%)	<0.001**
Yes	0(0%)	0(0%)	8(50%)	13(92.9%)	10(100%)	31(31%)	
Persistent	0(0%)	0(0%)	1(6.3%)	7(50%)	10(100%)	18(18%)	
Transient	0(0%)	0(0%)	7(43.8%)	6(42.9%)	0(0%)	13(13%)	
Total	41(100%)	19(100%)	16(100%)	14(100%)	10(100%)	100(100%)	

Chi-Square Test/Fisher Exact Test

BISAP score picks up the complications more clearly than the CTSI score. The cases with low score never developed complications and all the cases with high score developed complications whereas the CTSI scores are overlapping.

S.Lipase level stratified by the BISAP point score and plotted. The P Value was calculated using ANOVA test and was found to be <0.001 which is statistically significant. With the increase in BISAP score, there is an increasing trend in the S.Lipase level.

CORRELATION OF CLINICAL VARIABLES ACCORDING TO BISAP SCORE OF PATIENTS STUDIED

Variables	BISAP SCORE					Total	P Value
	0	1	2	3	4		
Age in Years	34.83±10.53	38.79±9.78	35.56±14.18	36.07±3.5	62.2±11.48	38.61±13.07	$<0.001^{**}$
SIRS	1.46±0.55	2.05±0.85	2.63±0.62	3.07±0.83	3.2±0.63	2.16±0.95	$<0.001^{**}$
LIPASE	303±28.17	357.89±29.66	480.5±13.34	567.14±31.25	784.7±71.15	426.98±156.67	$<0.001^{**}$
SERUM CALCIUM (MG/DL)	8.59±0.67	8.63±0.6	8.56±1.03	9±0.68	8.9±0.57	8.68±0.72	0.303
BUN	20.85±3.45	26.11±4.54	25.69±4.9	29.57±4.86	27.6±3.13	24.52±5.2	$<0.001^{**}$
GCS	15±0	15±0	13.25±1.88	13.36±1.6	12.5±1.58	14.24±1.42	$<0.001^{**}$
LENGTH OF STAY	3.85±1.17	5.37±1.98	9.69±3.4	11.93±6.15	26.1±10.06	8.43±7.82	0.268

The mean age of patients in the study is 38 years.

The mean length of hospital stay is 8 days.

Mean Lipase level of the patients in the study was 426 IU.

The mean BUN of patients in the study is 24mg/dl.

The mean serum calcium of patients in the study is 8.6mg/dl.

Significant figures

+ Suggestive significance (P value: $0.05 < P < 0.10$)

* Moderately significant (P value: $0.01 < P < 0.05$)

** Strongly significant (P value: $P < 0.01$)

Statistical software: The Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc

DISCUSSION

The most of the articles state that gall stone as the common cause and alcohol related pancreatitis is on increasing trend. Few studies shows Alcohol and gall stones were equally related to pancreatitis.

In this study Alcohol is the most common etiology and BISAP serves as a simple and reliable prognostic score. BISAP score shows significant correlation with age, lipase levels and outcome of the patients.

Abdominal pain consistent of acute pancreatitis means moderate to severe epigastric pain which is radiating to the back (seen in 40–70% of patients) and lasting for several hours to days. Abdominal pain is the cardinal symptom which occurs in about 95% of cases of AP. Typically pain involves the upper abdomen or more localized to epigastric area, or left upper quadrant.

Recently, bedside index for severity in acute pancreatitis (BISAP) has been proposed as an accurate and simple method for prediction of severe AP. Several studies demonstrated that the accuracy of BISAP in predicting severe AP and death was similar to that of the other scoring systems, including Ranson and Acute Physiology and Chronic Health Evaluation (APACHE)-II. The severity of acute pancreatitis was defined on the basis of BISAP score. Of the total of 100 patients studied in the study, most of the patients (41%) were in the age group of 31–40 years. 15% of patients were above 50 years and 24% of patients were below 30 years of age. In some studies, majority of the patients fall in 4th and 5th decade of life according to Shabbir S et al (74) and between 21–30 years according to Khanna AK et al.

The current study was a prospective observational study done in medical wards in patients receiving conservative treatment. The majority of the cases of acute pancreatitis from the present study were middle age group. The reason for this being that commonest etiologies

are alcoholism and gall stones, both of which are common in middle age group.

This male preponderance is due to high incidence of alcohol consumption in a male population of India. In our study, all patients presented with abdominal pain which was radiated to back in 71% of cases.

The pain was associated with vomiting in 78% of cases. Among 100 patients in our study, 97(97%) were males and 4(4%) were females.

In this study, alcohol was found to be the most common etiology of acute pancreatitis contributing 55% of cases followed by gallstones contributing 29% of cases. Hypertriglyceridemia and Post ERCP were also found to be rare causes contributing 2 and 2% respectively.

In this study out of the total 31 cases of SAP diagnosed to have organ failure, majority 12 cases were found to have Cardiovascular System failure which presented as shock and hypotension, 8 patients had renal failure and Respiratory failure was found in 7 patients. Alcohol is the major cause in this study. The prevalence of Alcoholism in the regional population may attribute to this situation.

Hence Alcoholism can be considered as a social disorder in this population and policy makers may consider the remedies since it affects mainly the adult men of productive age. All these patients with alcohol related disease are counseled along with their family and it was emphasized that the Alcoholism is the primary diseases. They all were referred to de addiction centres.

Gall stone disease is the next common cause in our study, that too in females. Since this is the common cause all over the world, all the patients with acute pancreatitis must be screened for gall stones. Once the common cause are excluded the possible etiological factor must be sought for to attain early remission and to take steps to prevent the disease in future.

The cases with low BISAP score need not undergo with CECT since the negative predictive value of BISAP of almost 100%.

This study shows that BISAP score is the best in predicting the prognosis than the CTSI.

In this study BISAP correlates well with the outcome as the patients with low score did not develop complications and all patients with high score developed complications. Whereas the CTSI scores were overlapping.

Hence the patients with low BISAP scores, <3 , need not undergo CT scan unless specifically required.

This study shows that BISAP score is the best in predicting the prognosis than the CTSI. The sensitivity and negative predictive value of BISAP is more than the CTSI. In this study BISAP correlates well with the outcome as the patients with low score did not develop complications and all patients with high score developed complications. Whereas the CTSI scores were overlapping. Hence the patients with low BISAP scores, <3 , need not undergo CT scan unless specifically required and can be treated at district level centres. This reduces the cost and saves time for the both, patients as well as the service providers. Even it can reduce the over load of cases at the higher centers.

CONCLUSION

- Men were most commonly affected than women 96% vs 4% respectively.
- The age group affected were in 35 to 45 years of age with mean age of 38.
- Alcohol is the most common etiological factor for acute pancreatitis in this regional population.
- Out of 100 patients 97 recovered and 3 died.
- The BISAP score is more accurate in predicting disease severity and significantly than CTSI in this study.

REFERENCES:

- 1) <https://www.wjnet.com/2307-8960/full/v7/i9/1006.htm>
- 2) Blamey SL, Imrie CW, O'Neill J, et al Prognostic factors in acute pancreatitis. Gut 1984;25:1340-1346.
- 3) Shah AP, Mourad MM, Bramhall SR. Acute pancreatitis: current perspectives on diagnosis and management. J Inflamm Res. 2018 Mar 9;11:77-85. doi:

- 10.2147/JIR.S135751. PMID: 29563826; PMCID: PMC5849938.
- 4) Ajay K. Khanna, Susanta Meher, Shashi Prakash, Satyendra Kumar Tiwary, Usha Singh, Arvind Srivastava, V. K. Dixit, "Comparison of Ranson, Glasgow, MOSS, SIRS, BISAP, APACHE-II, CTSI Scores, IL-6, CRP, and Procalcitonin in Predicting Severity, Organ Failure, Pancreatic Necrosis, and Mortality in Acute Pancreatitis", HPB Surgery, vol. 2013, Article ID 367581, 10 pages, 2013. <https://doi.org/10.1155/2013/367581>
 - 5) Gao W, Yang HX, Ma CE. The Value of BISAP Score for Predicting Mortality and Severity in Acute Pancreatitis: A Systematic Review and Meta-Analysis [published correction appears in PLoS One. 2015;10(10):e0142025]. PLoS One. 2015;10(6):e0130412. Published 2015 Jun 19. doi:10.1371/journal.pone.0130412
 - 6) Knaus WA, Draper EA, Wagner DP, Zimmerman JE. APACHE II: a severity of disease classification system. Crit Care Med. 1985 Oct;13(10):818-29. PMID: 3928249.
 - 7) Bollen TL, Singh VK, Maurer R, Repas K, van Es HW, Banks PA, Mortelet KJ. Comparative evaluation of the modified CT severity index and CT severity index in assessing severity of acute pancreatitis. AJR Am J Roentgenol. 2011 Aug;197(2):386-92. doi: 10.2214/AJR.09.4025. PMID: 21785084.
 - 8) Li, Y., Zhang, J. & Zou, J. Evaluation of four scoring systems in prognostication of acute pancreatitis for elderly patients. BMC Gastroenterol 20, 165 (2020). <https://doi.org/10.1186/s12876-020-01318-8>
 - 9) Harshit Kumar A, Singh Griwan M. A comparison of APACHE II, BISAP, Ranson's score and modified CTSI in predicting the severity of acute pancreatitis based on the 2012 revised Atlanta Classification. Gastroenterol Rep (Oxf). 2018 May;6(2):127-131. doi: 10.1093/gastro/gox029. Epub 2017 Jul 28. PMID: 29780601; PMCID: PMC5952961.
 - 10) Yadav, Jitin et al. "Predicting morbidity and mortality in acute pancreatitis in an Indian population: a comparative study of the BISAP score, Ranson's score and CT severity index." Gastroenterology Report 4 (2016): 216 - 220.
 - 11) Mayerle J, Sendler M, Hegyi E, Beyer G, Lerch MM, Sahin-Tóth M. Genetics, Cell Biology, and Pathophysiology of Pancreatitis. Gastroenterology. 2019 May;156(7):1951-1968.e1. doi: 10.1053/j.gastro.2018.11.081. Epub 2019 Jan 18. PMID: 30660731; PMCID: PMC6903413.
 - 12) Tenner, Scott MD, MPH, FACP; Baillie, John MB, ChB, FRCP, FACP; DeWitt, John MD, FACP; Vege, Santhi Swaroop MD, FACP. American College of Gastroenterology Guideline: Management of Acute Pancreatitis. American Journal of Gastroenterology: September 2013 - Volume 108 - Issue 9 - p 1400-1415 doi: 10.1038/ajg.2013.218
 - 13) Wu BU, Johannes RS, Sun X et al. Early prediction of mortality in acute Pancreatitis: a large population-based study. Gut 2008;57: 1698–703.
 - 14) Khanna AK, Meher S, Prakash S, Tiwary SA, Singh U, Srivastava A, et al. Comparison of Ranson, Glasgow, MOSS, SIRS, BISAP, APACHE II, CTSI score, CRP, procalcitonin in predicting severity, organ failure, pancreatic necrosis and mortality in acute pancreatitis. HPB Surg. 2013;2013:367581. doi:10.1155/2013/367581.