https://africanjournalofbiomedicalresearch.com/index.php/AJBR
Afr. J. Biomed. Res. Vol. 27 (September 2024); 1136-1165

Research Article

To Study the Utility of Systemic Immune Inflammatory Index (Sii) As A Marker in Determining the Outcomes in Patients Presenting to the Emergency Department with Acute Pancreatitis

DR. Tharun Pg M.B.B.S, Dnb[1*], Dr. P. Moses Aadarsh M.B.B.S Dnb[2], Dr. Prudhvinatha Chama Reddy M.B.B.S Dnb[3], Dr. Nithya Shreya Meghna M.B.B.S, Dnb[4], Dr. Karthk Ravikanthi Md[5]

[1](Emergency Medicine 3rd Year) Asian Institute Of Gastroenterology 1-66/Aig/2 To 5, Mindspace, Road, Pjanardhan Reddy Nagar Gachibowli, Hyderabad, Telangana-500032*
[2](Emergency Medicine 2rd Year) Asian Institute Of Gastroenterology 1-66/Aig/2 To 5, Mindspace, Road, Pjanardhan Reddy Nagar Gachibowli, Hyderabad, Telangana-500032
[3](Emergency Medicine 2rd Year), Asian Institute Of Gastroenterology 1-66/Aig/2 To 5, Mindspace, Road, Pjanardhan Reddy Nagar Gachibowli, Hyderabad, Telangana-500032
[4](Emergency Medicine 3rd Year), Asian Institute Of Gastroenterology 1-66/Aig/2 To 5, Mindspace, Road, Pjanardhan Reddy Nagar Gachibowli, Hyderabad, Telangana-500032
[5](Emergency Medicine), Drnb (Critical Care), Asian Institute Of Gastroenterology 1-66/Aig/2 To 5, Mindspace, Road, Pjanardhan Reddy Nagar Gachibowli, Hyderabad, Telangana-500032

TABLE OF CONTENTS

S.No.	Description	Page no
1	INTRODUCTION	1137
2	REVIEW OF LITERACTURE	1338
3	AIMS AND OBJECTIVES	1143
4	MATERIALS AND METHODS	1143
5	RESULTS	1144
6	DISCUSSION	1156
7	SUMMARY	1157
8	CONCLUSION	1158
9	LIMITATION	1158
10	REFERENCES	1158
11	ANNEXURE I- PROFORMA	1160
12	ANNEXURE II – INFORMED CONSENT FORM	1160
13	ANNEXURE III – PATIENT INFORMATION SHEET	1163
14	ANNEXURE IV- DATA MASTER SHEET	1164

TABLE OF FIGURES

1	Computed tomography (CT) scan of one patient showing acute pancreatitis with peripancreatic necrosis	**1139**
2	Modified Marshall score	**1141**
3	Revised Atlanta classification	**1141**
4	APACHE-II	**1141**

LIST OF ABBREVIATIONS

1	SII	Systemic immune inflammatory index
2	BISAP	Bedside index of severity in acute pancreatitis
3	APACHE	Acute physiology and chronic health evaluation
4	CTSI	CT severity index
5	SAP	Severe acute pancreatitis
6	MAP	Moderate acute pancreatitis
7	NADPH	Nicotinamide adenine dinucleotide phosphate
8	SIRS	Systemic inflammatory response syndrome
9	PLR	Platelet lymphocyte ratio
10	NLR	Neutrophil lymphocyte ratio
11	AP	Acute pancreatitis
12	CRP	C reactive protein
13	MODS	Multi organ failure

Receiving Date: 10/07/2024 Acceptance Date: 20/08/2024

DOI: https://doi.org/10.53555/AJBR.v27i1S.1580

INTRODUCTION

Acute pancreatitis is an inflammatory condition leading to enzymatic auto digestion and the destruction of pancreatic tissue. Its presentation ranges widely from mild, self-limited disease to sepsis and multi organ failure [(1)]

Delays in the identification of early organ dysfunction are associated with a higher risk of morbidity and mortality [(2)].Identifying patients with severe disease at earlier stages would facilitate appropriate intervention, goal directed treatment and reduce associated morbidity and mortality. A number of scoring systems have been created and revised with the aim to stratify the severity of Acute Pancreatitis. Most commonly used ones include the Ranson's score, Bedside index of severity in Acute Pancreatitis (BISAP) , Acute Physiology and Chronic Health Evaluation (APACHE II)- (has 15 variables designed for use in the intensive care unit (ICU) to predict mortality)and CT Severity Index (CTSI)(based on CT imaging)3.The practicality and usefulness of these tools in ED management are limited by their complexity and reliance on post-admission data.[(1)]

The 2012 revision of the Atlanta Classification provides a framework to classify acute pancreatitis based on clinical and radiologic criteria. This classification delineates three degrees of severity: mild acute pancreatitis, moderately severe acute pancreatitis, and severe acute pancreatitis. Under this system, patients cannot be diagnosed with severe pancreatitis until 48 hours following presentation which limits its use in the ED.[(1)(5)]

Systemic immune-inflammation index (SII) is a new systemic inflammatory prognostic indicator associated with outcomes in patients with different tumors [(4)] and many chronic/acute inflammatory diseases. We calculated SII from the equation, SII = P x N/L, where P, N and L are the peripheral blood platelet, neutrophil and lymphocyte counts per liter respectively[(5)(6)]

Acute Pancreatitis is a highly inflammatory disease and it triggers , excessive stimulation of leukocytes which invokes the release of inflammatory factors and trigger systemic inflammatory response syndrome. Inflammatory factors cause pancreatic tissue damage and platelet activation. Activated platelets can produce a large number of cytokines and chemokines, thereby promoting activation of neutrophils [(7)].Activated neutrophils can produce a large number of oxygen-free radicals and proteolytic enzymes, which may damage endothelial cells. Neutrophil depletion can significantly reduce pancreatic injury and damage to organ systems and significantly improve the SAP survival rate[(8)].In addition, neutrophils mediate further activation of trypsinogen byproducts of NADPH oxidase, exacerbate pancreatic injury and even cause lung injury[(9)].

So in acute pancreatitis the storm of pro-inflammatory cytokines leads to SAP and systemic inflammatory response syndrome (SIRS) or multiple organ failure.

So it is sensible and feasible to use SII as a systemic inflammatory ischemic index as a severity marker because it can reflect the disease characteristics of acute pancreatitis more comprehensively and some studies suggest that SII has a significantly better predictive value than PLR and NLR.[(13)]

CRP is a solitary and early assessment tool and a viable indicator of morbidity and mortality in acute pancreatitis. Measurement of CRP levels is a simple and inexpensive method. Initial CRP at time of admission still has poor initial predictive value of severity, even at 24 h post onset of AP, CRP is still inferior to other biomarkers.Il-6, IL-8 and TNF-α are early pro-inflammatory cytokines released during the acute

phase response which in turn stimulate the liver to produce CRP[10]. So the accepted figure by international consensus for prediction of severe acute pancreatitis is an absolute CRP >150 mg/dL within 48 hr of admission [11][12].some studies suggest that Interval change in CRP is a comparable measure to absolute CRP in the prognostication of AP severity[11].

In this study we compare the diagnostic accuracy of the new inflammatory marker SII with the already established marker CRP in predicting the severity of acute pancreatitis and to demonstrate the outcome of patient (no of hospital stay and ICU admissions) in order to establish SII too have similar predictive and prognostic value compared to CRP.

REVIEW OF LITERATURE

The pancreas is a retroperitoneal organ with endocrine and exocrine functions. It contains three segments—head, body, and tail—that span across the upper abdomen. The pancreatic head sits within the concave C loop of the duodenum, located in the epigastrium. The body of the pancreas traverses posteriorly to the stomach, and the pancreatic tail abuts the hilum of the spleen in the left upper quadrant. A large main pancreatic duct (duct of Wirsung) courses within the pancreas from the tail to the head, where it meets the common bile duct to form the ampulla of Vater, which drains its contents into the duodenum via the sphincter of Oddi.

The localized destruction characterizes the pathophysiology of pancreatitis in the pancreas and systemic inflammatory response. The major inciting event is the premature activation of the enzyme trypsinogen to trypsin within the acinar cell instead of the duct lumen. The leading cause is an elevation in ductal pressures (such as duct obstruction) and problems with calcium homeostasis and pH. Many toxins responsible for causing pancreatitis cause ATP depletion, increasing the intra-acinar calcium concentrations that may stimulate the early activation of trypsinogen to trypsin, activating enzymes such as elastase and phospholipases.

This premature activation of these zymogens causes extensive tissue damage and Damage Associated Molecular Patterns (DAMPs) release. This release of DAMPs is associated with recruiting neutrophils and initiating the inflammatory cascade. This inflammatory cascade then leads to the systemic manifestations of acute pancreatitis. It ultimately produces capillary permeability and endothelium damage with microvascular thrombosis that gives rise to multi-organ dysfunction syndrome (MODS) as the most common cause of death.

CAUSES OF ACUTE PANCREATITIS

- Gallstones
- Alcohol use
- Hypertriglyceridemia
- Hypercalcemia
- Drug-induced pancreatitis
- Idiopathic
- Post-procedural, e.g., endoscopic retrograde cholangiopancreatography or abdominal surgery
- Ampullary stenosis, which is formerly known as sphincter of Oddi dysfunction type I
- Autoimmune pancreatitis, type I (systemic IgG4 disease-related), and type II
- Viral infections like Coxsackie, Cytomegalovirus, Echovirus, Epstein-Barr virus, Hepatitis A/B/C, HIV, Mumps, Rubella, and Varicella
- Bacterial infections like Campylobacter jejuni, Legionella, Leptospirosis, Mycobacterium avium, Mycobacterium tuberculosis, and Mycoplasma
- Smoking
- Trauma
- Congenital anomalies, e.g., annular pancreas
- Genetic disorders like hereditary pancreatitis, cystic fibrosis, and alpha 1-antitrypsin deficiency
- Parasitic infections (Ascaris lumbricoides, Cryptosporidium, Clonorchis Sinensis, Microsporidia)
- Renal disease (Hemodialysis)
- Toxins (Scorpion bites, organophosphate poisoning)
- Vasculitis (Polyarteritis nodosa, Systemic lupus erythematosus)

DIAGNOSTIC CRITERIA

According to the Revised Atlanta Classification, the diagnosis of acute pancreatitis requires meeting at least 2 of 3 criteria:

A lipase or amylase level is three times the normal upper limit.

Abdominal pain is consistent with pancreatitis.

Abdominal imaging is consistent with acute pancreatitis.

Serum amylase rises within 6 to 12 hours of the onset of acute pancreatitis. Amylase has a short half-life of approximately 10 hours and in uncomplicated attacks returns to normal within three to five days. Serum amylase elevation of greater than three times the upper limit of normal has a sensitivity for the diagnosis of acute pancreatitis of 67 to 83 percent and a specificity of 85 to 98 percent.Given the short half-life of amylase, the diagnosis of acute pancreatitis may be missed in patients who present >24 hours after the onset of pancreatitis.20 percent of patients with alcoholic pancreatitis due to the inability of the parenchyma to produce amylase its value won't raise above three fold of normal limit, and in 50 percent of patients with hypertriglyceridemia-associated pancreatitis as triglycerides interfere with the amylase assay.

Serum amylase is not specific as it is raised in other conditions like renal failure, salivary gland disease, liver disease, appendicitis, cholecystitis, intestinal obstruction, intestinal ischemia,

peptic ulcer disease, and gynecologic diseases.

Serum lipase has a sensitivity for acute pancreatitis ranging from 82 to 100 percent . Lipase rises within four to eight hours of the onset of symptoms, peaks at 24 hours, and returns to normal within 8 to 14 days. So useful in patients who present >24 hours after the onset of pain.

OTHER ENZYMES ELEVATED IN ACUTE PANCREATITIS

Trypsinogen activation peptide (TAP), a five amino-acid peptide that is cleaved from trypsinogen to produce active trypsin, is elevated in acute pancreatitis.TAP may be useful in detection of early acute pancreatitis and as a predictor of the severity of acute pancreatitis.

Urinary and serum trypsinogen-2 levels are elevated in early acute pancreatitis. However, additional studies are needed to determine their role in the diagnosis of acute pancreatitis.

Markers of immune activation

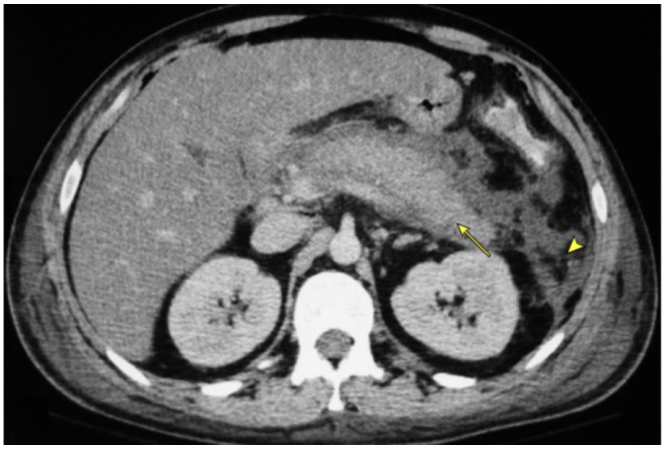
Activation of granulocytes and macrophages in acute pancreatitis results in release of a number of cytokines and inflammatory mediators. Acute pancreatitis is associated with elevations in C-reactive protein (CRP), interleukin (IL)-6, IL-8, IL-10, tumor necrosis factor (TNF), and PMN elastase. A CRP level above 150 mg/L at 48 hours is associated with severe pancreatitis.

RADIOLOGICAL EVALUATION

ABDOMINAL ULTRASOUND: In patients with acute pancreatitis, the pancreas appears diffusely enlarged and hypoechoic on abdominal ultrasound.Peripancreatic fluid appears as an anechoic collection on abdominal ultrasound. In 25 to 35 percent of patients with acute pancreatitis, bowel gas due to an ileus precludes evaluation of the pancreas or bile duct..

Ultrasound cannot clearly delineate extra pancreatic spread of pancreatic inflammation or identify necrosis within the pancreas.

CECT ABDOMEN: It is performed three or more days after the onset of abdominal pain, contrast-enhanced CT scan can reliably establish the presence and extent of pancreatic necrosis and local complications and predict the severity of the disease. The modified CT severity index (CTSI) is a classification system based on CT imaging.



(CT) scan of a 34-year-old male with acute pancreatitis reveals the pancreas enhances homogeneously (arrow) but there is evidence of peripancreatic necrosis (arrowhead)

Severity Scoring Systems

At initial evaluation, the severity of acute pancreatitis should be assessed by clinical examination to assess for early fluid losses, organ failure (**Modified Marshall scoring system** for organ dysfunction) ,systemic inflammatory response syndrome **(SIRS) score** and Bedside Index of Severity in Acute Pancreatitis **(BISAP) score**.

Harmless Acute Pancreatitis Score **(HAPS)** aims to identify mild cases of acute pancreatitis using just three factors: presence or absence of peritonitis (rebound tenderness or guarding), creatinine, and hematocrit. HAPS has been shown to be 97% specific for mild disease,

although it is not sensitive.

Several isolated serum markers have also been proposed as indicators of severity. **Procalcitonin** has been shown to be a predictor of severe acute pancreatitis, as well as C-- reactive protein (CRP); however,**CRP** is more useful 24 to 48 hours after admission.

The 2012 revision of the **Atlanta Classification** provides a framework to classify acute pancreatitis based on clinical and radiologic criteria. This classification delineates three degrees of severity: mild acute pancreatitis, moderately severe acute pancreatitis, and severe acute pancreatitis. But to classify pancreatitis with atlanta needs at least 48 hours following presentation which limits its use in the ED.

The oldest and most well-- known scoring system to assess the severity of pancreatitis is the **Ranson criteria**, which uses a combination of clinical features, vital signs, and serum

markers at both presentation and 48 hours after admission to predict mortality.

Another well known scoring is the Acute Physiology and Chronic Health Evaluation II **(APACHE II)** system, which consists of 15 variables designed for use in the intensive care unit (ICU) to predict mortality.

The **modified CT severity index** (CTSI) is a classification system based on CT imaging. The CTSI allots points for pancreatic enlargement, inflammation, necrosis, fluid collections, and

extrapancreatic complications.

A Ranson score ≥3, APACHE II score ≥8, and an MCTSI ≥4 are considered high risk for severe disease. Modified marshall scoring 2 or more in any system defines the presence of organ failure.

Majority of score requires collection of several parameters, hence limits its application in early

diagnosis of AP severity and prediction of prognosis in ED.There is a need to identify early and easy diagnosis indicators for distinguishing SAP from MAP with the overarching goal of

reducing mortality.

SII is a new systemic inflammatory prognostic indicator that takes into account the peripheral blood neutrophil, lymphocyte, and platelet counts. The formula for SII : product of neutrophils and platelets divided by lymphocytes.

SII has been used as an indicator for predicting and assessing neurological disease, inflammatory disease, and carcinomas. This study aimed at exploring whether SII can be used as an effective parameter for predicting the severity of acute pancreatitis (AP).

The rationale behind using SII lies in its ability to reflect both the pro-inflammatory response (neutrophils) and the anti-inflammatory response (lymphocytes), as well as the role of platelets in inflammation and coagulation.

Patients with chronic inflammatory disease , metabolic syndrome , patients on steroids , malignancy patients and pregnant females are excluded from this study as it can bias the SII index and outcome of acute pancreatitis.

SII can be used for predicting the severity , prognosis (including the need for intensive care unit (ICU) admission, length of hospital stay) , clinical utility (early risk stratification and decision-making regarding the intensity of monitoring and treatment required).

The aim of this study is to find correlation between SII with other established severity scores and to compare with CRP which is also a proven prognostic marker for acute pancreatitis.

Modified marshall score

Organ system	0	1	2	3	4
Respiratory (PaO_2/FiO_2)	>400	301-400	201-300	101-200	≤101
Renal* (serum creatinine, mmol/L)	≤134	134-169	170-310	311-439	>439
Renal* (serum creatinine, mg/dL)	<1.4	1.4-1.8	1.9-3.6	3.6-4.9	>4.9
Cardiovascular (systolic blood pressure, mm Hg)†	>90	<90 and fluid responsive	<90 and not fluid responsive	<90, pH<7.3	<90, pH<7.2
For nonventilated patients, the FiO_2 can be estimated from below:					
Supplemental oxygen, L/min		FiO_2 (%)			
Room air		21			
2		25			
4		30			
6-8		40			
9-10		50			

Revised Atlanta classification

A. Mild acute pancreatitis:

(i) No organ failure

(ii) No local or systemic complications

B. Moderately severe acute pancreatitis:

(i) Organ failure that resolves within 48 h (transient organ failure) and/or

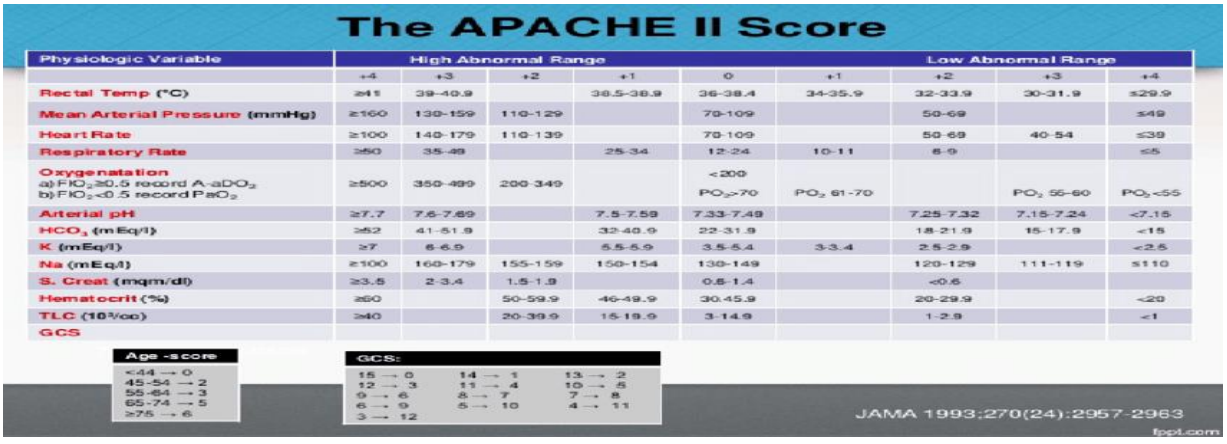
(ii) Local or systemic complications without persistent organ failure

C. Severe acute pancreatitis : Persistent organ failure (> 48 h)

(i) Single organ failure

(ii) Multiple organ failure

APACHE - II SCORE



1. Xingming Liu, Guoxin Guan and Xinye Cui conducted a study 101 acute pancreatitis patients in Dalian medical university in china to establish that SII can be used as an effective parameter for predicting the severity of acute pancreatitis. Patients were then divided
into two groups: MAP (n = 73, 65.7%) and SAP (including moderate-severe pancreatitis and severe acute pancreatitis) (n = 28) according to the Atlanta classification of acute
Pancreatitis. Data showed the majority of patients from MAP and SAP were male.
Laboratory markers, WBC, neutrophil ,lymphocyte, PLR, NLR, SII, BISAP 0 h score, and CTSI
score increased significantly in the SAP group. Patients with SII value ≥ 2207.53 had
a higher probability of having SAP with a sensitivity of 92.9% , along with cut off points of NLR were 9.68 (sensitivity = 82.1% and specificity = 82.2%), and PLR was 195.08 (sensitivity = 82.1% and specificity =84.9%). Hence the study results indicated that predictive value of SII was better than that of NLR and PLR[13]

2.Daguan Zhang, Tingting Wang,Xiuli Dong and colleagues conducted a retrospective cohort study using data retrieved from the Medical Information Mart for Intensive Care study in Wenzhou Medical University. Main outcome was to assess the impact of SII on the 30- and 90-day mortality of AP patients. 513 patients were enrolled into the study and divided them into 3 groups as low-SII group, mid-SII group, and high-SII group (SII: <75.5; 75.6 −104.2; and >104.2,respectively).Results indicated that patients in the high-SII group had higher SOFA and SAPS III scores ($p < 0.001$ for all). Patients in the high SII score group had high 30 day and 90 days mortality.[15]

3.Murat Biyik , Zeynep Bıyık , Mehmet Asil , Muharrem Keskin conducted a study to examine the relation of the SII index and SIRI with disease severity and acute kidney injury (AKI) in subjects with AP.A total of 332 subjects with AP were analyzed retrospectively.Multivariate regression (MR) was done to determine the independent risk factors for AKI and severe AP (SAP).Statistical analyses showed that both median SII index and median SIRI increased gradually with higher AP severity with positive correlation.ROC analysis showed that the SII index could accurately differentiate SAP (AUC = 0.809, $p < 0.001$) and AKI (AUC = 0.820, $p = 0.001$) in patients with acute pancreatitis.[16]

4.Bhavana tiwaria, Ankur Sharmab and Vishesh Vashishthab from Department of surgery, army College of Medical sciences, Delhi, India; conducted a study on Comprehensive Assessment of Inflammatory Indices to Predict Outcomes in Acute Pancreatitis.They took two novel inflammatory markers, the systemic immune-inflammation (SII) index and the systemic inflammatory response index (SIRI), in predicting outcomes in patients with acute pancreatitis.The study concluded that receiver operator characteristic (ROC) analyses for both the SIRI and SII, demonstrating the superiority of the SII through this analysis as an effective marker in predicting outcome in acute pancreatitis.[17]

5. Juthika Abhijit Deherkar, Ayush Pandey, Shahaji Deshmukh conducted an observational comparative prospective study in 100 patients to measure C- reactive protein (CRP) levels in patients of acute pancreatitis and evaluate if CRP levels predict the severity of pancreatitis in 2019 department of Surgery, Bharati Vidyapeeth, Medical College, Pune, Maharashtra, India.
The study observed that measurement of CRP level is a simple method to assess the severity of disease. Also an absolute CRP level higher than 170 mg/dl at 48 hours has been reported to be more valuable for predicting severe acute pancreatitis and pancreatic necrosis than CRP level measurements at any time before 48 hours.[12]

6.Varun Dogra, Javid Ahmad Peer, Ishfaq Ahmed Gilkar from GMC jammu have done a study to check whether a solitary and early assessment of CRP levels is a viable indicator of morbidity and mortality in acute pancreatitis. 50 patients were entitled to this prospective observational study. Samples for C reactive proteins levels were analyzed at 72 Hours after the onset of symptoms , Computed tomography with oral and IV contrast agents was done at 72 hours after admission and CT severity Index with CT grade and necrosis grade was
ascertained. The study showed a positive correlation with severity of pancreatitis in CT-scan (ct severity index) with CRP levels with a p value of >0.005. Most of the patients in our study with extreme disease had CRP values in excess of 100 mg/dl giving CRP at 72 hours a sensitivity and specificity of more than 80% and 85% respectively.[18]

7. Aaron D. Stirling , Neil R. Moran, Michael E. Kelly and colleagues did a retrospective study on 478 patients comparing absolute and interval changes in CRP values in predicting the adverse effects in acute pancreatitis patients.The measured outcome was to compare whether absolute CRP or interval CRP changes at 24, 48 and 72 h were a better predictor of disease severity. Absolute CRP measurements at admission, 24, 48 and 72 h were recorded along with revised Atlanta Classification disease severity for each patient. Absolute CRP at 48 hrs was again proven to be an acceptable predictor of severity ,which found that a CRP >190 mg/dL (83.3% sensitive and 69.5% specific) was the best indicator of severity having both the highest positive likelihood ratio (2.73) and the lowest negative likelihood ratio (0.24).[11]

8.Ertuğrul Altuğ, Adem Çakir, Hüseyin Kilavuz, Kemal Şener, and colleagues conducted a retrospective study to Compare SII and neutrophil-to-lymphocyte ratio (NLR) in diagnosing pancreatitis and predicting its severity. Study included a total of 300 patients: 150 in the study group and 150 in the control group. The control group was randomly composed of patients who matched the age and sex of the patients in the study group. As for the ratios of laboratory parameters, mean SII, NLR, and PLR were found to be significantly higher in the study group.
The disease was classified into mild and severe according to the Ranson's criteria.WBC, neutrophil, lymphocyte, and CRP were found to be significantly higher in the severe pancreatitis group but there was no significant difference in mean platelet levels.SII, NLR, and PLR scores were significantly higher in patients with severe pancreatitis. These values were compared in terms of diagnosing and predicting the severity of pancreatitis. In diagnosing pancreatitis, SII with a cutoff value of 938.82 × 109/L had 78.7% sensitivity and 46% specificity,

whereas NLR with a cut-off value of 4.45 had 74.7% sensitivity and 50% specificity. This study showed SII was found to perform better than NLR in diagnosing AP. On the contrary, in predicting the severity of pancreatitis, SII, with a cutoff value of 1872.07 × 109/L, had 76.9% sensitivity and 57.7% specificity. NLR, with a cutoff value of 7.44, had 82.1% sensitivity and 60.4% specificity. These results showed that NLR was better than SII in determining the severity of pancreatitis.[19]

9. Gunay Yildiz, Fatih Selvi, Cihan Bedel, Okkes Zortuk and colleagues conducted a retrospective study to investigate the clinical utility of the systemic inflammatory response index (SIRI) and systemic immune- inflammation index (SII) in showing the severity of AP.

They divided 201 patients into two groups according to the severity of the disease as mild and severe AP (MAP and SAP).65 (82.1%) patients had MAP and 36 (17.9%) patients had SAP.

that 49.7% of the patients in the MAP group and 66.7% of the patients in the SAP group were male but mean age was found to be significantly higher in the severe AP group than in the MAP group. Mean WBC, neutrophil, CRP, LDH, and glucose levels were significantly higher in SAP patients compared to the MAP group. While the mean SIRI levels were 3165.71±3058.42 in SAP patients, it was 1043.31±849.15 in MAP patients. Mean SIRI levels were discovered to be significantly higher in SAP patients. While the mean SII levels were 11.19±6.27 in SAP patients, it was 3.12±3.01 in MAP patients. In regression analysis, CRP, SIRI and SII was found to be able to predict SAP in patients with AP. The power of SIRI and SII was found to be higher [AUC for SIRI: 0.890; sensitivity 83.8, specificity 80 $p<0.001$]; [AUC for SII: 0.859, sensitivity 83.3, specificity 73.3; $p<0.001$] in predicting the severity of pancreatitis.[20]

10.Syed Jawad Haider Kazmi,a Muhammad Talha Zafar,b Beenish Fatima Zia,c Saleha Rashid Khalid,c Vikesh Kumar and colleagues conducted a retrospective study on role of serum C-reactive protein (CRP)/Albumin ratio in predicting the severity of acute pancreatitis.

The rationale of this study is to diagnose the severity of acute pancreatitis using a single test ratio, i.e., CRP/albumin ratio which is a combination of markers for systemic inflammation and nutritional status. Severe pancreatitis was determined as CT severity score above 7.

About 41% of patients out of total 225 had severe pancreatitis with a CRP/albumin ratio >4.35 had a sensitivity of 87% and accuracy of 76% to predict acute severe pancreatitis. Elevated CRP/albumin ratio was also associated with complications like multi-organ failure. Hence this study proved that CRP/albumin ratio has higher sensitivity and negative predictive value to predict severe pancreatitis than CRP alone and hence give additional advantage as a prognostic marker.[21]

11. Cardoso et al report in GE Portuguese Journal of Gastroenterology the potential utility of CRP determination in the first 24h as a predictor of in-hospital mortality for AP. This is a retrospective study, involving 134 patients, with nine deaths (6.7%) during hospital admission. The median overall CRP level at 24h was 104.4 (inter-quartile range, 29.2–191.2mg/l) and this biochemical parameter was higher in patients who died during hospital stay (197.2 vs. 100.2, $p=0.003$). In univariate analysis the odds ratio of CRP at 24h for prediction of in-hospital mortality was 1.11 (95% CI, 1.04–1.17) and the corresponding AUC was 0.80 (95% CI, 0.65–0.95). It is interesting to note that none of the 46 patients with CRP levels at 24h lower than 60 mg/l died and only one of the nine patients with severe acute pancreatitis had a CRP level lower than that potential cut-off. On the other hand, the addition of CRP to BISAP reduced the calculated risk of in-hospital mortality in about 42% of patients who survived but the overall effect was not statistically significant.[22]

STUDY OBJECTIVES:

PRIMARY OBJECTIVE:

To study the utility of systemic immune inflammatory index(SII)as a marker in determining the outcomes in patients presenting to the Emergency department with acute pancreatitis.

SECONDARY OBJECTIVE:

To compare systemic immune inflammatory index(SII) to absolute CRP count in acute pancreatitis as an early predictor of severity and outcome.

Material & Methods:

STUDY POPULATION:

Study population includes those patients coming to the emergency department who fits into the inclusion criteria.

STUDY DESIGN: prospective observational study.

DURATION OF STUDY: November 2022 – march 2024

SAMPLE SIZE CALCULATION: Considering 92.9% sensitivity of probability having severe acute pancreatitis by using Systemic immune-inflammation index with an effect size of 12% and 5% level of significance and at 80%power the required sample size is 86 patients

METHODOLOGY

Definitions:

Acute Pancreatitis: Acute pancreatitis (AP) is characterized by inflammation of the exocrine pancreas and is associated with acinar cell injury and both a local and systemic inflammatory response. AP may range in severity from self-limiting, characterized by mild pancreatic oedema, to severe systemic inflammation with pancreatic necrosis, organ failure and death.[1]

Diagnosis of acute pancreatitis is made if the diagnostic criteria are satisfied:

1. Abdominal pain consistent with acute pancreatitis (acute onset of a persistent severe epigastric pain radiating to back)
2. Serum amylase and lipase elevated to threefold to the upper limit of normal value.
3.Characteristic manifestation of acute pancreatitis on CECT ,MRI or trans-abdominal USG.

Organ Failure scores:

Modified Marshall score

Revised Atlanta classification

APACHE-II

Database collection will include documentation of UHID, age, sex, vital signs, abdominal signs, drug and alcohol history and other medical and surgical history. Blood will be drawn routinely on arrival of the patient to the Department of emergency for whole blood cell count with differential count, platelet count, serum amylase and lipase and CRP count on arrival to the hospital. Values of neutrophil, lymphocyte and platelet along with CRP levels are correlated with the disease severity and outcome using the above mentioned scores.

INCLUSION CRITERIA:
Age >18
Meeting the diagnostic criteria for acute pancreatitis.

EXCLUSION CRITERIA:
- Chronic pancreatitis patients
- Patients with chronic inflammatory disease presenting with acute pancreatitis.
- Patients with malignancy
- Pregnancy
- Patients on chronic steroid therapy.
- Obese patients[ɤ]/ with metabolic syndrome[(14)]

SUBJECT RECRUITMENT: study includes patients diagnosed with acute pancreatitis, meeting the inclusion and exclusion criteria to predict the severity of disease using SII as a prognostic tool, after an informed and written consent.

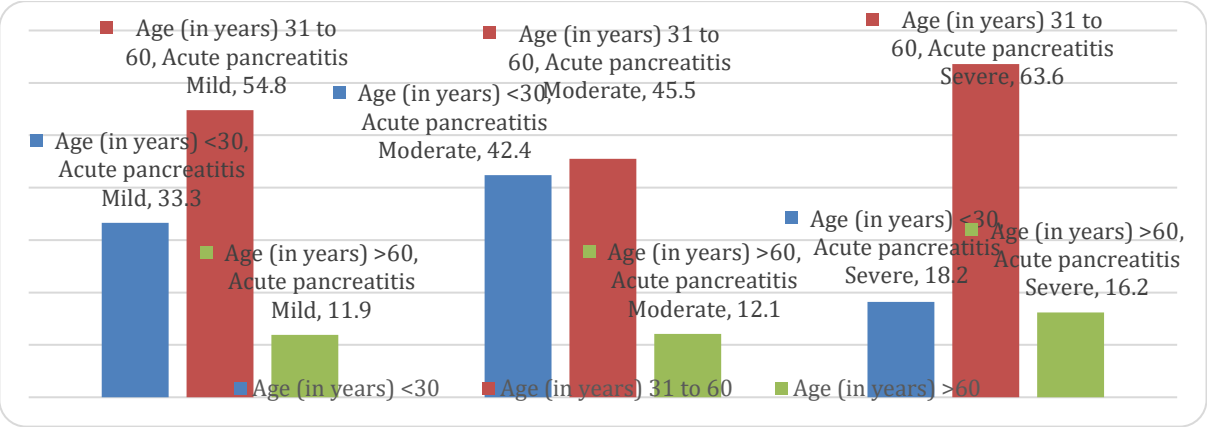
STUDY PROCEDURE:
Patients diagnosed with acute pancreatitis in emergency department
↓
Enrolled into the study after informed and written consent
↓
Blood samples which include CBP and CRP are taken on arrival to the emergency department.
↓
SII score is correlated with severity of acute pancreatitis which includes local and systemic complications , no of days in ICU / need of NIV or ventilator support / Renal replacement therapy and total no days in hospital as primary outcome. Thereby correlating the SII score with modified Marshall and revised Atlanta score.
↓
Establishing SII score as a new inflammatory marker by comparing established and proven marker like CRP in determining the severity of disease as secondary outcome.

STATISTICAL ANALYSIS
The data obtained was manually entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) v23. All the categorical variables were summarized using frequencies and percentages. Continuous variables were summarized using mean (standard deviation) and/or median (interquartile range) (based on the results of data normality, tested using Kolmogorov–Smirnov test and the Shapiro–Wilk test). To test for statistical significance, Chi square test or Fisher exact test (for categorical variables) and independent "t" test or one-way ANOVA with Bonferroni correction (for continuous variables) was used. To test for correlation, we used Pearson's correlation coefficient with 95% confidence interval. Statistical significance was considered at p value less than 0.05.

RESULTS
A total of 86 patients were enrolled in the present study. Based on revised Atlanta classification, it was found that 42 patients (48.8%) had mild acute pancreatitis, 33 patients (38.4%) had moderate, and 11 patients (12.8%) had severe acute pancreatitis.
The mean age of patients was 39.3 years (SD 14.5) for mild cases, 35.4 years (SD 14.3) for moderate cases, and 40.5 years (SD 18.0) for severe cases, with an overall mean age of 37.9 years (SD 14.9), and no significant difference among the groups (p>0.05). When considering age groups, 34.9% of patients were younger than 30 years old, with 33.3% in the mild group, 42.4% in the moderate group, and 18.2% in the severe group. Among patients aged 31 to 60 years, 52.3% were distributed as 54.8% in the mild group, 45.5% in the moderate group, and 63.6% in the severe group. For those older than 60 years, 12.8% of the total patients fell into this category, with 11.9% in the mild group, 12.1% in the moderate group, and 16.2% in the severe group. None of these age distribution differences were statistically significant (p>0.05).

Distribution of severity of acute pancreatitis, by age (in years)

		Acute pancreatitis				**P value**
		Mild N = 42	**Moderate N = 33**	**Severe N = 11**	**Total N = 86**	
		n (%)	**n (%)**	**n (%)**	**n (%)**	
Age (in years) Mean (SD)		39.3 (14.5)	35.4 (14.3)	40.5 (18.0)	37.9 (14.9)	0.782
Age (in years)	<30	14 (33.3)	14 (42.4)	2 (18.2)	30 (34.9)	0.672
	31 to 60	23 (54.8)	15 (45.5)	7 (63.6)	45 (52.3)	
	>60	5 (11.9)	4 (12.1)	2 (16.2)	11 (12.8)	
*Statistically significant at p<0.05 SD, Standard deviation						

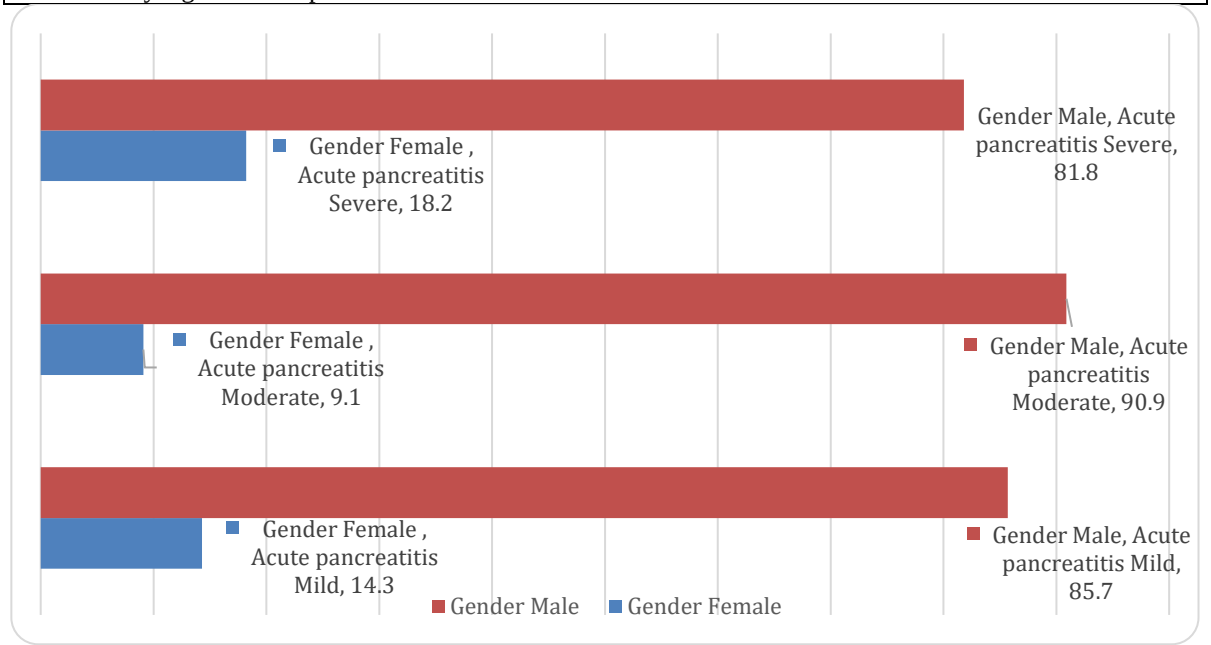


Distribution of severity of acute pancreatitis, by age (in years)

Among those with mild acute pancreatitis, 14.3% were female (6 patients) and 85.7% were male (36 patients). In the moderate group, 9.1% were female (3 patients) and 90.9% were male (30 patients). For the severe group, 18.2% were female (2 patients) and 81.8% were male (9 patients). Overall, 12.8% of the patients were female (11 patients) and 87.2% were male (75 patients). The differences in gender distribution across the severity groups were not statistically significant (p>0.05).

Distribution of severity of acute pancreatitis, by gender

		Acute pancreatitis				P value
		Mild N = 42	Moderate N = 33	Severe N = 11	Total N = 86	
		n (%)	n (%)	n (%)	n (%)	
Gender	Female	6 (14.3)	3 (9.1)	2 (18.2)	11 (12.8)	0.679
	Male	36 (85.7)	30 (90.9)	9 (81.8)	75 (87.2)	
*Statistically significant at p<0.05						



Distribution of severity of acute pancreatitis, by gender

The mean respiratory rate was 19.4 (SD 1.9) for mild cases, 23.3 (SD 3.6) for moderate cases, and 28.2 (SD 2.4) for severe cases, with an overall mean of 22.0 (SD 4.0), showing a statistically significant difference (p<0.05). The mean SPO2 was 97.6% (SD 4.1) for mild, 95.7% (SD 2.1) for moderate, and 88.5% (SD 8.1) for severe cases, with an overall mean of 95.7% (SD 5.1), also significantly different (p<0.05). The mean (SD) mean arterial pressure was 89.1 (9.2)for mild, 78.1 (10.4) for moderate, and 63.5 (10.3)for severe cases, with an overall mean (SD) of 81.6 (13.0), showing a significant difference (p<0.05).The mean pulse rate was 94.1 bpm (SD 11.3) for mild, 109.7 bpm (SD 10.5) for moderate, and 126.2 bpm (SD 16.1) for severe cases, with an overall mean of 104.2 bpm (SD 16.1), showing a significant difference (p<0.05). The mean temperature was 99.3°F (SD 0.9) for mild, 100.8°F (SD

1.2) for moderate, and 101.6°F (SD 0.7) for severe cases, with an overall mean of 100.2°F (SD 1.3), significantly different ($p<0.05$). Lastly, the mean Glasgow Coma Scale score was 15.0 (SD 0.0)for mild, 14.3 (SD 1.1)for moderate, and 13.7 (SD 2.1) for severe cases, with an overall mean of 14.3 (SD 1.1), which was also significantly different ($p<0.05$). All these differences across severity levels were statistically significant ($p<0.05$).

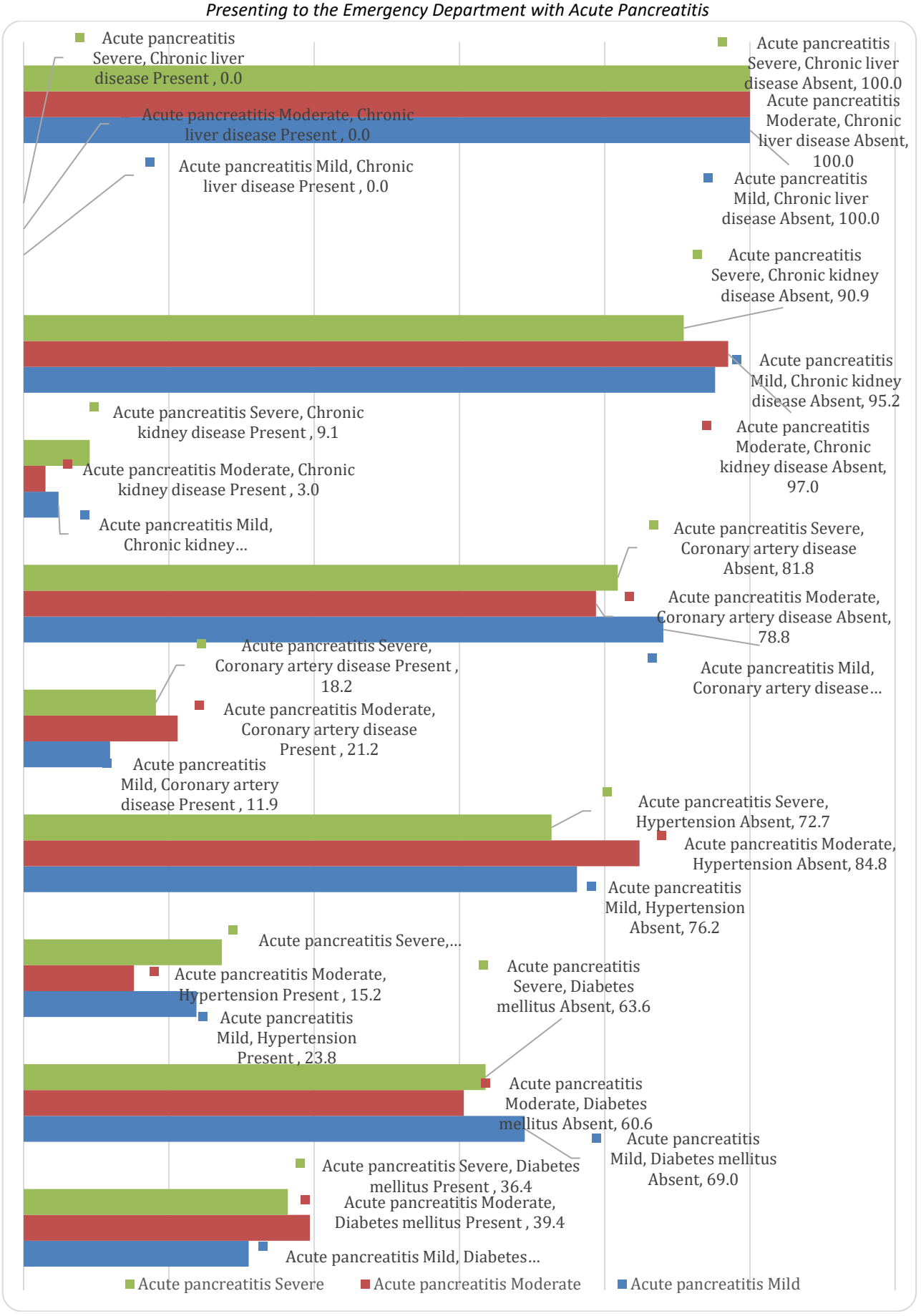
Distribution of severity of acute pancreatitis, by patient vitals and Glasgow coma scale scores

	Acute pancreatitis				**P value**
	Mild N = 42	**Moderate N = 33**	**Severe N = 11**	**Total N = 86**	
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	
Respiratory rate	19.4 (1.9)	23.3 (3.6)	28.2 (2.4)	22.0 (4.0)	<0.001*
SPO2	97.6 (4.1)	95.7 (2.1)	88.5 (8.1)	95.7 (5.1)	<0.001*
Mean arterial pressure	89.1 (9.2)	78.1 (10.4)	63.5 (10.3)	81.6 (13.0)	<0.001*
Pulse rate	94.1 (11.3)	109.7 (10.5)	126.2 (16.1)	104.2 (16.1)	<0.001*
Temperature	99.3 (0.9)	100.8 (1.2)	101.6 (0.7)	100.2 (1.3)	<0.001*
Glasgow coma scale	15.0 (0.0)	14.3 (1.1)	13.7 (2.1)	14.3 (1.1)	<0.001*
*Statistically significant at $p<0.05$ SD, Standard deviation					

Diabetes mellitus was present in 31.0% of mild cases (13 patients), 39.4% of moderate cases (13 patients), and 36.4% of severe cases (4 patients), with an overall prevalence of 34.9% (30 patients). Hypertension was observed in 23.8% of mild cases (10 patients), 15.2% of moderate cases (5 patients), and 27.3% of severe cases (3 patients), with an overall prevalence of 20.9% (18 patients). Coronary artery disease was present in 11.9% of mild cases (5 patients), 21.2% of moderate cases (7 patients), and 18.2% of severe cases (2 patients), with an overall prevalence of 16.3% (14 patients). Chronic kidney disease was noted in 4.8% of mild cases (2 patients), 3.0% of moderate cases (1 patient), and 9.1% of severe cases (1 patient), with an overall prevalence of 4.7% (4 patients). Chronic liver disease was absent in all patients across all severity levels. The test of association showed that none of these differences were statistically significant ($p<0.05$).

Distribution of severity of acute pancreatitis, by presence/absence of comorbidities

		Acute pancreatitis				**P value**
		Mild N = 42	**Moderate N = 33**	**Severe N = 11**	**Total N = 86**	
		n (%)	**n (%)**	**n (%)**	**n (%)**	
Diabetes mellitus	Present	13 (31.0)	13 (39.4)	4 (36.4)	30 (34.9)	0.744
	Absent	29 (69.0)	20 (60.6)	7 (63.6)	56 (65.1)	
Hypertension	Present	10 (23.8)	5 (15.2)	3 (27.3)	18 (20.9)	0.564
	Absent	32 (76.2)	28 (84.8)	8 (72.7)	68 (79.1)	
Coronary artery disease	Present	5 (11.9)	7 (21.2)	2 (18.2)	14 (16.3)	0.547
	Absent	37 (88.1)	26 (78.8)	9 (81.8)	72 (83.7)	
Chronic kidney disease	Present	2 (4.8)	1 (3.0)	1 (9.1)	4 (4.7)	0.710
	Absent	40 (95.2)	32 (97.0)	10 (90.9)	8 (95.3)	
Chronic liver disease	Present	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.000
	Absent	42 (100)	33 (100)	11 (100)	86 (100)	
*Statistically significant at $p<0.05$						

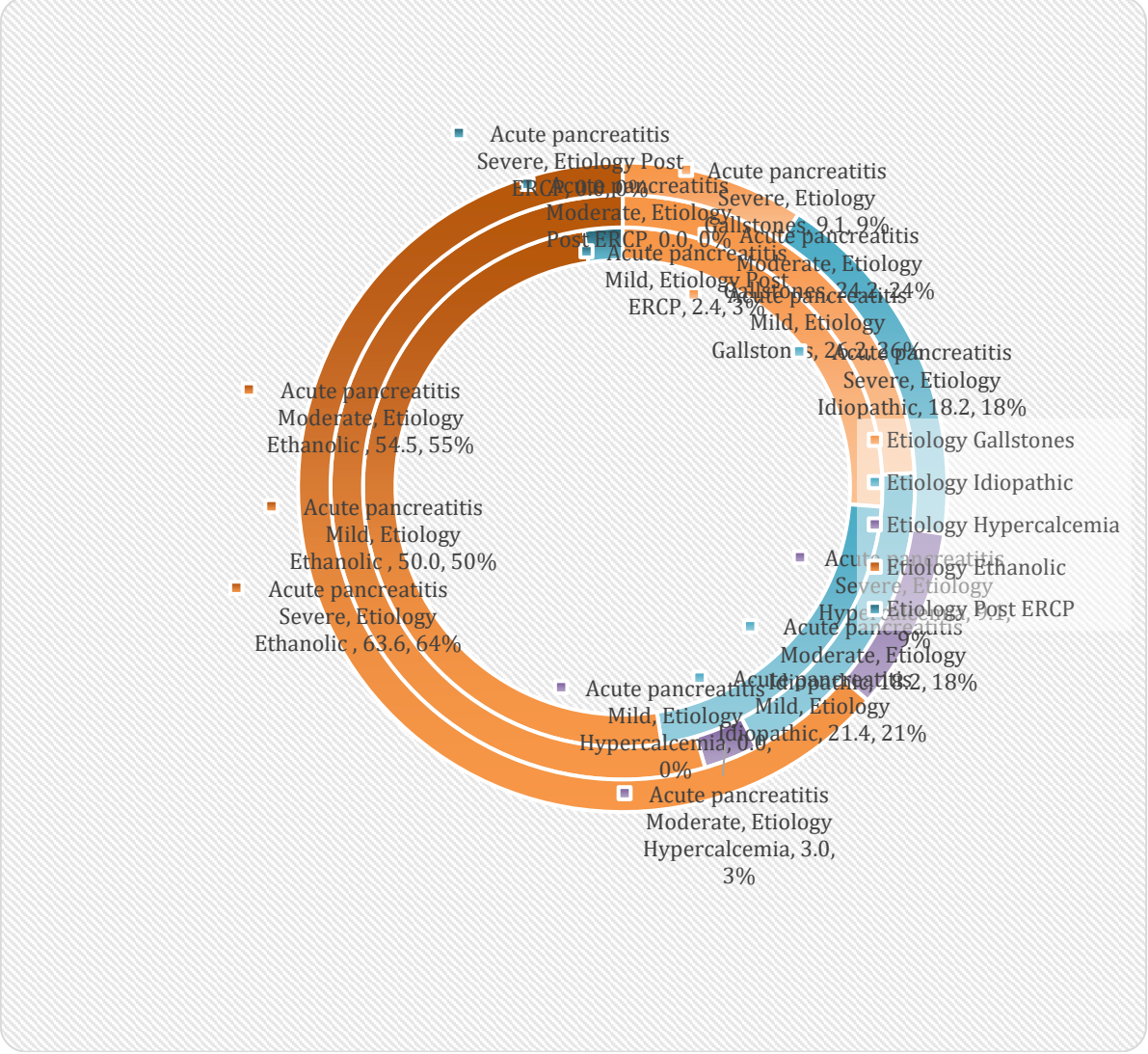

Acute pancreatitis Severe, Chronic liver disease Present , 0.0
Acute pancreatitis Severe, Chronic liver disease Absent, 100.0
Acute pancreatitis Moderate, Chronic liver disease Present , 0.0
Acute pancreatitis Moderate, Chronic liver disease Absent, 100.0
Acute pancreatitis Mild, Chronic liver disease Present , 0.0
Acute pancreatitis Mild, Chronic liver disease Absent, 100.0
Acute pancreatitis Severe, Chronic kidney disease Absent, 90.9
Acute pancreatitis Mild, Chronic kidney disease Absent, 95.2
Acute pancreatitis Severe, Chronic kidney disease Present , 9.1
Acute pancreatitis Moderate, Chronic kidney disease Absent, 97.0
Acute pancreatitis Moderate, Chronic kidney disease Present , 3.0
Acute pancreatitis Mild, Chronic kidney...
Acute pancreatitis Severe, Coronary artery disease Absent, 81.8
Acute pancreatitis Moderate, Coronary artery disease Absent, 78.8
Acute pancreatitis Severe, Coronary artery disease Present , 18.2
Acute pancreatitis Mild, Coronary artery disease...
Acute pancreatitis Moderate, Coronary artery disease Present , 21.2
Acute pancreatitis Mild, Coronary artery disease Present , 11.9
Acute pancreatitis Severe, Hypertension Absent, 72.7
Acute pancreatitis Moderate, Hypertension Absent, 84.8
Acute pancreatitis Mild, Hypertension Absent, 76.2
Acute pancreatitis Severe,...
Acute pancreatitis Moderate, Hypertension Present , 15.2
Acute pancreatitis Severe, Diabetes mellitus Absent, 63.6
Acute pancreatitis Mild, Hypertension Present , 23.8
Acute pancreatitis Moderate, Diabetes mellitus Absent, 60.6
Acute pancreatitis Mild, Diabetes mellitus Absent, 69.0
Acute pancreatitis Severe, Diabetes mellitus Present , 36.4
Acute pancreatitis Moderate, Diabetes mellitus Present , 39.4
Acute pancreatitis Mild, Diabetes...
Acute pancreatitis Severe
Acute pancreatitis Moderate
Acute pancreatitis Mild

Distribution of severity of acute pancreatitis, by presence/absence of comorbidities

Gallstones were identified in 26.2% of mild cases (11 patients), 24.2% of moderate cases (8 patients), and 9.1% of severe cases (1 patient), with an overall prevalence of 23.3% (20 patients). Idiopathic etiology was present in 21.4% of mild cases (9 patients), 18.2% of moderate cases (6 patients), and 18.2% of severe cases (2 patients), with an overall prevalence of 19.8% (17 patients). Hypercalcemia was not observed in mild cases but was present in 3.0% of moderate cases (1 patient) and 9.1% of severe cases (1 patient), with an overall prevalence of 2.3% (2 patients). Ethanolic etiology was the most common, found in 50.0% of mild cases (21 patients), 54.5% of moderate cases (18 patients), and 63.6% of severe cases (7 patients), with an overall prevalence of 53.5% (46 patients). Post-ERCP etiology was rare, seen in 2.4% of mild cases (1 patient) and not observed in moderate or severe cases, with an overall prevalence of 1.2% (1 patient). None of these differences were statistically significant ($p<0.05$).

Distribution of severity of acute pancreatitis, by etiology

		Acute pancreatitis				P value
		Mild N = 42	Moderate N = 33	Severe N = 11	Total N = 86	
		n (%)	n (%)	n (%)	n (%)	
Etiology	Gallstones	11 (26.2)	8 (24.2)	1 (9.1)	20 (23.3)	0.669
	Idiopathic	9 (21.4)	6 (18.2)	2 (18.2)	17 (19.8)	
	Hypercalcemia	0 (0.0)	1 (3.0)	1 (9.1)	2 (2.3)	
	Ethanolic	21 (50.0)	18 (54.5)	7 (63.6)	46 (53.5)	
	Post ERCP	1 (2.4)	0 (0.0)	0 (0.0)	1 (1.2)	
*Statistically significant at p<0.05						



Distribution of severity of acute pancreatitis, by etiology

The mean serum amylase levels were 718.5 U/L (SD 978.7) in mild cases, 713.5 U/L (SD 687.9) in moderate cases, and 1415.9 U/L (SD 1236.2) in severe cases, with an overall mean of 805.8 U/L (SD 935.5) (p>0.05). Serum lipase levels averaged 1352.2 U/L (SD 2002.3) in mild cases, 914.8 U/L (SD 952.4) in moderate cases, and 2325.2 U/L (SD 3143.8) in severe cases, with an overall mean of 1308.8 U/L (SD 1906.0) (p>0.05).

The mean neutrophil count was significantly higher in severe cases at 18025.9 cells/mm³ (SD 4725.2), compared to 14842.4 cells/mm³ (SD 5639.8) in moderate cases and 10152.6 cells/mm³ (SD 5238.0) in mild cases(p<0.05). The lymphocyte count did not differ significantly across severity levels, with means of 1735.5 cells/mm³ (SD 690.8) in mild cases, 1261.3 cells/mm³ (SD 626.8) in moderate cases, and 1285.6 cells/mm³ (SD 623.8) in severe cases(p>0.05).Platelet counts averaged 247.4 x 10^3/µL (SD 77.6) in mild cases, 286.7 x 10^3/µL (SD 101.8) in moderate cases, and 227.3 x 10^3/µL (SD 91.8) in severe cases (p>0.05). C-reactive protein levels were significantly higher in severe cases at 293.5 mg/L (SD 106.4), compared to 259.5 mg/L (SD 97.7) in moderate cases and 115.7 mg/L (SD 81.3) in mild cases(p<0.05).

Blood urea levels were significantly elevated in severe cases at 59.0 mg/dL (SD 20.1), compared to 28.9 mg/dL (SD 11.3) in moderate cases and 26.1 mg/dL (SD 13.4) in mild cases(p<0.05). Serum creatinine levels also showed significant differences, averaging 2.2 mg/dL (SD 1.2) in severe cases, 0.8 mg/dL (SD 0.4) in moderate cases, and 1.0 mg/dL (SD 1.6) in mild cases(p<0.05).Total bilirubin levels were similar across all severity levels, with a mean of 1.6 mg/dL (SD 1.2) (p>0.05). SGOT levels averaged 87.9 U/L (SD 116.1) in mild cases, 89.6 U/L (SD 133.2) in moderate cases, and 64.8 U/L (SD 36.6) in severe cases (p>0.05). SGPT levels were 88.1 U/L (SD 120.2) in mild cases, 70.3 U/L (SD 81.3) in moderate cases, and 104.7 U/L (SD 208.7) in severe cases(p>0.05). Among laboratory parameters, the differences in neutrophil count, C-reactive protein, blood urea, and serum creatinine were statistically significant (p<0.05).

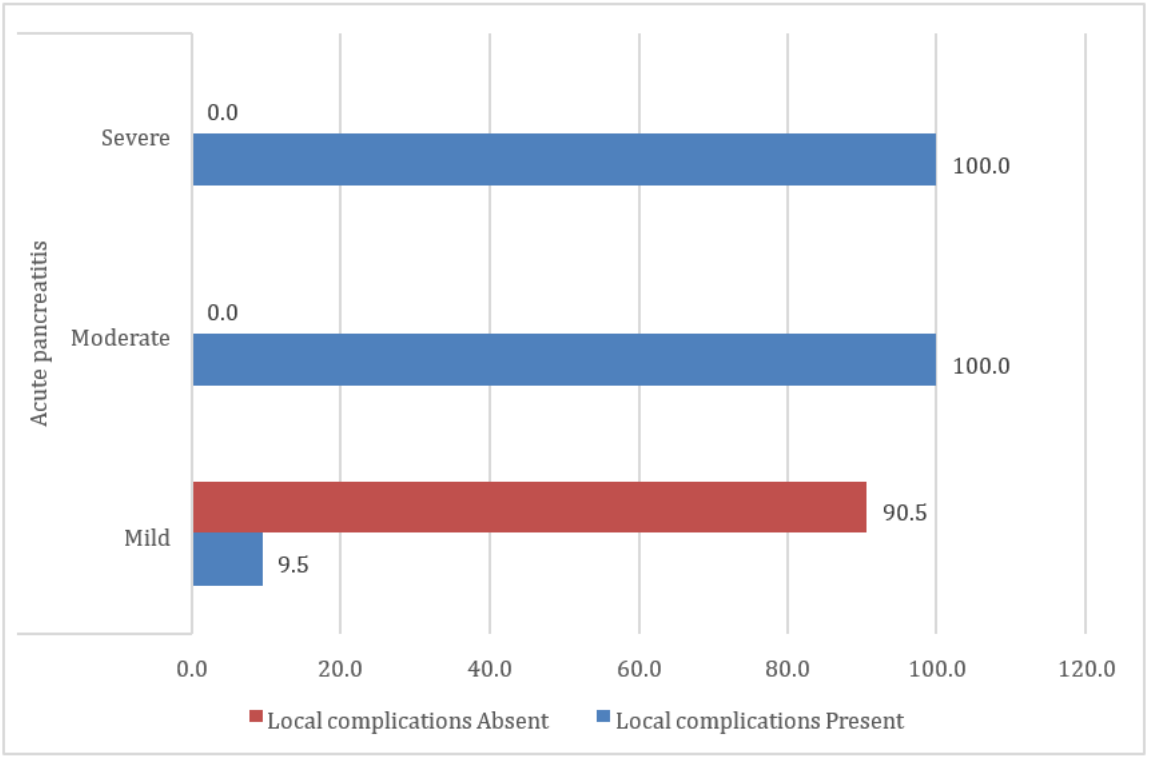
Distribution of severity of acute pancreatitis, by laboratory parameters

	Acute pancreatitis				**P value**
	Mild N = 42	**Moderate N = 33**	**Severe N = 11**	**Total N = 86**	
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	
Serum Amylase	718.5 (978.7)	713.5(687.9)	1415.9(1236.2)	805.8(935.5)	0.082
Serum Lipase	1352.2 (2002.3)	914.8(952.4)	2325.2(3143.8)	1308.8(1906.0)	0.389
Neutrophil	10152.6 (5238.0)	14842.4(5639.8)	18025.9(4725.2)	12959.2(6035.5)	<0.001*
Lymphocytes	1735.5 (690.8)	1261.3 (626.8)	1285.6 (623.8)	1496.0 (692.3)	0.141
Platelet	247.4 (77.6)	286.7 (101.8)	227.3 (91.8)	259.9 (91.1)	0.179
C-reactive protein	115.7 (81.3)	259.5 (97.7)	293.5 (106.4)	193.6 (118.7)	<0.001*
Blood urea	26.1 (13.4)	28.9 (11.3)	59.0 (20.1)	31.4 (17.2)	<0.001*
Serum creatinine	1.0 (1.6)	0.8 (0.4)	2.2 (1.2)	1.1 (1.1)	<0.001*
Total bilirubin	1.6 (1.6)	1.5 (0.8)	1.5 (1.1)	1.6 (1.2)	1.000
SGOT	87.9 (116.1)	89.6 (133.2)	64.8 (36.6)	85.6 (115.8)	1.000
SGPT	88.1 (120.2)	70.3 (81.3)	104.7 (208.7)	83.4 (121.3)	1.000
*Statistically significant at p<0.05					

Among the mild cases, 4 patients (9.5%) experienced local complications, whereas all patients in the moderate and severe groups (100%) had local complications. Overall, 48 patients (55.8%) presented with local complications, while 38 patients (44.2%) did not. The difference in the occurrence of local complications among the severity groups was statistically significant (p<0.05).

Distribution of severity of acute pancreatitis, by presence or absence of local complications

		Acute pancreatitis				**P value**
		Mild N = 42	**Moderate N = 33**	**Severe N = 11**	**Total N = 86**	
		n (%)	**n (%)**	**n (%)**	**n (%)**	
Local complications	Present	4 (9.5)	33 (100)	11 (100)	48 (55.8)	<0.001*
	Absent	38 (90.5)	0 (0.0)	0 (0.0)	38 (44.2)	
*Statistically significant at p<0.05						



Distribution of severity of acute pancreatitis, by presence or absence of local complications

The presence of organ failure, as determined by the Modified Marshall Scoring System, was significantly different across these groups. In the mild group, only 1 patient (2.4%) had organ failure, compared to 11 patients (33.3%) in the moderate group and all 11 patients (100%) in the severe group. Overall, 23 patients (26.7%) had organ failure, and this difference was statistically significant ($p<0.05$). The APACHE II scores were 3.3 (SD 2.9) for mild, 7.5 (SD 2.8) for moderate, and 17.6 (SD 8.4) for severe cases, with an overall mean of 6.7 (SD 6.0), also statistically significant ($p<0.05$). The SII scores were 1541.1 (SD 929.3) for mild, 3866.2 (SD 2150.4) for moderate, and 3891.5 (SD 2789.8) for severe cases, with an overall mean of 2733.9 (SD 2108.9), indicating significant differences across the groups ($p<0.05$).

Distribution of severity of acute pancreatitis, by prognostic scores

		Acute pancreatitis				**P value**
		Mild N = 42	**Moderate N = 33**	**Severe N = 11**	**Total N = 86**	
		Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	
Modified Marshall Scoring System – Organ failure	Present	1 (2.4)	11 (33.3)	11 (100)	23 (26.7)	<0.001*
	Absent	41 (97.6)	22 (66.7)	0 (0.0)	63 (73.3)	
APACHE II		3.3 (2.9)	7.5 (2.8)	17.6 (8.4)	6.7 (6.0)	<0.001*
SII scores		1541.1 (929.3)	3866.2 (2150.4)	3891.5 (2789.8)	2733.9 (2108.9)	<0.001*
*Statistically significant at p<0.05						

The mean duration of ICU stay was 0.1 days (SD 0.8) for mild cases, 1.2 days (SD 1.5) for moderate cases, and 5.5 days (SD 2.9) for severe cases, with an overall mean of 1.2 days (SD 2.2), showing a statistically significant difference ($p<0.05$). The mean duration of hospital stay was 6.1 days (SD 2.4) for mild cases, 9.8 days (SD 2.4) for moderate cases, and 16.0 days (SD 4.3) for severe cases, with an overall mean of 8.8 days (SD 4.2), also indicating a statistically significant difference ($p<0.05$).

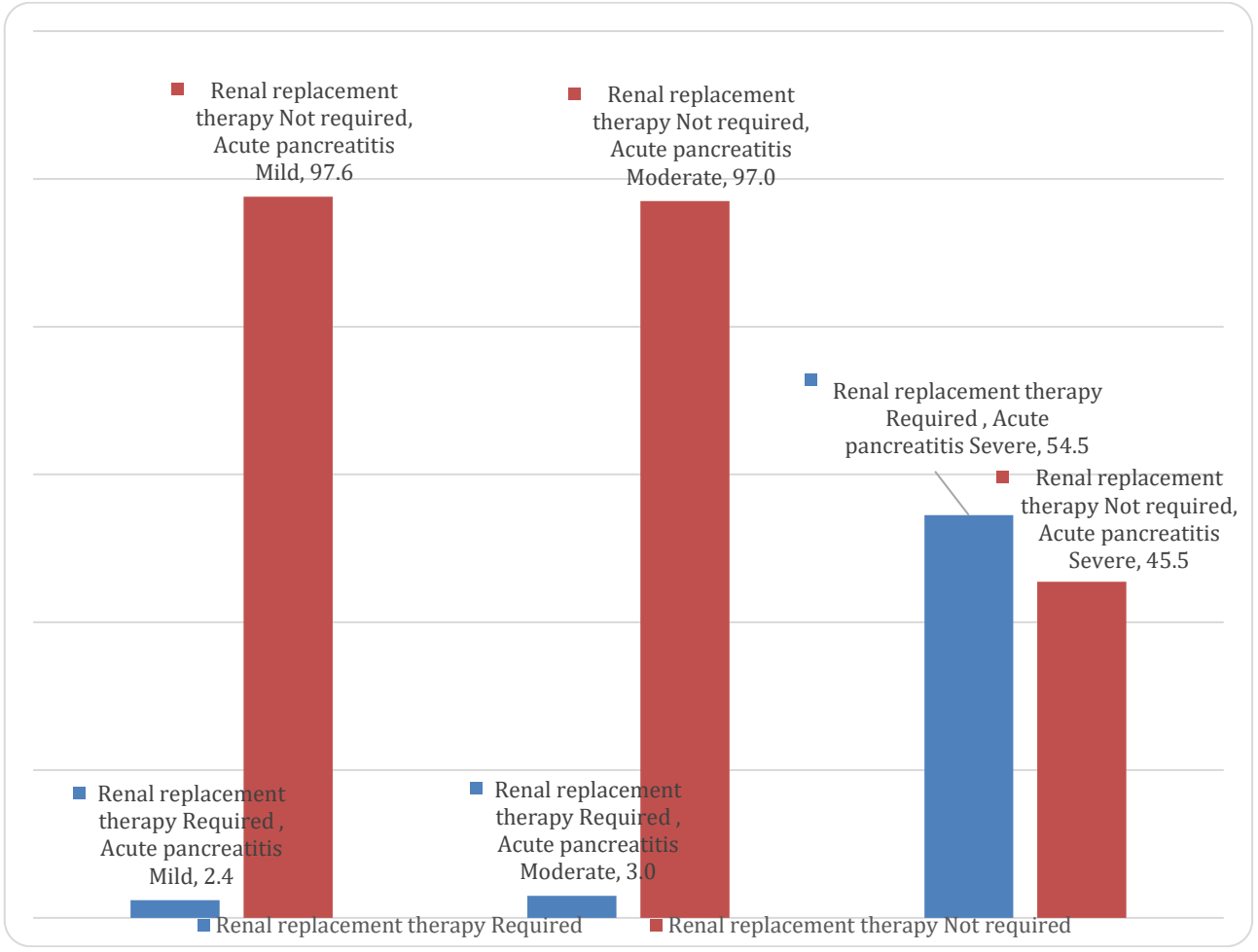
Distribution of severity of acute pancreatitis, by duration of ICU and hospital stay

	Acute pancreatitis				P value
	Mild N = 42	Moderate N = 33	Severe N = 11	Total N = 86	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Duration of ICU stay	0.1 (0.8)	1.2 (1.5)	5.5 (2.9)	1.2 (2.2)	<0.001*
Duration of hospital stay	6.1 (2.4)	9.8 (2.4)	16.0 (4.3)	8.8 (4.2)	<0.001*
*Statistically significant at p<0.05					

Among the mild cases, only 1 patient (2.4%) required RRT, while 41 patients (97.6%) did not. In the moderate group, 1 patient (3.0%) required RRT, and 32 patients (97.0%) did not. However, in the severe group, 6 patients (54.5%) required RRT, whereas 5 patients (45.5%) did not. Overall, 8 patients (9.3%) required RRT, and 78 patients (90.7%) did not. The differences across the groups were statistically significant (p<0.05).

Distribution of severity of acute pancreatitis, by need for renal replacement therapy

		Acute pancreatitis				P value
		Mild N = 42	Moderate N = 33	Severe N = 11	Total N = 86	
		n (%)	n (%)	n (%)	n (%)	
Renal replacement therapy	Required	1 (2.4)	1 (3.0)	6 (54.5)	8 (9.3)	<0.001*
	Not required	41 (97.6)	32 (97.0)	5 (45.5)	78 (90.7)	
*Statistically significant at p<0.05						

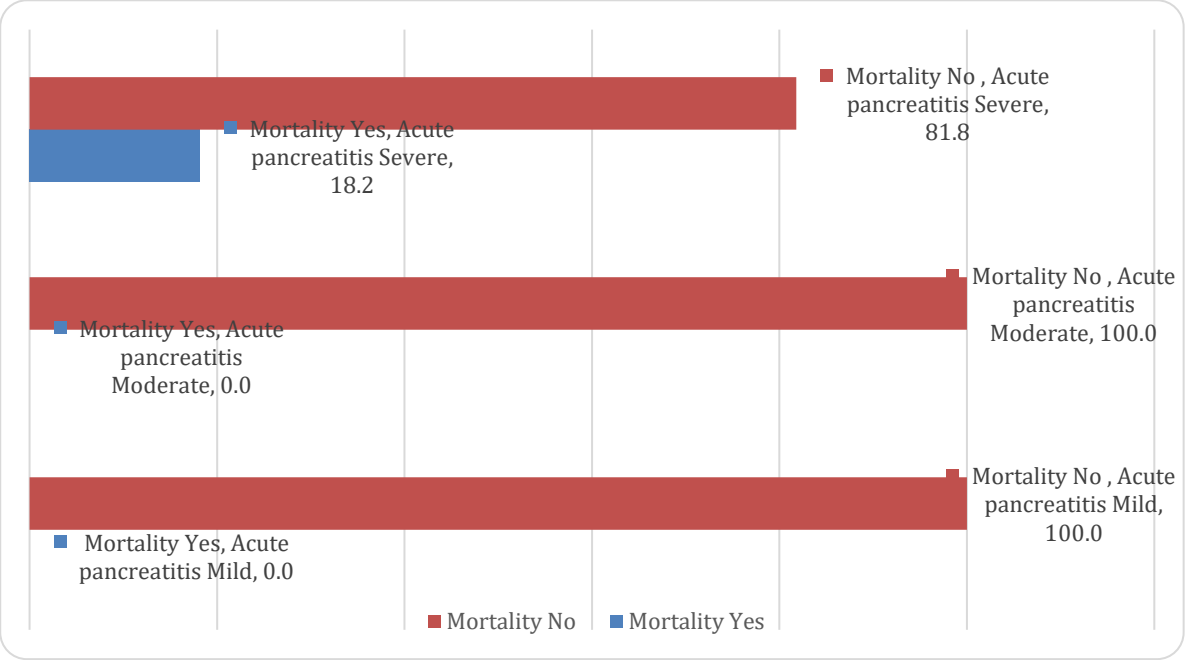


Distribution of severity of acute pancreatitis, by need for renal replacement therapy

Among the mild and moderate cases, there were no reported deaths, representing 0.0% mortality in both groups. In contrast, 2 patients (18.2%) in the severe group died, resulting in an overall mortality rate of 2.3%. The difference in mortality rates between the severity groups was statistically significant ($p<0.05$).

Distribution of severity of acute pancreatitis, by mortality

		Acute pancreatitis				P value
		Mild N = 42	Moderate N = 33	Severe N = 11	Total N = 86	
		n (%)	n (%)	n (%)	n (%)	
Mortality	Yes	0 (0.0)	0 (0.0)	2 (18.2)	2 (2.3)	0.001*
	No	42 (100)	33 (100)	9 (81.8)	84 (97.7)	
*Statistically significant at p<0.05						

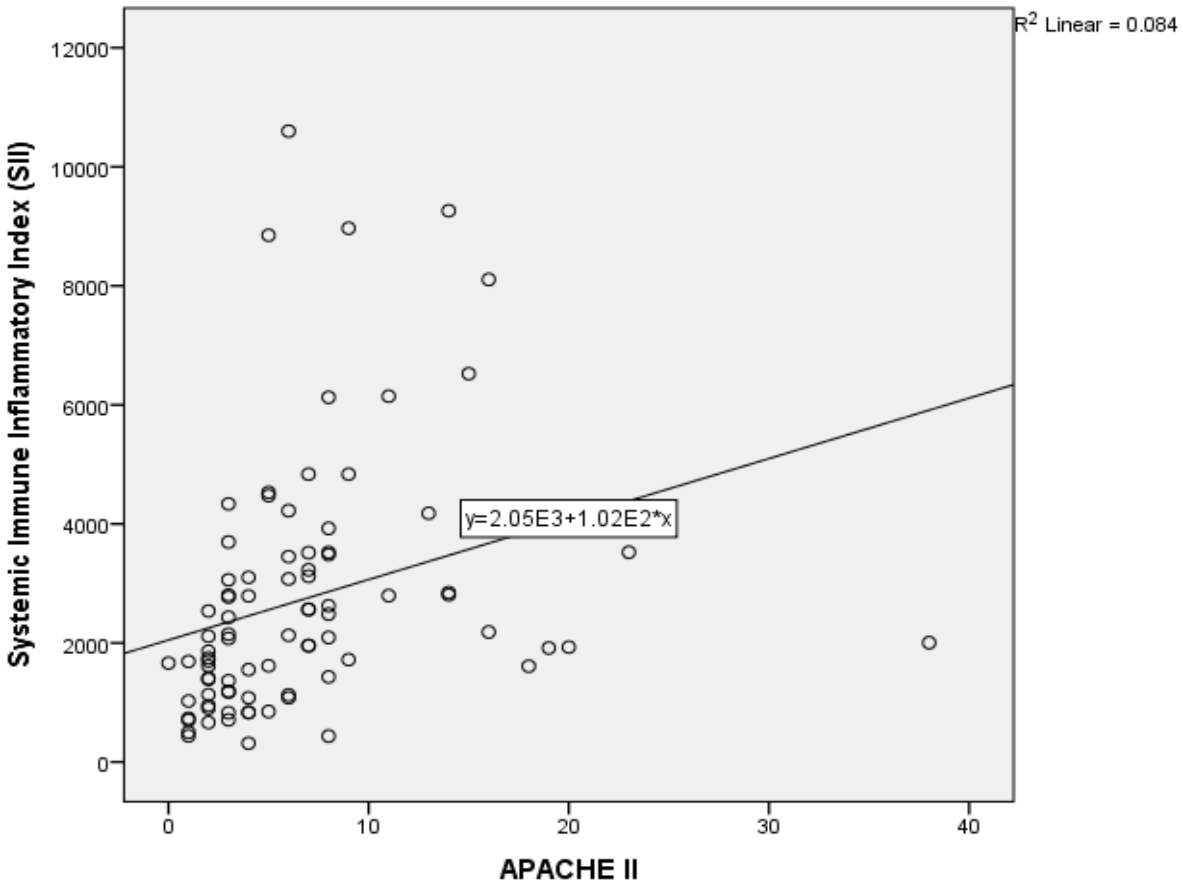


Distribution of severity of acute pancreatitis, by mortality

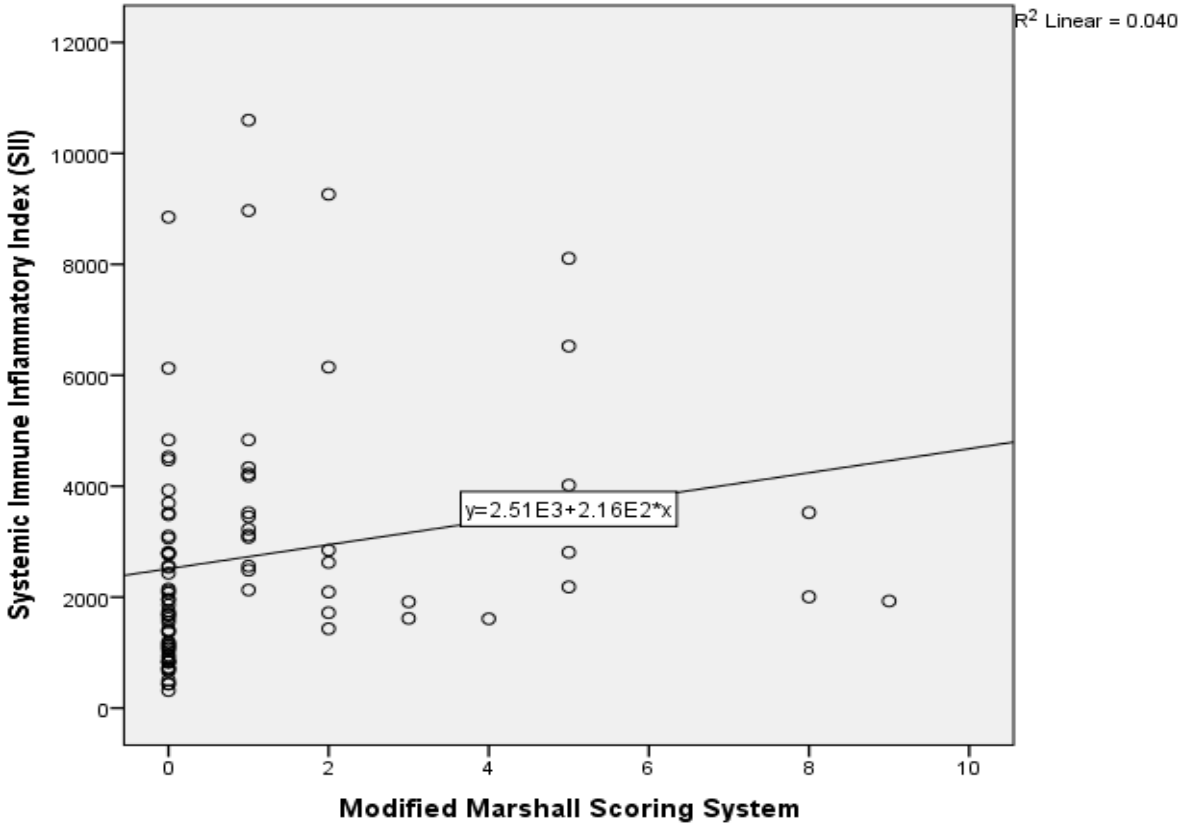
The correlation between Systemic Immune-Inflammation Index (SII) scores and various clinical parameters in acute pancreatitis was assessed. Significant positive correlations were observed between SII scores and the Revised Atlanta Classification (Kendall's tau = 0.48, 95% CI: 0.37 to 0.58, $p<0.05$), APACHE II score (r = 0.29, 95% CI: 0.08 to 0.47, $p<0.05$), Modified Marshall Scoring System (r = 0.42, 95% CI: 0.29 to 0.61, $p<0.05$), C-reactive protein levels (r = 0.55, 95% CI: 0.38 to 0.68, $p<0.05$), duration of ICU stay (r = 0.41, 95% CI: 0.21 to 0.57, $p<0.05$), and duration of hospital stay (r = 0.44, 95% CI: 0.25 to 0.59, $p<0.05$). However, there was no significant correlation between SII scores and the number of organ failures (Kendall's tau = -0.13, 95% CI: -0.36 to 0.11, $p>0.05$).

Correlation between SII scores and other prognostic/severity scores

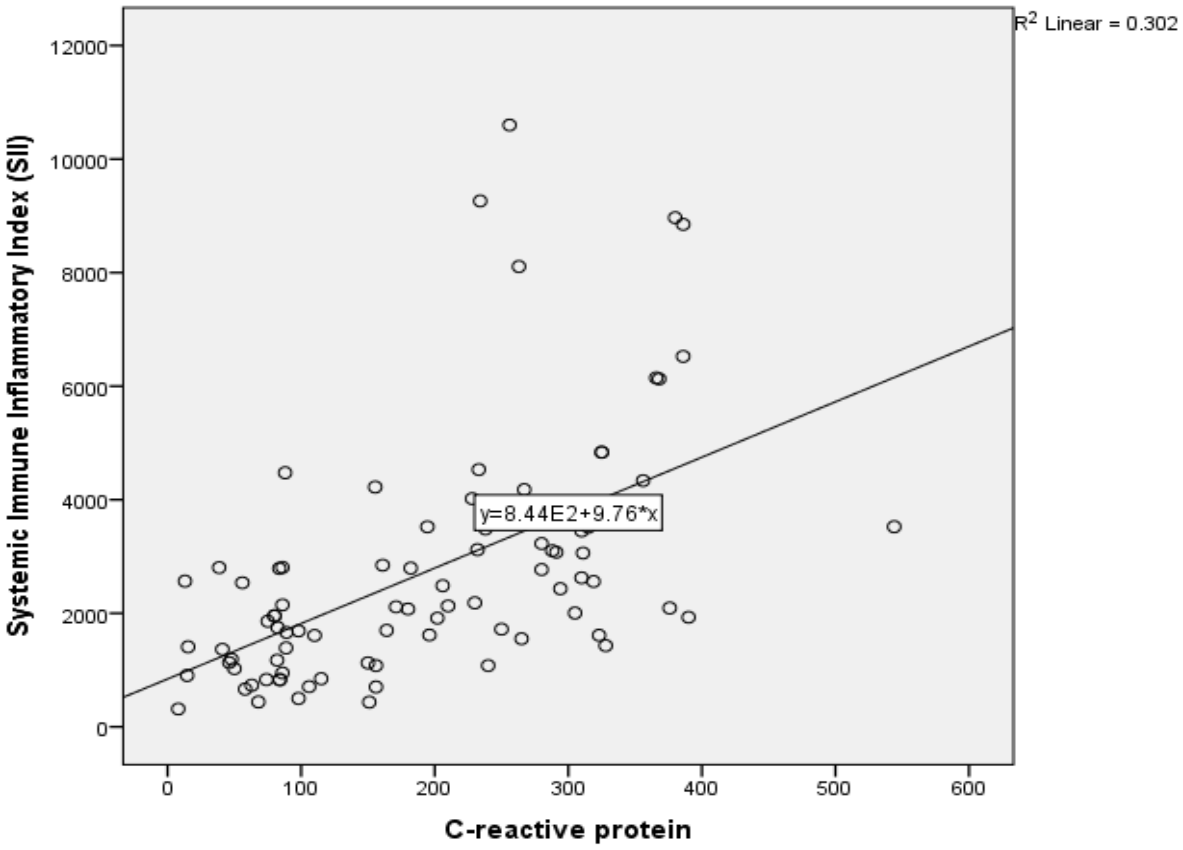
	SII scores	
	Correlation coefficient (95% CI)	P value
Revised Atlantaclassification	Kendall's tau = 0.48 (0.37 to 0.58)	<0.001*
APACHE II	r = 0.29 (0.08 to 0.47)	0.007*
Modified Marshall Scoring System	r = 0.42 (0.29 to 0.61)	<0.001*
C-reactive protein	r = 0.55 (0.38 to 0.68)	<0.001*
Number of organ failures	Kendall's tau = -0.13 (-0.36 to 0.11)	0.336
Duration of ICU stay	r = 0.41 (0.21 to 0.57)	<0.001*
Duration of hospital stay	r = 0.44 (0.25 to 0.59)	<0.001*
*Statistically significant at p<0.05		



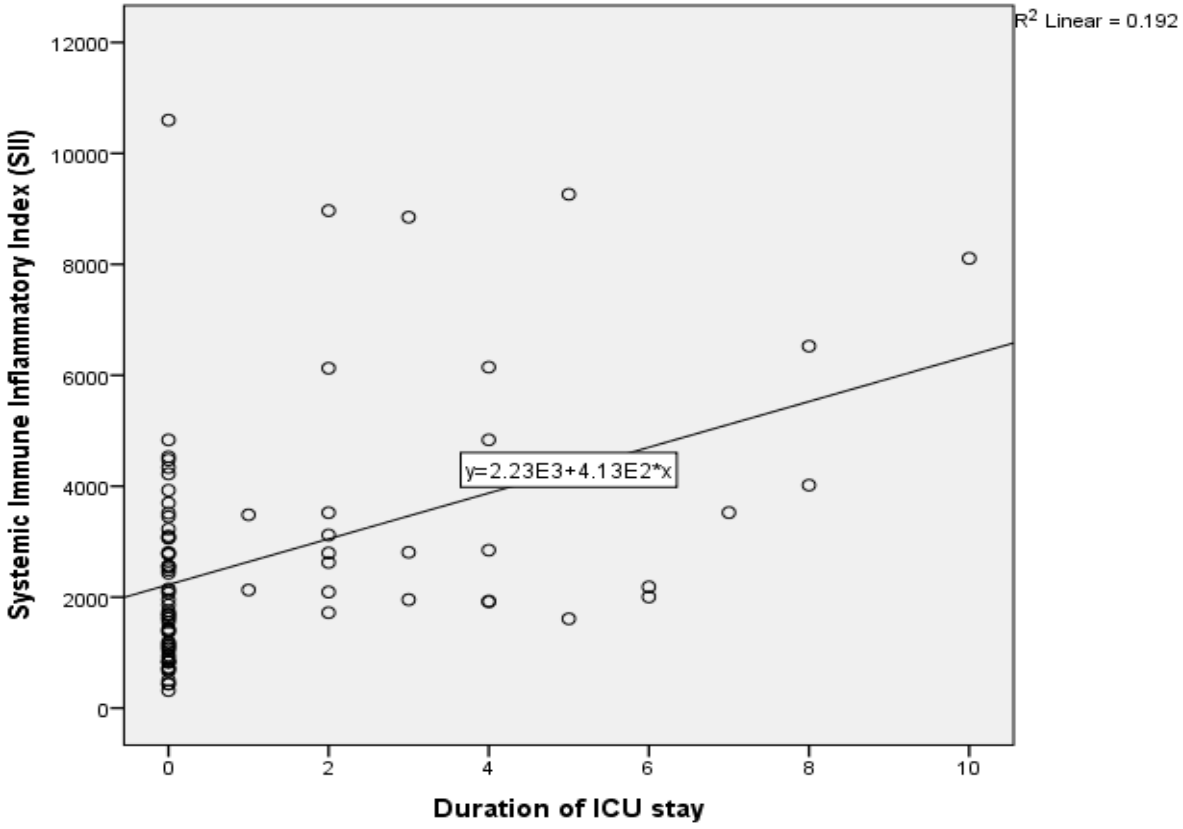
Correlation between SII scores and APACHE II



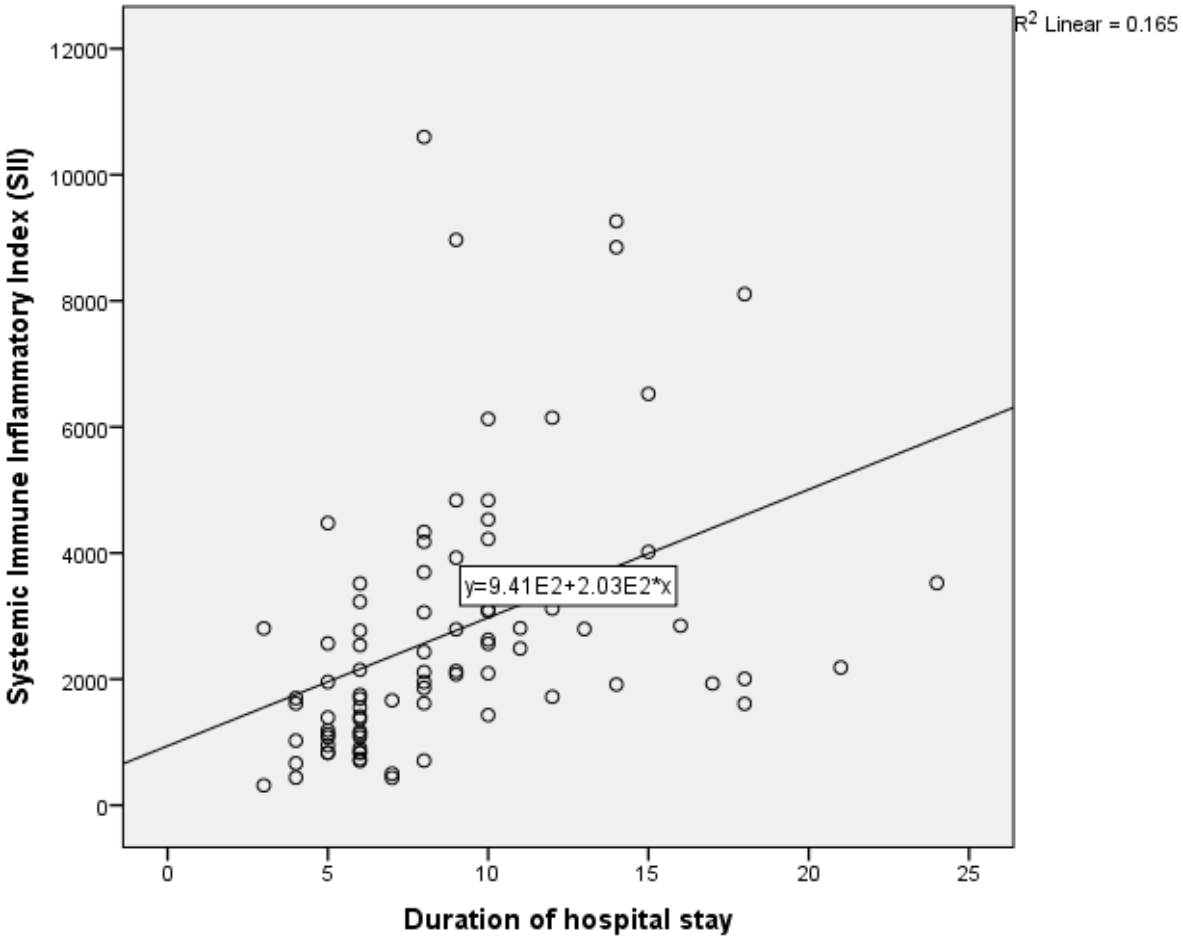
Correlation between SII scores and modified Marshall scoring system



Correlation between SII scores and c-reactive protein



Correlation between SII scores and duration of ICU stay

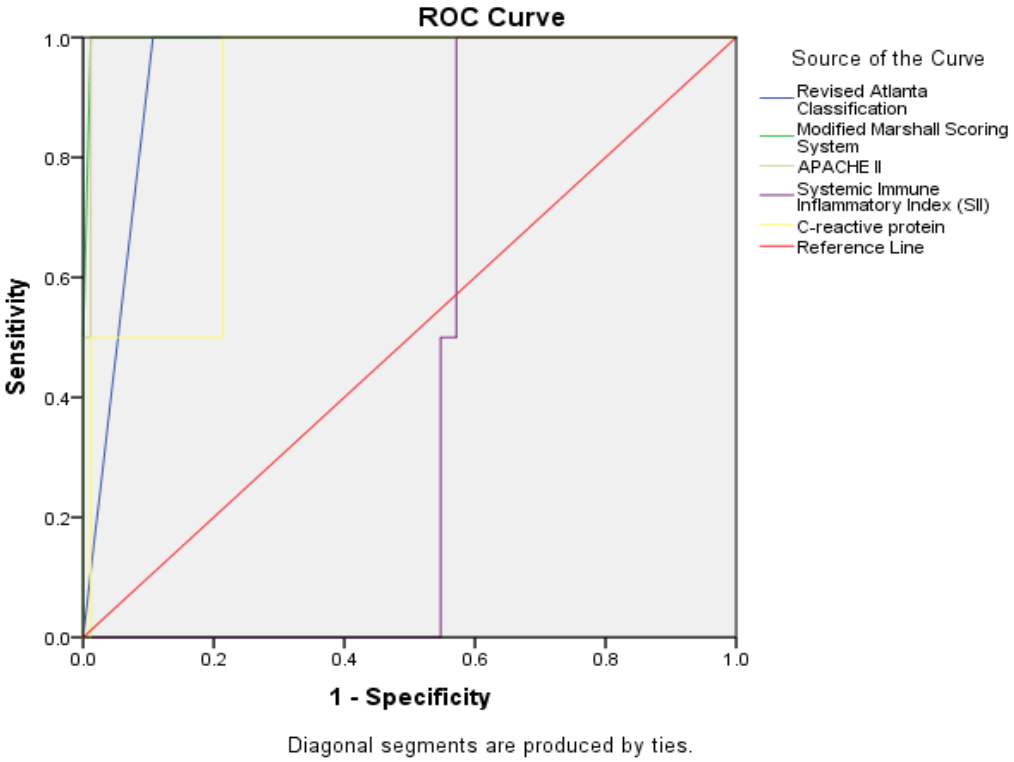


Correlation between SII scores and duration of hospital stay

The area under the receiver operating characteristic curve (AUC) for various scoring systems and biomarkers in acute pancreatitis was analyzed. The Revised Atlanta Classification demonstrated an AUC of 0.946 (95% CI: 0.885 to 1.000), with a p-value of 0.032, indicating statistical significance. Similarly, the APACHE II score had an AUC of 0.994 (95% CI: 0.978 to 1.000) and a p-value of 0.017, also showing statistical significance. The Modified Marshall Scoring System exhibited an AUC of 0.997 (95% CI: 0.986 to 1.000) with a p-value of 0.017, further supporting its significance. In contrast, C-reactive protein had an AUC of 0.887 (95% CI: 0.736 to 1.000) with a p-value of 0.063, which was not statistically significant. The Systemic Immune Inflammatory Index showed an AUC of 0.440 (95% CI: 0.334 to 0.547) with a p-value of 0.774, indicating that it was not significant for predicting mortality.

Receiver operating characteristic (ROC) analysis showing area under the curve for various prognostic indicators

	AUC	Lower CI	Upper CI	P value
Revised Atlantaclassification	0.946	0.885	1.000	0.032*
APACHE II	0.994	0.978	1.000	0.017*
Modified Marshall Scoring System	0.997	0.986	1.000	0.017*
C-reactive protein	0.887	0.736	1.000	0.063
Systemic Immune Inflammatory Index	0.440	0.334	0.547	0.774
*Statistically significant at p<0.05				



Receiver operating characteristic (ROC) analysis showing area under the curve for various prognostic indicators

DISCUSSION

Acute pancreatitis is an inflammatory disease with a sudden onset, rapid progress, and a high risk of morbidity and mortality. Hence it is very important to diagnose and determine the severity of AP in a timely and accurate manner. Numerous clinical and laboratory parameters are used for diagnosing and determining the severity of pancreatitis. Majority of scores currently used in emergencies requires collection of several parameters, and some of the scores require 48 hours after admission to predict mortality, hence limits its application in early diagnosis of AP severity and prediction of prognosis in ED. Inflammation plays an important role in the development of AP and disease progression. The early phases of SAP are characterized by a complex state of inflammation and immunosuppression that leads to intestinal mucosal barrier dysfunction. During the pancreatitis process, neutrophils and reactive oxygen radicals exert synergistic effects on damaged cells. Platelets are directly involved in the systemic inflammatory process of acute pancreatitis, thereby leading to consumption, which is compensated by an

Immediate bone marrow response. [23]

Neutrophils are thought to play a role in the chemokine and cytokine cascades that accompany inflammation in the pathogenesis of SAP. Therefore, SII is viewed as a potential marker in diagnosing and determining the severity of AP.SII is an inexpensive, quick, and easy method that can be used in diagnosing and determining the severity of AP and can, thus, reduce the need for diagnostic imaging methods that involve exposure to radiation like CECT. SII in conjunction with the Ranson's criteria can reduce the rate of misdiagnosis and prevent delays in treatment.[19]

In our study we evaluated the utility of SII index as a marker in determining the outcomes and severity in patients presenting to the Emergency department with acute pancreatitis. SII score was compared with standard severity and organ failure scores like APACHE-II, REVISED ATLANTA CLASSIFICATION AND MODIFIED MARSHALL SCORE.

The study was conducted in 86 patients 75 of them were male and mean age of presentation was 37.9(14.9), where as in studies done by Gurleyik et al and Ertugrul et al had a mean age of 57

We also compared distribution of severity of acute pancreatitis based on three age groups ≤ 30, 31-60 ,>60. It was found that none of these age distribution differences were not statistically significant (p=0.672 , p >0.05). It was also found that there is no statistically significant correlation between co-morbids and severity in pancreatitis.

The most common causes of acute pancreatitis include gallstones, alcohol use, and hypertriglyceridemia. The rate of occurrence of each etiology of acute pancreatitis varies across geographic regions and socioeconomic strata.[24]

In our study ethanol was the most common etiology (53.5%) and the least among was post ERCP(1.2%). In a retrospective study done by Xingming Liu et al it is seen that most common etiological cause was biliary followed by hypertriglyceridemia. Study showed statistically significant correlation between the patient vitals , GCS, with distribution of severity in pancreatitis (p < 0.001). Patients with SAP had higher SII scores along with increased respiratory rate (mean RR =28.2 , SD =2.4)

decreased saturation (mean spo2 88.5 , SD =8.1), Increased pulse rate (mean 126.2 , SD= 16.1) with elevated temperature (mean temperature =101.6F, SD = 0.7) . Majority of patients with SAP were in shock. The mean (SD) mean arterial pressure was 89.1 (9.2) for mild, 78.1 (10.4) for moderate, and 63.5 (10.3)for severe cases supported with fluid resuscitation and inotropes. This outcome was expected because of high agreement between severity of clinical manifestation and SAP. Among the laboratory parameters, patients with SAP showed significant rise in neutrophil count (mean 18025.9 SD =4725.2) and CRP level, (mean 293.5 SD=106.4) with p <0.001.

In a study conducted by Aaron D. Stirling et al on CRP as an indicator of severity of pancreatitis suggested an rise of >90 mg/dL from admission or an absolute value of >190 mg/dL at 48 h predicts severe disease with the greatest accuracy. Ertuğrul Altuğ et al in their study also found that mean levels of WBC, neutrophil, lymphocyte, and CRP were significantly higher in the severe pancreatitis group as compared to mild pancreatitis group, but there was no significant correlation of severity and mean platelet levels. These study outcomes stays close to our results in terms of CRP , neutrophil and platelet level.

Blood urea (mean =59.0 SD =20.1) and serum creatinine (mean =2.2 SD = 1.2) were raised in patients with SAP those who required inotropic support even after adequate fluid resuscitation.

8 patients out of a total 86 required RRT, out of which 6 were from SAP group.

For predicting the severity of acute pancreatitis in emergency department standard scores like modified marshall, APACHE-II are used, but these scores have pitfalls like APACHE has 15 variables and marshall score need 48 hours of inpatient admission to predict the severity.

Our study showed the SII score is equally effective in predicting the severity and outcomes in acute pancreatitis like the above mentioned standard scoring system. Thus, easy, inexpensive, and quick application of SII makes it a practical index for use in inflammatory diseases like acute pancreatitis.

Xingming Liu et al in their study showed that AP patients with SII value ≥2207.53 have a higher probability of having SAP. The predictive capability of SII for the severity of acute pancreatitis is more specific than PLR and NLR.

Ertuğrul Altuğ et al found that NLR and PLR were more significant than SII in determining the severity of AP. This discrepancy may be because of the delayed presentation of patients referred to their hospital from other institutions.

Daguan Zhang et al in their study showed that patients in high-SII group had higher SOFA and SAPS III with statistically significant p score. Although SII was associated with high mortality, other factors might also affect the result such as age, sex, and diseases. Thus, subgroup analysis was conducted based on age, gender, race, co-morbidities, and other factors. Results indicated that there are no statistically significant differences across subgroups, indicating that their findings are reliable.

The correlation between Systemic Immune-Inflammation Index (SII) scores and various clinical parameters in acute pancreatitis was assessed. Significant positive correlations were observed between SII scores and the Revised Atlanta Classification (Kendall's tau = 0.48, 95% CI: 0.37 to 0.58, p<0.05), APACHE II score (r = 0.29, 95% CI: 0.08 to 0.47, p<0.05), Modified Marshall Scoring System (r = 0.42, 95% CI: 0.29 to 0.61, p<0.05), C-reactive protein levels (r = 0.55, 95% CI: 0.38 to 0.68, p<0.05), duration of ICU stay (r = 0.41, 95% CI: 0.21 to 0.57, p<0.05), and duration of hospital stay (r = 0.44, 95% CI: 0.25 to 0.59, p<0.05). Thus our results showed SII score is comparable with standard severity and organ failure scores like APACHE-II, Revised Atlanta and modified Marshall score in predicting the severity , prognosis (including the need for intensive care unit (ICU) admission, length of hospital stay) , clinical utility (early risk stratification and decision-making regarding the intensity of monitoring and treatment required)

However, there was no significant correlation between SII scores and the number of organ failures. This discrepancy was due to inclusion of patients with chronic kidney disease in the study.

SUMMARY

Our study was a single hospital based study conducted in 86 patients diagnosed with acute pancreatitis meeting the inclusion criteria in the department of emergency medicine. Diagnosis of acute pancreatitis was made based on clinical, laboratory and radiological evidences. The aim of our study was to find correlation between systemic immune inflammatory index SII with other established severity scores like apache-II, modified Marshall and revised Atlanta classification in terms of predicting the severity, prognosis (including the need for intensive care unit (ICU) admission, length of hospital stay), clinical utility (early risk stratification and decision-making regarding the intensity of monitoring and treatment required) and to compare with CRP which is also a proven prognostic index for predicting the severity in acute pancreatitis

- In our sample population, a higher prevalence of males was seen mean age of presentation was 37.9(14.9).There was no significant correlation between severity of disease and age distribution.
- There was no statistically significant correlation between co-morbidities and severity in pancreatitis.
- In our study ethanol was the most common etiology (53.5%) followed by gall stone and idiopathic and the least among was post ERCP (1.2%).
- Patients with SAP had higher SII scores along with increased respiratory rate (mean RR =28.2 , SD =2.4) decreased saturation (mean spo2 88.5 , SD =8.1), Increased pulse rate (mean 126.2 , SD= 16.1) with elevated temperature (mean temperature =101.6F, SD = 0.7).
- Among the laboratory parameters, patients with SAP showed significant rise in neutrophil count (mean 18025.9 SD =4725.2) and CRP level, (mean 293.5 SD=106.4) with p <0.001.
- The correlation between Systemic Immune-Inflammation Index (SII) scores and various clinical parameters in acute pancreatitis was assessed. Significant positive correlations were observed between SII scores and the Revised Atlanta Classification (Kendall's tau = 0.48, 95% CI: 0.37 to 0.58,

p<0.05), APACHE II score (r = 0.29, 95% CI: 0.08 to 0.47, p<0.05), Modified Marshall Scoring System (r = 0.42, 95% CI: 0.29 to 0.61, p<0.05), C-reactive protein levels (r = 0.55, 95% CI: 0.38 to 0.68, p<0.05), duration of ICU stay (r = 0.41, 95% CI: 0.21 to 0.57, p<0.05), and duration of hospital stay (r = 0.44, 95% CI: 0.25 to 0.59, p<0.05). Thus our results showed SII score is comparable with standard severity and organ failure scores like APACHE-II, Revised Atlanta and modified Marshall score in predicting the severity, prognosis and outcome of acute pancreatitis.

- There was no significant correlation between SII scores and the number of organ failures. This discrepancy was due to inclusion of patients with chronic kidney disease in the study.
- The Systemic Immune-Inflammatory Index (SII) is a biomarker used to assess the severity and prognosis of acute pancreatitis (AP). In acute pancreatitis, SII reflects the balance between inflammation and immune response. Higher SII values are associated with more severe inflammation and can indicate worse outcomes. This index helps in stratifying patients by their risk levels, guiding treatment decisions, and predicting complications. For instance, elevated SII levels correlate with increased severity of AP, longer hospital stays, and higher mortality rates.
- Overall, the SII is a useful, cost-effective tool for clinicians to gauge the severity of acute pancreatitis and to anticipate patient outcomes, improving management and potentially guiding more aggressive treatment strategies for high-risk individuals.

CONCLUSION

Systemic inflammatory index (SII) has emerged as a valuable prognostic tool in the assessment of acute pancreatitis. This index, which integrates parameters such as platelet count, neutrophil count, and lymphocyte count, offers a comprehensive snapshot of the inflammatory status and systemic response of patients. Elevated SII levels correlate with increased severity and poorer outcomes in acute pancreatitis, by comparing with standard scoring system making it a useful marker for early identification of patients at higher risk of severe complications and adverse prognosis. By incorporating SII into clinical practice, healthcare providers can enhance their ability to stratify patients based on risk, tailor treatment strategies more effectively, and potentially improve overall patient outcomes. However, it is crucial to consider SII as part of a broader diagnostic and prognostic framework, alongside other clinical parameters and imaging findings. Further research and validation in diverse patient populations will be essential to fully establish the role of SII in guiding management and improving prognostication in acute pancreatitis

LIMITATION

- Our study is a single centre study which may limit the generalisability of the findings to other settings or populations with different demographic and environmental factors.
- Although our study includes a substantial number of participants, a larger sample size could provide more generalized conclusions and reduce the margin of error.
- No significant correlation between SII scores and the number of organ failures. This discrepancy was due to inclusion of patients with chronic kidney disease in the study.
- Our study included only adults older than 18 years of age, the findings may not be applicable to other age groups, particularly children.
- We excluded patients with chronic pancreatitis, chronic inflammatory disease, malignancy, patients on long term steroids, metabolic syndrome. Findings of this study may not be applicable to above mentioned groups.

REFERENCE

.Li C, Tian W, Zhao F, Li M, Ye Q, Wei Y, Li T, Xie K. Systemic immune-inflammation index, SII, for prognosis of elderly patients with newly diagnosed tumors. Oncotarget. 2018 Oct 19;9(82):35293-35299. doi: 10.18632/oncotarget.24293. PMID: 30450158; PMCID:

30.Gürleyik G, Emir S, Kiliçoglu G, Arman A, Saglam A. Computed tomography severity index, APACHE II score, and serum CRP concentration for predicting the severity of acute pancreatitis. OP 2005;6:562–7.

Aaron D. Stirling, Neil R. Moran, Michael E. Kelly, Paul F. Ridgway, Kevin C. Conlon,The predictive value of C-reactive protein (CRP) in acute pancreatitis – is interval change in CRP an additional indicator of severity,Volume 19, Issue 10, 2017,Pages 874-880,ISSN 1365-182X, https://doi.org/10.1016/j.hpb.2017.06.001 (https: //www.sciencedirect.com/science/article/pii/S1365182X17308195)

Abdulla A, Awla D, Thorlacius H, Regnér S. Role of neutrophils in the activation of trypsinogen in severe acute pancreatitis. J Leukoc Biol. 2011 Nov;90(5):975-82. doi: 10.1189/jlb.0411195. Epub 2011 Aug 2. PMID: 21810937.

Almeida N, Fernandes A, Casela A. Predictors of Severity and In-Hospital Mortality for Acute Pancreatitis: Is There Any Role for C-Reactive Protein Determination in the First 24 Hours? GE Port J Gastroenterol. 2015 Jul 3;22(5):187-189. doi: 10.1016/j.jpge.2015.05.004. PMID: 28868406; PMCID: PMC5579989.

Biyik M, Biyik Z, Asil M, Keskin M. Systemic Inflammatory Response Index and Systemic Immune Inflammation Index Are Associated with Clinical Outcomes in Patients with Acute Pancreatitis? J Invest Surg. 2022 Aug;35(8):1613-1620. doi: 10.1080/08941939.2022.2084187. Epub 2022 Jun 5. PMID: 35855674.

C-reactive protein levels in acute pancreatitis and its clinical significance Juthika Abhijit Deherkar, Ayush Pandey, Shahaji Deshmukh

https://dx.doi.org/10.18203/2349https://dx.doi.org/10.18203/2349-2902.isj20194074-2902.isj20194074.

C-Reactive Protein, the Metabolic Syndrome, and Risk of Incident Cardiovascular Events Paul M Ridker, MD , Julie E. Buring, ScD , Nancy R. Cook, ScD , and Nader Rifai, PhD. C-

Reactive Protein, the Metabolic Syndrome, and Risk of Incident Cardiovascular Events | Circulation.

DograV,PeerJA,GilkarIA,Mushtaq. Role of C-reactive protein in acute pancreatitis: an observational study in a tertiary care center. Int Surg J2022;9:559-62.

Drupal-HighWire17Goodchild, George Chauhan, ManilJohnson, Gavin JPractical guide to the management of acute pancreatitisFrontline Gastroenterology 20192019-07-01 00:00:0029229910.1136/flgastro-2018-101102103Acute pancreatitis (AP) is characterized by inflammation of the exocrine pancreas and is associated with acinar cell injury and both a local and systemic inflammatory response. AP may range in severity from self-limiting, characterized by mild pancreatic oedema, to severe systemic inflammation with pancreatic necrosis, organ failure and death. Several international guidelines have been developed including those from the joint International Association of Pancreatology and American Pancreatic Association, American College of Gastroenterology and British Society of Gastroenterology. Here we discuss current diagnostic and management challenges and address the common dilemmas in AP.

Duchene J, von Hundelshausen P. Platelet-derived chemokines in atherosclerosis. Hamostaseologie. 2015;35(2):137-41. doi: 10.5482/HAMO-14-11-0058. Epub 2015 Jan 16. PMID: 25592448.

Gapp J, Tariq A, Chandra S. Acute Pancreatitis. [Updated 2023 Feb 9]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482468/.

Haider Kazmi SJ, Zafar MT, Zia BF, Khalid SR, Kumar V, Tabassum S, Ali A, Aziz N, Khan NA, Kumari K, Saleem K, Asghar MS. Role of serum C-reactive protein (CRP)/Albumin ratio in predicting the severity of acute pancreatitis: A retrospective cohort. Ann Med Surg (Lond). 2022 Sep 21;82:104715. doi: 10.1016/j.amsu.2022.104715. PMID: 36268355; PMCID: PMC9577824.

HarshitKumarA,SinghGriwanM.AcomparisonofAPACHEII, 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;6:127–31.

Kaplan M, Ates I, Oztas E, et al. A new marker to determine prognosis of acute pancreatitis: PLR and NLR combination. J Med Biochem. 2018;37(1):21–30. doi:10.1515/jomb-2017-0039

Khanna AK, Meher S, Prakash S, Tiwary SK, Singh U, Srivastava A, Dixit VK. 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 Surg. 2013;2013:367581. doi: 10.1155/2013/367581. Epub 2013 Sep 24. PMID: 24204087; PMCID: PMC3800571.

Li JP, Yang J, Huang JR, et al. Immunosuppression and the infection caused by gut mucosal barrier dysfunction in patients with early severe acute pancreatitis. Front Biosci. 2013;18:892–900. doi:10.2741/4150

Liu G, Tao J, Zhu Z, Wang W. The early prognostic value of inflammatory markers in patients with acute pancreatitis. Clin Res Hepatol Gastroenterol. 2019;43(3):330–337. doi:10.1016/j.clinre.201 8.11.002.

Liu X, Guan G, Cui X, Liu Y, Liu Y, Luo F. Systemic Immune-Inflammation Index (SII) Can Be an Early Indicator for Predicting the Severity of Acute Pancreatitis: A Retrospective Study. Int J Gen Med. 2021 Dec 8;14:9483-9489. doi: 10.2147/IJGM.S343110. PMID: 34949937; PMCID: PMC8689009.

Mimidis K, Papadopoulos V, Kotsianidis J, et al. Alterations of platelet function, number and indexes during acute pancreatitis. Pancreatology. 2004;4(1):22–27. doi:10.1159/000077024).

Neeraj Anand, Jung H. Park, Bechien U. Wu,Modern Management of Acute Pancreatitis,Gastroenterology Clinics of North America,Volume 41, Issue 1, 2012,Pages 1- 8,ISSN 0889-8553, https://doi.org/10.1016/j.gtc.2011.12.013 (https://www.sciencedirect.com/science/article/pii/S0889855311001208) Keywords: Acute pancreatitis; BISAP; Mortality; Management; Complications; Fluid Resuscitation; Necrosis. PMC6219675.

Pooran N, Indaram A, Singh P, Bank S. Cytokines (IL-6, IL-8, TNF): early and reliable predictors of severe acute pancreatitis. J Clin Gastroenterol. 2003 Sep;37(3):263-6. doi: 10.1097/00004836-200309000-00013. PMID: 12960727.

Şener K, Çakır A, Kılavuz H, Altuğ E, Güven R. Diagnostic value of systemic immune inflammation index in acute appendicitis. Rev Assoc Med Bras (1992). 2023 Feb 10;69(2):291296. doi: 10.1590/1806-9282.20221003. PMID: 36790235; PMCID: PMC9983470.

Tiwari B, Sharma A, Vashishtha V. Comprehensive Assessment of Inflammatory Indices to Predict Outcomes in Acute Pancreatitis. J Invest Surg. 2023 Dec;36(1):2152914. doi: 10.1080/08941939.2022.2152914. PMID: 36514899.

Wan J, Ren Y, Yang X, Li X, Xia L, Lu N. The Role of Neutrophils and Neutrophil Extracellular Traps in Acute Pancreatitis. Front Cell Dev Biol. 2021 Jan 21;8:565758. doi: 10.3389/fcell.2020.565758. PMID: 33553136; PMCID: PMC7859271.

Yildiz G, Selvi F, Bedel C, Zortuk O, Mutlucan UO. Systemic inflammation response index and systemic immune-inflammation index are associated with severity of acute pancreatitis. J CLIN MED KAZ. 2023;20(3):44-8. https://doi.org/10.23950/jcmk/13320.

Zhang D, Wang T, Dong X, Sun L, Wu Q, Liu J, Sun X. Systemic Immune-Inflammation Index for Predicting the Prognosis of Critically Ill Patients with Acute Pancreatitis. Int J Gen Med. 2021;14:4491-4498 https://doi.org/10.2147/IJGM.S314393

Zhang, D., Wang, T., Dong, X., Sun, L., Wu, Q., Liu, J., & Sun, X. (2021). Systemic Immune Inflammation Index for Predicting the Prognosis of Critically Ill Patients with Acute Pancreatitis. International Journal of General Medicine, 14, 4491–4498. https://doi.org/10.2147/IJGM.S314393.

Zhang, K., Hua, YQ., Wang, D. et al. Systemic immune-inflammation index predicts prognosis of patients with advanced pancreatic cancer. J Transl Med 17, 30 (2019). https://doi.org/10.1186/s12967-019-1782-x.

Zhou H, Mei X, He X, Lan T, Guo S. Severity stratification and prognostic prediction of patients with acute pancreatitis at early phase: a retrospective study. Medicine. 2019;98(16):e15275. doi:10.1097 /MD.0000000000015275

ANNEXURE-1
PROFORMA

NAME:	UHID:
AGE:	SEX:
DATEOFADMISSION:	DATEOFDISCHARGE:

INITIALASSESSMENT	FINDINGS	CRITICAL ACTIONS
AIRWAY		
BREATHING	RR:	
CIRCULATION	PR: BP:	
DISABILITY	GCS:	
EXPOSURE	TEMP:	

EVENTS:
CO MORBIDITIES:
LAB INVESTIGATIONS:

COMPLETE BLOOD PRODUCT	TC: DC: PLT:
CREACTIVEPROTEIN(after48hrsof symptom)	
BLOOD UREA/ SERUM CREATININE	
AMYLASE/LIPASE	
TOTALBILIRUBIN	
SGOT/SGPT	
ARTERIALBLOODGAS	
IMAGING	

LOCALCOMPLICATIONS
☐ Acute peri-pancreatic fluid collection
☐ Acute necrotic collection
☐ Pancreatic pseudocyst
☐ Walled-off necrosis
☐ Peri-pancreatic Vascular Complications

Revised Atlanta classification
☐ Mild acute pancreatitis
☐ Moderately severe pancreatitis
☐ Severe acute pancreatitis

Number of days stayed in ICU:
Number of days stayed in hospital:
SYSTEMIC IMMUNE INFLAMMATORY SCORE:
ABSOLUTE CRP VALUE (within48hrsofsymptoms):

NNEXURE-2
INFORMED CONSENT DOCUMENT (ICD)
[Written subject information sheet & consent form]

Study Title :	To study the utility of systemic immune inflammatory index(SII)as a marker in determining the outcomes in patients presenting to the Emergency department with acute pancreatitis
Study Center :	AIG Hospitals, Gachibowli, Telangana
Language :	ENGLISH

Patient Identification
Subject / Patient full name in BLOCK LETTERS:
Subject / Patient ID:
Date of Birth:
Age at the time of consent:
Study Doctor

Name of the investigator (s) :	Dr. Tharun pg
E-Mail ID :	tharunpgayoor@gmail.com
Name of the sub- investigator/ guide :	Dr.Karthik ravikanthi
E-Mail ID :	

Address(s) of the Study Site:
Asian Institute of Gastroenterology Hospitals Pvt Ltd,
1-66/AIG/2 TO 5, Mindspace Road, Gachibowli
Hyderabad, Telangana 500032.
Telephone: +91-40-4244 4222 / 6744 4222
Participation.
You are being considered for participation in a research study. Your eligibility to participate inthe study is subject to the screening procedures described below and other eligibility criteria. Before you can take part in this study, it is important that you understand what the study involves. Please read this information carefully and ask any questions that you might have. You will be included in the study only after you give consent to take part in the study. The study has been approved by the Institutional Ethics Committee.

Purpose / Aim of the Study:
To study the utility of systemic immune inflammatory index(SII)as a marker in determining the outcomes in patients presenting to the Emergency department with acute pancreatitis.

The approximate number of participants and the expected duration of your participation in the study:
The approximate number of participants in our study will be 86. The expected duration of the study is for a period from November 2022 to March 2024.

Study Procedure / Methodology.
Study population includes patients diagnosed with acute pancreatitis, meeting the inclusion and exclusion criteria to predict the severity of disease using SII as a prognostic tool, after an informed and written consent. Blood samples for CBP and CRP will be drawn in emergency department. SII score is correlated with severity of acute pancreatitis which includes local and systemic complications , no of days in ICU / need of NIV or ventilator support / Renal replacement therapy and total no days in hospital as primary outcome

Follow-up / Duration of the study.
The duration of study is from November 2022 to March 2024.

What are the possible risks (adverse effects/advents events) and discomforts to you?
So far, no adverse events have been reported with the study that is being undertaken and is proven safe as per the literature.

Your responsibilities.
Your responsibility is to co-operate with the Doctors and the staff and follow their directions during the study.

Voluntary Participation / Withdrawal from the Study
Your participation in this study is entirely voluntary. It is up to you to decide whether to take part or not. Even if you do decide to take part, you are free to leave the study at any time without giving a reason. This will not affect your future medical care in any way. Furthermore, your study doctor may withdraw you from the study if he/she feels this is in your best interest, or in case of stopping the study early. If you decide to withdraw your consent to participate in the study, your study doctor will ask your permission to perform the final evaluation and to collect the data through a report form. If you do not agree, no new data on you

will be added to the database. Your doctor, the sponsor of the study or designee, may end your participation in this study at any time without your consent. The possible reasons for ending your participation: if the study treatment offers you little or no future benefits or if you develop severe or life-threatening side effects. You will be discontinued from the study if you fail to follow directions for participating in the study.

Permission for Review of Records, Confidentiality and Access to Records

The study doctor or research staff will collect information about you. This information called data will be entered without your name, on a report form. In all these report forms a code will replace your name. All the data collected will be kept confidential. Authorized personnel will enter the data into the investigator's / sponsor's case report form or computer database. The data collected will be used for the evaluation of the study and may be used in the future in related or other studies. This data may also be used for the purpose of publication and presentations at Scientific platforms. The data may be submitted to health authorities for registration purposes. Health authorities,Indian Council of Medical Research (ICMR) and like, Institutional Ethics Committee (IEC) /Institutional Review Board (IRB) or other persons required by law may review the data provided. To make sure that the data collected from you is correct, it is necessary for the sponsor or national /international authorities to directly compare them with your medical record. Such checks will only be done by qualified and authorized personnel. While all reasonable efforts be made to keep the data confidential, absolute confidentiality cannot be guaranteed .If you agree, your personal doctor will be informed of your participation in the study.

Questions/Information.

(i) If you or your representative(s) have any questions regarding the study or in case of study related injuries, you should contact your study doctor.

Name of the investigator/study doctor: Dr. Tharun pg
Telephone: +91 8086461614

(ii) If you or your representative(s) have any questions regarding your patient rights as they relate to thestudy, you should contact the following personnel as allowed by local regulation and IRB/IEC policy,

(iii) If you seek emergency care, or if hospitalization is required, please inform the treating doctor that you are participating in a clinical trial.

(iv) If any new information becomes available during the study that may affect your willingness to participate, you will be informed.

Informed Consent Declaration

Date: _____
Subject Name: _____ Sex: _____
S/o, W/o., D/o: _____
Subject ID: _____
Date of birth/Age: _____
Address of the subject: _____
_____
Subject contact number: _____
Qualification: _____
Occupation :
Student Self-Employed Service
(*Please tick as*

☐
☐

Appropriate) **_ Housewife Other: _____**

I have been provided with the details of the known or foreseeable side effects and risks of the research medication and study procedures that I may receive.

I understand I am free to accept or refuse my participation at any time without giving a reason.

My decision to accept or refuse my participation will have no effect on my continuing treatment. I understand that I am free to discontinue my participation at any time without giving a reason. My decisio to discontinue my participation will have no effect on my continuing treatment. I will keep all my rights to treatment and alternative therapy.

I agree that data collected for the study will be used for the purpose described above, including transferring data to the case report form or database and processing and archiving by AIG in a coded form with respect to the confidentiality of my data.

I agree that direct access to my medical records may be given to authorized persons representing national and international authorities. These authorities may include the local regulatory authorities or Institutional Ethics Committee (IEC)/Institutional Review Boards (IRB's).

I understand that my study records can be forwarded to my primary physician if I request my study doctor to do so.
I will not lose any rights that I have under the law by signing and dating this form.
I have read and understood the information presented in this informed consent form. I have been given the opportunity to ask questions, and they have been answered.
I will receive a signed and dated copy of this Informed Consent Form.
I confirm that I have read and understood the information sheet dated _____ (dd /mm/yyyy) for the above study and had the opportunity to ask questions. My questions have been answered satisfactorily.
I understand that my participation in the study is voluntary and that I am free to withdraw
at any time, without giving any reason, without my medical care or legal rights being affected.
I understand that the ethics committee will not need any permission to look at my health records both in respect of the present study or any further research that may be conducted in relation to it even if I withdraw from the trial. I agree with this access. However, I understand that my identity will not be revealed in any information released to third parties or published.
I agree not to restrict the use of any data or result that arises from this study provided such use is only for the scientific purpose(s).
I agree to take part in the above study, allow access to my data in the study, and I agree to co-operate and inform unexpected or unusual symptoms experienced during the study. For the duration of the study, I will notify the investigator of any other medical treatments that may be necessary to undergo. I received a copy of this consent form.

_____	_____	_____
Name of the subject	**Signature /thumb impression of the subject**	**Date (DD/MM/YYYY)**

_____	_____	_____
Name of the investigator	**Signature of the Investigator**	**Date (DD/MM/YYYY)**

If the subject/patient / legally acceptable representative cannot read:

_____	_____	_____
Name of impartial witness1 witness 1	**Signature of the impartial**	**Date (DD/MM/YYYY)**

_____	_____	_____
Name of impartial witness 2 witness 2	**Signature of the impartial**	**Date (DD/MM/YYYY)**

స్టడీసంఖ్య:
పేరు:
వయసు:
సెక్స్:
రోగి / బంధువుయొక్కప్రారంభాలు:

1.నేనుపైనతెలిపినఅధ్యయనంలో ---- / / - నాటిరోగిసమాచారపుషీట్నుచదివానుఅనినిర్ధారించానుమరియుప్రశ్నలనుఅడగడానికిఅవకాశంఉంది.
2. అధ్యయనంలోనాపాల్గొనడంస్వచ్ఛందంగాఉందిమరియుఏసమయంలోనైనాఉపసంహరించుకోవడంనాకుఉచితం, నావైద్యసంరక్షణలేదాచట్టపరమైనహక్కులులేకుండానేఏవైనాకారణాలుఇవ్వకుండానేఉన్నారనినేనుఅర్థంచేసుకున్నాను .
3. ఈఅధ్యయనంలోఉత్పన్నమయ్యేఏదైనాడేటాలేదాఫలితాలవినియోగాన్నిపరిమితంచేయవద్దనినేనుఅంగీకరిస్తున్నాను, అటువంటిఉపయోగంశాస్త్రీయ

	UHID	AGE	SEX	VITALS								COMORBIDITIES					ETIOLI	DIAGNOSTIC CRITER	LAB TESTS														LOCAL	REVISI	MODIFIED MA	APACHI	ICU ST	RENAL	DAYS I	SII	SC	ALIVE/EXPIRED
2				RR	SPO2	SBP	DBP	MAP	PR	GCS	TEMP	DIABET	HTN	CAD	CKD	CLD			S.AMYL	S.LIPA	SRADICL	NEUTRI	PLATEL	LYMPHI	CRP @4	BLOOD S	CREA T.	BILIR	SGOTIS	SGPT				ORGAN F	AILURE						
3	20729770	18	M	20	98	110	60	77	100	15	100	NIL	NIL	NIL	NIL	NIL	IDIOPA	1018	3668	MILD AC	12000	317	1800	171	19	0.97	0.42	19	18	NIL	MILD AC	0	ND	2	0	NIL	8	2113	ALIVE	
4	10630458	35	M	22	98	110	60	77	102	15	100.6	NIL	NIL	NIL	NIL	NIL	BILIARY	1748	1550	MILD EC	5084	358	1071	164	18	1.06	5.4	509	497	NIL	MILD AC	0	ND	2	0	NIL	4	1699	ALIVE	
5	20762764	18	M	20	98	110	80	77	106	15	100.8	NIL	NIL	NIL	NIL	NIL	IDIOPA	548	550	ACUTE	12473	295	1882	80	12	0.4	1.3	55	32	YES	MODER	0	ND	7	0	NIL	5	1955	ALIVE	
6	20724520	31	M	22	96	90	60	70	110	15	102	NIL	NIL	NIL	NIL	NIL	HYPER	1131	2475	ACUTE	15515	368	2296	206	30	1.12	2	107	35	YES	MODER	RESP-2	YES	8	0	NIL	11	2486	ALIVE	
7	20720637	40	M	24	98	80	60	67	115	15	102	YES	NIL	NIL	NIL	NIL	ETHANI	1747	2618	ACUTE	21694	304	732	380	30	1.09	1.8	21	16	YES	MODER	CVS-1	YES	9	2	NIL	9	8988	ALIVE	
8	20720421	19	M	22	98	100	60	73	114	15	101	NIL	NIL	NIL	NIL	NIL	IDIOPA	789	886	ACUTE	19356	354	642	256	20	0.65	0.93	26	21	YES	MODER	RESP-1	NO	6	0	NIL	8	10600	ALIVE	
9	20719778	48	F	22	96	100	60	73	118	15	102	YES	YES	YES	NIL	NIL	BILIARY	1444	1221	ACUTE	19215	220	874	325	20	0.61	2.3	29	64	YES	MODER	RESP-2	YES	9	4	NIL	9	4836	ALIVE	
10	20753874	40	M	18	96	110	60	77	115	15	101	YES	NIL	YES	NIL	NIL	ETHANI	1219	2843	ACUTE	14600	229	800	267	20	1.07	1.17	47	78	YES	MODER	RESP-1	NO	13	4	NIL	8	4179	ALIVE	
11	20753718	45	M	18	98	130	80	97	98	15	99.6	YES	YES	NIL	NIL	NIL	ETHANI	103	917	ACUTE	9593	153	1303	150	20	0.9	1	29	33	NIL	MILD AC	0	ND	6	0	NIL	5	1126	ALIVE	
12	20729276	22	M	22	98	120	80	93	80	15	99.6	NIL	NIL	NIL	NIL	NIL	POST E	1087	3353	ACUTE	12788	189	960	56	20	0.79	1.2	77	66	NIL	MILD AC	0	ND	2	0	NIL	6	2538	ALIVE	
13	20749533	47	M	24	98	100	60	73	100	15	99.5	YES	YES	NIL	NIL	NIL	ETHANI	663	1260	ACUTE	7716	304	1687	88.7	18	0.8	0.8	18	17	NIL	MILD AC	0	ND	2	0	NIL	5	1390	ALIVE	
14	20748284	38	M	38	90	90	60	70	122	15	102	YES	NIL	NIL	NIL	NIL	ETHANI	3234	3705	ACUTE	1684	195	1563	375.9	18	0.9	1.9	88	114	YES	MODER	RESP-2	YES	8	2	NIL	10	2093	ALIVE	
15	20747983	23	M	22	96	88	58	68	74	15	98.6	NIL	NIL	NIL	NIL	NIL	ETHANI	127	406	ACUTE	3975	553	1561	15.3	33	1.16	1	51	60	YES	MODERATE	ACI	YES	2	0	NIL	6	1409	ALIVE	
16	20747785	18	F	26	95	92	62	72	115	15	101	NIL	NIL	NIL	NIL	NIL	IDIOPA	965	350	ACUTE	10069	251	963	309.9	25	0.47	0.8	24	14	YES	MODER	RESP-1	NO	8	2	NIL	10	2624	ALIVE	
17	20747462	63	M	28	94	90	64	73	114	15	102	NIL	YES	YES	NIL	NIL	BILIARY	488	309	ACUTE	16617	216	584	365.8	31	0.72	1.9	28	27	YES	MODER	RESP-2	YES	11	4	NIL	12	6146	ALIVE	
18	20746561	32	M	32	75	50	40	43	135	8	102	NIL	NIL	NIL	NIL	NIL	ETHANI	1836	717	ACUTE	18004	150	1400	390	60	2.5	0.8	116	112	YES	SEVERE	RESP-3	YES	20	4	YES	17	1929	EXPIRED	
19	20335512	21	M	18	99	120	80	93	80	15	99	NIL	NIL	NIL	NIL	NIL	BILIARY	150	202	ACUTE	4606	168	1165	58	20	0.58	1	76	78	NIL	MILD CA	0	ND	2	0	NIL	4	664	ALIVE	
20	20276899	48	M	19	99	110	80	90	84	15	100	NIL	NIL	NIL	NIL	NIL	IDIOPA	128	976	MILD AC	7023	226	1753	14.6	18	1	1	22	28	NIL	MILD AC	0	ND	2	0	NIL	6	905	ALIVE	
21	20739112	53	M	20	100	110	80	90	90	15	100	YES	NIL	YES	NIL	NIL	ETHANI	156	157	MILD AC	14252	215	1900	323	38	1.09	1.8	36	27	YES	MILD AC	0	ND	2	0	NIL	4	1512	ALIVE	
22	20737404	72	M	19	98	110	80	90	98	15	100	YES	YES	YES	NIL	NIL	BILIARY	1536	3684	MILD AC	8982	235	571	280	36	0.77	4.07	76	112	NIL	MILD AC	0	ND	3	0	NIL	8	3696	ALIVE	
23	20755693	75	M	30	75	80	50	60	120	14	101	NIL	YES	NIL	NIL	NIL	IDIOPA	2770	10770	ACUTE	20700	200	1030	228	54	1.2	1.3	32	22	YES	SEVERE	RESP-3	YES	18	8	NIL	15	4019	ALIVE	
24	20746344	46	M	20	98	100	70	80	100	15	98	YES	NIL	YES	NIL	NIL	BILIARY	2488	4998	ACUTE	12816	316	1885	66	19	0.86	2.5	303	180	NIL	MILD BI	0	ND	3	0	NIL	6	2148	ALIVE	
25	20757326	38	M	18	80	120	80	93	86	15	98	NIL	NIL	NIL	NIL	NIL	ETHANI	253	132	ACUTE	7508	206	1823	115	25	0.67	0.5	32	11	NIL	MILD IN	0	ND	5	0	NIL	6	848	ALIVE	
26	20756524	22	M	24	94	100	60	73	94	15	97.4	NIL	NIL	NIL	NIL	NIL	ETHANI	984	929	ACUTE	9828	485	1078	155.4	28	0.5	1.1	43	20	YES	MODER	RESP-1	NO	6	0	NIL	10	4223	ALIVE	
27	20736322	45	M	22	98	100	60	73	120	15	100	YES	NIL	NIL	NIL	NIL	ETHANI	328	1574	ACUTE	13318	250	1193	83.6	28	0.81	1.8	29	18	NIL	MILD ET	0	ND	4	0	NIL	9	2790	ALIVE	
28	10711445	45	M	18	98	110	60	77	108	15	100	YES	NIL	YES	NIL	NIL	BILIARY	317	950	ACUTE	5165	150	686	46.1	31	0.7	7.4	215	399	NIL	MILS AC	0	ND	2	0	NIL	6	1133	ALIVE	
29	20728282	56	M	20	98	110	70	83	110	15	101	NIL	NIL	NIL	NIL	NIL	ETHANI	297	348	ACUTE	10267	261	955	38.6	18	0.88	2.3	35	55	NIL	MILD AC	0	ND	3	0	NIL	3	2805	ALIVE	
30	10630458	35	M	18	99	120	80	93	88	15	98	NIL	NIL	NIL	NIL	NIL	BILIARY	96	33	ACUTE	4167	264	1500	63	18	1.06	5.4	497	509	NIL	MILD AC	0	ND	1	0	NIL	6	733	ALIVE	
31	20710844	48	F	26	95	96	62	73	105	15	101	YES	NIL	NIL	NIL	NIL	ETHANI	238	886	ACUTE	19215	220	874	325	18	0.61	2.3	29	64	YES	MODER	0	ND	7	0	NIL	10	4836	ALIVE	
32	20699103	62	M	24	95	98	64	75	110	15	100	YES	NIL	YES	NIL	NIL	ETHANI	126	220	ACUTE	11238	270	773	350	22	0.69	1.3	28	22	YES	MODER	0	ND	8	0	NIL	9	3925	ALIVE	
33	20760642	30	M	20	98	110	70	83	84	15	98	NIL	NIL	NIL	NIL	NIL	ETHANI	93	177	ACUTE	9877	230	1365	69	17	0.68	2	43	37	NIL	MILD AC	0	ND	0	0	NIL	7	1664	ALIVE	
34	20760808	46	M	20	96	110	80	90	122	15	101	YES	NIL	YES	NIL	NIL	BILIARY	336	451	ACUTE	11405	239	775	315	42	0.76	0.7	63	30	YES	MODER	0	ND	7	0	NIL	6	3517	ALIVE	
35	20762763	26	M	24	95	100	60	73	115	15	101	NIL	NIL	NIL	NIL	NIL	IDIOPA	521	321	ACUTE	12648	375	1542	291	40	0.67	0.6	22	31	YES	MODER	RESP-2	YES	6	0	NIL	10	3075	ALIVE	
36	20762764	18	M	18	98	90	60	70	120	15	100	NIL	NIL	NIL	NIL	NIL	ETHANI	220	186	ACUTE	12473	295	1882	80	12	0.4	1.3	55	32	YES	ACUTE	0	ND	7	3	NIL	8	1955	ALIVE	
37	20763113	27	M	22	97	110	70	83	96	15	100	NIL	NIL	NIL	NIL	NIL	BILIARY	736	602	ACUTE	28405	475	3097	356	20	0.67	1.71	712	288	YES	ACUTE	RESP-2	YES	3	0	NIL	8	4336	ALIVE	
38	20763913	37	M	18	99	120	80	93	86	15	98.7	NIL	YES	NIL	NIL	NIL	IDIOPA	236	326	ACUTE	6640	321	2560	74	20	0.52	0.7	15	16	NIL	ACUTE	0	ND	4	0	NIL	5	832	ALIVE	
39	20763534	40	M	18	100	140	90	93	100	15	101.6	NIL	NIL	NIL	NIL	NIL	BILIARY	231	355	ACUTE	21284	258	1227	88	32	0.67	5.2	215	279	YES	ACUTE	0	ND	5	0	NIL	5	4475	ALIVE	
40	20763913	37	F	17	99	120	80	93	108	15	100	NIL	NIL	NIL	NIL	NIL	ETHANI	110	171	ACUTE	6640	321	2560	84	20	0.52	0.7	15	16	NIL	ACUTE	0	ND	4	0	NIL	5	832	ALIVE	
41	20765616	21	M	19	98	130	80	97	102	15	99	NIL	NIL	NIL	NIL	NIL	ETHANI	622	560	ACUTE	14311	279	1441	280	30	0.8	1.5	25	43	YES	ACUTE	0	ND	3	0	NIL	6	2770	ALIVE	
42	20766871	18	M	19	99	110	70	83	80	15	97.6	NIL	NIL	NIL	NIL	NIL	IDIOPA	176	84	ACUTE	2766	263	2302	8	14	0.4	0.4	13	35	NIL	ACUTE	0	ND	4	0	NIL	3	316	ALIVE	
43	20749413	18	M	18	98	130	90	103	90	15	98.6	NIL	NIL	NIL	YES	NIL	IDIOPA	2099	608	ACUTE	12144	242	1825	110	93	8.6	1	68	89	NIL	ACUTE	RENAL-	YES	18	5	YES	18	1610	ALIVE	
44	20768048	38	M	20	97	110	80	90	80	15	97.5	NIL	NIL	NIL	NIL	NIL	ETHANI	150	202	ACUTE	6725	150	984	50	24	1.04	1	32	19	NIL	ACUTE	0	ND	1	0	NIL	4	1025	ALIVE	
45	20684712	61	M	29	94	106	54	71	140	13	102.1	YES	YES	YES	YES	NIL	BILIARY	4015	4198	ACUTE	8668	213	988	305	69	5.19	4.5	117	727	YES	ACUTE	RESP-3	YES	38	6	YES	18	2084	EXPIRED	
46	20762542	69	F	18	98	130	80	97	84	15	100	YES	YES	NIL	NIL	NIL	IDIOPA	177	3665	ACUTE	10300	294	1180	13	20	0.7	0.7	58	38	NIL	ACUTE	0	ND	7	0	NIL	5	2566	ALIVE	
47	20643673	26	M	24	94	100	60	73	123	15	101	NIL	NIL	NIL	NIL	NIL	BILIARY	1610	1011	ACUTE	15351	400	1355	233	17	0.67	4.3	325	360	YES	ACUTE	0	ND	5	0	NIL	10	4531	ALIVE	
48	20630744	27	M	18	98	110	80	90	86	15	100	NIL	NIL	NIL	NIL	NIL	ETHANI	4701	9664	ACUTE	15075	520	4638	98	17	0.79	0.6	36	30	NIL	ACUTE	0	ND	1	0	NIL	6	1690	ALIVE	
49	20642647	38	M	24	94	100	80	87	110	15	101	NIL	NIL	NIL	NIL	NIL	ETHANI	66	62	ACUTE	22627	243	1703	280	19	0.67	0.9	48	26	YES	ACUTE	RESP-2	YES	7	0	NIL	6	3228	ALIVE	
50	20638469	68	M	18	99	110	70	83	100	15	100	YES	YES	NIL	YES	NIL	BILIARY	256	348	ACUTE	28050	41	2640	151	47	1.33	2.07	183	96	NIL	ACUTE	0	ND	8	0	NIL	7	435	ALIVE	
51	20527252	27	M	20	94	110	80	90	110	15	101	NIL	NIL	NIL	NIL	NIL	ETHANI	326	456	ACUTE	20400	203	1200	310	37	0.37	0.8	36	52	YES	ACUTE	RESP-1	NO	6	0	NIL	12	3451	ALIVE	
52	20627389	24	F	18	100	120	80	93	82	5	99	NIL	NIL	NIL	NIL	NIL	ETHANI	228	562	ACUTE	3452	278	2185	68	27	0.6	0.4	32	11	NIL	ACUTE	0	ND	1	0	NIL	4	439	ALIVE	
53	20615920	31	F	28	94	60	40	47	140	13	102	NIL	NIL	NIL	NIL	NIL	ETHANI	1540	1220	ACUTE	19231	347	823	263	36	2.65	1.6	36	11	YES	ACUTE	CVS-3	IF YES	16	10	YES	18	8107	ALIVE	
54	20630129	33	M	30	84	90	60	70	120	14	101	NIL	NIL	NIL	NIL	NIL	ETHANI	636	946	ACUTE	23480	249	896	366	45	2.04	1	48	56	YES	ACUTE	RENAL-	YES	15	8	YES	15	6525	ALIVE	
55	20628877	31	M	20	98	120	86	97	86	15	98	NIL	NIL	NIL	NIL	NIL	ETHANI	460	328	ACUTE	4052	328	1889	156	18	0.86	0.8	86	110	NIL	ACUTE	0	ND	1	0	NIL	6	703	ALIVE	
56	20623286	30	F	24	98	130	80	97	110	15	101	NIL	NIL	NIL	NIL	NIL	ETHANI	660	1320	ACUTE	15640	321	2560	106	20	0.96	1	42	18	NIL	ACUTE	0	ND	3	0	NIL	8	707	ALIVE	

56	20632286	30	F	24	98	130	80	97	110	15	101	NIL	NIL	NIL	NIL	NIL	ETHANI	880	1320	ACUTE	5640	321	2560	106	20	0.96	1	42	18	NIL	ACUTE	0	NIL	3	0	NIL	8	707	ALIVE
57	20617275	18	M	20	98	110	70	83	110	15	102	NIL	NIL	NIL	NIL	NIL	BILIARY	132	320	ACUTE	18934	294	1800	288	28	0.7	2.9	144	204	YES	ACUTE	0	NIL	4	0	NIL	10	3102	ALIVE
58	20618386	40	M	18	98	130	80	97	90	15	100	YES	YES	NIL	NIL	NIL	ETHANI	286	368	ACUTE	8160	280	1920	48	20	0.9	0.8	68	93	NIL	ACUTE	0	NIL	3	0	NIL	5	1190	ALIVE
59	20656358	30	M	24	99	110	60	77	102	15	100	NIL	NIL	NIL	NIL	NIL	ETHANI	1082	2306	ACUTE	13468	257	1660	75	18	0.7	0.9	22	16	NIL	ACUTE	0	NIL	2	0	NIL	8	1660	ALIVE
60	20657411	18	M	25	94	100	70	80	110	15	102	NIL	NIL	NIL	NIL	NIL	DIOPAT	124	193	ACUTE	16400	352	2255	318.9	32	0.25	0.8	38	23	YES	ACUTE	RESP-1	IND	7	0	NIL	10	2560	ALIVE
61	20689521	45	M	20	99	90	64	73	102	15	101	YES	NIL	NIL	NIL	NIL	BILIARY	321	412	ACUTE	12792	274	1248	66	55	2.09	1.1	48	33	YES	ACUTE	RENAL-	YES	14	3	NIL	11	2808	ALIVE
62	20674521	45	M	22	98	130	80	97	105	15	100	YES	YES	NIL	NIL	NIL	DIOPAT	186	245	ACUTE	9887	443	642	368	24	0.6	1.6	32	42	YES	ACUTE	0	IND	8	2	NIL	10	6128	ALIVE
63	20684521	61	M	24	96	90	60	70	106	15	101	YES	NIL	YES	NIL	NIL	ETHANI	328	412	ACUTE	16500	144	950	192	48	1	1	85	62	YES	ACUTE	0	IND	11	2	NIL	13	2795	ALIVE
64	20645128	30	M	18	98	110	60	77	110	15	100	NIL	NIL	NIL	NIL	NIL	BILIARY	2442	707	ACUTE	12966	185	1155	180	31	1.01	2.1	140	125	YES	ACUTE	0	IND	3	0	NIL	9	2075	ALIVE
65	20685754	31	M	28	93	80	60	67	108	15	102	NIL	NIL	NIL	NIL	NIL	ETHANI	586	764	ACUTE	20328	421	324	234	34	0.96	1	98	84	YES	ACUTE	RESP-2	YES	14	5	NIL	14	9352	ALIVE
66	20606392	43	M	20	99	120	80	93	84	15	99	NIL	NIL	NIL	NIL	NIL	ETHANI	149	367	ACUTE	6160	150	1848	98	27	0.74	1	86	98	NIL	ACUTE	0	IND	1	0	NIL	7	500	ALIVE
67	20603648	18	M	24	98	80	60	67	110	15	102	NIL	NIL	NIL	NIL	NIL	ETHANI	500	479	ACUTE	19522	140	1589	250	80	1.5	1.2	41	43	YES	ACUTE	CVS-1	PYES	9	2	NIL	12	1728	ALIVE
68	20624582	29	M	28	96	90	50	63	112	15	101	NIL	NIL	NIL	NIL	NIL	ETHANI	388	191	ACUTE	18010	220	1200	238	23	0.72	0.7	84	50	YES	ACUTE	0	IND	8	1	NIL	10	3485	ALIVE
69	20674568	43	M	25	98	80	50	60	110	15	102	YES	NIL	NIL	NIL	NIL	DIOPAT	92	185	ACUTE	10254	150	944	202	81	2.94	0.8	40	15	YES	DI	ACUTE	RENAL-	YES	19	4	NIL	14	1915	ALIVE
70	20685841	38	M	18	99	120	74	89	86	15	99	NIL	NIL	NIL	NIL	NIL	ETHANI	3151	7056	ACUTE	11760	179	1540	41	31	1.01	0.8	22	29	NIL	ACUTE	0	IND	3	0	NIL	6	1386	ALIVE
71	20777741	38	M	24	96	130	80	97	96	15	102	YES	NIL	NIL	NIL	NIL	ETHANI	395	356	ACUTE	6804	150	714	328	38	0.76	1.8	52	20	YES	ACUTE	RESP-2	YES	8	0	NIL	10	1430	ALIVE
72	20767177	63	M	21	99	160	80	107	99	15	98	NIL	YES	YES	YES	NIL	BILIARY	1773	3191	ACUTE	10766	365	444	366	34	1.11	2.4	337	206	YES	GI	ACUTE	0	IND	5	3	NIL	14	8850	ALIVE
73	20777085	29	M	19	99	120	80	93	110	15	99	NIL	NIL	NIL	NIL	NIL	DIOPAT	186	231	ACUTE	12216	188	2115	82	17	1.04	1.1	40	39	NIL	ACUTE	0	IND	3	0	NIL	6	1174	ALIVE
74	20782152	59	M	18	99	130	80	97	89	15	99	NIL	NIL	NIL	NIL	NIL	BILIARY	132	169	ACUTE	18159	150	1755	265	37	0.88	1.5	248	150	NIL	ACUTE	0	IND	4	0	NIL	6	1552	ALIVE
75	20005916	34	M	20	98	90	60	70	120	15	102	NIL	NIL	NIL	NIL	NIL	DIOPAT	186	320	ACUTE	17280	160	886	232	30	1.2	1	40	37	YES	ACUTE	RENAL-	IND	7	2	NIL	12	3120	ALIVE
76	20656432	34	M	18	100	120	80	93	80	15	100	NIL	NIL	NIL	NIL	NIL	ETHANI	632	1141	ACUTE	7800	255	2400	84	19	0.88	0.5	71	107	NIL	ACUTE	0	IND	3	0	NIL	6	828	ALIVE
77	20659383	37	M	24	94	120	60	80	114	15	100	NIL	NIL	NIL	NIL	NIL	ETHANI	562	656	ACUTE	17200	202	986	194.51	19	0.67	1	85	94	YES	ACUTE	RESP-1	IND	8	2	NIL	14	3523	ALIVE
78	20616864	64	M	20	98	150	90	110	110	15	100	YES	YES	NIL	NIL	NIL	DIOPAT	161	79	ACUTE	8100	259	1944	156	35	1.2	1	22	31	NIL	ACUTE	0	IND	6	0	NIL	6	1079	ALIVE
79	20616204	33	M	25	94	110	70	83	116	15	101	YES	NIL	NIL	NIL	NIL	ETHANI	496	1115	ACUTE	13083	164	882	294	35	0.88	0.9	61	19	YES	ACUTE	0	IND	3	0	NIL	8	2432	ALIVE
80	20660741	19	M	24	95	90	60	70	110	15	102	NIL	NIL	NIL	NIL	NIL	DIOPAT	1536	1441	ACUTE	22700	310	2471	161	58	1.88	1.48	56	85	YES	ACUTE	RESP-2	RENAL-	14	4	YES	16	3947	ALIVE
81	20659466	44	M	18	99	130	80	97	88	15	99	YES	YES	NIL	NIL	NIL	DIOPAT	236	693	ACUTE	7740	211	1720	86	42	1.03	1.5	42	45	NIL	ACUTE	0	IND	2	0	NIL	5	949	ALIVE
82	20656515	64	M	18	98	120	80	93	90	15	98	YES	YES	NIL	NIL	NIL	DIOPAT	176	557	ACUTE	8100	259	1944	240	38	0.92	0.9	27	13	NIL	ACUTE	0	IND	4	0	NIL	5	1079	ALIVE
83	20005971	57	M	26	88	80	60	67	111	14	102	YES	YES	NIL	NIL	NIL	DIOPAT	236	253	ACUTE	22218	150	988	544	71	2.49	1.8	43	29	YES	ACUTE	RENAL-	YES	23	7	YES	24	3525	ALIVE
84	20791916	45	M	28	86	88	60	69	140	15	101	YES	NIL	YES	NIL	NIL	DIOPAT	2430	4188	ACUTE	18880	199	1580	230	87	2.15	2	111	29	YES	ACUTE	RENAL-	YES	16	6	YES	21	2784	ALIVE
85	20785888	48	M	24	91	130	80	97	101	15	100	YES	YES	NIL	NIL	NIL	ETHANI	251	718	ACUTE	10700	213	1070	210	37	0.7	1.6	56	48	YES	ACUTE	RESP-1	IND	6	1	NIL	9	2130	ALIVE
86	20785886	18	F	30	88	90	70	77	154	15	100	NIL	NIL	NIL	NIL	NIL	HYPERI	734	1757	ACUTE	16500	291	2370	186	32	0.9	0.7	32	24	YES	ACUTE	RESP-3	YES	5	0	NIL	8	1616	ALIVE
87	20777085	29	F	24	96	120	80	93	110	15	98	NIL	NIL	NIL	NIL	NIL	BILIARY	388	586	ACUTE	7659	293	1283	82.4	17	1.01	1.1	40	39	NIL	ACUTE	0	IND	2	0	NIL	6	1749	ALIVE
88	20783031	32	F	20	80	90	50	63	80	15	98.5	NIL	NIL	YES-EE	NIL	NIL	DIOPAT	328	458	ACUTE	20888	265	1808	311	17	0.51	1	29	32	NIL	ACUTE	0	IND	3	0	NIL	8	3061	ALIVE
89																																						
90																																						
91																																						
92																																						
93																																						
94																																						